review essays

working within the system

a review of systems approaches
in urban studies

SCIENTIFIC METHODS OF URBAN ANALYSIS. By Anthony J. Catanese. University of
   Illinois Press. 1972.

URBAN DYNAMICS. By Jay W. Forrester. MIT Press. 1968.

SYSTEMS ANALYSIS IN PUBLIC POLICY: A Critique. By Ida R. Hoos. University of
   California Press. 1972.

DESIGN WITH NATURE. By Ian L. McHarg. Natural History Press. 1969.

I

Almost imperceptibly at first, but with increasing frequency and a
sense of urgency, over the last twenty years, intellectuals, scientists, and the
popular press have been describing the complex interrelationships among
people, technology and the environment using a new language and a new
conceptual framework. Although the notion of system has been a part of
our intellectual heritage for at least half a century, it has only been in
recent years that the terminology, if not the methodologies, of systems
has become a prominent, indeed, dominant frame of reference for view-
ing experience. Systems, suddenly, are pandemic: there are ecosystems,
urban systems, educational systems, monetary systems, social systems,
energy systems and life-support systems. Part of the change in conceptu-
alization is little more than new jargon. Military aircraft, for example,
have become weapons delivery systems, while hospitals are now a part of
health delivery systems, and buses have become components of metro-
politan transportation systems. But many of the changes go far beyond
rhetoric, for whole new fields of inquiry and methods of study have been
developed in general systems theory, systems engineering, systems analysis
and cybernetics to deal with the newly-recognized complexity of behavior.

Systems techniques are frameworks for identifying and describing
complex patterns of interdependencies. They are self-consciously holistic
and interdisciplinary in scope, and with the characteristic bravura of new
analytical frameworks, advocates of systems approaches accuse everyone
else of being dangerously narrow-minded, and in a word, unsystematic.

Since systems approaches are oriented towards processes rather than
subject matter, they seriously call into question traditional atomistic,

discipline-oriented views of experience. Ludwig von Bertalanffy, a leading proponent of system approaches, has succinctly documented the opposing points of view. Prior to the development of systems thinking, "The only goal of science appeared to be analytical, i.e., the splitting of reality into ever smaller units and the isolation of individual causal trains. Thus, physical reality was split up into mass points of atoms, the living organism into cells, behavior into reflexes, perception into punctual sensations." To counter the failures of atomistic approaches, a new examination of interdependencies, interrelationships and multicausal analyses was advanced—the systems view. "Hence the appearance, in all fields of science, of notions like wholeness, holistic, organismic, gestalt, etc., which all signify that, in the last resort, we must think in terms of systems of elements in mutual interaction."[1]

What is a system? The definitions are numerous, but the term usually refers to a set of people, events and ideas that form a coherent whole through a structured pattern of interrelationships among its elements. It is important to note that systems are conceptual frameworks for purposes of description and analysis—they are intellectual constructs created to facilitate the logical analysis of experience. Since a system is only a reified and abstract conceptualization, there can never be a one-to-one correspondence between an individual's behavior and the general model of behavior described in a particular system. Thus, we speak of the social system in the abstract as the complex of individuals, ideas and patterns of interpersonal and institutional relationships which govern social life.

So pervasive is the use of the term "system," it often is employed in contexts far removed from those normally associated with new systems techniques. For example, in discussing American Studies as an "unscientific method," Leo Marx defines culture "as a system, or interrelated group of systems, of values, meanings and goals. Regional, class, or ethnic subcultures, as well as the literary 'high culture,' must be included among the systems embraced by the national culture."[2] Systems approaches usually attempt to go beyond the tacit identification of apparent relationships, where Marx's definition ends, to develop an operational mechanism for assessing and documenting the structural and behavorial interrelationships in the system.

Systems approaches require that researchers "stop acting as though nature were organized in disciplines in the same way that universities are."[3] While this has been a familiar battle cry of interdisciplinary enthusiasts, scholars in urban studies have been particularly prone to argue for comprehensiveness of subject matter without any particular concern for developing appropriate methodology. Dissatisfaction with discipline-oriented theory and methodology in the social sciences has never been higher, and particularly so in urban studies. It has been ten years since Scott Greer catalogued the failures of urban research conducted along traditional atomistic disciplinary lines. "Our image of the city is in dissolution," he wrote. "While we are far richer in heterogeneous concepts and partial theories, as well as information of one kind and another, in crucial ways were are curiously poverty stricken. There is little order in our theories, and our data seem largely irrelevant to them."[4]

Certainly, the gap between data availability and theory has not diminished in the past decade, for despite widespread exhortations to cross disciplinary boundaries in the pursuit of explanation, the breaches between and even within disciplines have grown wider. The expectation was that urban studies would develop and apply an interdisciplinary

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framework, but only rarely has research been even multidisciplinary in content or methodology. Urban too often was merely appended as a mod prefix to disguise business as usual.

With such a variety of disciplinary viewpoints and sources of data available to the urban researcher, it was inevitable that conflicting interpretations would emerge. In any given study, the city was seen as cause or effect, as the determinant of behavior and institutional development or the response to cultural changes, as embodying national trends or setting significant new ones. Far from being a constraint, however, the vast range of materials and the array of interpretations fed the heady eclecticism afforded by the diversity of disciplines involved in the examination of urban life.

This is not to say, of course, that those involved in urban research were working without theoretical formulations, or arrived at findings which they felt to be inapplicable to contemporary urban problems. Even if history did not repeat itself, what more important scholarly research could be pursued than the examination of earlier instances of urban riots, ghetto formation, white working class neighborhoods and the prospects for mobility in an urban environment? Instead of convincingly demonstrating continuities with the past by the systematic development and application of theory, the researcher relied, more often than not, on the anecdotal re-creation of contemporary parallels with the past.

Generalization from specific cases is thought to be a legitimate and necessary method of research, yet even in the best of such works there is often no systematic statement of the ways in which the parallels with the past were developed in terms of criteria for the selection of evidence, nor are there directions for the applications of the findings to general experience. Two examples will suffice. In *The Private City: Philadelphia in Three Periods of Growth,* Sam Bass Warner states that "Philadelphia history has been repeated, with minor variations, again and again across the nation, in Cincinnati, in St. Louis, in Chicago, in Detroit, in Los Angeles, and in Houston."[5] In a similar generalizing vein, Gilbert Osofsky has written: "What in our time has been called the social pathology of the ghetto is evident throughout our history: the wounds of centuries have not healed because they have rarely been treated. By all standards of measurements of human troubles in the city, the ghetto has always been with us—it has tragically endured."[6]

Warner and Osofsky are no doubt at least partially correct in their generalizations. To identify parallels, however, is not to explain them. What has persisted, and why? What has changed, and why? What can be altered today, and with what effect? What are the institutional and social processes that perpetuate certain forms of behavior? From the study of ghettos in other cities on a comparative basis, some answers to these questions would be forthcoming, though the research would most likely follow the traditional atomistic pattern based on the hope that the accretion of individual studies would somehow be analyzed by somebody to find consistent patterns of behavior.

Perhaps the best example in urban studies of the transition from an atomistic to a systems view of experience can be seen in the analysis of the urban riots of the 1960's. It is now generally conceded that the violence was caused by a complex of social, economic and behavioral problems symptomatic of a deep institutional racism. No single solution, whether directed to housing, employment, education or family structure will alleviate the problems. Rather, all such solutions must be imple-

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mented in concert. Then, and only then, will new patterns of behavior and social organization emerge in the central cities. Political scientists, economists, sociologists and historians working solely from their traditional disciplinary viewpoints did not predict nor could they later account for the causes of the violence. Yet after the riots, to some observers at least, the institutional pattern of oppression and racism that permeated every aspect of ghetto life suddenly became quite apparent, once the whole picture was finally viewed. From this new viewpoint, an additive or cumulative series of programs in job training, school enrichment and housing, as well as a shift in attitudes of the white majority, were simply no longer seen as solutions to the problems. Something even more fundamental, something about the system itself had to be changed.

II

Proponents of systems approaches usually go far beyond merely advocating intellectual foraging expeditions in other disciplines. Central to their work is the belief that systems have similar or identical characteristics of organization and process that are common to all complex systems —there are "laws" of system behavior. Consequently, even though systems are only abstractions created to facilitate analysis, they are themselves reified into appropriate subjects for study and comparison. A systems analysis of urban life, then, is an attempt to demonstrate "that human settlement patterns may be regarded as particular kinds of systems, namely complex dynamically interrelated sets of elements with characteristics of growth and change which may exhibit certain qualities of intrinsic organization such as are found in other kinds of complex systems."[7]

The major difference between systems approaches and other synthesizing frameworks is that in systems theory not only is the whole greater than the sum of its parts, it is substantially different. The whole simply cannot be studied as the assemblage of individual entities, with each being examined apart from its larger environment. In the systems view, then, urban behavior and institutions are quite different from what the historical, economic, social and behavioral analyses taken individually or collectively might lead the researcher to believe explains the phenomena.

Systems analyses in urban studies have been concerned with identifying the organizational and structural components that facilitate the process of urbanization.[8] They have also been employed to analyze the complex of institutions, norms and belief systems that shape individual behavior in the urban development.[9] The greatest emphasis in systems approaches, however, has been in urban and regional planning. The systems approach and the planning process have similar strategies of problem definition and solution, and many see systems as providing a new comprehensive framework for the analysis and solution of urban problems.[10] But whether focusing on the functional interrelationships or the behavorial responses of individuals, groups and institutions in an urban setting, systems approaches are designed to provide synthesizing, holistic frameworks for analysis. Systems analysis is not merely a process for identifying system components, although it too often ends at that point. It should instead lead to the use of an operational mechanism to measure the direction and magnitude of the interrelationships among the various system components.

The application of systems approaches in urban studies may be particularly valuable in aiding the researcher in defining more precisely the

spatial and temporal dimensions in which behavior takes place. The failures to specify research objectives and to document the findings with precision certainty are not unique to urban studies, but they are fatal to a field which assumes rather than convincingly demonstrates its relevance. Instead of delimiting a particular body of knowledge and applying a set of methodologies to test theory, research in urban studies has generally been the examination of anything that happens to have taken place in an urban setting, without any concern for explicit hypothetical formulations.

Systems approaches might provide the necessary impetus for researchers to provide hypotheses, with rigorous and systematic identification of the processes involved in regulating the flow of information, institutional development and individual behavior in the city. Systems approaches do not automatically generate causal analyses, but to those who seek explanation and not merely description, they do provide a framework that recognizes the complexity and interdependent nature of behavior.

To some, arguments for the use of systems approaches in urban studies will be seen as naively optimistic and actually somewhat dated, since many of the major theoretical breakthroughs in general systems theory and cybernetics came in the 1940's and 1950's.[11] Certainly, other disciplines have had sufficient time to apply the new systems frameworks, yet the quantity of significant research is disappointingly small. If systems approaches really were a new paradigm of major importance, the evidence of systems as a persuasive explanatory device would be well developed by now. It is probably more correct, so this argument would conclude, to think of systems as a refreshingly holistic though obviously unrealistic analytical framework.

While the questioning of the efficacy of systems approaches is quite appropriate, there are a number of reasons why their potential benefits simply have not been explored. First, the formulation and testing of theory *qua* theory is not seen to be a research task of high priority. Social, political and economic theory are usually discussed in a context more appropriate to intellectual history than to their respective disciplines. A study of theory in the social sciences is often only the examination of "schools of thought" in a quasi-historical framework. Theory, then, is what earlier thinkers used to arrive at incorrect explanations of empirically observed behavior.

Contemporary theory is seen from two different viewpoints, both of which are quite contradictory. On the one hand, some researchers attempt to construct a theory-free mode of investigation. They claim that their task is simply one of collecting, verifying and statistically manipulating or imaginatively rearranging data. If enough facts are properly collected and manipulated, behavior will be adequately explained. This last statement, of course, is a theory.

On the other hand, if the researcher admits to the existence of theory, the contending "schools of thought" once again appear. Each theory is evaluated and found wanting, for the theoretical formulations are based on incomplete data, or they only partially explain behavior in ways that may contradict other theories. In this context of conflicting theories, systems approaches are seen as yet another set of partial theories, useful in some areas, inappropriate in others.[12] With such a mixture of conflicting theories it is no wonder that many researchers have chosen to ignore theory for a while and return to the less vexing process of collecting and analyzing data. "We need fewer studies of the city in history than of the history of cities," writes Oscar Handlin. "However useful a general

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theory of the city may be, only the detailed tracing of an immense range of variables, in context, will illuminate the dynamics of the [urban] processes."[13]

Systems approaches generally have not been applied to subject areas or topics that cross traditional disciplinary lines—those most appropriate for systems analysis. Rather, their usefulness has been examined and criticized for the ways in which they provide or fail to provide explanation in existing disciplines. What this involves is the partial application of systems theory to materials that themselves do not necessarily comprise a discrete system. The analysis is constrained not by the theories of systems, but by the parameters of subject matter decided upon within the individual disciplines. Such books as David Easton's *A System Analysis of Political Life*, Walter Buckley's *Sociology and Modern Systems Theory*, and Robert F. Berkhofer's *A Behavorial Approach to Historical Analysis* all are excellent treatises on system theories. They are only of limited value, however, in their attempt to account for behavior defined along traditional disciplinary lines. For example, Berkhofer's study has been criticized because it does not make more clear what already is known from traditional historical methods. According to David Donald, "While some historians can gain insight from the literature that Berkhofer summarizes, none can write good history merely by following his behavioral method."[14] The correct critical question is, what might the method lead us to understand that we cannot now explain? Berkhofer's method provides the framework for the systematic analysis of institutional and individual behavior in a broad cultural context. If such concerns are inappropriate to the writing of "good history," it is history's loss.

Systems approaches will always be found wanting if they are expected to reinforce traditional disciplinary methods and definitions of the field of inquiry. Systems theory cannot synthesize the subject matter of sociology, for example, if the field is defined by sociologists in the traditional atomistic way. If the subject under study is the behavior of man in his social setting and in the larger societal and cultural environment, then systems techniques might be better able to explain that behavior; but they cannot provide a synthesis of urban sociology, the sociology of knowledge, family sociology and the other specializations within the discipline.

Similarly, systems approaches by their very nature cannot be applied as the synthesizing framework for a number of atomistic disciplines or subject areas. The mistaken hope is that systems theory might be the integrative salvation for those who would rather concern themselves with research in the traditional disciplines, with someone else taking their research findings and relating them in a holistic fashion to society's needs. Urban studies as an academic field is very prone to this fallacy. These programs are not really based on a discipline, but they are facilitators of interaction among faculty and students from a variety of disciplinary backgrounds and interests who have a commonly shared concern for the direction and quality of urban development. The rationale for urban studies is that the city is a complex institution that requires examination from a variety of viewpoints. Curricula are constructed that require students to focus on those courses which are primarily concerned with urban behavior and institutions. So the student takes urban sociology, urban history, urban politics, urban economics, urban geography, perhaps even urban literature, and by some as yet unidentified process, he is expected to emerge with a sense of the dynamic interrelated texture of urban life and its problems and prospects. To send a student through such a cur-

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riculum, however, is like asking him to buy the food for a dinner party without providing him with a menu or recipes. The professors hope he will select and create a gourmet's delight; more often than not the student returns only with a TV dinner.

When systems frameworks have been used in an attempt to integrate a fragmentary set of disciplinary approaches, they have not been very successful, for once again, the essential conceptual constraints of systems have been overlooked. A systems analysis of urban life is *not* the analysis of the political system, the social system, the economic system and so forth in the urban environment, for this is the supermarket variety of multidisciplinary study once again. Systems thinking can provide a framework for analyzing the interrelationships between disciplines, and it can be used to compensate for the tunnel vision of traditional disciplinary approaches, but it cannot provide a synthesis of essentially atomistic approaches.

III

Recent applications of systems approaches to urban studies can be grouped into three broad categories: cities as ecosystems, cities as social systems and cities as management problems. Each category defines a different cluster of subject matter and methodologies that are currently being applied to the study of urban phenomena. The diversity of viewpoints and techniques covered by the term "system" points to one of the approach's central weaknesses, however. While systems thinking is addressed to conceptual clarity and analytical rigor, there is a great deal of confusion concerning the scope of systems analysis, the appropriate techniques to be employed and the imprecision of reference when "systems" are identified and defined.

The ecological crisis has generated an extraordinary number of assessments of the interrelated consequences of technological growth and environmental deterioration. One of the most prominent figures in the recent study of ecosystems and the urban environment is Ian McHarg. McHarg sees the anthropocentric attitude of man as being responsible for bringing about the ecological imbalances that characterize modern industrialized cities. Anthropocentric man, according to McHarg, is man "the destroyer, atomic demolition expert, clear feller of forests, careless miner, he who fouls the air and the water, destroys whole species of wildlife: the gratified driver of bulldozers, the uglifier."[15] In sharp contrast to the view that nature is subservient to man, McHarg argues that the biosphere is "a single superorganism." Man "must recognize that he is of the system and entirely dependent upon it, but has the responsibility for management, derived from his apperception. This is his role—steward of the biosphere and its consciousness."[16]

McHarg's thinking has clear continuities with simple organismic models of urban development, in which the city is compared to an organism with a heart, lungs, a circulation system, plagued by congestion and subject to decay and death. At the next level of complexity are general statements of organic philosophy that subsume organismic metaphors, but which seek to explain behavior in a holistic framework derived from the observation of natural phenomena. Previous uses of organic philosophy in accounting for urban life can be seen in the writings of Lewis Mumford, Frank Lloyd Wright, Walter Gropius, Eeliel Saarinen and Victor Gruen. Organic and ecological descriptions of urban behavior were, of

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course, central to the major school of urban sociologists in the early 20th century—Park, Burgess and McKenzie.

McHarg extends the organismic arguments, for he is not content merely to describe the symbiotic relationship between man and his environment, but argues that man must control and direct growth. His technique for modeling the impact of urban development on the environment is to create a series of overlay maps describing the geological, climatic, topographical and social resources of the land. The product is a composite portrayal of the cumulative impact of ecosystem components that visually highlight the areas most and least suited for development. With advances in computer mapping, and with more sophisticated techniques of data collection and analysis, McHarg's resource analysis methodology has become a useful, if still crude, assessment technique, particularly in the area of environmental impact.

McHarg's techniques developed to analyze ecosystems have not been successfully applied to the analysis of social systems. It is relatively easy to quantify environmental data; it is far more difficult to quantify the factors involved in creating a sense of community, or improving the quality of education, or generating a feeling of safety and personal satisfaction in the urban environment. Some proponents of systems approaches think these kinds of quantitative analyses can and must be done. The major requirement is that quantified indices of essentially qualitative analytic constructs need to be developed. Social indicators, as these indices have come to be called, are meant to provide the basis for measuring performance towards achieving specified societal goals. Social indicators have been advocated based on the recognition that "For many of the important topics on which social critics blithely pass judgement, and on which policies are made, there are no yardsticks by which to know if things are getting better or worse."[17]

Although social indicators are often only crude quantitative equivalents of subtle social or environmental distinctions, they can provide a basis for the utilization of mathematically-oriented systems approaches for purposes of analysis and decision. The best argument for this viewpoint has been made by Jay W. Forrester: "Much of the behavior of systems rests on relationships and interactions that are believed, and probably correctly so, to be important but that for a long time will evade quantitative measure. Unless we take our best estimates of these relationships and include them in a system model, we are in effect saying that they make no difference and can be omitted. It is far more serious to omit a relationship that is believed to be important than to include it at a low level of accuracy that fits within the plausible range of uncertainty."[18]

Some of the most interesting and most controversial work in the application of systems approaches has been the computer simulation of urban and environmental problems undertaken by Forrester and his associates at MIT. Forrester found that cities and other complex systems act counterintuitively: "they give indicators that suggest corrective action which will often be ineffective or even adverse in its results. . . . Policies that have been adopted for correcting a difficulty are actually intensifying it rather than producing a solution."[19] By computer simulation of the complex system, the consequences of policy changes can be analyzed to suggest the best alternatives, which more often than not would have been considered inappropriate or irrational in the context of simpler systems.

The use of quantitatively-oriented systems approaches in basic research into urban phenomena must await the development of fairly

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sophisticated and measurable indices of system performance. There is no reason to believe, however, that the growing emphasis on quantitative methods in all of the social sciences is likely to diminish in the near future. The availability of more sensitively quantified variables will facilitate the application of systems approaches to a widening range of social problems. Social indicators in the broadest sense have always been employed by historians and other social scientists concerned with documenting change over time. Systems thinking may provide the framework for their refinement into more precise measures of change in society.

Lacking such precise measures of change, there has developed, nevertheless, a substantial literature on social systems that deals on a conceptual level with the dynamics of social organization and social change. While much of this literature is not primarily directed to urban social organization, it has had an important influence on theoretical depictions of urban society in systems terms. The most influential figure in the study of social systems has been Talcott Parsons, who provided the initial impetus during the 1950's for the study of society as a complex adaptive system.[20] For Parsons, systems are a vehicle for describing and classifying the interactions among the social system, the cultural system, the personality and the environment. His approach to systems is to focus on the descriptive and conceptual aspects of systems, with little concern for quantifiable evidence.

Since Parsons' systems techniques are conceptually oriented, they do not mesh well with the efforts of most systems analysts to develop better quantitative measures of social behavior. Without quantification, Parsons' systems approach may contribute to conceptual clarity, but it will probably remain outside the central thrust of systems approaches which are increasingly geared to quantitative social indices.

The third major area of the application of systems approaches to urban studies is in the field of urban management. A large number of mathematically based systems techniques such as linear programming, operations research, decision theory, and PPBS (planning, programming, and budgeting systems) are currently being applied in urban administration and management. Systems approaches to management, which were developed by the Department of Defense and the aerospace industries during the 1960's and which met with questionable success in military systems, are now being applied to "solve" the urban crisis. By limiting their view of the city to its management problems, systems analysts are clearly attempting to transfer the technology of the defense industries to the management problems of the city. As Ida Hoos persuasively argues, systems techniques applied to problems of management in the corporate sector are far from being comprehensive, holistic assessments of problems.[21] On the contrary, systems analysts often define problems in ways that are appropriate to applying systems techniques, but not to solving problems. This attempt at technology transfer of systems analysis to social problems has been accompanied by considerable fanfare, but as yet with only marginal and unconvincing success.

The applications of these techniques assumes that urban problems are concerned primarily with the allocation and management of fixed resources to efficiently achieve system objectives. For the purpose of employing these techniques, urban areas are treated as concrete entities analogous to corporate and administrative organizations with structural and functional similarities to the business firm. According to Philip M. Morse, a pioneer in the development of operations research, "even in as

complex and emotional an operation as running a city, there is a place—an important place—for the quantitative analysis of facts and forces and actions and that these analyses can assist in the wise and humane running of a city."[22]

Systems analysis in applied research requires performance standards measurable in quantifiable terms. Often, they use the most understandable performance measure of all, the dollar. PPBS and other applied systems approaches concerned with cost-effectiveness all require the identification of: (1) the system's objectives, (2) alternative methods of meeting these objectives and an assessment of the relative costs and benefits of each alternative, and (3) criteria to measure the alternatives for the purpose of selection and also as measures of system performance once a decision has been implemented. The appropriateness of these techniques to the analysis of social problems continues to be seriously questioned. Participants in the federally-funded Model Cities program, for example, were expected to "quantify five-year objectives for the Model Neighborhood Area and cost out their achievement."[23] The budgeting process was meant to aid in implementing and assessing the impact of programs directed toward better housing, education, employment, crime prevention, and health care through the development of measurable performance indicators of essentially qualitative analytical constructs. Yet resistance to the use of systems techniques by community residents and local program administrators was quite great, for the budgeting process seemed like another obstacle created by "the system" that was counterproductive to alleviating major social problems.

Running a city is a management problem; analyzing its problems is not. PPBS and other systems management techniques seemingly hold little interest for the urban researcher who is not on the decision-making firing line, for these techniques do not seem to be appropriate to the more abstract concerns of urban analysis that comprise basic research. Nevertheless, an increasing number of researchers are trying to employ decision-oriented systems approaches to "solve" reified urban problems that are only imaginative conceptual constructs.[24]

Depending on the analytical framework and the appropriateness of data for quantitative analysis, systems approaches can either involve complex mathematical statements of interdependencies, or they can be phrased in a simple metaphor: cities are magnets that attract wealth and industry. The concern with holistic, dynamic analysis that is characteristic of systems approaches provides a direct link with earlier formulations of urban theory, however rudimentary. Whether the model involves the comparison of the city to a collection of living cells, or is a flow diagram of information transfer in electronic circuitry, both are seeking useful metaphors and analogues, derived from natural phenomena, that describe the complexity and interdependent character of urban life.

Though the portrayal of society as "a high order, multipleloop, nonlinear feedback structure"[25] may be jarring to the sensibilities, it is meant to be so. By providing a different angle of vision, system approaches hopefully can bring to urban studies a set of conceptual frameworks and analytical methods that have demonstrated applicability in similar, if not identical complex organizations. As Lithwick and Paquet have argued, one aim of urban studies should be "to shift the discussion from the level of superficial analogies to basic functional homologies between the many dimensions of the urban phenomenon."[26] Though the terminology may as yet be unfamiliar, the sentiment is not. For those who are interested

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in interdisciplinary approaches, working within the system may not be so bad after all.

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footnotes

1. *General Systems Theory: Foundations, Developments, Applications* (New York, 1968), 45.

2. "American Studies—A Defense of an Unscientific Method," *New Literary History*, I (Fall, 1969), 79.

3. Russell L. Ackoff, "Systems, Organizations and Interdisciplinary Research," *General Systems*, V (1960), 6.

4. *The Emerging City: Myth and Reality* (New York, 1962), 20.

5. *The Private City* (Philadelphia, 1968), XI.

6. *Harlem: The Making of a Ghetto*, 2nd ed., (New York, 1971), 201.

7. J. Brian McLoughlin and Judith N. Webster, "Cybernetics and General-System Approaches to Urban and Regional Research: A Review of the Literature," *Environment and Planning*, II (1970), 396. Other recent bibliographies of books and essays employing systems approaches in urban studies include William E. Hughes, *General Systems Theory, Systems Analysis and Regional Planning: An Introductory Bibliography* (Monticello, Ill., 1970); and Roy F. Kenzie, *Urban General Systems* (Monticello, Ill., 1971).

8. See especially Richard L. Meier, *A Communications Theory of Urban Growth* (Cambridge, Mass., 1962); Ian L. McHarg, *Design with Nature* (New York, 1969); Brian J. L. Berry and Frank E. Horton, *Geographical Perspectives on Urban Systems* (Englewood Cliffs, N.J., 1970).

9. Recent works include William Michelson, *Man and His Urban Environment: A Sociological Approach* (Reading, Mass., 1970); Robert L. Lineberry and Ira Sharkansky, *Urban Politics and Public Policy* (New York, 1971); Thomas R. Dye, *Understanding Public Policy* (Englewood Cliffs, N.J., 1972).

10. Anthony J. Catanese and Alan Walter Steiss, *Systemic Planning: Theory and Application* (Lexington, Mass., 1970); George F. Chadwick, *A Systems View of Planning* (Elmsford, N.Y., 1972); J. Brian McLoughlin, *Urban and Regional Planning: A Systems Approach* (New York, 1969). A negative view of the field can be seen in Martin Kuenzlen, *Playing Urban Games: The Systems Approach to Planning* (New York, 1972).

11. Among the major early works are Norbert Weiner, *Cybernetics* (New York, 1949) and *The Human Use of Human Beings* (Garden City, N.Y., 1954); Roy R. Grinker, ed., *Toward A Unified Theory of Human Behavior* (New York, 1956), and especially *General Systems, the Yearbook of the Society for the Advancement of General Systems Research*, published annually since 1956.

12. See *Contemporary Analytical Theory*, ed. David E. Apter and Charles F. Andrain (Englewood Cliffs, N.J., 1972). Apter and Andrian reject universal theories and interdisciplinary approaches and opt instead for a pluralistic view of theory: "use of alternative strategies requires a knowledge of the rules of theory and a knowledge of different types in order to construct solutions that are partial rather than universal" (vi).

13. "The Modern City as a Field of Historical Study," in *The Historian and the City*, ed. Oscar Handlin and John Burchard (Cambridge, Mass., 1963), 26.

14. "Between Science and Art," *The American Historical Review*, LXXVII (1972), 450. Donald contends that "The true standards for judging the historian's work are not to be derived from natural science, nor philosophy, nor literature. Instead, as in any other art, they are autochthonous" (452).

15. McHarg, *Design with Nature*, 76.

16. *Ibid.*, 124.

17. Raymond A. Bauer, "Detection and Anticipation of Impact: The Nature of the Task," in *Social Indicators*, ed. Raymond A. Bauer (Cambridge, Mass., 1966), 20. Italics in original suppressed.

18. *Urban Dynamics* (Cambridge, Mass, 1968), 114.

19. Forrester, *Urban Dynamics*, 9. The counterintuitive behavior of complex systems is further explored in Jay W. Forrester, *World Dynamics* (Cambridge, Mass., 1971), and Donnella H. Meadows et al., *The Limits to Growth* (New York, 1972).

20. Parsons' major works include *The Social System* (New York, 1951), and *The System of Modern Societies* (Englewood Cliffs, N.J., 1971). Other examples of systems thinking in sociological theory include Marion J. Levy, *The Structure of Society* (Princeton, 1952), Robert K. Merton, *Social Theory and Social Structure* (Glencoe, Ill., 1951), and Walter F. Buckley, ed., *Modern Systems Research for the Behavioral Scientist* (Chicago, 1968).

21. Ida R. Hoos, *Systems Analysis in Public Policy: A Critique* (Berkeley, 1972).

22. "The History and Development of Operations Research," in *The Challenge to Systems Analysis*, ed. Grace J. Kelleher (New York, 1970), 27.

23. *The Model Cities Program: A History and Analysis of the Planning Process in Three Cities* (Washington, D.C., 1969), 9.

24. See, for example, Anthony J. Catanese, *Scientific Methods of Urban Analysis* (Urbana, Ill., 1972).

25. Forrester, *Urban Dynamics*, 107.

26. N. H. Lithwick and Giles Paquet, *Urban Studies: A Canadian Perspective* (Toronto, 1968), 7.