

REVISITING SCIENTIFIC EPISTEMOLOGY IN ARCHITECTURE:
Ekistics and Modernism in the Middle East

by

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ABSTRACT

Initiated by the Greek architect Doxiades in the early fifties, the term "Ekistics" designated "the science for human settlements" which promoted a scientific method for architectural design and planning. It had an immense impact on many fields of architecture and planning worldwide, especially during the sixties. With the theoretical shifts in subsequent decades, Ekistics was displaced as obsolete and its aspirations remained unexplored, while scientific methods in architecture are often dismissed in their entirety. This thesis explores the epistemological premises of Ekistics through a critical overview of its origins and features. It discusses the limitations of the method that Ekistics promoted (which sometimes searched for formulaic solutions and a stable field of conclusions) while exposing the complexities of its inquiry--which resist the rejection of the method's premises in their entirety. This thesis discusses in particular, the influence of Ekistics in the Middle East, and the method's contributions to architectural thinking in the region. The juxtaposition between the contributions of Ekistics on the one hand, and later architectural positions in the Middle East which entirely rejected scientific thought on the other, offers a basis to reflect on the positive contributions of scientific epistemology in general.

This thesis neither reformulates yet another scientific method nor does it attempt to displace scientific epistemology with a revisionist critique. Rather, it argues that while radical criticisms of Doxiades's method (whether these criticisms are based on social critique, or whether they come from the domain of the philosophy of science, or operate within the disciplinary terrain of architecture) have irreversibly changed our perception of it (as well as of other scientific methods of the fifties and sixties) they cannot subsume scientific epistemology, and they should not warrant its abandonment. This thesis examines scientific epistemology as an active critical attitude and reevaluates its usefulness as an orientation in architectural thought.

Thesis Supervisor: Sibel Bozdogan
Title: Assistant Professor of Architecture

To Mom and Dad

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INTRODUCTION

Scientific thought influenced architecture since the Renaissance, when it took the form of an inquiry into quantifiable modes of spatial understanding, distinguishing architecture from craft. With the introduction of rational thought by modern science in the seventeenth century, architectural theory searched for systematization and rationalization of all aspects of architectural production, from methods of conceptualization of design, to techniques of making and technology. Nineteenth century attempts to control design and building production with mathematical certainty, the efforts to establish a priori criteria for aesthetics, functionalism, and various biological analogies with architecture, all were influenced by the conceptual framework of science.¹

In the late-modernism of the fifties and sixties, scientific epistemology acquired a particularly conspicuous presence in the domain of architectural design and planning, and permeated an immense variety of theoretical positions and practices. Later, with the theoretical shifts in the subsequent decades, the modernism of the fifties and sixties was dismissed as devastating and the scientific grounds on which it rested were displaced as obsolete, and sometimes even dismissed in their entirety. Assuming a critical stand towards the stereotypical portrayals of the modernist architecture of that period as a profit-oriented and functionalist enterprise, this thesis will attempt to offer a different insight into the impact and contributions of scientific approaches in the architectural thinking of the fifties and sixties. Through a critical overview of the scientific method of Ekistics--an influential design and planning method during this period--and with a particular focus on the impact of this method in the region of the Middle East, it will reevaluate the usefulness of scientific epistemology as an orientation in architectural thought.

¹ Gottfried Semper's notions of functionalism and rational certainty were influenced by Durand's seventeenth century functionalization of theory. Semper's classificatory methods, as well as Viollet-le-Duc's rational philosophy of architectural structure have explicit traces of the work of the nineteenth century biologist Cuvier, who was the first to use 'objective' and 'empirical' techniques in formulating anatomical principles. Similarly, James Fergusson's notions of progress, improvement and refinement of building is based on nineteenth century evolutionary analogies based on notions of trial and error.

Chapter one will describe the intellectual climate of the fifties and sixties in Europe and America, and how scientific epistemology influenced many aspects of architecture. This discussion will form the basis for understanding the origins of the Ekistic method.

Chapter two will elaborate on characteristic features of Ekistics that exemplify the method's epistemological premises. Furthermore, this chapter will expand on the impact of Ekistics in the Middle East. It will discuss the circumstances in which Doxiades's work expanded in the Middle East, to present some of the concrete contributions of Ekistics to the region. The juxtaposition between Doxiades's efforts on the one hand, and later architectural positions which rejected scientific thought on the other, will offer a basis to reflect on positive aspects of scientific epistemology as well as point to the limitations of the specific version of scientific method of Ekistics.

Chapter three will take the above discussion beyond the context of the Middle East into a general critical reflection on the epistemological premises of Ekistics. To this end, it will review a number theoretical positions which challenge Doxiades's scientific method, including critiques which propose its modification as well as those which discard its premises in their entirety in favor of alternative approaches. The discussion of these approaches is not intended as a piecemeal criticism of Doxiades's version of scientific method, but as basis for the evaluation of scientific epistemology in architecture.

Some Clarifications

I. The long-standing influence of science on the epistemological domain of architecture took multiple forms. Even within the specific period of the fifties and sixties, scientific epistemology was associated with the theoretical grounds of a number of different architectural methods. Some "scientific methods" of the fifties and sixties were developed to define working procedures for the designer; others, were limited to the evaluation of buildings; and other methods used the data presented by other scientific disciplines to define the factors that could determine aspects of architectural production; others, combined some or all of the above approaches. The thesis will focus on the study of Doxiades's own version of "scientific method." It will critically explore to what extent Doxiades's method was aligned with a search for utopian certainty, and to what extent it reflected a looser and open-ended endeavor. This discussion will offer a the context for defining the very nature of "scientific epistemology" as he understood it.

II. Doxiades differs from other planners of his time in that he articulated the theoretical premises of his approach extensively. His theoretical publications embody an elaborate account of Ekistics and constitute a significant body of work in its own right, which, although largely disregarded, remained unexplored. Especially the journal *Ekistics*, which was established by Doxiades and embraced contributions from planners and scientists from numerous disciplines, provided a forum for discussion and debate on issues of planning at the time. The discussion of Doxiades's positions and method is treated as a vehicle for rethinking commonly held criticisms of science. The focus of the thesis on those aspects of Doxiades's method which reflect influences by scientific thought does not attempt to inscribe Doxiades's multifaceted method into a model of a specific scientific methodology. On the contrary, the complexities of Doxiades's approach resist any description of it as a singular method.

III. Although the fifties and sixties scientific discourse originated and flourished within the American and European contexts, its resonance reached many other parts of the world. Whether transported from outside via western firms (e.g., SOM, TAC, Luis Sert) or emerging from local practices through designers who were captured by the scientific aspirations (e.g., Fathy's earlier work), the scientific methodology and the process of modernization at large operated on an altogether different mode from that in the west. Inserted within the particular social conditions of the Middle East at the time, the scientific method was transformed within that new context, both in the process of its initial assertion and its subsequent reception. Within the peripheral context of the Middle East, the scientific method did not operate in all its multiplicity and complexity--it was not systematized by research institutions. The Middle East architectural enterprise picked up on a few aspects of the scientific methods that were cultivated in the west, only to further reinterpret and transform them. Furthermore, events of a particular consequence in the Middle East, (emergence of new nations, and later the oil wealth in a context of energy crisis in the world) constituted the larger context in which the ideas of science and modernization took place. The study of the impact of scientific method outside the context it originated can introduce important new insights, not only about how it was interpreted in a "foreign" context, but also can offer insights about the nature of the method at large. Thus, the study of the Middle East is not a separate branch of the thesis' s study Doxiades's method, but in fact integral to the thesis's attempt for a closer understanding of the premises of Ekistics.

CHAPTER ONE

The Fifties and Sixties Architectural Culture

Within a climate of optimism for a peaceful world, fascination with the second world-war's rapid technological achievements, excitement with the economic expansion and the consumer culture, as well as agony for the earth's overpopulation and limited resources, the period of the fifties and sixties shed a different light on modernism. The population increase, the drift into cities, and later the energy crisis, exacerbated the fear that modern life made tremendous claims on the earth's unexpandable resources, and reinforced a general message that humankind was experiencing the greatest transformation in its history. In this period, architectural culture underwent numerous changes. The influx of new technologies as well as the bureaucratization of architectural production under the public sector transformed both the formal and social discourse of modernism and unveiled a new vision of architecture and planning.

The Festival of Britain (1951), for example, celebrated the era's optimism and asserted a new paradigm of modernist and technological concerns. Meanwhile, architectural production in Europe transcended its initial task to facilitate recovery from the war and established foundations for future economic expansion and social transformations. The development of the British New Towns under government assistance became an example of planning methodology and was followed by Sweden, Canada, Germany, France, the 'Soviet Union', and later on, the United States. Concerns with housing; planning; low-cost, minimum dwellings; divisions between public and private domains, etc., were particularly emphasized, and public housing, in general, was expanded to include many social classes. Systems of prefabrication were adopted as an efficient means of production to meet the crisis of building shortage.(e.g., extensive construction of schools in England between 1945-1955.)

R. Banham (1960) proclaimed that the new type of modern life began in the in fifties, not twenties and thirties, and called architects to acknowledge the new demands of life.¹

¹ See Banham, *Theory and Design in the First Machine Age*, (last chapter on "Functionalism and technology.")

Buckminster Fuller's "Whole Earth Catalog" attempted to expose these new demands which ranged from innovations in space technology to concerns about famine and ecological disasters. During this period, the opposition between the subjective "form-making" and the rational "design thinking", which was inherent in early modern architecture, came to the surface.² Some architects subscribed to the ethos of the signature designer (e.g., Jørn Utzon, Eero Saarinen, Edward Durrell Stone) while others attempted to rationalize design in terms of quantifiable methods of analysis. Those who rejected artistic intuition and personal subjectivity in formal expression promoted scientific determination--efficiency, economy, standardization, objectivity, rational analysis and neutrality--as a means to produce better environments for human needs. Intuitive methods of design or tendencies to fall back onto historical styles and typological precedents were regarded as increasingly inadequate and more and more architects searched systematic tools to rationalize design, to objectify and empirically ground it. Designers moved to new directions of design solutions for the modern problems which were altogether new and of unprecedented complexity. The architect needed to redefine architecture in order to meet newly emerging social responsibilities and environmental concerns.

The accelerated developments in social, behavioral and systems sciences instigated the notion that the effectiveness of architecture--and of other fields of practice--as well as its legitimization, status, and even federal funding, hinged on its "rationalization within the norms of scientific inquiry." As Studer points out,

"Almost overnight the term 'science' was tacked on to various fields of praxis, e.g., management science, policy science, engineering science, library science, military science, building science and decision science..."³

The proliferation of research programs within other well established disciplines that took an interest in architecture--decision sciences, social and behavioral sciences, environmental psychology, environmental sociology, human geography, etc.--constructed various

² Mary McLeod, "The Post-Modern Moment" and Colquhoun, "Typology and Design Method". McLeod argues that for the most part, the leaders of the Modern Movement of the twenties--Le Corbusier, Mies van der Rohe, and Gropius--actually combined two conflicting notions about the generation of form. The first saw form as a result of "a logical process by which operational needs and operational technique could be brought together" and considered human biological needs, social transformations and technical issues of materials, structure, and standardization as design determinants. The second position proclaimed a new freedom in formal expression and faith in artistic intuition. (This distinction is proposed by Colquhoun, p.45). McLeod argues that in the fifties and sixties the inherent conflict between these two notions of the generation of form became visible, separating scientifically derived form and personal expression as two radically opposed approaches. (McLeod's distinction is only one among many attempts made to classify the trends of the post-war architectural culture. I adopt this one here, as a loose framework in which to situate the scientifically derived design approach)

³ Studer, "The Scientification of Design" p.16..

scientific paradigms for architecture. Architects soon endorsed the “scientific” methods of the engineer or the biologist, psychologist, social scientist, and engaged in diverse interpretations of science and its relationship to architecture.

The tremendous body of knowledge that emerged from the extensive research in technological and social fields quickly infiltrated architecture and brought new insights into the process of design. Technology, the physical sciences as well as the human sciences redefined the factors that guided design and introduced altogether new questions about the role of architecture in the making of a new social and technological world. Architecture schools worldwide, adopted many of these new theories and reconfigured their curricula, or introduced "Architectural Science" as a distinct course of study. The first Department of Architectural Science was established in the University of Sydney with the goal to "define the field of architectural science, to change the ethos of an undergraduate architectural program...to provide an opportunity for practicing professionals to acquaint themselves with an increasingly technological world, and to establish a research program in architecture based on scientific principles."⁴ In the field of practice, architectural firms, emerged as grand corporate institutions of an unprecedented scale of operation throughout the world (e.g., SOM, TAC, Doxiades Associates).

The following sections will describe some of concerns that emerged within the architectural culture of Europe and America at the time. This discussion will form a basis for understanding the origins and characteristics of Ekistics.

Increased technological awareness:

The rapid advancement in technology that resulted from the war proved the human capability to control and survive within hostile environments on the sea-beds or on the surface of the moon. In contrast to these achievements, architecture appeared to fall behind, failing to solve the much simpler problem of designing buildings to control the physical environment on the surface of the earth and to improve human conditions. A feeling of inferiority, accompanied by a fascination with miraculous technological achievements of the time--from the atomic bomb to undersea housings and lunar vehicles--led architects to look into other disciplines that demonstrated great achievements, and to adopt their techniques. Following Buckminster Fuller--who had, adopted an 'objective' and 'efficient' attitude towards design as early as 1927 with his design of the Dymaxion

⁴ John Gero, "Forty Years of Architectural Science," *Architectural Science Review*, No 4, December 1993.

House--the English Archigram group attempted to apply the technologies such as that of undersea housings or space capsules to buildings on the ground (1961). Ron Herron's 'Walking Cities' of 1964 or, Peter Cook's 'Plug-In City' of 1964 are additional examples of Archigram's extreme fascination with space-age imagery which completely disregarded the social and environmental consequences of their proposals. Cedric Price was equally concerned with 'future systems' yet also addressed the process of production and the social relevance of such sophisticated techniques. Work such as Fuller's Price's and Cook's, had an impact that can in fact be traced to the recent work of Norman Foster, Richard Rogers and Renzo Piano.

Social responsibility

Some architects, believed that the 'one-off' building, designed by an individual architect for a particular client was an anachronism, an indulgent self-expression on the architect's part and a socially irresponsible act.⁵ They promoted standardized methods, whereby the building would be composed by prefabricated systems to be assembled on the site, and would defy the possibility for the architect's self expression. For example, Gropius promoted an 'objective' functionalist approach when he became the director of the Graduate School of Design at Harvard, in 1963, and called for the replacement of individual prejudices by a collaborative, 'scientific' method of working based on the dictates of the intellect. More moderate attitudes accepted the architect's right to self-expression as necessary for the creation of aesthetically pleasing buildings, but as inadequate for the generation of designs. They saw the architect as part of a design team that would transcend the traditional role of architectural design and would address issues of efficiency, productivity, cost control.⁶ In either approach--whether it completely defied the architect's self expression or whether it accepted it as a fraction of the design process-- the systematization of design knowledge became an imperative because it would set the necessary standards within which the designer should be confined. To this end, technology suggested the parameters of standardization and construction to maximize *efficiency and productivity*, while social sciences defined design requirements as a function of *human needs*.

⁵ See, for example, Gropius' book *Scope of Total Architecture*, 1956. Cited in Broadbent, p.vii.

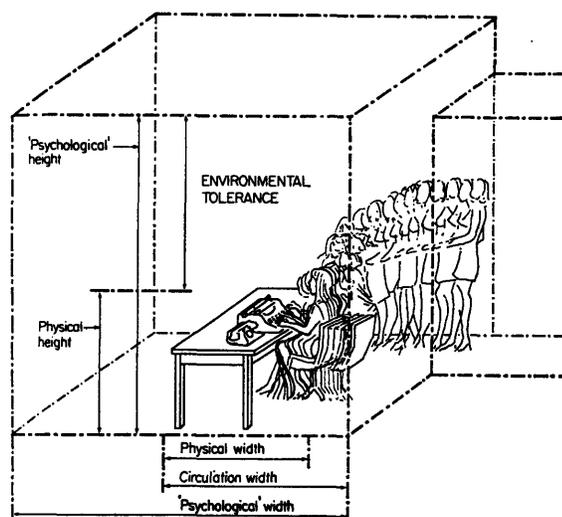
⁶ Broadbent mentions amendment to Vitruvius' categorization of architectural qualities which was well received by management oriented architects: "Well building hath five conditions; commoditie, firmness and delight--on time and at the right price" (Broadbent, *Design in Architecture*, p. vii)

Human Needs

Rasmussen's *Experiencing Architecture* (1959) touched on issues of perceptual psychology, while others attempted to incorporate new understandings of the perceptual nature of human relationship to buildings into design. A series of studies in the field psychology and behaviorism examined the impact of various environments--work-place, home, etc.--on human beings, and suggested different requirements for creating optimum environments for different activities. For example, J. Noble described the psychological and physiological consequences of sensory deprivation, and described how the provision of variety and stimulus in office buildings, could increase efficiency among people.⁷

Figure 1

'Psychological height' and 'environmental tolerance' were added to physical height and circulation width, to determine the correspondence between an activity and the space it occupies. These were defined based on studies of variations in human dimensions, patterns of movement and perceptual expectation.



A new understanding was generated about the human being as a perceiving organism within a larger environment. Environmental researchers attempted to define the human organism's relationship to its environment in terms of the user's senses (seeing, hearing, smell, etc.) the building environment's form and fabric (topography, sunlight, hygiene, etc.) and the building's services (electric lighting, air conditioning, etc.).⁸ Others attempted to define the correspondence between a given activity and the size and shape of the space that contains it, extending the notion of "function" of a space to include a multitude of human needs (fig 1) . Individual behavior and larger social relationships were

⁷ See Noble, "The How and Why of Behavior: Social psychology for the Architect" *Architect's Journal*, March 6 1963, pp. 630-646.

⁸ See, for example, *Architect's Journal: Environmental Handbook*, 1968-69.

sometimes studied as a function of the physical relationships among spaces and the way the movement of people is facilitated.⁹ Such studies had an impact on locational planning decisions, the design of people's movement in space, etc.¹⁰ Psychology and behavioral sciences, along with human ecology thus became interrelated with studies of social relationships and cultural formations. The cultural, social and political factors involved in design were acknowledged also, and human sciences, psychology, sociology etc., attempted to quantify those as well.

Ecological crisis

Scientific research brought to the forefront the reality of the finite nature of the earth's resources, and for the first time, revealed the fundamental connection between the physical environment and humanity as a whole:

"...two aspects of knowledge coincided in the circles of science and later of policy-making: the knowledge of the planet as a container for mankind and for the resources that allow human life, and the exhaustion of certain fundamental products in the foreseeable future, a generation hence, such as oil; a crisis that is bringing home to millions a sense of danger and the eagerness to challenge it through a rational approach to the ecological problem."¹¹

The earth was, for the first time perceived as a single entity, and the concerns for its development and protection were elevated from local to international concerns.

"The phrase 'only one earth' was born on the Apollo 8 mission circling the moon and was successfully deployed as the theme of the United Nations Conference on the Human Environment. The image of the tiny earth with the moon in the foreground, simultaneously shown on TV sets around the globe, changed man's cosmic view of his home."¹²

Within the context of the numerous ecological movements that emerged in the sixties, architects too, were sensitized to environmental awareness. Buckminster Fuller's "Whole Earth Catalog" drew attention to the fear of ecological crisis. Architectural concerns became intimately tied to human ecology, and the study of the interactions of people with their environment, their spatial distribution in relation to material and social causes, in search for ways to defend the natural and built environment.

⁹ For example, See Hochberg, *Perception*, Englewood Cliffs, New Jersey, 1964. He discussed how environmental stimuli affect people's relationships to spaces they occupy, and consequently, their behavior.

¹⁰ See Broadbent, p. viii-XI.

¹¹ Ivan Pedro de Martins, p.139.

¹² From *Ekistics* 208, p.114, March 1973.

Design methods:

With the newly emerging issues of technological innovations, environmental concerns, and the questions of behavioral and social repercussions of buildings, the complexity of design issues became more overwhelming than ever before. Architects felt that it would have been impossible to encompass all the complex design issues without systematic and analytical classifications, and, often, perceived design as a branch of the wider process of problem solving.¹³ Although questions of design methodology and systematization have surrounded architectural culture since the Renaissance, these were tackled much more systematically and extensively in the fifties and sixties.

With the aspiration to define the quantifiable aspects of design, to systematize architectural knowledge, and even to standardize design process, architects abstracted theories of design process from other areas of designing and redefined architectural design methods to conform more to the scientific mode of thinking. A range of quantitative techniques from ergonomics, operational research, systems analysis, information theory and other disciplines which originated, or developed rapidly during World War II, and which had developed some very powerful decision-making tools, became available to designers.¹⁴

The Hochschule fur Gestaltung, in Ulm, Germany, for example, embraced a form of operational research, in an attempt to rationalize the production of built form, based on an analysis of the nature of an object's production and use (1956).¹⁵ During the sixties, a number of conferences on design methods took place in educational settings, exploring the relationship design could have to operational research, systems analysis and cybernetics.¹⁶ Bruce Archer, and Thomas Markus¹⁷, among others, developed architectural design methods from operational research and systems analysis (fig. 2). Moving along the same lines, but perhaps more complex, Christopher Alexander's work, especially *Notes on the Synthesis of Form* (1964), became one of the most influential in promoting a rational

¹³ Colquhoun, "Typology and Design Method", p.43.

¹⁴ Broadbent, p.xiii.

¹⁵ Frampton, *Modern Architecture*, p.287.

¹⁶ See for example: J.C.Jones and D.C.Thornley, (eds.) *Conference On design methods*, Oxford 1963; S.A. Gregory (ed.) *The Design Method*, London, 1966; Ulm Group 4, *Papers and Programmes from the Conference on Design Methods in Architecture*, Ulm 1966, G. Broadbent and A. Ward (eds.), *Design Methods in Architecture*, London, 1968.

¹⁷ See, for example, Archer's "Logical Model of the Design Process" or Markus' "The Role of Building Performance Measurement and Appraisal in Design Method." in G. Broadbent and A. Ward, (ed) *Design Methods in Architecture*.

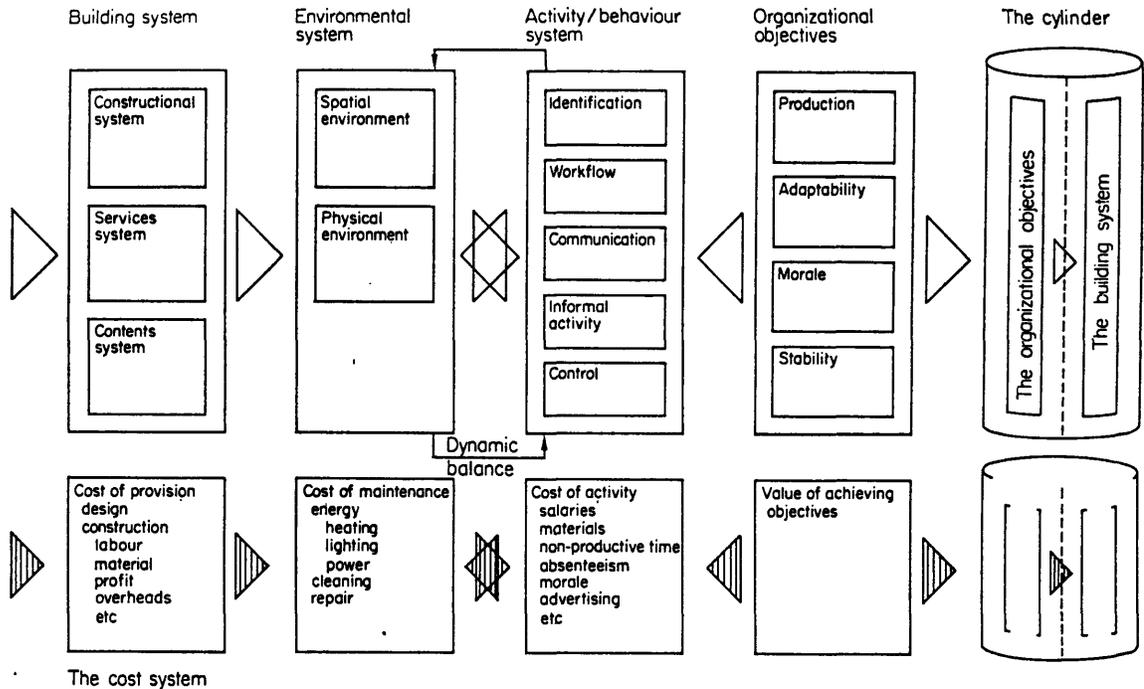


Figure 2

Conceptual model for the appraisal of buildings in use developed by Markus. It consists of four systems plotting interactions between them. When it is folded into a cylinder, interactions can be plotted between the building and organizational systems; a cost/ value system is also incorporated in the lower part of the model.

explicit design method which analyzed the complex structure of design problems based on mathematics, systems analysis and cybernetics.

Modernization theory.

The new phenomena that emerged in the international scene--the cold war, the decolonization of third world societies and their increasing importance in the world economy and politics--led social scientists (especially American) to study problems of economic development, political stability, and social and cultural change, in third world societies. "Modernization theory"--the large body of research and literature that attempted to explain phenomena of modernization around the world--began to develop in the sixties and became a widespread term in social sciences by the sixties. Modernization theory was largely based on the tradition of nineteenth century evolutionary theory and twentieth century functionalism which permeated western social sciences.¹⁸

¹⁸ Tipps, "Modernization Theory and the Comparative Study of Societies: A Critical Perspective", p.200.

Despite their diverse positions, the various modernization theorists (e.g., Eisenstadt¹⁹, Lerner²⁰, Black,²¹ Levy²²) shared a number of methodological assumptions:

- a. They perceived social change as a directional progressive process and modernization as a goal directed process of transition from primitive, subsistence economies to technology-incentive, industrialized economies, from closed, ascriptive status systems to open achievement-oriented systems; from extended to nuclear kinship units; and so on.
- b. They assumed that modernization is extensive in scope, "a multifaceted process involving changes in all areas of human thought and activity." Thus, modernization theory strove to create generalized concepts that would include all of these multifaceted processes in its definitions.
- c. Although theories of modernization addressed many different levels, from the individual to local communities to national and international scale, they primarily focused on the transformation of the national states. Each component of the modernization process--industrialization, economic growth, rationalization, political development, social mobilization etc.--was viewed as representing, primarily, "a source of change operative at the national level."

The notions and assumptions that permeated modernization theory, have many significant parallels with many urban planning practices of the time. Doxiades's practice in the third world, which will be discussed in detail in the later part of chapter two, reflects many influences from modernization theory and shares many of its assumptions.

The concerns with recovery from the second world war, the subsequent economic developments and construction boom that occurred on an international scale within the euphoric climate of the fifties, and the more critical environmental and social awareness that emerged during the sixties, all combined, influenced the formation of Ekistics. The next chapter will describe the origins and characteristics of this method.

¹⁹ Eisenstadt, *Modernization: Protest and Change*, 1966.

²⁰ Lerner, *The Passing of Traditional Society: Modernizing the Middle East*, 1958.

²¹ Black, *The Dynamics of Modernization: A Study in Comparative History*, 1966

²² Levy, *Modernization and the Structure of Societies*, 1966.

CHAPTER TWO

Ekistics: The Science of Human Settlements

The Emergence of Ekistics

During the post-war era, in the period immediately after the war, Doxiades¹ was secretary of Housing Reconstruction in Greece, (1945-48) and later became the supervisor for the implementation of the Marshal Plan in Greece (1948-51). Doxiades faced similar concerns about architecture and planning as did other architects in Europe at the time. Greece had suffered heavy destruction from the war, and Doxiades led a very significant role in the plans for recovery, providing housing quickly and with limited means. The provision of housing extended from a normative architectural concern to an effort to cultivate the country's social and economic growth. In his search for "proper planning" for the rebuilding of Greece, Doxiades's theory of Ekistics began to crystallize. In a later interview, Doxiades recounted how his early experience at a remote Greek village, lead him to formulate the foundations of the ideology of Ekistics. Deane, the interviewer writes:

¹ Constantinos Doxiades (1913-1975) had an architecture degree from the Technical University of Athens (1935) and a graduate diploma from the Berlin-Charlottenburg University (1936). He began his professional career in Greece in 1945. A skillful organizer and administrator, Doxiades had a very significant role in the plans for the recovery of Greece. By the mid-fifties, he began to launch projects throughout the world acting as an architect, a planner, an engineer, a scientist, and most of all, as a passionate teacher of his self-coined Ekistics--the science of human settlements. A charismatic speaker and a skillful coordinator, Doxiades promoted Ekistics throughout the world and formed an international network of friends--which included politicians, journalists, and foreign officials. By 1963 he became a lecturer of Town Planning at the Technical University of Athens, and a visiting lecturer at the universities of Chicago, Yale, Princeton, Harvard and MIT. He participated in numerous international conferences, worked as a consultant for the United Nations (India), the International Bank for Reconstruction and Development (Syria, Jordan, Venezuela), the international Cooperation Administration (Lebanon), the Ford Foundation (Pakistan, Syria, Lebanon), the Redevelopment Land Agency of Washington, DC., and for the governments of Ghana, Greece, India, Iraq, Jordan, Lebanon, Pakistan, Spain, Sudan, and Syria. The "master builder," as Doxiades liked to call himself, used many opportunities--the United Nations interest in housing and development, the building expansion in the Middle-East, etc.--to nurture an international reputation and to implement his theory. His opponents sarcastically called him a global philosopher imbued with a passion to save the world, or accused him of being a traveling salesman and showman, a top-notch businessman, a publicity expert, an opportunist, and a builder who was preoccupied with how extensive he could be rather than with how well he could do something. Regardless of these characterizations, Doxiades succeeded in establishing and promoting Ekistics as an influential planning approach around the world. During the sixties, his experience in the field of planning, reconstruction and development included more assignments, commissions and jobs than any other planner of his time.

“The villagers who were harboring him did not need an architect’s help; they knew how to design their own homes. They did not need engineers; they were capable of erecting a house themselves. They did not need a town planner; their village had a sound plan...They needed someone to tell them whether to remain and rebuild, or go to the mountains and start anew or abandon the fields altogether and go to the towns. Where would they fare better? What did the future hold for them? They wanted to know what was their place in the world, where they would fit into the scheme of things...To give man settlements in which he could lead a happy life, required a new intellectual discipline, drawing on all the existing ones...”²

Doxiades's notions soon extended beyond Greece into larger world problems on planning. He proclaimed that the rapid modernization that occurred throughout the world after the Second World War would constitute unprecedented changes in all aspects of life. Almost repeating earlier modernist rhetoric, (such as that of Le Corbusier³) Doxiades spoke of the 50's as “an epoch of transition” whereby the world moved from handicraft to industry, from the human scale to the car scale, to airplanes and space ships (fig. 3). Doxiades, like Banham⁴, believed that the modern 'new epoch' actually began in the fifties, not in the twenties and thirties as Le Corbusier prematurely proclaimed. Doxiades predicted that the world would soon be faced with an unprecedented urban population, immense demands for transportation and space,⁵ as well as ecological disasters and warned that the normative architectural practice--limited to arbitrary self-expression of styles and fashion⁶--was inadequate to prevent imminent ecological and population crises. Furthermore, he pointed to the multiplicity of the human needs revealed by the advancements in human and social sciences, and emphasized the obligation of the architect and planner to address these "essential" needs. Doxiades, therefore, considered it a historical necessity to institute a scientific method that would encompass all economic, environmental, social, and cultural

² Deane, *Constantinos Doxiades*, p.18.

³ See, for example, Le Corbusier, *Towards a New Architecture*, 1927. "A great epoch has begun. There exists a new spirit. There exists a mass of work conceived in the new spirit; it is to be met with particularly in industrial production..."

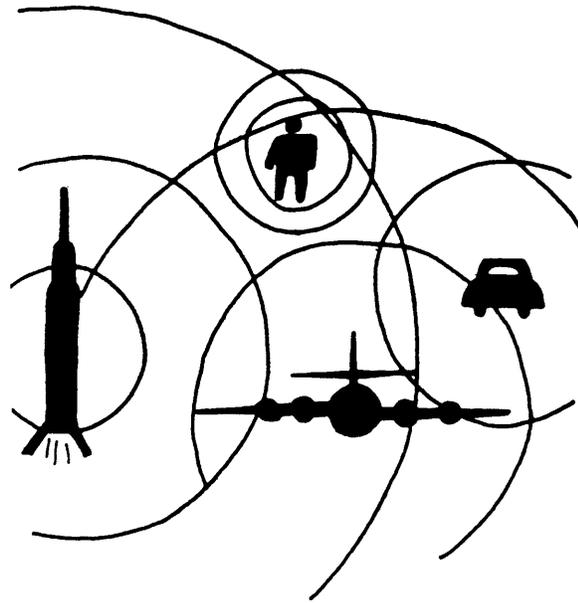
⁴ See Banham, *Theory and Design in the First Machine Age*.

⁵ Doxiades's rhetoric of radical changes in the earth's physical and social landscape, appeared very often in his interviews and speeches. "In this period humanity will put up its greater number of buildings; that is the crisis"(Cited in Deane, 10), or, "We will not have gardens in our cities." (Cited in Deane, 89).

⁶ He criticized the architectural practice for focusing on the "mask" of buildings rather than the "essential" issues about human settlements. Also see Doxiades's statement in his Report for the International Council for building research studies and documentation: "Let us not forget that human interests are the goals always and not the construction of houses.... We should not start by conceiving the house and then see how we can build it, we should start by conceiving the economics of a society, the social goals by mobilizing [sic] best and utilizing best our resources for the largest possible number of people." (Doxiades, "Mass Housing in Rapidly Developing Tropical and Subtropical Areas" p.11)

Figure 3

"Many masters and many scales, but balance must be established in every scale" (*Ekistics*).



aspects of living because only through such a method, would architecture and urban planning cope with the new responsibilities they were faced with.⁷ Ekistics emerged as the appropriate scientific method that would "cure" the problems of man's habitat." Defined by Doxiades as "the Science of Human Settlements," Ekistics attempted to redirect the focus of architecture, planning and building production in general, towards systematic study of the social and material conditions of the environment. The concerns that characterized many design and planning approaches of the time--the fulfillment of human needs, the cultivation of economic growth and social progress, and the prevention of an ecological disaster--constituted the guiding principles for Ekistics.

"Forty years ago, most people talking about cities spoke only of monumental buildings or slums, impressive avenues or narrow romantic streets. Later, discussion was mainly concerned with traffic problems and the preparation of technologically impressive solutions involving the construction of major highways. In the fifties, all problems of life were believed to be social ones. More recently, they have been related to the natural environment and now to energy utilization. So, in four decades, the image and concern about the 'city' as our system of life...has shifted from buildings to transportation, then to society and now to nature and energy; although we know in fact that people all over the world suffer from much more complex situations than these fashionable attitudes would have us believe. We must not allow passing fashions and incomplete diagnoses to divert us from understanding the real problems or basic diseases of human settlements, and their causes"⁸

⁷ Doxiades's attempt to encompass "all aspects of living" is directly tied to the notion that modernization is a systemic process involving changes in all areas of human thought and activity (see discussion of modernization theory in Chapter one).

⁸ Doxiades, *Ecology and Ekistics*, p.50.

The concept Ekistics was disseminated through a large enterprise of institutions and research efforts: The Athens Center of Ekistics, the Graduate School of Ekistics in the Athens Technological Institute, international conferences and book publications. Above all, the multi-disciplinary journal *Ekistics*--with the slogan, "We need a great revolution to save our settlements"--became through its international circulation the most effective forum for promoting the Ekistic method.⁹

The Ekistic Method

Coined by Doxiades, the term "Ekistics" was derived from the ancient Greek adjective "Oikistiki", which meant "settling down" (in a dwelling or a city.) Doxiades chose this term for his method, because, as J. Tyrwhitt pointed out, it denoted both a specific settlement orientation and a wide field of interest, encompassing all processes involved in the formation of settlements.¹⁰ Ekistics was a synthetic approach to planning which was based on the equanimous cognizance of the "economic, social, political, administrative, technical, ecological and aesthetic factors."¹¹

Ekistics attempted to establish universally applicable guidelines for structuring a future urbanized world. It divided its endeavor in two channels: On one hand, it acted as a "descriptive science" which, through empirical analysis of urban problems, attempted to define a system that could "comprehensively and comprehendingly"¹² encompass the multiple interactions between human beings and their environment; on the other hand, it acted as a "prescriptive science" which would set the framework for new developments and define techniques for handling large scale developments (e.g., industrially produced housing, institutional centers, transportation routes, industrial plants etc.). The Ekistic theory saw the "descriptive" aspect of it as one that would grow by accumulating "more facts"--which were assumed to be "constant"--until it ultimately became complete and

⁹ The Journal *Ekistics* initially appeared in 1955 as a digest that would publish material on tropical housing, building and planning. By 1960 it had developed into a professional journal with a wide coverage and audience, circulating to 94 different countries. It had correspondents from all continents and collected material from various research stations, university departments, and United Nations Technical experts. Its advisory board was composed of architects, historians, geographers and economists from many parts of the world. The editorial office for *Ekistics* was based in Cambridge, Massachusetts, with Professor Jacqueline Tyrwhitt (Professor of the city planning program at Harvard University) as the editor.

¹⁰ Tyrwhitt, *Human Identity in the Urban Environment*, p.28.

¹¹ See Tyrwhitt, "Background to Doxiades's 'Ecology and Ekistics' " p.12-20.

¹² Tyrwhitt, "Background...", p.16.

definitive. Its prescriptive aspect, on the other hand, would formulate theories that would be open to reevaluation through time.¹³

I. Synthesis of disciplines:

"Like geography, resource development, regional science, regional and city planning, landscape architecture, urban design and architecture, Ekistics is concerned with the organization of terrestrial space. Like history, literature, economics, and sociology, it is concerned with man--his aspirations, his thoughts and his acts. But Ekistics is no mere bundling together of a number of different facets of the human environment. It is an earnest and scientific endeavor to find ways of identifying and verifying the relations between the most significant factors that combine to make a viable human settlement."¹⁴

"We have only to deal with one problem, the problem of human settlements, which is the total problem of living conditions within human settlements. We cannot break this overall problem into many partial ones and try to solve them separately. It is like trying to cure different diseases of the human body without considering the total body and total human nature...We cannot develop any program or any policy for one part of the body without taking into consideration the whole of it."¹⁵

The primary principle of the Ekistic method of urban development was the integration of disciplines. The task of Ekistics was to establish connecting links among economic, social, technical administrative and cultural issues in order to define a framework in which all branches of knowledge related to human settlements could be coordinated (fig.4). Any *independent* departmental action in the areas of housing, transportation or economic development, Doxiades argued, would only lead to a deterioration of the human settlements as "a whole".¹⁶ Very critical of specialists for their narrow-mindedness--they "stay within their intellectual cubicles where they could preserve their safe, exclusive jurisdictions,"¹⁷ Doxiades called himself a "specialist in generalism." For this quality of being a "generalist"

¹³ Doxiades emphasized this distinction between "constant" facts and evolving theories when he quoted Hans Selye: "Our facts must be correct. Our theories need not be if they help us discover important new facts". (Doxiades, *Ekistics: An Introduction to the Science of Human Settlements* p.52).

¹⁴ Tyrwhitt, ed., "What is Ekistics?", *Ekistics*, November 1962, p.192. Ecology was not included in the disciplines Ekistics embraced until later on in the development of the method.

¹⁵ C.A. Doxiades, "Total programs for human settlements" *Ekistics*, vol. 16, no. 93, August 1963

¹⁶ *Ekistics* 247, June 1976, p. 310.

¹⁷ Deane, p.19.

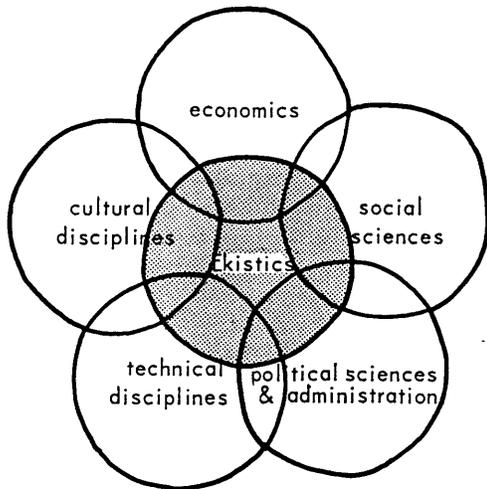


Figure 4

"Ekistics and the sciences directly contributing to it" (*Ekistics*).

Doxiades was praised by Sigfried Giedion who in a symposium in 1963¹⁸ stressed the importance of "generalist planners"¹⁹ At the time Ekistics was established, urban design and planning was already influenced by a number of other disciplines: Geography (e.g., Christaller, in Germany) sociology (e.g., Louis Wirth, in Chicago) and later on, Economics, Law, Anthropology, Ecology, and Public Health all introduced new issues beyond physical planning. Ekistics made a unique contribution in that it attempted to synthesize and comprehensively encompass *all* input of all disciplines related to human settlements.²⁰

The term "human settlements" implied an integral problem involving all aspects of the human environment as an interconnected whole. The individual human being (anthropos)

¹⁸ Doxiades organized a series of annual symposia where he invited scientists and administrators from various countries to discuss problems in human settlements. The first symposium took place in Delos in 1963.

¹⁹ From Deane, 139. Giedion's praise of Doxiades--who defied any monumental dimensions of architecture and focused solely on meeting people's "basic" needs--may seem contradictory to Giedion's own beliefs, since in this period, Giedion promoted the need for monumental expression. (See, for example, the polemical "Nine Points on Monumentality", written in 1943 in collaboration with F. Leger and J.L. Sert, where Giedion spoke of the need of architecture to express the collective aspirations of people., or his paper, a year later, "The Need for a New Monumentality"). Giedion's reaction in favor of monumentality argued for the need for buildings to represent people's social and community life and to give more than functional fulfillment. It is perhaps in this spirit that he endorsed Doxiades's "generalism" in that it attempted to address all aspirations of people, economic, social, aesthetic, cultural. Furthermore: Doxiades active efforts in restructuring of urban community life may have related to Giedion's call to use the Post-war changes in the economic structure of nations as a basis to organize community life in the city. (See, "Nine Points on Monumentality").

²⁰ The ultimate goal of the science of Ekistics, as described by J. Riley, was to become a science that analyses the "total phenomena" of human settlements with a methodology powerful enough to allow verification and application of its studies. From *Ekistics*, Jan. 1965, p.76.

and the human scale were proclaimed to be the central concern in a comprehensive integrated environment. Reacting to the technological and mechanical intensity of modern life, Doxiades proclaimed that the science of human settlements should revive the primacy of anthropos²¹. Ekistics expanded the Renaissance vision of human scale, articulating a notion of *multiple* human scales that would account for the body's movement as well as the human senses, mind and soul. Each of these various human scales formed a number of bubbles radiating around the human body (fig.5). "Anthropos" was, as in the Renaissance, the center of the world, but the world was seen as having multiple dimensions--a notion which introduced a critical social awareness. Ekistics aspired to include all these scales into its guidelines and to combine many of them under different conditions.²² This is why it embraced all sciences that could offer insights into the multi-phased relationships between human beings and their environment--the different "bubbles" that surround anthropos (fig 6).

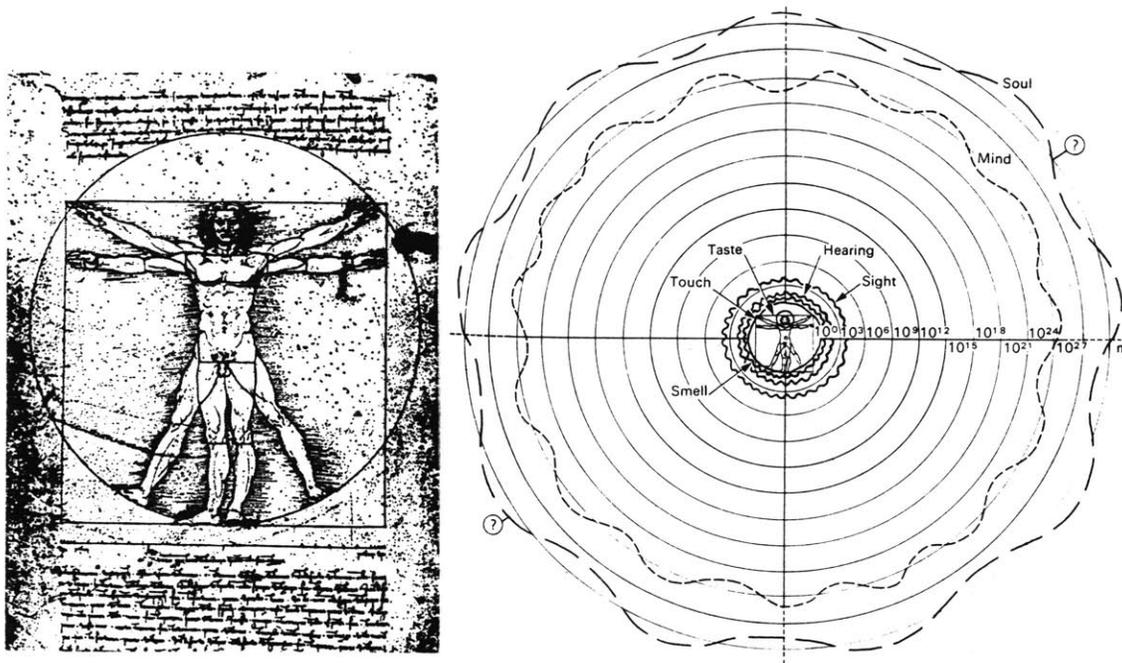


Figure 5

The scale of "anthropos" in the Renaissance human scale (left) is "confined to the static body" whereas the "total anthropos" of Ekistics (right) is defined by multiple human bubbles and human scales .

²¹ Doxiades often chose to use the word "anthropos" rather than "man" because it was inclusive of both genders. Nonetheless, none of his system of classification and research considered any possible differentiation between each gender's respective characteristics.

²² From *Ekistics: An Introduction*. p.301.

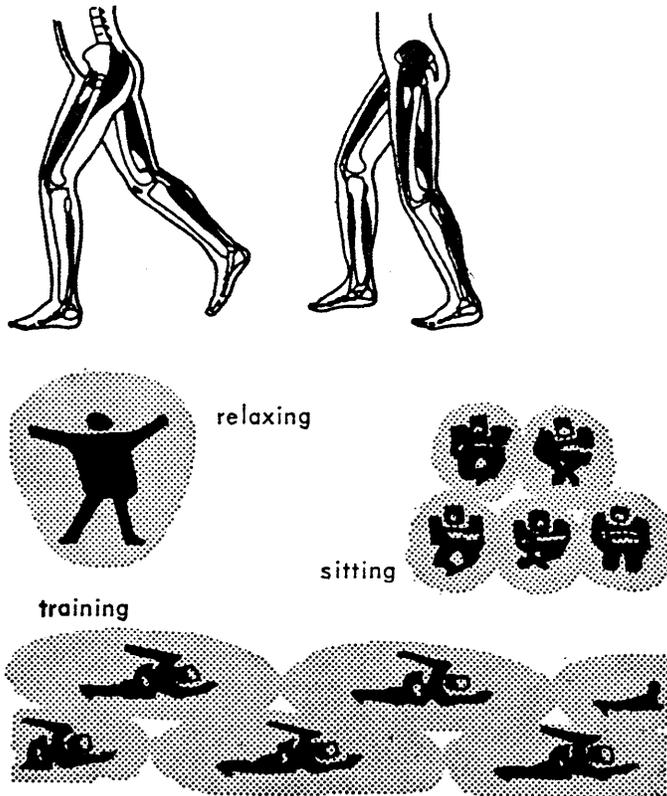


Figure 6

"Dynamic human bubbles" defined by the movement of the human being (*Ekistics*).

Regional Science and Urban Geography:

Ekistics was influenced by disciplines which attempted to formulate synthetic approaches to the understanding of the human environment--such as regional science and urban geography--and tried to expand these by embracing contributions from more disciplines (social, economic and aesthetic). Following the methods of regional science and urban geography, Ekistics divided space into regions and into units of certain sizes. It adopted methods from regional science in studying economic functions, production and transportation, but criticized it for not adequately addressing social, technical, administrative and aesthetic problems²³ (fig 7). Ekistics appreciated more urban geography's broader scope of concerns, but rejected its analysis for not being methodical enough

Ecology:

As the theory of Ekistics developed, Doxiades became most interested in the interrelationships of Ecology with Ekistics. The last of Doxiades's book, *Ecology and*

²³ See, Doxiades, "Ekistics and Regional Science." *Ekistics*, November 1962.

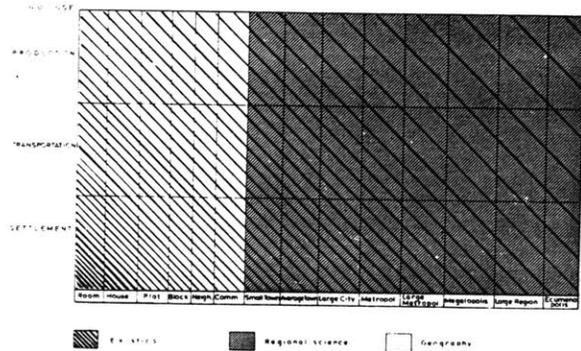
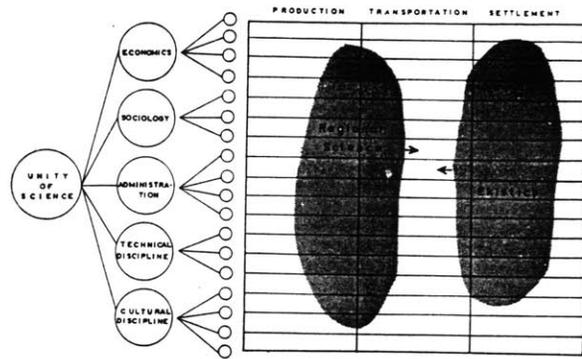


Figure 7

(top) The relationship of Ekistics and Regional Science

(bottom) Ekistics and Urban Geography have the same scope, but Ekistics deals with human settlements in more detail.

Ekistics was the one that articulated most clearly the ecological grounds of the Ekistic theory.²⁴ The goal to create “total settlements” was dependent on the understanding of the complementary relationship between physical forms and the natural environment. Human settlements were thus approached as organisms situated within the larger environment. The ecological studies of the relationships between living organisms and their surroundings, constituted the grounds for Ekistics to explore the relationship between settlements as artifacts within the natural setting, as well as that of human beings and the overall environment they create.²⁵

In his book, Doxiades outlined a problem-solving process of coordinating Ecology and Ekistics, in order to ultimately achieve a stable ecosystem. *Ecology and Ekistics* proposed guidelines for global planning to define how settlements should be planned in balance with nature. Doxiades presented his method as a necessary basis for the wise use of the

²⁴ Doxiades defined Ecology, as “a branch of biology dealing with the mutual relations of living organisms and their surroundings; their habits, modes of life, populations, etc.”

²⁵ For the study of the relation between human beings and the overall environment Doxiades also turned to social behavioral sciences formulating an early version of Urban Ecology. This aspect of Ekistics will be further discussed later on in this chapter.

environment, where the aspirations of humankind for growth and development would be reconciled with the limitations of a finite world.

Doxiades derived the global planning guidelines from various intricate classification structures that the theory of Ekistics developed which related the ecological data he collected with other Ekistic factors.²⁶ His book established a whole set of definitions and rules for the rational use of space by basic functions. The area of the earth was divided into four main use areas, for nature, cultivation, mankind's habitation and industrial use, and these were then precisely subdivided and defined in such a way that over 94 per cent of the land area was left undisturbed for wildlife or available for cultivation. Doxiades believed that these divisions would facilitate the "scientific management" of the resources of the earth that would be sufficient to support a world of up to 69 billion inhabitants. Though Doxiades admitted that Ekistics could not specify the balance between human endeavors and the natural environment, he believed that this balance would eventually be definitively specified when the "descriptive aspect of the Ekistic science made "the reciprocal needs of man and nature...known."²⁷

II. Division of data into component parts and Classification

In an attempt to outline the process involved in the growth of Human Settlements, the Ekistic method divided the considerations that affected design into component parts, with the major parts being social, economic, aesthetic. The task of Ekistics, then, was to systematically gather all facts affecting human settlements and order them into component parts in order to systematize the process of their planning, and to facilitate a scientific method of prediction.²⁸

"Our task is to define the system of life expressed by human settlements so clearly that it can contain every part, aspect, expression or opinion, known or unknown, foreseen or unforeseen. Once defined, our task is then to learn to control this system wisely for the sake of mankind"²⁹

²⁶ The most important classification structure is that of the anthropocosmos model which will be discussed later.

²⁷ Cited in Ivan Pedro DeMartins, p.147.

²⁸ The attempt to systematize design and divide data into component parts is one of the most definite connections between Doxiades and Christopher Alexander, who also argued that there are "too many factors" in design and they need to be broken up and be systematized. In his *Notes on the Synthesis of Form*, Alexander attempted to describe how to represent a design problem so that a designer can "handle it". Alexander tried to define the conceptual order of design problems, while Doxiades attempted the same in his anthropocosmos model.

²⁹ Doxiades, "Order in our Thinking: The need for a total approach to the anthropocosmos", *Ekistics*, July 1972, p.44.

The science of Ekistics devised increasingly intricate classification systems for all types and scales of human settlements worldwide. Based on the study of history and the observation of present conditions, these classifications were seen as the means to both to facilitate the manageability of the complex information on human settlements and to organize the continual modification and improvement of proposed solutions. I will discuss some examples that are characteristic of Doxiades's attempt to divide data into component parts and to present it in a quantifiable form.

Ekistic Elements

According to Doxiades, the character of human settlements is constituted by five elements: "Nature" (the ecosystem within which cities must exist), "anthropos" (the individual human) "society" (humankind, as a group, organized or not) "shells" (the structures in which we live, learn and work and "networks" (the communication and transportation systems). (fig.8&9). By defining these five elements, Doxiades's attempted to expand the understanding of settlements beyond their physical aspect ("shells"). He argued that the shells are only the membrane that covers the "real" life of the settlements , the life of the people, their society and their functions. "We must understand that we have to deal with phenomena consisting of five elements, although we can see only one of them."³⁰

Each of these elements could be further subdivided: "Nature" involved a number of component processes including the hydraulic cycle, biosystems, climatic zones, etc. "Anthropos" was defined with respect to the human biological needs (space, air, temperature) sensation, perception, emotional needs--all of which were traditionally dealt with by the medical profession and psychology. The realm of "society" comprised social

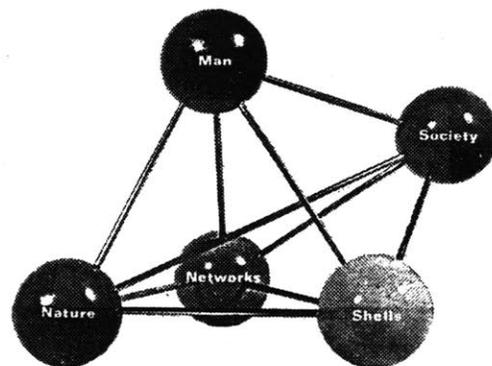


Figure 8

"The goal of Ekistics is to achieve a balance between the elements of human settlements in order to guarantee happiness and safety for Man." (*Ekistics*)

³⁰ Doxiades, "Order in our Thinking", p.35.

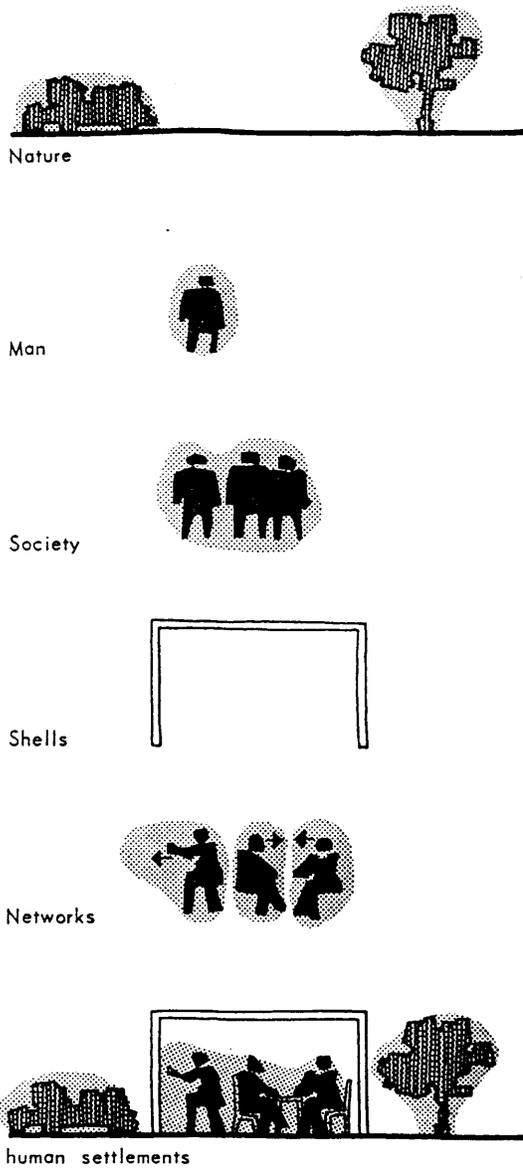


Figure 9

The five elements that constitute human settlements.

customs, population trends, economic development, income and occupations, education, health and welfare, law, and systems of urban governments--all those aspects of urban life which were commonly dealt with by sociologists, economists and administrators. "Shells" involved the built environment, housing, community services, shopping centers, civic centers and industry--which traditionally constituted the domain of architectural and engineering professions. "Networks", was the element which provided the linkages for urban systems: water supply systems, power supply, transportation systems,

communication systems, sewage and drainage.³¹ The Ekistic elements provided the basis for the classification and examination of towns and regions and formed, as Doxiades argued, the basis for a scientific analysis of the components that define human settlements, and urban life.

Doxiades's definition of the five Ekistic elements could be seen as an early attempt to describe the city based on an ecological understanding. These five elements, however, which attempted to comprehensively encompass the constituent components of the urban environment, subdivided the large and open system of the city into analytical component parts which fell short of acknowledging the complex ontology of the city and the ways urban environment is actually used and interpreted. Patterns of use, variations in social conditions, economic conditions etc. were assumed to have a direct correspondence with the physical distinctions. For example: The element "networks" (movement channels) of the urban space was sharply distinguished from the element of "shells" (usable space). Doxiades's model assumed that there can be a "purely physical demarcation"³² between movement channels and adaptable usable spaces, and ignored the actual overlaps that often occur, or their possible combinations which can generate spaces that may not correspond to either one of the two categories. The shell may constitute part of the movement network, and similarly, a road may not simply be part of the movement network but also a place for use and inhabitation. Furthermore, a road and a building combined might create a space that can be neither a shell nor network.

The element of "man" and his "human needs" were assumed to constitute uniform undifferentiated standards. The elaborate analysis of human needs that covered biological needs to psychological needs and sensation, however, operated beyond any distinctions with respect to gender, cultural, or racial specificity. Furthermore, the various "needs" were treated as distinct, overlooking the possible interrelationships and even interferences among them. Biological needs were separated from emotional needs, so that the need for air, for example, fell into the category of biological needs, whereas visual stimuli were seen as strictly of psychological significance.

³¹ Doxiades, *Ekistics: An Introduction*, p.35.

³² See, Anderson, "Studies Towards an Ecological Model of the Urban Environment", in *On Streets*, which pointed to some of the limitations of Doxiades's approach. (Anderson, *On Streets*)

In short, the distinctions among the five elements of Ekistics--and the equally sharp categorization of "five forces" that were identified as acting on them on them (economic, social, political, technical and cultural)--were limited by their preoccupation to define clear and distinct components without ambiguity and reduced the relationships between built form and social activity. Even the Ekistic model's attempt to "synthesize" the forces and elements and their various systems and subsystems in thousands of combinations, did not accommodate the complex relationships between these elements and their subdivisions, because this synthesis was based merely on combinations of the various divisions in various permutations, rather than on the integration and overlap among them.

Territorial and Population sizes

Ekistics classified human settlements with respect to fifteen levels for population units, from anthropos to room, to dwelling, to neighborhood to polis, metropolis, megalopolis, the continental eperopolis, and the global ecumenopolis.³³ Each level had a numerical value in terms of population and corresponded to the scale of human settlements. The units increase in logarithmic progression by multiples of seven--a mathematical relationship developed by the urban geographer Walter Christaller³⁴ (fig 10).

Average Population	Ratio	Log. 6	Ekistic Unit
1			Man
2	1:2	0.387	Room
4	1:2	0.387	Dwelling
40	1:10	1.286	Dwelling Group
250	1:6.25	1.023	Small Neighbourhood
1,500	1:6	1.000	Neighbourhood
7,000	1:6	1.000	Small Town (9,000?)
50,000	1:5.55	0.952	Town
300,000	1:6	1.000	Large City
2,000,000	1:6.66	1.059	Metropolis
14,000,000	1:7	1.086	Conurbation
100,000,000	1:7.14	1.097	Megalopolis
700,000,000	1:7	1.086	Urbanized Region
5,000,000,000	1:7.14	1.097	Urbanized Continent
30,000,000,000	1:6	1.000	Ecumenopolis

Figure 10

Ekistic territorial and population scale

³³ Other ways of classification of elements, which were mentioned but not extensively developed, included classification a) by function (living, sleeping, production, industrial, commercial) b) by evolutionary phases (nomadic, agricultural, urban, industrial) c) by factors and disciplines (money, financing, organization of labor, building industry, land tenure, legislation, etc.) All these classifications were meant to be seen in combination with one another, to form an understanding of the process of growth of settlements. See *Ekistics: An Introduction*, p.33-43.

³⁴ Note, also, the conceptual similarity between the Ekistic units and the units of analysis on which Modernization theory was based (individual, local community, national territorial scale, international scale).

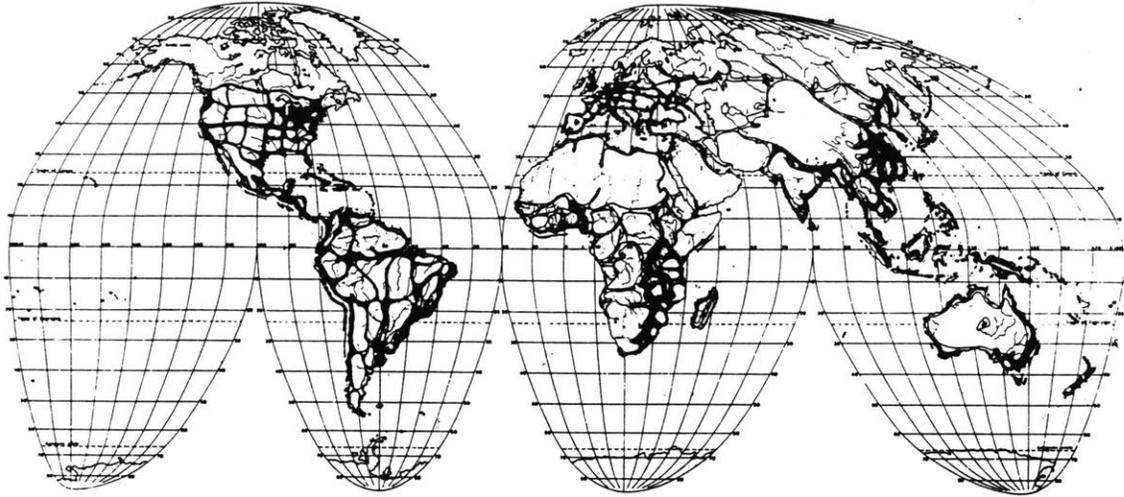


Figure 11

"Ecumenopolis, A.D. 2100." Prediction of Ekistics for the future development of the globe (The density of shading represents density of population).

The last four sizes of settlements in the Ekistic scale were assumed to be urban agglomerations that would emerge in the future. The largest population unit of all, the "ecumenopolis," would encompassed the entire world as an urbanized region. Doxiades believed that in the future, the entire earth would inevitably become a "continuous system forming a universal settlement."³⁵ This theory had been based on observations of the developed industrial countries, like the Great Lakes Megalopolis in North America and the Randstadt region in Holland. Doxiades attempted to define the maximum population for the ecumenopolis that could cover the world's habitable surface, concluding that 22 billion would be a practicable maximum population under reasonable conditions, but he did discuss the possibility of a maximum of 69 billion.³⁶ Based on these projections, the ultimate objective of the rational universal guidelines which Ekistics attempted to implement was to establish "a coherent conception" of the future developments of ecumenopolis so that "man has full control".³⁷ (fig.11) As Doxiades stated:

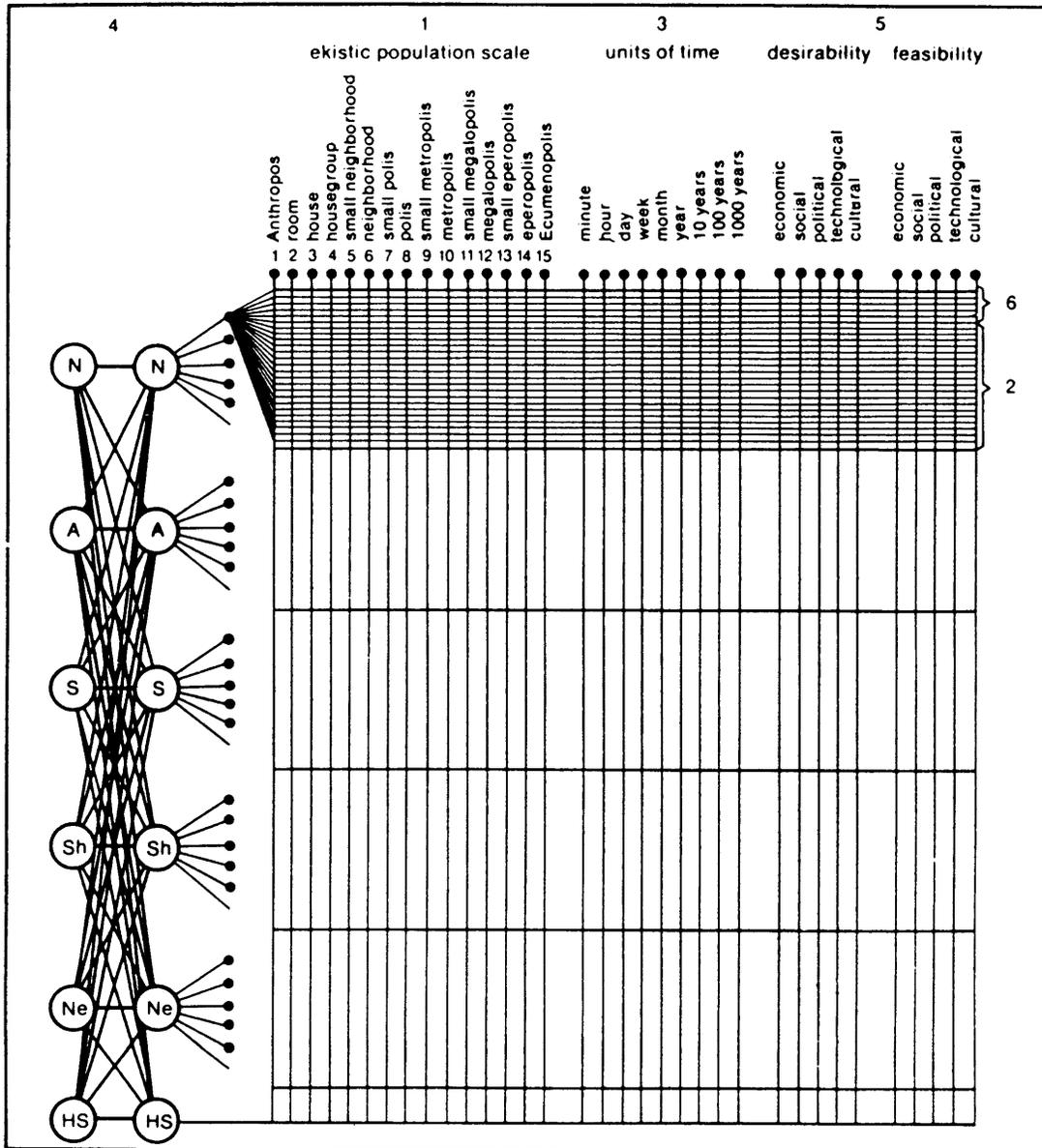
"If we develop the globe scientifically, our march into the future will lead towards a humane ecumenopolis based on a global ecological balance. It will serve and respect human goals and values and enhance the quality of life."³⁸

³⁵ *Ecology and Ekistics*, p.xxi.

³⁶ *Ecology and Ekistics*, p.80-81.

³⁷ *Ecumenopolis*, p.126.

³⁸ *Ecology and Ekistics*, p.13.



1. ekistic population scale
2. ekistic territorial scale
3. ekistic time scale
4. ekistic elements
5. aspects
6. principles

Figure 12:

The anthropocosmos model. The two dimensions of the grid were defined by the two primary categories of Ekistics: The ordinate was defined by the five Ekistics elements (where their synthesis constituted the sixth ordinate) and the abscissa was defined by the territorial and population sizes, and, in addition, by the factors of "time" "desirability" and "feasibility".

Anthropocosmos model:

The most comprehensive system that the Ekistic method used to organize all knowledge generated about human settlements was the anthropocosmos model³⁹ (fig 12). Largely grounded on the encyclopedic tradition of the European Enlightenment, reaching back to Diderot, and other systems of taxonomy which aimed at capturing, ordering and objectifying their object of study, the anthropocosmos model attempted to identify and categorize relationships of all principal characteristics of settlements and regions, people and activities into an all-encompassing matrix. It classified all types of settlements taking into account size, area, population density, functions, and other characteristics such as growth and decline.⁴⁰ The "growth" of human settlements was defined in terms of the set of referents of the anthropocosmos model which served to map the experience of changes through time.

The anthropocosmos model was a development from previous attempts made in this century to encompass the totality of urban problems and set the framework for design. The first attempt was made by Patric Geddes⁴¹ who developed diagrams that expressed the evolution of the city. "The Notation of Life," Geddes's synthetic grid, attempted to establish a comprehensive universal guide to social evolution and tendencies in progress which could then be used as tools of urban analysis (fig.13). Geddes had been influenced by Le Play's earlier attempt to relate three different fields of scientific investigation-- Geography, Economics, and Anthropology--in terms of a simple interaction between Place, Work and Folk. Geddes treated Le Play's categories as a formula that explained life processes which would be expressed in terms of Environment, Function and Organism: i.e., "Environment acts, through Function upon the Organism". He then extended this to include the inverse, i.e., "Organism acts, through Function, upon the Environment," a

³⁹ "Anthropocosmos" was a term coined by Doxiades to define the world of "anthropos," as distinguished from the greater world beyond the human reach.

⁴⁰ A smaller version of the anthropocosmos model is the Ekistic grid which became the trade mark of the journal *Ekistics*. The grid was a chart that classified each article of the journal *Ekistics* with respect to the Ekistic factors it synthesized. First of all, the article was classified with respect to the scale of the settlement it dealt with--selected among fifteen Ekistic units. Then the article was classified with respect to the subject--selected among the five Ekistic elements which were then subdivided into four subheads. Each article collected a number of dots on the Ekistic grid which represented a "measure" of the issues the article tackled.

⁴¹ Geddes, *Cities in Evolution*, London 1949 (1915). Geddes was perceived as a father of social theories underlying modern town and country planning. His book, *Cities in Evolution*, was originally written in 1915, but then remained out of print for more than thirty years, until the period following the second world war, when his ideas regained their influence. *Cities in Evolution* was reprinted in 1949 under the supervision of Jacqueline Tyrwhitt--who later wrote extensively on the Ekistic method and became the chief editor of the Journal *Ekistics*.

Operative Acts: The Town			Executive Deeds: Utopia		
PLACE	Place Work	Place Folk	Achieved Polity	Achieved Synergy	ACHIEVEMENT
Work Place	WORK	Work Folk	Synergized Polity	SYNERGY	Synergized Achievement
Folk Place	Folk Work	FOLK	ETHNOPOLITY (Love)	Politized Synergy (Wisdom)	Politized Achievement
Feeling Sense (Home)	Feeling Experience (Mastery)	FEELING	EMOTION (Mysticism)	Emotioned Ideation (Philosophy)	Emotioned Imagery (Poetry)
Experienced Sense	EXPERIENCE	Experienced Feeling (Folkways)	Ideated Emotion (Doctrine)	IDEATION (Science)	Ideated Imagery (Design)
SENSE	Sensed Experience	Sensed Feeling	Imaged Emotion (Symbol)	Imaged Ideation (Mathematics)	IMAGERY (Imagination)

Directive Facts: The School Reflective Dreams: The Studio

Figure 13
Patrick Geddes' diagram, "The notation of life"

	10 Environment Physical, Historic and Demographic Data	11 Land Use Rural and Urban, Existing and Projected	12 Building Volume 3-Dimensional City Structure	13 Community Facilities	14 Ethics and Aesthetics	15 Economic and Social Aspects
Living						
Working						
Recreation						
Transportation						
Miscellaneous						

	16 Legislation	17 Finance	18 Stages of Realization	19 Miscellaneous	20 Rational Reaction Client, Public, and Authorities	21 Emotional Reaction Client, Public, and Authorities
Living						
Working						
Recreation						
Transportation						
Miscellaneous						

Figure 14
Le Corbusier's CIAM grid

process which he later described with more descriptive terms--Polity, Synergy (willed act towards a specific end) Achievement. Furthermore, he added the physiological and biological factors acting on life processes, as well as the psychological and cultural factors, to create a grid with thirty six divisions which could be subdivided to four equal components of nine divisions.

Geddes's matrix was similar to the anthropocosmos model in that it attempted to develop a universal model that synthesized urban processes, and also tried to accommodate modifications according to the characteristics of each local case. As Tyrwhitt suggests, However, Geddes's grid was perceived by Doxiades as "confusing" and "doubtfully scientific," as well as limited in scope because it was relevant only to the study of individual projects and places. The second grid, developed by Le Corbusier (CIAM grid), was also limited to individual projects since it was used to classify Le Corbusier's own architectural and planning practice (fig. 14) Doxiades's anthropocosmos model was the first one to try to address the complete spectrum of human settlement sizes--from the single human being to the world-encompassing city of ecumenopolis.

The anthropocosmos model was the fundamental basis for the investigation of existing situations and the formulation of policies for future development. Operating in diachronic and transcultural dimensions, the investigations of Ekistics generated fantastically detailed maps of the world's regions, conducted meticulous analysis of their configurations in past periods in history, and offered predictions for the future relative sizes of cities and regions: e.g., "Expected urban and non-urban population for USA in 2000", or, "Formation of global population in 2200" etc., The predictions ventured in the various Ekistic studies extended from how New York would be in year 2000, to Lahore's transformed urban form in 2200. These predictions, along with additional analysis of each region's economic development prospects etc. formed the basis for the development of guidelines for global planning of human settlements (fig 15&16).

Like economics, an editorial in the journal *Ekistics* argued, which has a system for measuring all its phenomena in terms of money, gold, etc., the Ekistic theory aspired to establish scales to measure all the complex phenomena that affect it.⁴² The editors of the journal admitted that the theory sometimes encountered difficulties in quantifying the data of its research and its articles into its charts, but they expressed the hope that with the

⁴² *Ekistics*, July 1975, p.1.

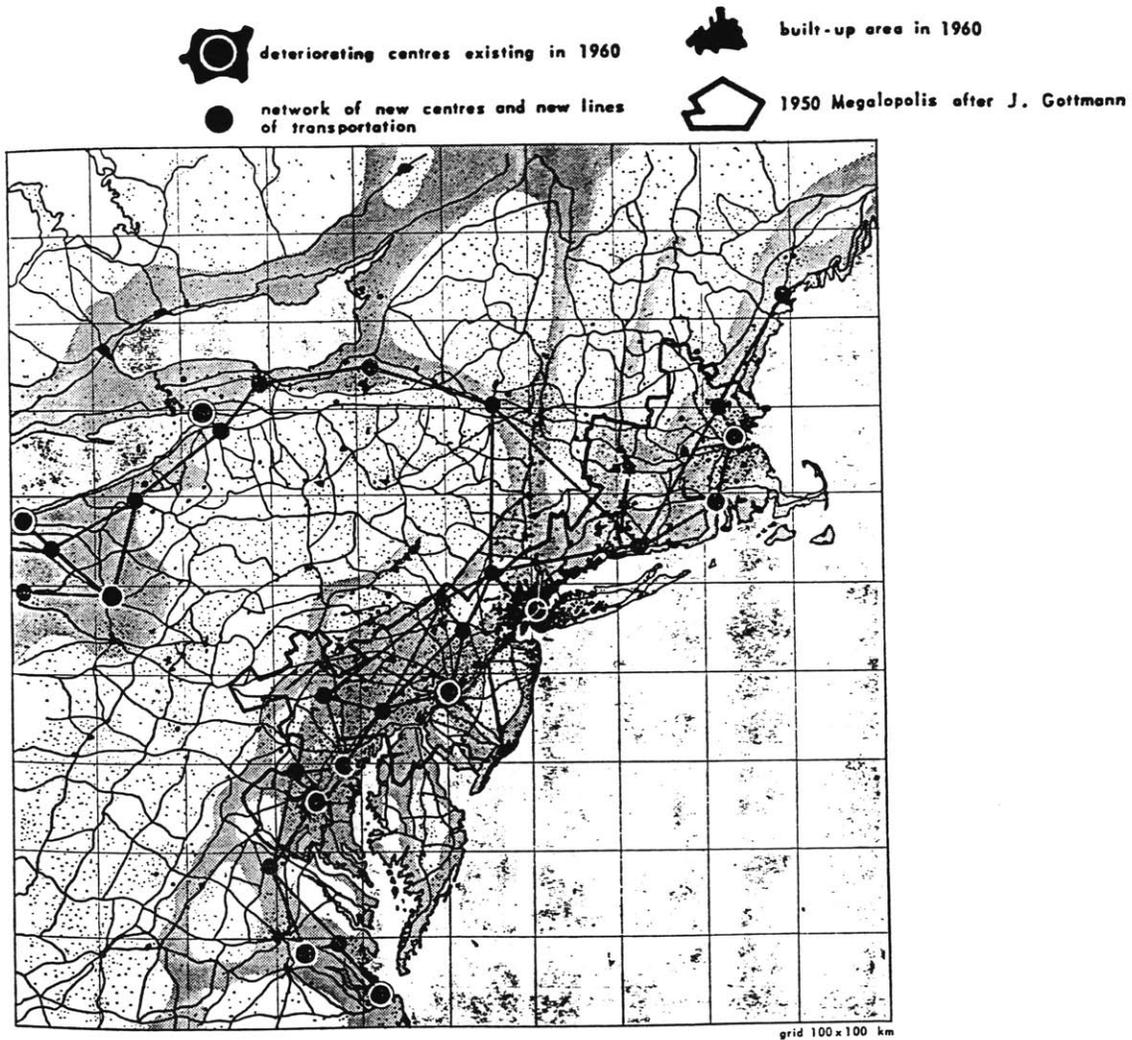


Figure 15
North-Eastern branch of Ecumenopolis

refinement and expansion of the Ekistic theory, all data would ultimately be encompassed into a scientific system.⁴³ In an editorial to the journal, Doxiades himself spoke of his aspiration to formulate a “social calculus” which would measure the social parameters of the human settlements and would guide social policy. This calculus would be explained by scientific facts in a way comparable to economic and engineering data.⁴⁴

⁴³ Even the journal’s extensive reference to ancient Greek and its exaggerated emphasis on etymological analyses of Greek roots is tied to the journal’s preoccupation with scientific analyses. It reflects a search for the “pure” “precise” (and, by extension, “scientific”) meanings of words.

⁴⁴ Ekistics, July 1959, v.8, p.33.

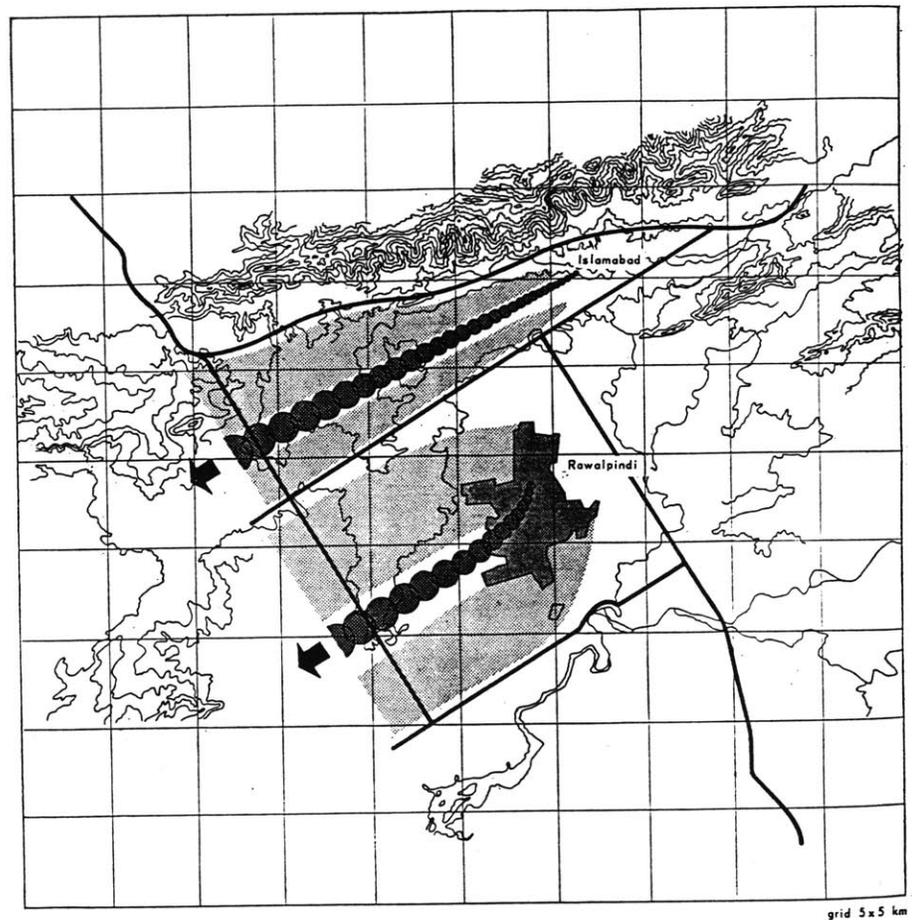


Figure 16

"Dynamically growing Dynametropolis." Ekistic study of the future development of Islamabad, Pakistan (1960).

Despite its elaborate divisions, the Ekistic system of classification (anthropocosmos model) was locked into a singular mode of analysis and failed to anticipate the diverse developments of the world's human settlements. The Ekistic scale's organization of communities as settlements was simplistic in the connections it drew between settlement types and population. The actual relationship between the territorial and population sizes of communities and their economic, technological, social and cultural development are immensely varied and could not be encompassed by the Ekistic scale. The population scales of Ekistics are often idealised mathematical abstractions. As deMartins points out, the family unit of five is too big for some countries and too small for others; a "small

metropolis" of a half million could be a "big metropolis" in some developing countries due to differences in public services, housing, and general standard of living (fig.16). Furthermore, how could the Ekistic scale account for the realities of new nations with less than a hundred thousand inhabitants, or political entities like Monaco and San Marino, for example? According to the Ekistic scales, they should be classified as neighborhoods. Furthermore, the Ekistic scale did not recognize the geographical differences of regions. It did not differentiate between Australia's 8 million km, South America's 20 million km, and Europe's 3 million km.⁴⁵ When juxtaposed with the realities the world's composition, the basic moduli of the Ekistic scale do not really correspond to actual counterparts in any country.

Doxiades's charts are often rigid and artificial because they treat the population densities as an idealized mathematical abstraction rather than as an ever-changing urban reality. The predictions of the Ekistic population scale assumed a constant population increase which could reach up to 69 billion inhabitants. He did not anticipate any decrease in the population growth through population control. Current predictions postulate that by the last quarter of the XXI century, the world, will come to a balanced population 10 per cent of the size of the ecumenopolis postulated by Doxiades's Ekistic population scale. Most predictions and the planning decisions on human settlements that hinged on the rigid (and evidently false) basis of the Ekistic population scale, prove unrealistic. In fact, the very notion of the Ecumenopolis, which conceived the development of the world as a unilinear progressive change was, after all based on a utopian perception of development.

The Ekistic calculations assumed urbanization was an irreversible process and that the culmination from metropolis, megalopolis, eperopolis to ecumenopolis, was inevitable. However, the demographic concentration of cities, although it may have appeared efficient at some point, eventually became very inefficient, and costly. The efforts made in the resettling of some cities and in the planning of others to establish rigid zoning--industrial districts, civic center, commercial exchanges, residential areas--did not offer positive results. The Ekistic projections of the irreversible growth of cities and its prescriptions for zoning organization could not account for phenomena such as the rise of American suburbia, the subsequent decentralization of cities, or the decay of inner cities, all of which changed the nature of the growth of metropolitan centers in ways the Ekistic linear projections did not accommodate. In short, the scales and mathematical exercises of Ekistics

⁴⁵ Ivan Pedro de Martins, "Random Factors: Ekistics, Ecology And A Think Tank", p.145.

<i>EPS unit</i>	<i>Settlement class</i>	<i>Persons</i>			
15	Ecumenopolis	69	206	436	005
14	Eperopolis (continental)	9	886	633	715
13	Small eperopolis	1	412	376	245
12	Megalopolis		201	768	035
11	Small megalopolis		28	824	005
10	Metropolis		4	117	715
9	Small metropolis			558	245
8	Polis			84	035
7	Small polis			12	005
6	Neighbourhood			1	715
5	Small neighbourhood				245
4	Housegroup				35
3					5
2					2
1					1

Figure 17

Ekistic population scale. Later development of the Ekistic population scale which anticipated an Ecumenopolis of 69 billion.

attempted to project into the future, while they failed to anticipate any reversal or inflection of the changes they projected.

The Ekistic method did not only fall short in its rigid and linear analysis of variables relating to each regions' aspects of social culture and structure, but it also largely underestimated the mechanisms of trans-cultural influences upon social change. It focused predominantly on calculating development processes within national territorial states--an attitude which, as mentioned earlier, was an influence from modernization theory. As Tipps argues in his critique of the post-war modernization theory,

"Any theoretical framework which fails to incorporate such significant variables as the impact of war, conquest, colonial domination, international political and military relationships, or of international trade and cross-national flow of capital cannot hope to explain either the origins of these societies or the nature of their struggles for political and economic autonomy--struggles, it should be added, which all societies face, though perhaps in varying degrees and contexts at different historical moments."⁴⁶

III. The implementation of the Ekistic Method in Planning

All master plans of new cities or projects within existing cities that Doxiades Associates designed were guided by the scientific framework of analysis and prediction of the Ekistic theory. The model cities of west Baghdad, Kirkuk, Islamabad were inserted within the

⁴⁶ See Tipps, "Modernization and Comparative Study of Societies", p.212. Tipps points this out when he talks in general about modernization theory.

prospective global system of Ecumenopolis, and were structured in a way that would ensure the city's engagement with global processes, which was expected to achieve optimum productivity, efficiency, transportation integration, and economic growth. The Ekistic framework of prediction attempted to predict changes in regional patterns and to define which areas would develop in the future, where housing projects should take place etc.

"Programs of action have to be decided according to the new patterns of settlements to be developed. This makes it necessary to understand the character of every area and the phase of development which its settlements are going through at a given moment. These types and phases of areas can be classified in the following categories:

- a. Areas which are developing and where development is justified economically.
- b. Areas which are developing but where development is not justified economically and will not continue.
- c. Areas which are stable and where this stable position is justified.
- d. Areas which are keeping stable but whose stability is not justified and therefore it will be upset later, upwards and downwards.
- e. Areas which are depressed and this is economically justified because there is no possibility to develop them economically.
- f. Areas which are depressed unjustifiably simply because they have been overlooked, have not been aided and where existing natural potentials are going to create a much more important development later and turn them from depressed into fast-developing areas.

It is obvious that policies have to be decided for every such area...after a real understanding of the phase they are in. On the basis of such policies the sizes of settlements at present and in the future have to be decided and only then the functions within them can be determined as well as the action to be taken for every one of them."⁴⁷

The above quote is indicative of the rigidity of the Ekistic classification rules which governed the Ekistic theory's planning proposals. This mentality is not only reflected on a regional scale but also on a smaller urban scale where Doxiades's new cities were broken up into distinct parts based on very strict zoning rules that were meant to make cities more "manageable", "efficient" and "humane", but, instead--as its critics argue--this definitive control and division of function created sharp demarcations and social segregation between different parts of the city.⁴⁸

In his critique of Doxiades's plan for Islamabad, Imran Ahmed interpreted the functional division of the new city into a central administrative area on the one hand and a purely

⁴⁷ Doxiades, "Mass Housing in rapidly developing tropical and subtropical areas" *Report for the International Council for Building Research Studies and Documentation*. p.13.

⁴⁸ See, for example, Richard Meier, "Islamabad is Already Twenty-five", and Rabia Specht, *Islamabad/Rawalpindi*.

residential area on the other, as the cause of the socio-spatial segregation that exists in the city. The first sector, Ahmed argues, which was further organized into sub-sectors for different functions, fulfilled the interests of the military bureaucratic authority and became a city for the "pure." The latter sector was exclusively residential and was subdivided again and again according to income distribution, as a way to determine the subsequent development of the city's housing (fig.18&19). Ahmed describes:

"Each sector was conceived as a self-sufficient community with its own municipal administration and institutions. The functional structure was to be organized into three categories: First, the class V center, holding the public and private administrative functions such as municipal administration, offices, banks, etc., and a large shopping center. Social facilities such as college, a health center, restaurants, movie theaters etc. are also provided within the center, in order to serve the whole population of one sector. Second, the class IV center, which was represented in each sector, provided a secondary school, a shopping center and a mosque. And finally, the class II center consisted of a primary school, a collection of shops, a tea house and a small mosque."⁴⁹

As a result, the residential divisions were classified as static communities, in contradiction to the larger intention of the master plan to accommodate "dynamic growth." The social and functionalist divisions of the master plan of Islamabad, reflected in many ways the logic of the English new towns after the second world war. Ahmed indicates, furthermore, that the ecological concerns that were claimed to constitute the grounds of the Ekistic theory were contradicted by the imposition of a universal grid which "severed any sensitivity to the landscape or to other specificities of the site."⁵⁰

The Ekistic methods of classification, analysis and planning were implemented in numerous countries worldwide. The next section will study more closely the impact of Doxiades's method in the Middle East.

⁴⁹ Ahmed, p.102.

⁵⁰ Ahmed, p.101.

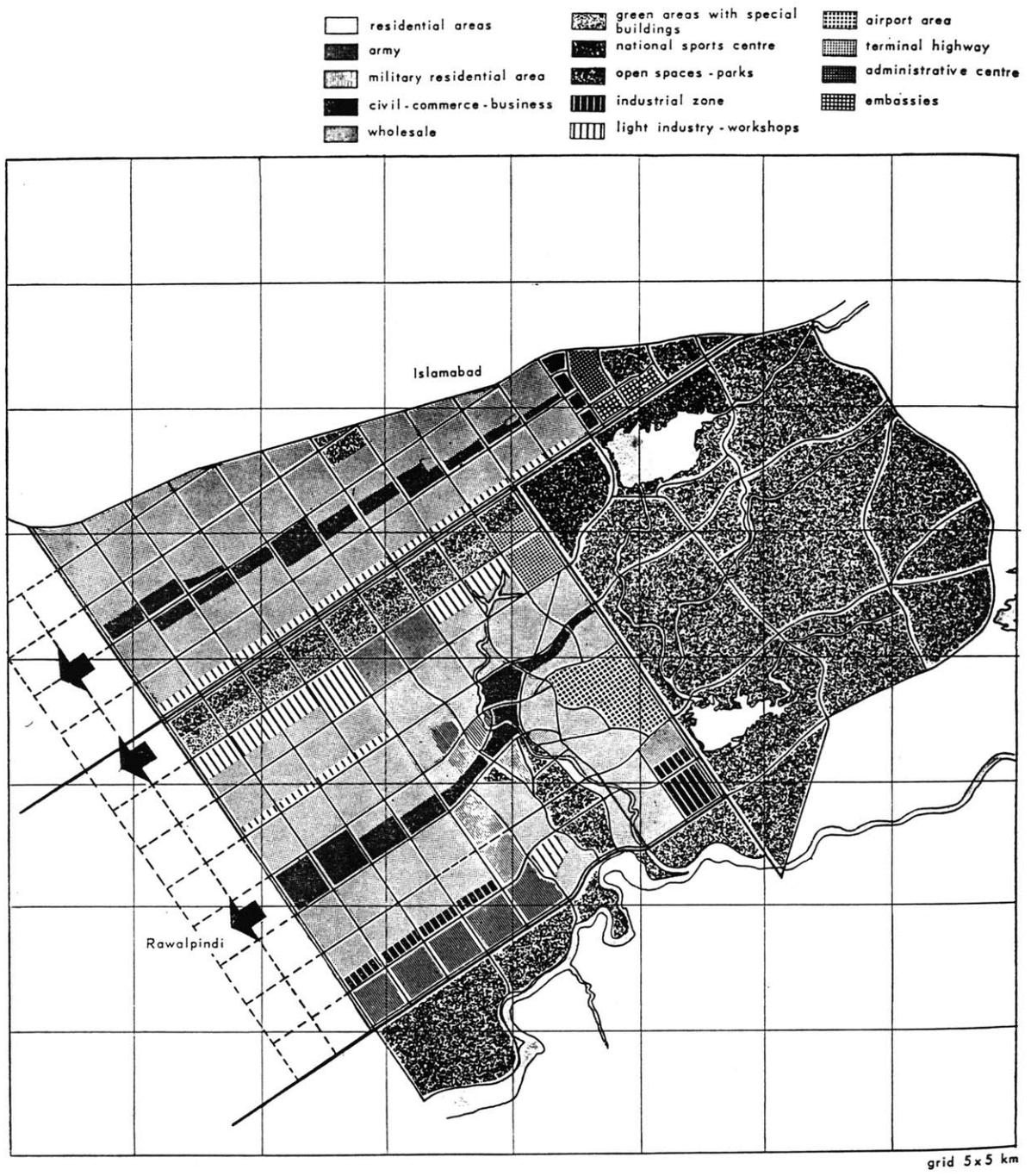
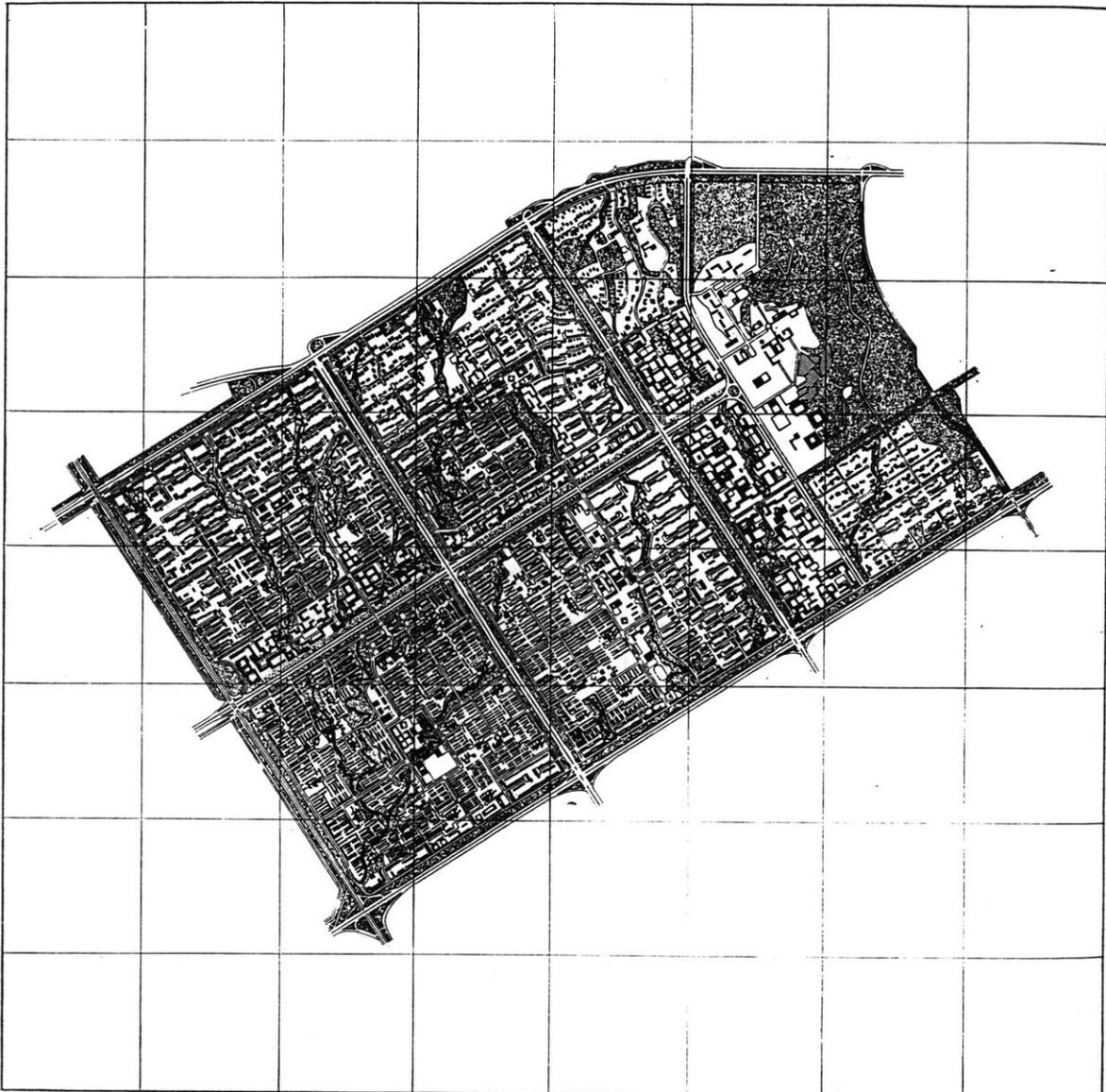


Figure 18
 "Typical Dynametropolis." Master plan of the metropolitan area Islamabad, Pakistan (1960).



grid 1 x 1 km

Figure 19

"Shells and Networks of Dynametropolis." The first four sectors (communities class V) Islamabad, Pakistan (1960).

Ekistics in the Middle East

This section will discuss the circumstances in which Ekistics flourished in the Middle East, describing the new urban conditions that emerged. Furthermore, it will discuss the particular forms Ekistics took, and the impact it had within the region.

The creation of new individual states in the Middle East--emerging out of the Ottoman empire at the turn of the century, and later, the independence of many parts of the region from the European colonial domination in the post-second world war era, brought new conditions and new problems of economic development, political stability, and social and cultural change. The fifties and sixties found the Middle East as a prominent actor in the political international scene and the Middle Eastern society experienced processes of capitalist development--expanding international trade, increasing agricultural transformations, formation of new institutions, and the beginnings of modern industry. Society began to be organized in a distinctively modern way--divided into components that distinguished between the sphere of the state and the sphere of the society, separated with respect to class, etc.⁵¹ Because of the need to control new national territories and the desire to promote grand programs of economic development and social welfare under the auspices of the state, the modern Middle Eastern states were characterized, as a rule, by a growth of state power and administrative expansion. With further stimulus by foreign aid, (and local oil wealth in some cases), numerous governmental programs were implemented to face the rapid modernization--in Egypt, starting in the early fifties, in Iraq in the late fifties, in Syria and Algeria in the sixties, followed by Libya, Saudi Arabia, etc.

The expansion of the oil industry in parts of the region and the consequent influx of peoples from different cultures, put its development and urbanization on an even faster track. The population gravitated towards urban and industrial centers, creating unprecedented congestion in big cities while the upward mobile classes of urban dwellers, industrial workers, and managerial officers created new and higher demands for housing. Similar to the earlier western experience, this phenomenon signaled the emergence of new concerns in urban environments of the Middle East (and of developing regions in general) which ranged from socioeconomic problems of housing shortage, poverty, unemployment, to biological problems of ill health, administrative needs for transportation and civic services and technological problems of water supply, pollution and waste-management.

⁵¹ See Owen, *State, Power and Politics in the Making of the Modern Middle East*.

Third world countries in general, and the Middle East in particular, experienced an especially difficult process of urbanization because it was faster and more chaotic. Settlements for housing people and accommodating their multiple needs and activities became an increasingly focal concern for local governments as well as the international community.

At that time, various fields of social and economic practice promoted a discourse on developmental policies throughout the world. Government plans, United Nations policies, private financial institutions, economic commissions, and agricultural plans, all aspired to a set of objective and universal standards that would formulate and implement social and economic change. Common to all the different approaches was the valorization of scientific methodology which infiltrated, at that time, a wide range of disciplines, from economics to psychology and from sociology to architecture. The United Nations proclaimed the development decade (1961-70) and--along with American government agencies and the generous support of private foundations--encouraged and facilitated research about "underdeveloped" regions on earth and subsidized their development through economic commissions, agricultural plans, etc. Doxiades attended many United Nations seminars on human settlements as Greece's representative and provided the United Nations with consultation on development of "underdeveloped regions." He became involved with numerous international development plans, arguing persistently that the provision of sufficient human settlements in developing regions should be the first step in the implementation of national and international development programs that were under way at the time. The Athens Technological Institute instituted the "School of Ekistics" which was specifically geared towards training workers for the specific social, material and economic issues involved with human settlements in developing countries. Very soon, Doxiades became a specialist for development, and the theory of Ekistics a primary reference on the subject. Ekistics was taught in universities, included in various governmental programs, and incorporated in the agenda of "The Habitat," the United Nations conference on human settlements. Doxiades Associates rendered services to governments and governmental agencies (75% of the value of contracts of all DA projects), international organizations (12% of value), public, and private organizations, municipalities, research and educational institutions, large companies, etc.⁵²

⁵² Among the International Organizations that were clients of Doxiades Associates were: the United Nations, the United Nations Special Fund, Food and Agriculture Organization, International Bank for reconstruction and development, International Cooperation Administration, Agency for International Development and the Ford foundation. Governments that were clients: Ethiopia, Ghana, Greece, Brazil, Iraq, Lebanon, Libya, Pakistan, Spain, Sudan, Vietnam, USA. Municipalities: In Greece, Cyprus,

The Ekistic goal to structure a socially, economically and ecologically viable urbanized world became more emphatically important in third world regions. The planning of new human settlements in modernizing regions became a very crucial component of the Ekistic effort to control global urban development because advancement of those regions would introduce altogether new economic and social dynamics as well as tremendous global environmental changes. Fearing that the earth's resources could not afford more development to be as extravagant as that which western industrialization had already imposed on global ecology, Ekistics became concerned with facilitating the advancement of developing countries without over-use of resources.

"If in becoming rich a European nation has done away with two thirds of its wildlife, as many have, it cannot insist that to maintain global balance some African countries should retain every single part of their wildlife--and remain poor in consequence...If there is to be a global balance, there must be a proper and realistic distribution of resources and obligations."⁵³

Ekistics was thus intended to outline a "scientific management" of the resources of the earth so that both development and ecological preservation could coexist without distrusting each other.

As one of the most rapidly growing regions with intense demands on housing and economic development, the Middle East became of particular importance to Doxiades's enterprise. Doxiades maintained that the task of providing proper human settlements was so urgent and difficult that it should be performed in cooperation under the auspices of national scale policy-making. For this reason, and because Doxiades's theory touched on the very burning concerns of the Middle East government administration about housing, economic development, and urban infrastructure, his approach became very appealing to local governments. Propounded with the legitimacy and authority of the Ekistic scientific analyses, the projects and studies of Doxiades Associates were extensively implemented.

Doxiades Associates launched many projects in the Middle East: It offered consulting for the International Bank for reconstruction and development (Syria, Jordan). It worked for the governments of Iraq, Jordan, Lebanon, Sudan, and Syria⁵⁴ preparing master plans for a number of cities. For example: For the Development Board of Iraq, they provided

Pakistan, Spain, U.S.A.. Public and private organizations: Harvard University, University of Aleppo, Syria.

⁵³ Doxiades, *Ecology and Ekistics*, p. 41.

⁵⁴ From *Ekistics*, October 1963.

housing schemes for many urban and rural areas--they provided a master plan for a new city of 100,000 inhabitants in western Baghdad, they provided a master plan for Kirkuk, plans for 24 villages, etc. Furthermore, they designed a large number of primary and secondary schools in Iraq and Lebanon, and designed the general master plan for the university of Aleppo, Syria. They provided advice on agricultural development, made feasibility studies, designed industrial plants, community facilities and other projects to improve the infrastructure of many areas. For example: For the government of Sudan, they made a comprehensive land and water use survey and suggested how to improve the use of resources; they made studies on irrigation systems in Libya; designed systems for water supply in Iraq, Lebanon and Libya; they gave consultation on electricity distribution systems for Baghdad, Mosul, Basrah, in Iraq, Marsa el Brega in Libya, Tripoli in Lebanon, etc.; they designed highways and community roads in Iraq and Pakistan.

When dealing with the Middle East, Doxiades's enterprise became involved with the particular problems and demands of the region--immense housing shortage, lack of modern construction materials and techniques, rapid economic advancements etc. These were most extensively dealt with in the journal *Ekistics*--which was the most widespread venue for the Ekistic enterprise. The journal was extensive in addressing a variety of the concerns of the Ekistic theory that did not only focus on large scale planning or built projects, but were devoted to exploring a multitude of specific concerns involved in the design of dwellings, construction techniques or infrastructural needs as they pertain to the Middle East.⁵⁵ The material for the journal was selected from articles sent by correspondents, to *Ekistics* research stations, university departments, or UN technical experts. Grounded on the Ekistic theory's scientific mode of research and analysis, the articles hosted in *Ekistics* accumulated a systematic body of knowledge that suggested solutions for the social, economic, and ecological success of "total" settlements in the region.

The topics in *Ekistics* spanned from climatic concerns, and sanitation issues to outlining techniques for water purification and for economic use of solar energy, to discussing ways of increasing building production using local methods of construction, to exploring how to create new materials based on local raw materials. Various studies in *Ekistics* defined, for

⁵⁵ See, for example, Doxiades's statement: "...the increase of production which is required dictates much greater use of local methods of construction and in a better way; much greater standardization in implementation; more research, new materials based on local raw materials. This requires a great zeal of effort and research which is very seldom done and hence great local resources, materials and skill, remain unexploited" (See Doxiades, "Mass Housing in rapidly developing tropical and subtropical areas" Report for the International Council for building research studies and documentation, p.7)

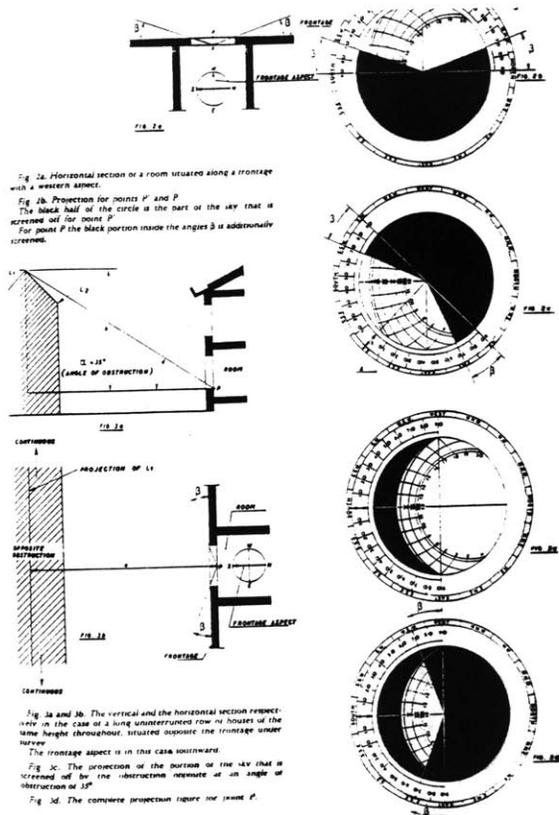


Figure 20

"The Sunlighting Rule" (*Ekistics*)

example, the appropriate cross ventilation, the climatic sensibility, or lighting, for various types of dwellings in different climates--e.g., "Window and ventilation openings in warm and humid climates" or, "The Sunlighting Rule: a technique for predicting sunlighting and daylighting". Other articles suggested ways to minimize dependence on mechanical methods of climate control--e.g., "Planning in Persian Oil Towns: Rigors of Climate and Economy"⁵⁶, "Passive cooling" (fig. 20-23). They described irrigation systems and water supply. They offered consultation on social policies, labor policies, economic gains. Articles pointed to the issues involved in the increase of the building industry, discussed how to produce new materials for new needs, how to train workers or finance a project.-- e.g., "Standardization tests for earth block construction." Similarly, in his projects, also, Doxiades encouraged the use of new types of materials and new methods of construction, transforming the building site into training workshops for help.

⁵⁶ Contributed by Jane Drew, *Ekistics*, June 1960, pp. 51-56.

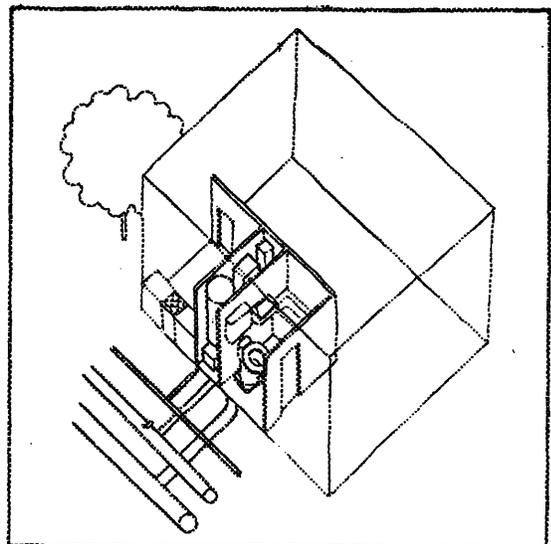
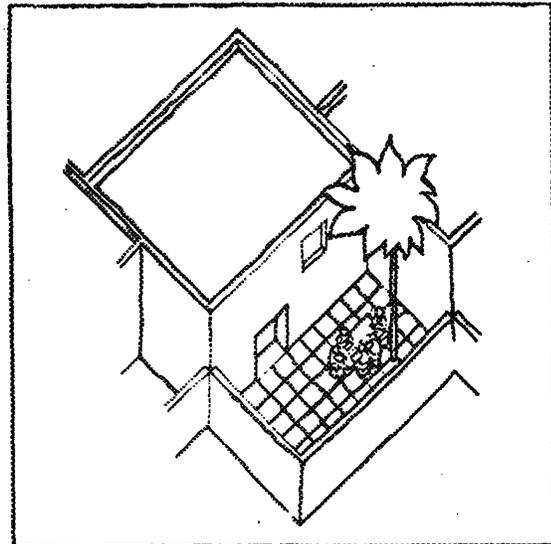
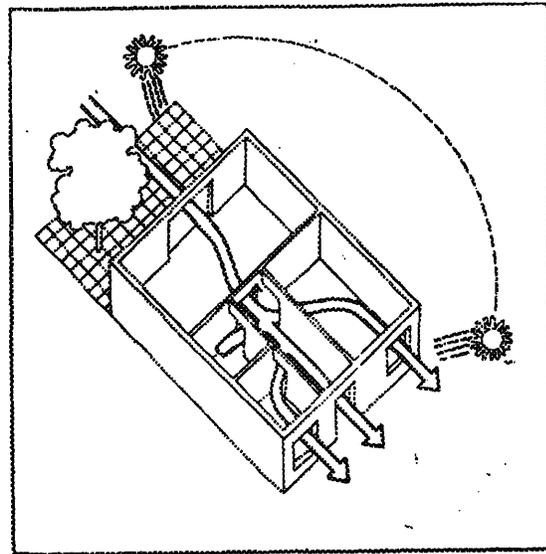


Figure 21

**Dwelling Recommendations:
(Ekistics)**

(top) "Each family dwelling should be open to the air and (have) views in at least two directions to permit cross ventilation and light, and a sense of space and time."

"The design of the dwelling should minimize dependence on mechanical methods of climate control."

(center) "Each Dwelling should have direct access to a private, furnishable outdoor garden, court, terrace, atrium, balcony, or roof space, preferably open to sky."

(bottom) Each dwelling unit should have basic utilities consistent with health and sanitation standards.

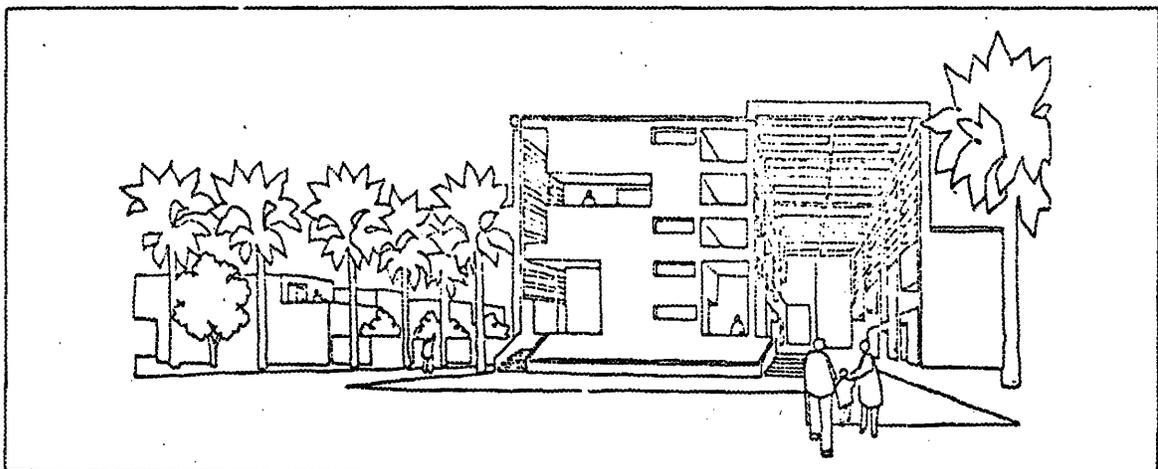
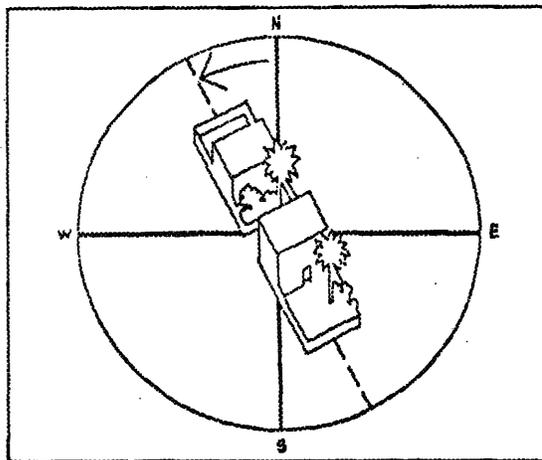
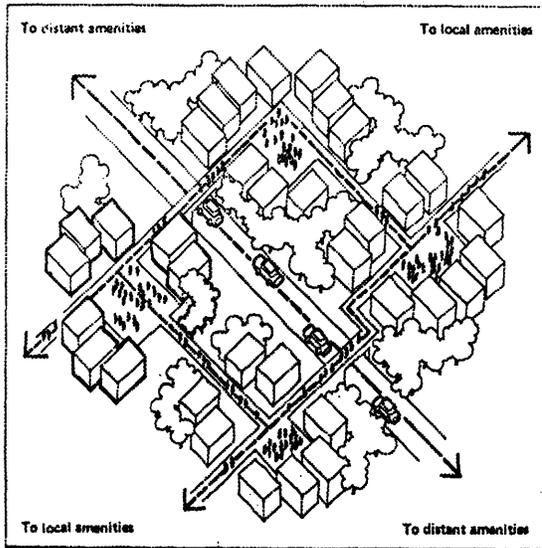


Figure 22

(top) "The cluster should be planned so that each dwelling and the common space related to it benefit and are protected by the prevailing climatic conditions." (*Ekistics*)

(center) "Correct solar-air orientation is an important consideration" (*Ekistics*)

(bottom) "The location, size and type of openings can greatly increase comfort conditions in dwellings." (*Ekistics*)

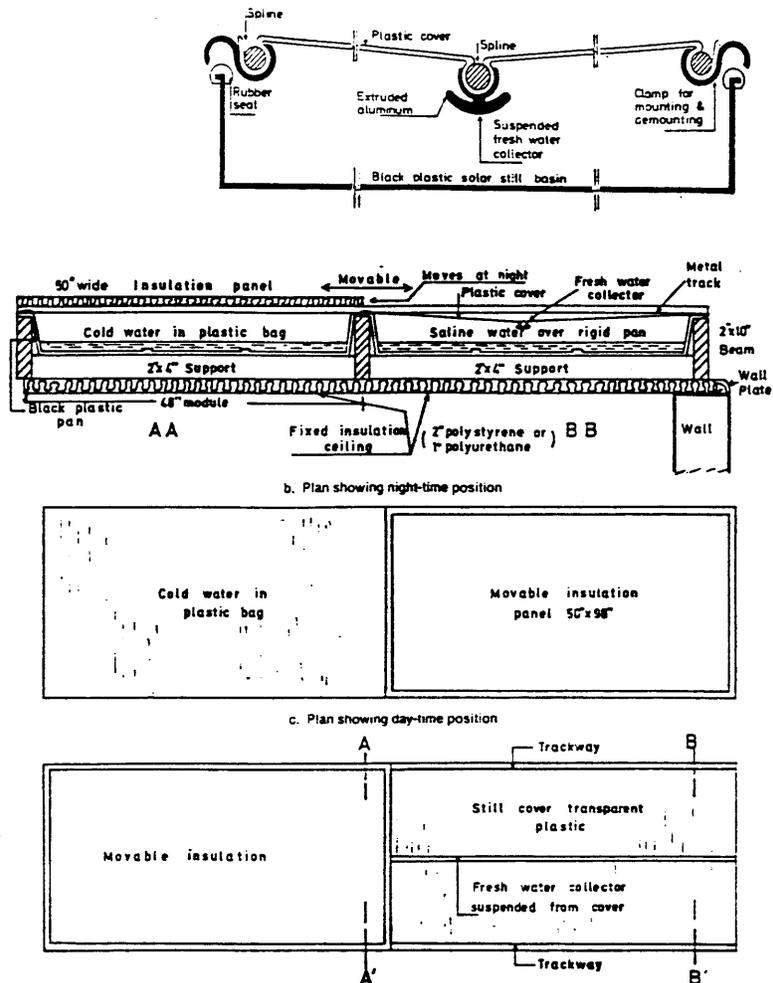


Figure 23

(top) "Solar roof still for desalination of water" (*Ekistics*)

(bottom) "Water cooler and storage combined with solar still" (*Ekistics*)

A *New York Times* article described some of the contributions of Doxiades's projects in Iraq to the demands of the country at the time:

"Iraqi housing authorities, instead of razing present slums and erecting tenements in their site, are creating groups of new sub-hamlets in the adjoining countryside to provide [a] close family and tribal relationship...The general planning, basic house design and supervision is in charge of the Greek engineering and planning organization, Doxiades Associates...One reason for the slow pace of the housing program has been the lack of cement and of wood and metal for wood and window frames and stairways. Another is the lack of skilled workmen. The first lack is being met by construction of two new cement factories and by experimentation with mixtures of mud and cement or clay and cement. The lack of skills is being remedied by on-the-job training, which every contractor is committed to provide, and by the creation of vocational training schools"⁵⁷

⁵⁷ Special report to the *New York Times* from Baghdad, May 14, 1958. Republished in *Ekistics*, June 1958, p.280-81.

The solutions and "directives" that Doxiades's practice and his journal outlined operated within the framework of the Ekistic models of analysis. All data of economic, social, and technical conditions of the region was gathered, sorted and interpreted based on the established set of categories of the Ekistic matrices and standards. The context of the Middle East was, in that sense, a "case" on which the universal Ekistic cognitive map was superimposed, with the tacit assumption that the development process of the Middle East could be inserted in the same categories and follow the same established path of development as any other part of the world.

Interestingly, the use of the "universal" scientific model of Ekistics was, for Doxiades the very *means* for understanding and meeting the particular needs of the Middle East. Far from seeing it as an imposition of an external method that would displace local traditions, the scientific approach was, to Doxiades a way of thinking that would lead to a deeper understanding of the specificity of each context and would resist the transportation of alien elements.

"...planners and designers who do not learn the scientific approach to the problems but the technique of solving problems of the countries where they are trained...become technicians able to work out certain examples of solutions but not the scientists to open new lines of thought and able to find the appropriate solution in every case..."⁵⁸

Furthermore:

"Our approach should be scientific; it is the scientific approach that we need; the approach which will allow us to recognize situations and then find the appropriate solutions and not the technique which will teach us how to apply known methods"⁵⁹

Also:

"When thinking of new and developing countries, of countries where there is no traditional or modern technique, we should not speak of modern conceptions, of modern architecture, but we should speak and think of local architecture which will have to be improved gradually and constantly, which will be more modern for the country, much more adjusted to the local conditions, will serve much more the people than what is called modern abroad."⁶⁰

In short, Doxiades saw the scientific method of his theory as the basis to prevent blind copying from external techniques. At the same time, it would still allow possibilities of

⁵⁸ Doxiades, "Mass Housing in Rapidly Developing Tropical and Subtropical Areas", p.6.

⁵⁹ Doxiades, "Mass Housing", p.7

⁶⁰ Doxiades, "Mass Housing", p.15

learning from previously existing studies which could guide the experimentation with local resources.

"There is no question that we have to use in the best possible way the experience gained abroad, but we should not transplant the findings as they would have been implemented in another country. We should study what has already happened in other counties and see in what way we can adjust it to the county we are concerned with. It is here, again, that we must use as much as possible every type of experimentation and carry out all possible research...I have seen so many cases of experimentation and research on problems already answered that I have to insist when speaking of research and experimentation that we must first evaluate the experience already gained before proceeding to new experiments"⁶¹

As defined in Doxiades's statements, the scientific method would sustain a continual play between local particularities and useful preexisting knowledge. As a *universal method* that could provide *local solutions*, Ekistics would not allow the unquestioned copying of alien techniques, while it would not valorize local techniques for the sake of coming "from within." This distinction in the Ekistic method resists interpretations of the method as one that offers scientific solutions that are merely "applications" of universal undifferentiated models. It acknowledges the value of local traditional solutions in that they too (like scientific methods) emerge from active critical attitudes of continual experimentation. Yet it incorporates traditional solutions only to the extent that they appear helpful, without clinging onto them as symbols of identity.

Despite the fact that the Ekistic method often ended up being bound by positivistic fact-finding and was confined by a universal model of analysis (at least on a generic level) its broader aspirations to accumulate a systematic body of knowledge on which to ground "a way of thinking"--as Doxiades put it--could also be interpreted as an effort to engage in a more open-ended study of the problems of the region. This is one of the most intriguing aspects of Doxiades's theory which reflects an intention beyond the prescription of solutions founded on a deterministic epistemology, to an attempt to ground *a process of inquiry* that would open up "new lines of thought" with respect to different conditions. A scientific method, in this sense, would be against any static conception of solutions--such as techniques, (or, for that matter, any doctrinaire ideologies of identity?)--which remain unchanged and absolute.

⁶¹ Doxiades, "Mass Housing", p.17

However problematic the implementations of Doxiades's method were, his attempt to raise the sensibility to the environment, to emphasize climatic concerns, to guide the utilization of local resources, etc., point to an interpretation of scientific method which is *not* a universal concept imposed under the guise of objectivity, but an analytical tool for exploring the needs of a place, in its struggle to face constantly increasing social and environmental demands.

Reactions to Ekistics (and Modernization) in the Middle East

During the sixties and seventies, local architects in the Middle East found scientific methods such as Doxiades's especially appealing as the basis of professional authority and legitimacy. While Doxiades's enterprise was flourishing in the Middle East, the journal *Ekistics* became a valuable "handbook" for local architects and was very widely received in academic circles. The Middle East Technical University in Ankara, for example, compiled its first of a series of monographs on City Planning from articles taken exclusively from *Ekistics*.⁶² These articles emphasized specific guidelines on housing design, e.g., "Habitat Bill of Rights"--National Committee for Human Settlements, Government of Iran, or, "Co-op housing, Baghdad: an evaluation and recommendations."

Later, however, while fifties and sixties modernism succumbed in its birthplaces in the West, the Middle East underwent new political and religious reorganizations. In this climate, Doxiades's work, along with most post-colonial interventions in the region came under scrutiny. The critique generally targeted the post-war modernist interventions in the Middle East for their aesthetic sterility on the one hand and their self-conscious ventures into social engineering and grand social developmental plans on the other. In a 1981 symposium, in Medina,⁶³ for example, which discussed the state of Arab city, a number of participants criticized the late modernist enterprise of the fifties and sixties for destroying the character of the "Arab" city and for presenting "grave threats" against its "Islamic Heritage." The retrospective accounts of local architects diagnosed "complete ruptures" between the structure of traditional environment and the "imported" interventions of western modernism and science.

⁶² See "Residential Areas in Cities: World Perspective", Compiled from *Ekistics* (1970-1980) published by M.E.T.U Faculty of Architecture Department of City and Regional Planning, Turkey.

⁶³ "The Arab City: Its character and Islamic Cultural Heritage." The proceedings of the symposium were published in *The Arab City*.

Often correct in their descriptions of urban problems in cities of the region--criticisms targeted projects of "urban renewal" for distrusting local heritage, mass housing projects for creating dormitory towns empty of social infrastructure etc.--such criticisms misplaced the blame on the premises of modernist methods and sometimes scientific approaches specifically, neglecting the fact that the reasons for the problematic architectural interventions they criticized often rested on other external influences such as the social conditions in the Middle East and the forceful technocratic agendas of the local state-governments, not to mention mediocre design. The western modern, along with its premises of rationality, universalism, progress, and secularization were seen as alien impositions, or even rendered suspect as a threat of cultural domination.

In his article, Youssef Belkacem criticized "modern architecture" for the "brutal mutation of the environment" and for creating alienating environments with none of the "intimacy", "quiet beauty" "purity" of vernacular architecture. He then argued that:

"This failing of a technology transfer applied to building and planning results from the domination of one economic system over another, one culture over another, a mass conditioning and *rapport de force* that lead one to believe there is no other civilization than one of alignment and alienation. Technical operation and aid only serve to create an illusion of human solidarity, and the North-South dialogue remains one of deaf-mutes.⁶⁴

In conclusion, Belkacem argued that the only means for escaping the Arab cultural dependence on the western forces is a return to the Arab inheritance itself. His conclusion, a quote from the Islamicist Frithjof Schuon, epitomized Belkacem's absolutist rejection of the western modern and the valorization of a "primordial" truth of the Arab tradition:

"The mistake of the Orient is that it no longer thinks, the mistake of the West is that it thinks too much and erroneously. The Orient sleeps on its truths, the west lives in its errors"⁶⁵

Similarly, in his article, "Alienation, Architectural Relevance, and Cultural Survival in the Islamic City," Said Zulficar criticized "progress" for the "disfigurement of the Arab urban landscape, and constructed an opposition between Islamic values and the western "standardized" impositions, to argue that only a return to the values of the past would achieve the creation of coherent and harmonious physical environments in the future. Ironically, appeals such as Zulficar's, to the "values of the past," which seek for a purely Islamic, anti-western (and sometimes anti-modern) position and attempt to "instill in new

⁶⁴ The Arab City, p. 10

⁶⁵ The Arab City,, p.11.

forms the essence of the traditional Islamic city,"⁶⁶ create as rigid a concept of the architecture of the region, as the "standardized" western modern that these appeals reject; because, postures that assume pure and absolute qualities in any part of the Middle East, fail to acknowledge the hybrid cultural formation of the region, whereby the locale exists within a complex and *not* "pure" reality.

Equally ironic is Stefano Bianca's misinterpretation of Christopher Alexander's *Timeless Way of Building* as representative of "trends in Europe and the United States [that] have shown a growing interest in the timeless values of traditional (including Islamic) architectures, [sic] considering them as a resource for reforming the current western planning methods."⁶⁷ Alexander's notions of systematization and mathematization of design thought did not intend to valorize any rigid religious or traditionalist constructs. Bianca's article also makes a direct accusation against science, arguing that it is a western concept and alien to Muslim societies⁶⁸ Echoing contemporary fundamentalist arguments, Bianca's attack is constructed on a distorted perception of western science and progress which collapses them into a blind belief in technology.

"Since the age of the Renaissance and the so-called Enlightenment, the Western World has been governed by the idea of an autonomous manmade development. This concept, based on rational and materialistic theories of thinking, culminated in the modern ideology of progress. Within the corresponding system of thought, dogmatic sciences have in a sense taken the place of religion, and technology has made the attempt at generating an artificial world, a "second-hand-creation" by technical means... However, with regard to Islam, there is reason to reject the western concept of progress: Speaking in terms of religion, the blind belief in technology is unlawful, because it places man in the role of a seemingly almighty creator, and therefore contradicts the basic tenet of La Ilaha Allah. Furthermore, Islam stresses man's role as God's responsible vicegerent (Khalifa) on Earth. This concept is opposed to the western ideal of man as the unrestricted dominator of earth and nature--an attitude which should be branded as sheer human arrogance from the point of view of Islam".⁶⁹

The various ideological postures that emerged in the Middle East, which attempted to define concepts of national or religious essence, appealed to the specificity of local culture and its incompatibility with western forces. The architectural culture of the region revealed new

⁶⁶ Duraid Al-Yawer, *The Arab City*, p.111.

⁶⁷ Stefano Bianca, *The Arab City*, p.36.

⁶⁸ Note that the opposite phenomenon also occurs: Islamic revivalism philosophy makes reference to scientific facts as pre-given in the Koran in order to prove the legitimacy of religion. They attempt to reconcile reason and revelation, just as did Thomas Aquinas in the medieval west.

⁶⁹ Stefano Bianca, *The Arab City*, p.38.

trends which often aligned themselves with such ideology. As reaction to the alleged sterility and austerity of late modern architecture, these trends often gravitated towards a "return to tradition"--which aspired to revive the essential uniqueness of the "Islamic" (or "Arab", or "Turkish") way of life--or, latched onto post-modern stylistic practices which claimed to address the aspirations of common people and to recover popular identity.

Islamic revivalism--colored with nostalgic, essentialist or separatist overtones--usually searched for the non-formal essence of Islamic tradition and the timeless spiritual premises of the divine creation, constructing Islam as a static entity. Other versions of the "return to tradition" revived the vernacular to valorize other non-religious primordial values, generating constructs such as the "Arab" house or "Turkish" style. Though these references to traditional values may act as a criticism of the superfluous formalist indulgence of illusory post-modern practices, traditionalism, just like post-modern kitsch, resorts to static culturalist constructs. Thus the courtyard house, for example, which would be interpreted in terms of extracultural factors of lighting, ventilation and climate in Doxiades's analysis, ended up, during the eighties, to be propagated as an emblem of "Arab identity".

Ironically, these postures grew at a time when the Middle East was (and is) more than ever infiltrated by transcultural economic forces, the proliferation of media technologies, and massive demographic movements which called for integrative cultural growth.⁷⁰ Either instituted by the government--e.g., Saddam's Egypt in the seventies or Ozal's Turkey in the eighties--or through informal means, liberal economic policies and engagement with globalized capitalism became a dominant condition in the Middle East. In such a context, the "return to tradition" option cultivated isolationist and separatist postures antagonistic to the hybrid reality of the contemporary Middle East. The Post-modern practices, on the other hand, may succeed in disengaging architecture from the large vanguardist socialist missions it assumed in the late modern period, but they also conceal the dynamics of the social inequality of the society. In its celebration of individuality and populism, the post modern aesthetic fails to tackle the predicaments of the contemporary social conditions of the region which is characterized by an increasingly prosperous upper and middle classes, while its rural population is insistently confined to poverty.

⁷⁰ M. Fischer, "Is Islam the Odd Civilization Out?"

The Ekistics influence on the Middle East marked a period when the architectural culture of the area was focused on environmental concerns, productivity, etc.--concerns which were tied with "rational" and supranational notions. These "scientific" and "rational" concerns negated the nationalist discourse which permeated the architecture of some Middle Eastern countries before the fifties (e.g., republican Turkey) and reappeared over again in the eighties in the form of religious and culturalist identity politics. The Ekistics concerns also negated any indulgence in stylistic kitsch by focusing, instead, on social and environmental demands. The contrast between the scientific premises of Ekistics and the alternatives that displaced them--a contrast which the context of the Middle East demonstrates most dramatically--can guide towards an understanding of the positive contributions of the Ekistic approach and facilitate a closer rethinking its epistemological grounds.

CHAPTER THREE

Rethinking the Status of Science in Architecture

Reflections on reactions to modernism in the Middle East

The rejection of modernism in the Middle East coincides, paradoxically, with the increasing transformation of these countries into industrialized societies and the proliferation of a global capitalist condition. The new realities in the Middle East create hybrid societies, where modernity does not displace tradition (or vice versa), but both coexist in "mutual interpretation and transformation"¹ Neither radical identity politics, nor stylistic kitsch can reflect these conditions--they only display reactionary or nostalgic postures. The rejection of any "western" institutional (or political) system as part of an anti-western--or sometimes a more militant anti-modern doctrine--falls short of recognizing the current realities in the region and proves just as inadequate in addressing current conditions.

Seen as part of the modernist enterprise in the Middle East, Doxiades's Ekistics would be subject to the general criticism of modern projects in the Middle East--assertion of a faceless image, aesthetic sterility of built products, imposition of alien solutions, homogenization etc.--all perceived as symptomatic of the scientific (universal, functional, materialist) grounds of late-modern architecture. In juxtaposition with these criticisms, however, we should be reminded that work like Doxiades's was successful in cultivating a sensibility to climate, energy consciousness, and other supra-national concerns. Largely geared towards help, it instituted workshops to train local labor with new construction materials and techniques. When evaluated in retrospect, Doxiades's social environmental and supranational concerns exercise, despite any limitations his built projects may have, a refreshing criticism against contemporary practices in the Middle East which diverted the concerns of architectural practice towards identity politics and populism. This critical force embodied within Doxiades's thought and practice deserves a fresh look within the context of present architectural predicaments.

¹ Tipps, 214.

It should be clarified at the outset that, at least in part, the problematic aspects of projects that Ekistics implemented are not internal to the scientific premises of the method, but are symptomatic of the larger social conditions in the Middle East, or of local governmental agendas that affected these implementations. Indeed, there is even Doxiades's own alignment with the technocratic agendas of local-governments. To the extent that these problems are related to the *scientific premises* of Ekistics, they are caused by the *particular* version of scientific method that Ekistics adopted and should not be generalized beyond that. Doxiades's version of scientific method sometimes treated the results of its studies as a stable field of operational rules and was bound by flawed assumptions. However, to use the limitations in Doxiades's method--or, for that matter, any other method--as a justification for a sweeping dismissal of the scientific epistemology in design and planning would not only be unfounded, but would disregard the potential of scientific epistemology to contribute to contemporary architectural predicaments. With this as a premise, this chapter will discuss four dominant lines of criticism of scientific epistemology and their theoretical underpinnings. It will refer to the scientific premises of Ekistics to the extent that these are vulnerable to these critiques, and will use this discussion as a basis for evaluating the usefulness of scientific epistemology in general. In light of the above critiques as well as contemporary notions of the philosophy of science it will suggest directions for rethinking the status of scientific epistemology in architecture.

Critiques of Scientific Epistemology

I. Inadequate prediction

The first line of criticism accepts the fundamental premises of the paradigm of science and points to possible modifications of specific scientific methods in order to overcome initial limitations. This criticism operates within the context of an empirical framework that usually expands the methodological complexity of an approach in order to account more successfully for actual processes that take place.

Within this framework, Ekistics is criticized to the extent that it failed to anticipate significant changes in urban developments and made inadequate predictions. In a recent article that articulated a new approach to planning, DeMartins² expanded on the ideas of Ekistics to develop more comprehensive guidelines for environmentally conscious and economically viable planning. DeMartins criticized the classifications of Ekistics as unrealistically rigid (e.g., it separated settlements only with respect to population size

² Ivan Pedro de Martins, "Random Factors: Ekistics, Ecology And A Think Tank"

ignoring the ambiguous conditions created by small political entities or geographical differences) and many of its predictions proved flawed (e.g., it assumed a constant rate of population increase). Then DeMartins proposed that despite these limitations, Ekistics can still offer a helpful guidelines for planning, if it is treated as a philosophical framework for design rather than a definitive procedural technique. For example: the Ekistic scale could still be useful if its numerical analyses were seen not as a fixed datum but as a "starting point to give a sense of size in something as vague as global ecological planning"³ Similarly, the concept of Ecumenopolis could be useful not in the quantitative aspect of Doxiades's proposal, but as a "vision of a communications net on a global scale" and a metaphor of a world system, that describes the economic and cultural interrelationships of regions in the world.⁴ Also, the ecological balance that Doxiades attempted to define with mathematical calculations should be seen as a constantly changing formula. DeMartins proceeds to introduce what he calls the random factor, a remedial modification which could be incorporated into the Ekistic calculations that would anticipate the reversibility of phenomena and would accommodate the possibility that all figures in its predictions may have to be changed "either through unavoidably differing needs of man, or because of changes observed in nature."⁵

In short, DeMartins' position is that if the mathematical calculations and taxonomic categorization of Ekistics are adopted tentatively, and expanded with respect to the complexity of urban processes and the impossibility to capture them a priori, the inadequacies of Ekistics can be transcended, and Ekistics can still offer a valuable theoretical basis for coping with challenging planning concerns--maintaining ecological balance, facilitating future developments on earth, etc.

Developments in urban ecology reflect the basic premise of Ekistics--the attempt to define the urban environment analytically--while they have revealed many inadequacies in Doxiades's models of classifications of urban phenomena. More sophisticated methods of analysis rejected the physical distinctions with which Doxiades identified urban elements and searched for distinctions which can more adequately correspond to the ways in which we conceive and use the city.⁶ For example, in his article "Studies towards an Ecological model of the urban environment" Stanford Anderson, criticized the five elements that

³ DeMartins, p.144

⁴ DeMartins, p.147.

⁵ DeMartins, p.147.

⁶ Anderson, *On Streets*, p.271.

Ekistics defined as constitutive of the urban environment, and proposed, instead, three societal distinctions ("Space of Public Claim", "Space of Dwelling Claim", Space of Occupational Claim") which could coexist and overlap with one another and to different degrees.⁷ This could more successfully capture the range of possible uses and the multiplicity of social meanings that the varying forms of adaptability of the urban environment could generate.

II. Phenomenological Critique

Operating within the disciplinary terrain of architecture, this critique questions the very premises of scientific reason, to argue that the projection of scientific models onto the analysis of human experience can only create simplistic understandings of architectural creation, and argue for the alignment of design with poetic and phenomenological, rather than rational and systematic grounds.

In the book *Architecture and the Crisis of Modern Science*, for example, Perez-Gomez⁸ argued that a search for "truth" which dominated scientific thought since the seventeenth century, caused human decisions to be made "over and above 'reality', which is always ambiguous and accessible only through the realm of poetics.⁹ Having Husserl and Heidegger as intellectual sources, Perez-Gomez constructed a radical critique of the values of scientific structure of thought, presenting it in a strict dichotomy with Phenomenology and Existentialism. He characterized the scientific conceptual framework based on abstraction, logic, mathematics and technological systems as "prosaic" and inadequate to deal with the richness of cultural human behavior and he especially criticized it for creating an illusion of an infinite power of reason. He criticized scientific methods in architecture in general for often turning into an obsession with mathematical certainty, reducing design theory to rational prescriptive rules, devoid of meaning and value. As an example of how rational thought and the search for factual reality, logic, and technological systems divorced architecture from its mythical origins, he described the planning of new towns as follows:

"...our cities are becoming a vast world village where the external reality of man is at odds with man himself and whose reason for being is to express a mute universal process embodying the values of technology rather than to establish a meaningful framework for man's finite existence. The well-known failures of modern planning continue to be a source of embarrassment. And still the modern professional waits

⁷ Anderson, pp.267-308.

⁸ Perez-Gomez, *Architecture and the Crisis of Modern Science*.

⁹ Perez-Gomez, p.5.

for a set of objective and universal standards, either formal, ideological, or functional that will determine his design and contribute to truly meaningful buildings"¹⁰

To Perez-Gomez, the systematization of knowledge within the structure of scientific thought is doomed to crisis because it would only lead to a reductionist, materialist and instrumentalist understanding of architecture. He advocated that architectural thought needs to reconsider the "immediate perception of the reality of quality of place" in order to rediscover its poetic and mystical content and the richness and ambiguity of symbolic thought.

Gomez's critique is enlightening to the extent that it criticizes those aspects of Ekistics which claim to encompass reality objectively and comprehensively and to set design apart from interpretation. Gomez's criticism, however, reached an extreme, when it dismissed reason, science and technology as the basis for human progress, and proposed a return to the realm of symbolism and poetry as an appropriate ground for design. Though his critique is valid when applied to those versions of scientific reasoning which are locked into a positivistic fact-gathering, the proposal to replace all values of scientific rationality with intuition and transcendental perceptual values, constructs as self-referential an approach to architecture, as the logic of positivism had created.

Along the same lines in the article "Technique and the Metaphysics of Science" Angelil criticized modern science and its emphasis on rationality for failing to maintain its bonds with imaginative thought. He referred to specific forms of scientific methods which attempted to turn all aspects of life into procedures through systematization, division of labor, creation of standards and production of norms,"¹¹ As Angelil writes, dividing the design process into component parts cannot account for the creative engagement of design, and dividing architecture into features cannot encompass the complexity of architecture. Angelil's critique, and some of the more general critique of Gomez can apply, in many ways, to the Ekistic method. First, Ekistics exemplified a method largely preoccupied with step by step processes and with "ordering all aspects of human activity", as Angelil described.¹² Its charts and graphs categorized not only the data, but--through their strict prescriptions of zoning--ended up categorizing actual life in the city. Ekistics compartmentalized issues of design, which reduced its multiple and complex implications

¹⁰ Perez-Gomez, p.7.

¹¹ Angelil, p.75.

¹² See Angelil, p. 63

(e.g., economy and efficiency may not be as separate from social concerns as Doxiades thought;¹³ the effort to increase efficiency in his master plan for Islamabad, he created an unprecedented class segregation in the city). Secondly, Ekistics focused on operational rules and functional requirements in the design of buildings. It was confined to only a simplistic view of human experience in buildings because it drew its guidelines from inadequately developed forms of behaviorism and positivistic psychology. Finally, aesthetics was treated as an issue of appearance rather than a form of knowledge relevant to an intersubjective interpretation of building such as Perez-Gomez argues for. Doxiades did not address the experience of the building, being caught up in specifying human needs as a priori, quantifiable criteria. Even the inclusion of aesthetic variables in the Ekistic calculations treated aesthetics as a distinct feature in architecture and limited aesthetic concerns to what architecture can “communicate” disregarding the more complex place making potential of architecture.

III. "Against Method"

Departing from the domain of the philosophy of science, the most radical critic of science, P. Feyerabend, questioned the fundamental premises of scientific methods to reject them in their entirety. Feyerabend argued that appeals to reason create an artificial domain for scientific activity which restrains the imagination and creativity of the scientist, and which treats scientific facts independent of opinion, belief, and cultural background.

"Scientific education as we know it today...simplifies 'science' by simplifying its participants: first, a domain of research is defined. The domain is separated from the rest of history (physics, for example, is separated from metaphysics and from theology) and given a 'logic' of its own. A thorough training in such a 'logic' conditions those working in the domain; it makes *their actions* more uniform and it freezes large parts of their *historical process* as well. Stable 'facts' arise and persevere despite the vicissitudes of history. An essential part of the training that makes such facts appear consists in an attempt to inhibit intuitions that might lead to a blurring of boundaries."¹⁴

Ekistics operated within a logic that it created on its own since the facts it accumulated and the way in which they were ordered were conditioned by the very order of the models and charts it developed. It restricted the domain of its inquiry within the parameters that its models preestablished, and fell short of acknowledging that the "facts" on which it based its planning were constituted by ever-changing political and temporal circumstances.

¹³ The abstract notion of Ekistics that the factors it compartmentalized are “interrelated” was not sufficient, because it still maintained these factors as distinct.

¹⁴ Feyerabend, p.19.

Ekistics saw its development as an increasing accumulation of *facts* which, as long as they were "correct," would ultimately develop into a definitive and complete solution. As a "descriptive science," Ekistics would gather new facts until it ultimately became complete and definitive. While it accepted that its theories would be reevaluated through time, it saw the facts it gathered as constant. "Facts," however, just like the theories they produce, are far from being constant and objective; they are themselves informed by ideology and social conditions. The factual descriptions that the centers of Ekistics accumulated prescribed interpretations and ascribed particular meanings which could not remain constant in time and merely expand in quantity.

Feyerabend's rejection of the standards and fact-finding tradition of scientific methods extended to an argument that scientific progress hinges on the creativity and interests of the individual scientist rather than any established authority of scientific methodological rules. The success of scientific inquiries, he argued, and the growth of science and knowledge, is not a result of a rational method but of a depend on a mixture of other interests, rhetoric and propaganda. Feyerabend's polemic position rejected the 'law and order' imposed by scientific method because it did not only overlook the complexity of the forces operating on scientific progress but, in fact, inhibits the very progress itself:

"It is clear, then, that the idea of a fixed method, or a fixed theory of rationality, rests on too naive a view of man and his social surroundings. To those who look at the rich material provided by history, and who are not intent on impoverishing it in order to please their lower instincts, their craving for intellectual security in the form of clarity, precision, 'objectivity', 'truth', it will become clear that there is only one principle that can be defended under *all* circumstances and in *all* stages of human development. It is the principle: *anything goes*."¹⁵

IV. Criticism of the political and social agenda of modernization theories

Moving in parallel with Feyerabend's notion of science as ideology, some critiques questioned the self-proclaimed objectivity and neutrality of scientific methods by pointing to the larger political and ideological motivations which instituted the scientific discourse in the fifties and sixties, and by exposing the tacit cultural imperialism behind such methods. When applied to efforts for development and modernization in non-western contexts, methods which claim to analyze and map reality objectively have concealed issues of power and inequality that are integral with such processes. Most developmental interventions for third world regions were based on some version of modernization theory which was in turn founded on scientific models which analyzed social development as an evolutionary

¹⁵ Feyerabend, p.27-28.

process. Tipps¹⁶ exposed how the attempt of modernization theory to analyze social and economic processes in third world regions and outline their processes of development was in fact driven by political agendas of western--especially American--intelligence to exert control on third world regions. He furthermore pointed to how this was based on a unique set of referents which assumed a transcultural uniformity in the model of urbanization and modernization.

Moving on similar lines, Mitchell, in "America's Egypt" described how the discourse of international development always presented itself as a rational, disinterested center of intelligence, detached from its object of study. Mitchell argues that this detachment "transforms political questions of power and inequality into technical issues of natural resources and their management" and thus obscures the involvement of these solutions in creating more problems in a place. Doxiades's enterprise--which shared parallel notions with modernization theory--can be seen as part of a larger discourse on international development, initiated in the post-war era, and largely founded on modernization theory. Sometimes, Doxiades Associates directly collaborated with international development agencies, such as the World Bank and USAID, but even when it acted independently, it presented itself as an agency which possessed the expertise, technology and managerial skills for the needs in those places, and based its interventions on a preconceived model of developmental process.¹⁷

As Mitchell's and Tipps critique would suggest, the assumption of Ekistics that it offered technical and managerial consulting on development, depoliticized the processes involved in its planning interventions which were nevertheless inevitably tied to such issues as land distribution, allocation of resources, social class divisions and the like. For example, the planning of Islamabad overlooked the questions of power and inequality between the domestic regime and the various classes of the population. Confined within the established governmental agenda, Ekistics failed to address the needs of the less privileged of the city.

¹⁶ Dean Tipps, "Modernization and comparative study of societies."

¹⁷ It is important to emphasize that Doxiades's specific case acquires a particular importance in the study of the political and social implications of modernization theory: As somebody who operated both in the East and West, (e.g., he proposed housing schemes for both Baghdad, Iraq as well as Eastwick, Pennsylvania) Doxiades's method blurs the distinctions between the modernization processes in the two contexts, and takes the study of the social and political implications of his method beyond East-West dualities.

Furthermore, the insertion of Islamabad into the economic megastructure of ecumenopolis did not consider the questions of inequality on global relationships of exchange.¹⁸

Tipps' and Mitchell's critiques of developmentalism reveal that underlying the claim to objectively measure and assess phenomena of development and outline methods for technical support, there exists political and economic parameters which are inseparable from any development processes. However, despite the fact that such critiques are highly illuminating, it is crucial to question the extent to which they should dismiss Doxiades's method--or any other which attempted to facilitate development based on a "scientific" approach--*in its entirety*. While scientific methods that attempted to systematically capture, order and objectify urban processes concealed the political and power inequalities involved in such processes--whether in a third world region, or, for that matter, in any other urban environment--they also actively articulated specific programs, policies, and strategies to provide shelter, infrastructure, even jobs, and education to regions. As much as Doxiades's anthropocosmos model could be criticized as a totalizing classificatory grid that constructed urban regions as bounded, determinate and controllable objects of study, it also facilitated systematic and organized attempts to guide solutions for problems and to empower regions that were in great need of support. If the systematic Ekistic studies and its "scientific" analyses of the resources and economic conditions of Baghdad and Kirkuk can be seen as an external imposition driven by political agendas, they also have to be recognized as workshops for help which tried to improve the building industry, address the demand for housing, education and infrastructure.

Ekistics initiated a sensitivity to the environment, and pioneered in promoting energy consciousness. It indicated a large sensitivity to humanistic concerns as well as a foresight into problems that we face still more intensely today. One cannot help but point to the similarities between the philosophical concerns which grounded Doxiades's method and contemporary concerns about the future of the world. Robert Kaplan's recent article "The Coming of Anarchy" which discussed how overpopulation, disease, and environmental degradation continue to threaten the world and in fact pose even larger threats for the future social fabric of the globe, affirmed the relevance of Doxiades's fears and the philosophical underpinnings of Ekistics. Based on studies of the social and political conditions and economic inequalities around the world, Kaplan made the following warning for the future:

¹⁸ The tacit dynamics of power and inequality are not only limited to western vs. non-western relationships, but constitute part of the internal social and political making of any place and are relevant to any planning intervention.

"While a minority of the human population will be...sufficiently sheltered...living in cities and suburbs in which the environment has been mastered and ethnic animosities have been quelled by bourgeois prosperity, an increasingly large number of people will be...living in shantytowns where attempts to rise above poverty, cultural dysfunction, and ethnic strife will be doomed by a lack of water to drink, soil to till, and space to survive in..."¹⁹

Radical critiques of science--whether they operate within the discipline of architecture or whether they move on a larger political level, point to the vulnerability of Doxiades's work and of the scientific discourse of the fifties and sixties. But the concerns that methods like Doxiades's attempted to tackle are as pressing as ever and their scientific premises can still offer a useful ground for tackling them.

The importance of scientific epistemology

The perception of science as a positivistic mode of inquiry which attempts to map reality objectively and define solutions with certainty is a very limited one, although it is widely prevalent. In his address to the World Economic Forum, which was excerpted in *The New York Times* with the almost celebratory title, "The End of the Modern Era", Vaclav Havel exemplified this common perception of science. He portrayed science as an attempt to accumulate knowledge as mere statistics and universal rules based on false claims to objective analysis of reality, and expressed his distrust towards scientific reasoning. Havel attributed many of the threats to world civilization to science, which, "with its usual coolness, can describe the different ways we might destroy ourselves, but it cannot offer us truly effective practicable institutions on how to avert them." Reacting to the alleged commitment of science to certainty, a practicing scientist responded to Havel's speech in this way:

"From the first day to the last day of my 45-year career as a research scientist, I never had either the reason or the inclination to believe that scientists were capable of 'objectively describing, explaining and controlling everything that exists' or that 'the world is a wholly knowable system' [quoted from Havel's speech] ...Science, for me, was always an adventure of the human intellect, a search for a partial understanding, which was occasionally rewarded by the emergence of theories that had the potential to improve the human condition."²⁰

¹⁹ Kaplan, p.59.

²⁰ Herbert L.Meltzer, "Letters" in *The New York Times*, March 17, 1992.

It would indeed be a sweeping oversimplification to define the aims of science as a search for certainty and as an attempt to codify reality in universal models. Even Doxiades's own work often offered a more complex interpretation of science, and challenges the stereotypical perception of science. His "universal" planning method, in fact attempted to accommodate local conditions and conducted extensive studies of each locale. His more philosophical writing indicated an open-ended perception of the task of Ekistics which did not indulge in mathematical prophesies and comprehensive maps, but recognized the need for continual experimentation and reevaluation of its positions. Furthermore, Doxiades's understanding of the world of "man", as multiple realms surrounding the human being, already moved away from the singular anthropocentric model of the renaissance and suggested the multiplicity and complexity of the human world, which comes closer to our current critical understanding. If the contributions of Doxiades's method present a number of challenges to the radical criticisms of Perez-Gomez, Angelil, Mitchell, or to the commonly held stereotypes exemplified by Havel, this may not simply mean that Doxiades's method is an exception, but perhaps that scientific premises in general, are not as absolute as they are usually portrayed to be.

The following quote from Doxiades's last book, *Ecology and Ekistics*, captures, perhaps in the most distinctive way, Doxiades's own disbelief that procedural techniques and mathematical analyses can assess human potentials and that they can offer a definitive representation of reality. At the same time, his statement calls on planning to tackle pressing environmental concerns, and asserts that it is a *systematic approach* that can make this possible:

"Any proper feasibility report can show that no farmer can have the kind of house that in fact he owns in many parts of the world and cost benefit studies can show that no medieval city could build a new cathedral. But they both were built and we admire them today because humans were able to start processes and continue them step by step over a few generations to the stage of completion. My answer to the pessimists who laugh or cry at broad concepts about a much better world, is to say, "Let us have the proper concept on a global scale...Let us conceive of the overall system we need and elaborate on it with science and technology. If we do this, some day anthropos will enjoy a life of much higher quality..."²¹

This statement may seem contradictory, in that it rejects the adequacy of statistics in representing reality while it calls for the conceptualization of an "overall system" which would presumably aspire to capture reality--a paradox which runs through the entire Ekistic

²¹ Doxiades, *Ecology and Ekistics*, p.39

method. Once perceived from another angle however, whereby the "overall system" Doxiades talks about moves away from a definitive teleological aim towards an ever-changing and perpetually incomplete reality, then Doxiades's statement reflects a goal to search for directions systematically, to effectively tackle pressing problems (of the ecological balance in this case). In this sense, the spirit of Doxiades's statement embodies an enlightened philosophical position about science, which, on the one hand rejects absolutist and all-encompassing scientific methods, while it *recognizes* and *maintains* the scientific aim towards rationality and systematic inquiry as a means to tackle problems and improve the human condition. In this sense, scientific methodology can embody a critical force without losing the capacity to act and to tackle problems. In this spirit that the scientific epistemology can offer valuable contributions to architecture.

If in the field of architecture, some scientific methods--including Ekistics, at times--focused on positivistic fact-finding, this does not, certainly, reflect current understandings of the role of science, as they have been reformulated by contemporary philosophy of science. A reference to contemporary philosophy of science will offer an understanding of the potential of scientific epistemology for architectural thought.

Philosophy of science has long rejected positivist notions that the "facts" and the "standards" science deals with remain constant and unchanged. It has often shown that the search for a substantive, universal, ahistorical methodology is futile,²² and has also rejected any demand for certainty:

"At least since the time of the scientific revolution we have been in a position to appreciate that scientific generalizations (laws and theories) cannot be substantiated a priori and we also have good grounds for accepting that the demand for certainty is utopian. However, the demand that our knowledge be continually transformed, improved and extended is not utopian"²³

Despite the absence of secure foundations, science can maintain its aim to pursue the production of improved and more extensive knowledge--which is the very aim that will distinguish science from other fields of inquiry. This argument has been eloquently pursued in Chalmers' recent book *Science and its Fabrication*, which acknowledged that scientific knowledge is historically bound, while it rejected the "anarchism" of Feyerabend and the "relativism" of some contemporary sociologists, which collapse science onto an extreme "anything goes" position. Referring to positive sciences, Chalmers argues that

²² See, Chalmers, *The Fabrication of Science*, esp. Chapter 2.

²³ Chalmers, p.39.

although science cannot be rendered immune to a political and social critique, it *is* possible to pursue the aim of science in a way that predominantly serves the interest of the production and growth of knowledge, rather than being subservient to other personal, class, and ideological interests. Chalmers immediately qualifies this by stating:

"While the aim of science can be *distinguished* from other aims and epistemological appraisals distinguished from other appraisals, the scientific practice involved in the pursuit of that aim cannot be *separated* from other practices serving other aims"²⁴

Although the aim of science can be distinct, it is not an absolute, unquantifiable good that rests above other aims of other practices but it needs to be evaluated and articulated with references to a wide range of other interests and values outside the scope of scientific epistemology. For example, Chalmers says:

"While it is important to acknowledge that scientific knowledge is a powerful aid to our technological, engineering and environmental interventions in the world and our understanding of their possible effects, a recognition of the limitations of science in this respect is a necessary corrective to the mystifications and exaggerations typically accompanying the claims of technocrats...We move further beyond the legitimate domain of science once we introduce questions about the desirability and safety of various technological interventions in the world. Here it is important to avoid obscurantist talk about the interests of humanity in general...and excessive glorifications of...science, to recognize the variety of interests associated with various individuals, groups and classes and to recognize that those interests frequently conflict."²⁵

We need to appreciate both the fact that scientific analysis can help us cope with many situations in the world, as well as the fact that the complexity of the world is beyond the grasp of a complete scientific analysis. In this light, science remains a distinct form of knowledge and not a mere product of ideology, without claiming to be either superior or independent of other factors operating in social conditions. It remains distinct from myth, and voodoo, (and not as Feyerabend's suggested), but it is not a rigid tradition which constructs a logic of its own that conceals other forces within the social conditions that operate along with it. It remains a valuable form of inquiry committed to systematic study and reason, hoping--as the scientist's response to Havel, said humbly--for occasionally reaching to theories that had the potential to improve the human condition. Its purpose is not to provide any "intellectual security" as Feyerabend accuses it of, but a restless search--far from security--to tackle problems.

²⁴ Chalmers, 116.

²⁵ Chalmers, p.124.

Epilogue

The criticism of scientific methods and the reformulation of scientific aims by contemporary philosophy of science, can suggest important directions in reevaluating the utility of scientific epistemology in architecture, and can open up a new understanding of their relationship. The scientific framework of thought can operate much beyond paradigms of efficient and economical productions, or positivist and reductivist modes of ordering the world. It can be useful within the architectural field of action, not to provide specialized sets of operational rules and teleological procedures, but to offer open-ended analytical tools, dedicated to the pursuit and growth of knowledge. Architecture could structure its mode of inquiry around the paradigm of the scientific rigor to the extent that this can nurture the growth of knowledge about the field and can contribute to architecture's commitment to address human and material needs. This endeavor would not aim towards a discovery of laws underlying solutions of design or experience, but would explore directions for tackling crucial architectural concerns--directions that reach beyond the self-referential attempts of phenomenology and stylistic kitsch, the absolutist polemics of essentialism (e.g., in the Middle East), or the elitist preoccupations of a signature designer.

The directions of architectural thought under the influence of science can be multiple, subject to continual exploration, and would depend on particular architectural concerns and particular scientific frameworks. Diverse concepts can emerge reconfiguring the rational structure of architectural thought. If these concepts are always false²⁶ this should be a liberating realization rather than a cause for dismissing the scientific structure of thought in its entirety. As an open-ended endeavor with a broad basis, science does not reduce architectural thinking--it only activates it further.

The architectural field of action is not to seek its sole definition within science--surrendering to a notion of an infinite power of science. Along with Chalmers' emphasis that the scientific domain is defined within certain limitations, it is important to acknowledge that scientific thought cannot subsume those aspects of architecture that are intrinsic to the field, nor can it account for external forces operating on architecture that lie outside the grasp of the scientific framework of thought and action.

²⁶ Colquhoun characterizes the need to create cognitive models of architecture on the one hand, and the realization "that these cognitive models are always false" on the other as a paradox. See *Harvard Architectural Review*, Symposium On Architectural Research, p.75.

If contemporary critiques of science have profoundly and irreversibly changed our perception of scientific epistemology, they do not cause its abandonment--they only increase our critical awareness and vigilance in the evaluation of the potentials and limitations of scientific thinking, so that they do not turn into methodological orthodoxies, but continually nurture critical actions. As an open-ended intellectual endeavor, scientific thought promises immense contributions within the architectural field of action. Within this framework, architectural thought can remain critical without losing--as it often does--the capacity to act.

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