CULTURE : A DIMENSION IN DESIGN

A Thesis Presented By

Hammam Ezzeldin Serageldin

in fulfilment of the requirements for the Degree of

Doctor of Philosophy

June 1979

Department of Architecture and Building Science

THE UNIVERSITY OF STRATHCLYDE

ACKNOWLEDGEMENT

I should like to express my gratitude to Prof. F.N.Morcos-Asaad for his close supervision, valuable advice and stimulating discussions throughout the study.

Thanks are also due to my wife for her constant support and tolerant encouragement, also for the patience and skill with which she typed this thesis.

Finally I would like to mention all the members of the staff, administration and the students of the department of architecture who helped in making my stay at Strathclyde a most enjoyable experience in my life.

SYNOPSIS

Building is one of the earliest activities of man, whether building for shelter or for more complex symbolic needs the act of building was not a simple reactionary performance but rather was a behavioural process which embodied the total pattern of physical and intellectual forces acting from within and upon each person as an individual and as a member of a society. The intention of this research is to establish a better understanding of the intellectual development of man and the human society thus revealing the structure of the design activity. By understanding the nature of the design activity the right approach to architectural design education can be developed to prepare the architects of the future to cope with the diversified problems that will face them in the most natural and optimum way.

Chapter one is concerned with the controversial physical aspects of the universe. The development of the human mind and consciousness is then traced to uncover the framework by which the different aspects of the universe are related to each other according to human understanding and awareness. Myth, magic and religion were found to be necessary concepts for the human outlook on life, as they signify man's need for symbols and images in communication and for society formation. As societies are formed distinctive cultures appear and develop for each social group, therefore the basic concern becomes the people's culturally meaningful systems of behaviour. Since architecture is a reflection of cultural values it is the three way relationship between the absolute universal rythms, the individual and cultural values, and the architectural output in a society, that determines the understanding of architectural form and the design activity required for its conformation.

Chapter two discusses the theory and meaning of value asserting that the history of culture can be understood simply as a history of human values. However moral and aesthetic judgements do not occur in vacuum, and for this reason it is important to analyse them bearing in mind the context and the society in which they were issued, After considering a few methods to aid the designer to arrive at a choice of values; the history of aesthetics and its relation to culture and architecture is delineated. This demonstrates that the history of architecture is the history of the actual aesthetic consciousness and value systems dominating each cultural scene.

Closer investigation of human responses is undertaken in chapter three, demonstrating the effect of culture on human perception as a selective force acting on the subconscious of the individual. The role of meaning and experience in understanding architectural form is substantiated by a cross-cultural field study on the appreciation of form in an attempt to identify the constructs that affect such appreciation and their deviations cross-culturally. The forces acting in an environment to produce architectural forms are then identified and defined as determinants of form.

Chapters four and five are concerned with the relation between architecture and the human sciences and design methodology. Human desires and needs are assessed and creativity and imagination are related to the existing design methods.

A design activity model based on the human behavioural activity rather than on a cybernetic analogy is proposed in chapter six. This activity model explains qualitatively the architectural design process in relation to the different forces acting on the designer as a decision-maker. Proposals for augmentation of, and changes in the educational system are discussed in chapter seven. The main aim of the proposals in these two chapters is to influence the process of architectural education, so that it becomes balanced in its approach and more effective in educating the architects of the future. Those designers of tomorrow should perform optimally according to their own intellectual and behavioural needs as well as within the technological, cultural and social constraints of their societies.

Finally, this research establishes that qualitative analysis is a valid tool in explaining multi-variable situations where most of the variables are unknown as is the case with architectural design. Furthermore, it is recommended that future research efforts should be directed towards qualitative evaluation techniques in architectural design education, which in turn should be concerned with the whole structure of design thought in its technological, cultural and social contexts.

CONTENTS

Chapter One

Architecture and the Influence of Culture

1.1. THE UNIVERSE

Modern cosmology states that the Earth is a planet belonging to the planet system of the sun. The sun in its turn, is one star among millions of others in the Milky Way galaxy. This galaxy itself is only one of millions such galaxies, each one containing millions of stars. The stars in one galaxy always maintain approximately the same distance between each other, but the galaxies themselves are moving away from each other at very high speeds, indicating that at some time in the past they were much closer together than they are now. Hence one can never adequately represent the cosmos, except perhaps in a very limited way, be it in two dimensions on a drawing board as an abstraction, or in three dimensions in model form as a simulation; either method of representation refers to a three dimensional reality in its proper space at a particular time.

However, scientists and philosophers have always been trying to structure the universe into one set of scientific principles that will account for the total mechanism of the cosmos to its finest detail, "we are drawing near to the great question, whether there is any domain of activity, of life, of consciousness, of deity, which will not be engulfed by the advance of exact science.....exact science invokes or has seemed to invoke, a type of law inevitable and soulless against which the human spirit rebels.....we have found that where science has progressed the farthest, the mind has but regained from nature that which mind has put into nature. We have found a strange footprint on the shores of the unknown. We have devised profound theories, one after another, to account for its origin; at last, we have succeeded in reconstructing the creature that made the footprint. And lo ! It is our own."(1)

All exact sciences have been split for the last few years into at least two camps of opposing opinions; in physics there are those who assert (with Bohr, Heisenberg, and von Neumann) that strict physical causality must be replaced by statistical probability because subatomic events are indeterminate and unpredictable; and those who assert (with Einstein, Planck, Bohm, and Vigier) that there is order hidden beneath the apparent disorder, governed by as yet undiscovered laws, because they cannot believe that 'God plays with dice'. Another controversy opposes the upholders of the 'big bang theory' according to which the universe originated in the explosion of a single densely packed mass some thirty thousand million years ago, and has been expanding ever since; and the upholders of the 'steady state theory' according to which matter is continually being created in a stable cosmos. In neurophysiology, one school maintains that there is rigid localization of functions in the brain, another, that the brain works in a more flexible manner. In mathematics, 'intuitionists' are aligned against 'formalists'. In the medical professions, opinions are divided regarding the psychological or somatological origin of a great number of diseases, therapeutic methods vary accordingly, and each school is subdivided into factions (2). In some of these controversies, one of the competing theories would be more widely held because of the cumulative evidence in its favour; in other cases the contradiction between thesis and antithesis would be resolved in a synthesis of a higher order. But in either case what is termed 'scientific evidence' only confirms certain expectations based on a theory, but cannot confirm the theory itself.

The most complex and controversial factor in this universe is homo sapiens, because man's heritage is of two different kinds; one has been accumulated through perhaps two billion years of evolution and is encoded in the molecular structure of his genetic make up; the other has been built up during approximately one million years of communication and is encoded in the symbolic structure of his knowledge. The physiological and biological aspects of the human being, though still not completely explored, are easier to measure and understand, but it is the cultural and intellectual aspects which proved to be the most difficult to comprehend. Yet it is most important to explore these aspects if one is to approach the problems concerning the relation between man and his environment.

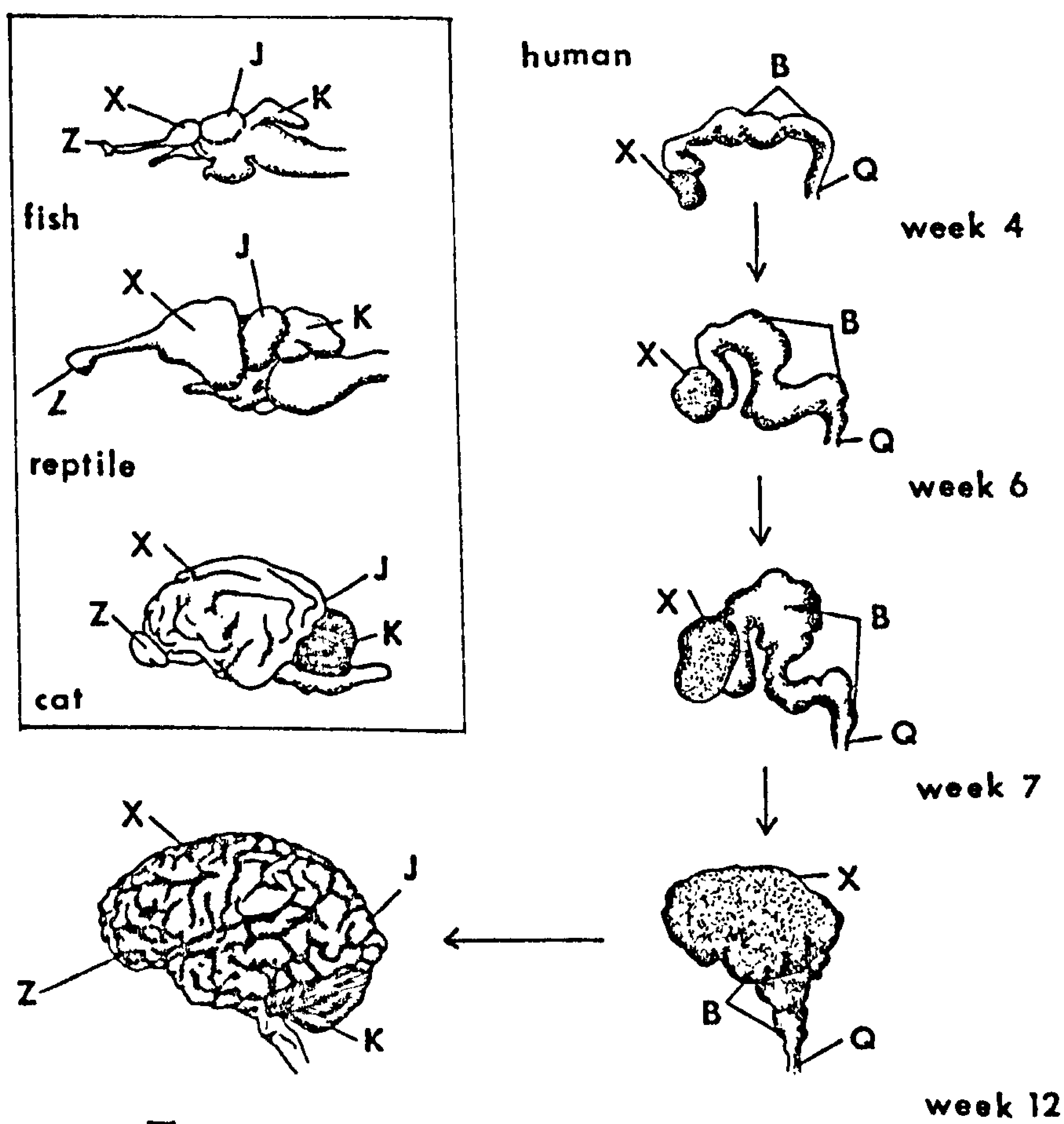
"Environment is seen in a twofold way : as a set of properties of the physical world that act upon an organism; and also as an accumulation of successful solutions to the problems of selecting such conditions in the physical world which are at least survivable..... environment and the organism associated with it will be duals to each other in the sense that a particular organism O implies its particular environment E(O)" (3).

Man is different than other animals, in a sense he is unique, he is not only a figure in the landscape but also a shaper of it. In nature animals fit into the environment in a precise and calculated way, they are equipped exactly to fit; but with man it is another story. Man's biological evolution did not fit him to any specific environment, on the contrary his survival kit is rather crude except for a tremendous capacity for imagination and reason which led to a series of inventions that made him change his environment rather than accept it. These innovations were handed from one generation to another through man's capacity to communicate. Hence it is by virtue of this capacity to communicate, which is the result of the highly developed human brain, that man was capablé of acquiring his superior position on Earth.

1.2. MIND, CONSCIOUSNESS and AWARENESS

The brain is a machine for communicating : receiving information, storing it, and issuing instructions based on it. It is a highly complex structure that inspite of its small size can store information more than any computer can hold. One of the most striking observations is that, "today's humans have the same cranial capacity, and hence presumably the same brain weight, as the earliest homo sapiens found in the fossil records"(4). The implication of such an observation is that the evolution of the human species must have been brought about by the development of the brain capacity not its size or rather by the development of the social interaction level not the physiological systems level of the brain.

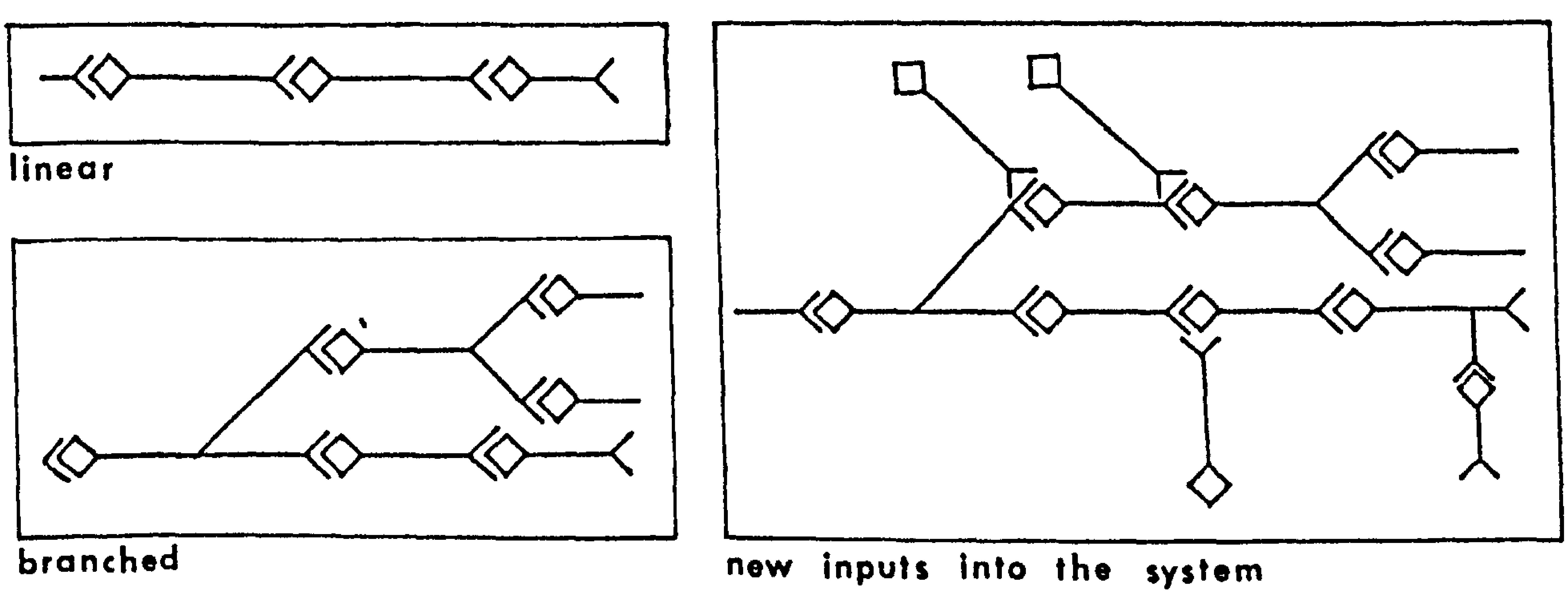
COMPARATIVE VIEW OF BRAIN ANATOMY AND THE DEVELOPMENT OF THE HUMAN BRAIN



K cerebellum
X cerebrum
B brainstem
Z olfactory bulb
Q spinal cord
J vision

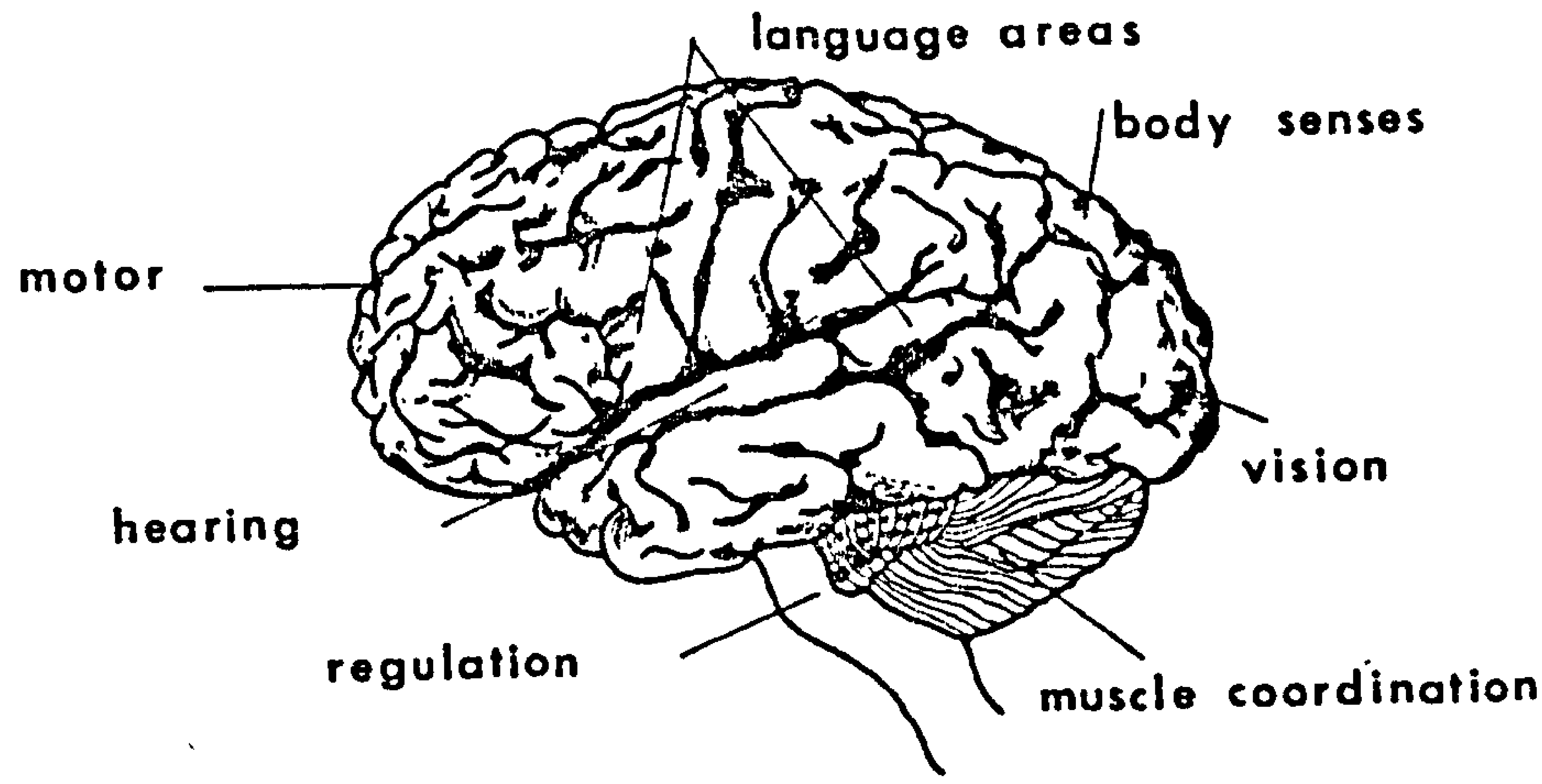
association areas □

The relation of mind and brain must however be seen in some sort of historical perspective. The literature of philosophy and medicine records the many attempts of man to describe the relationships of brain and mind, appropriate to the age and level of scientific understanding in which they were made. Science's way of thinking of the brain has, historically, been profoundly affected by the prevailing view of the universe. The analogies were set not so much by the internal development of science itself, but by the external shape of the society in which science is being investigated, hence analogies of the eighteenth century's clockwork and today's computer. Before the seventeenth century, and particularly before Newton and Descartes, because neither brain nor body, mind nor matter, were distinguishable one from another there were no problems as to the separation between brain and mind. There was no mind/body dualism in the sense that came to plague an apparently more rational eighteenth and nineteenth century world in which the mind and soul as insubstantial entities in a determinist mechanical world became major intellectual problems.



THE BRAIN AS A SYSTEM : NEURONAL PATHWAYS

BRAIN SURFACE



MIDLINE VIEW

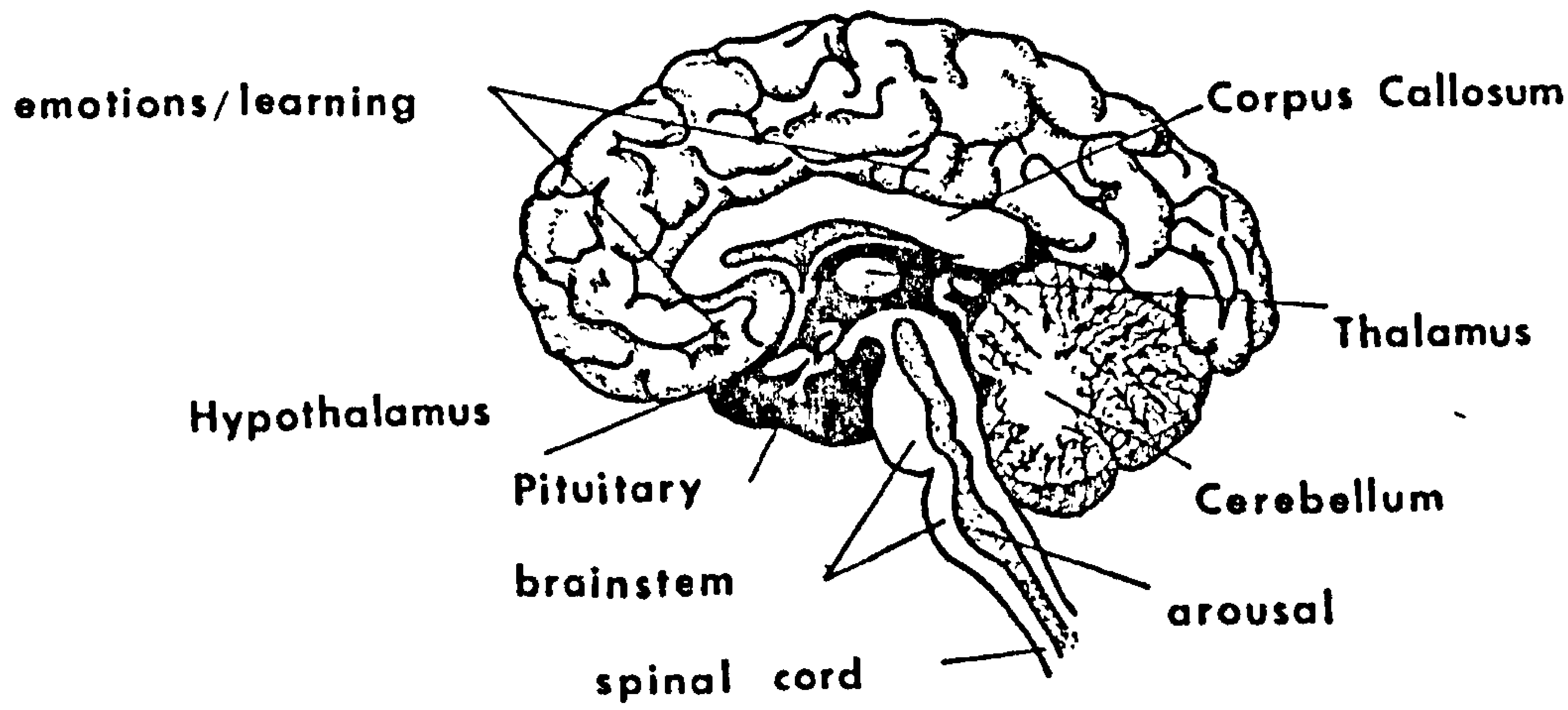


Fig 1.2.C.
MAJOR AREAS OF THE BRAIN AND THEIR FUNCTIONS

The more recent view of the mind is that it is the sum total of the brain activity, but at a hierarchical level of discourse above that of physiological description of the interaction of cells and below that of social analysis.
The activites of the mind include aspects such as consciousness, memory, creativity and will. Consciousness, however, means many things, sometimes simultaneously and often contradictorily. It may simply mean a state different from being asleep or in a coma. It may be used to relate to the private world of the mind in contrast to a presumed public world of observed behaviour. Consciousness may also have

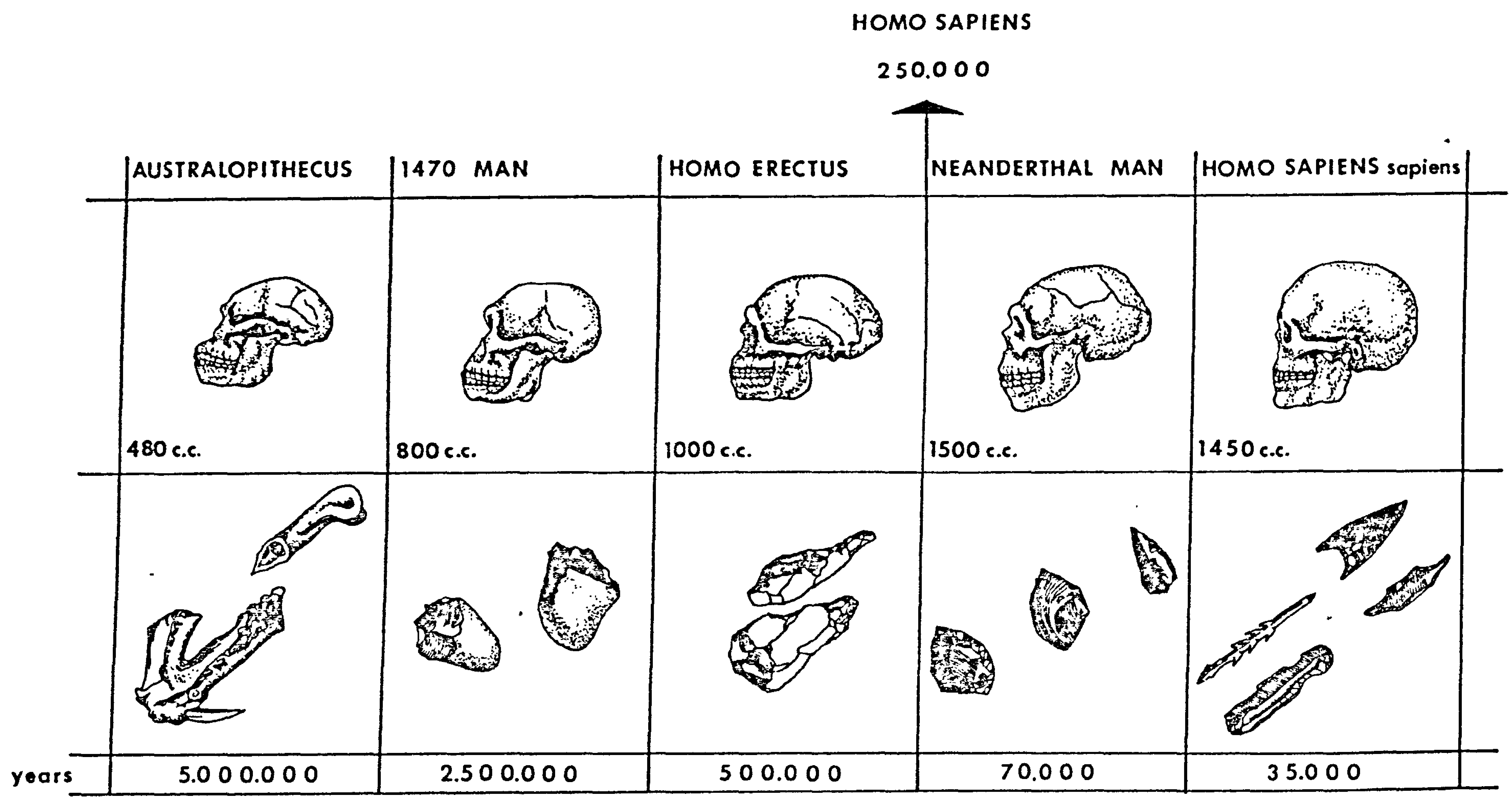


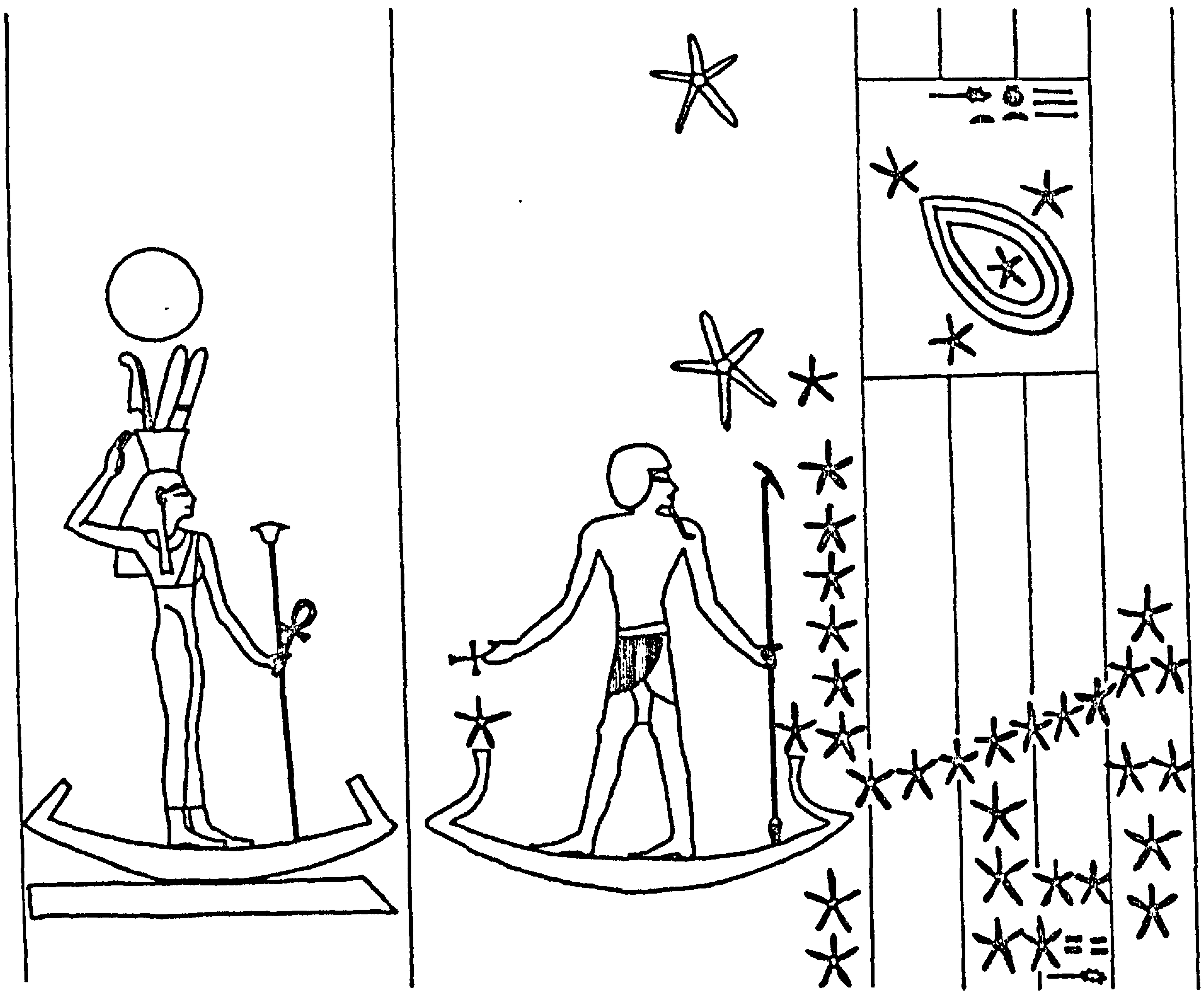
Fig 1.2.D. EVOLUTION OF BRAIN SIZE AND TOOLS USED BY MAN

a Freudian meaning, in which some human acts or the motivations for them occur at a level out of reach of the 'conscious' mind with its overt rationalizations and hidden in some relatively inaccessible 'subconscious'.

Most of these definitions imply a static form of consciousness as a state of being, however, consciousness is basically a dynamic force which emerges in the interaction between the individual and his environment. Consciousness is therefore a social product, at first it was merely a consciousness of the immediate sensuous environment, of nature, which first appeared to man as a completely alien powerful and violent force. Later man's awareness of the necessity of associating with individuals around him was the beginning of the consciousness that he is living in a society with a social order. Consciousness therefore is a continuously unrolling, continuously developing activity of the minds in interaction with their environment, modified either temporarily or permanently by changing circumstances. At any point in an individual's life history, consciousness is an expression of the totality of his mind activity in interaction with the environment, at a later time it will have changed and developed further. It is also worth noting that, "consciousness and the self are above all collective, but they are also individual, since it is thanks to them that each of us can recognize himself in the collectivity as a part of the whole......psychic conditions which affect a whole population within a geographical zone do not find their expression through one single individual but through the collective giving a particular colour to a psychic area of mankind, just as nature produces plants and animals in close relation to the soil and climate" (5).

With the emergence of consciousness a qualitative leap forward has occured, resulting in the critical distinction between humans and other species, so that humans have become vastly more varied and more subject to complex interactions than is possible in other organisms. The emergence of consciousness has qualitatively changed the mode of human existence; with it a new order of complexity, a higher order of hierarchical organization became apparent. Since consciousness is a dynamic process involving interaction between individual and environment and as human relations have transformed during the evolution of human society, human consciousness too has been transformed. Modern man's cranial capacity may not be so different from the early homo sapiens, but his environments and forms of society are, and hence too is his consciousness.

At any period in history man sees the world in terms of a particular 'paradigm' (6), that is simultaneously an apparatus of recognition, which brings into particular focus certain aspects of existence, and a framework by which the many different facets of the universe can be related to each other. So although the basic pattern of rythms in the universe affects human beings and transfers its cosmological messages to them equally, still culture influences the systems of interpretation of this rythmic vision of the wholeness of the universe.



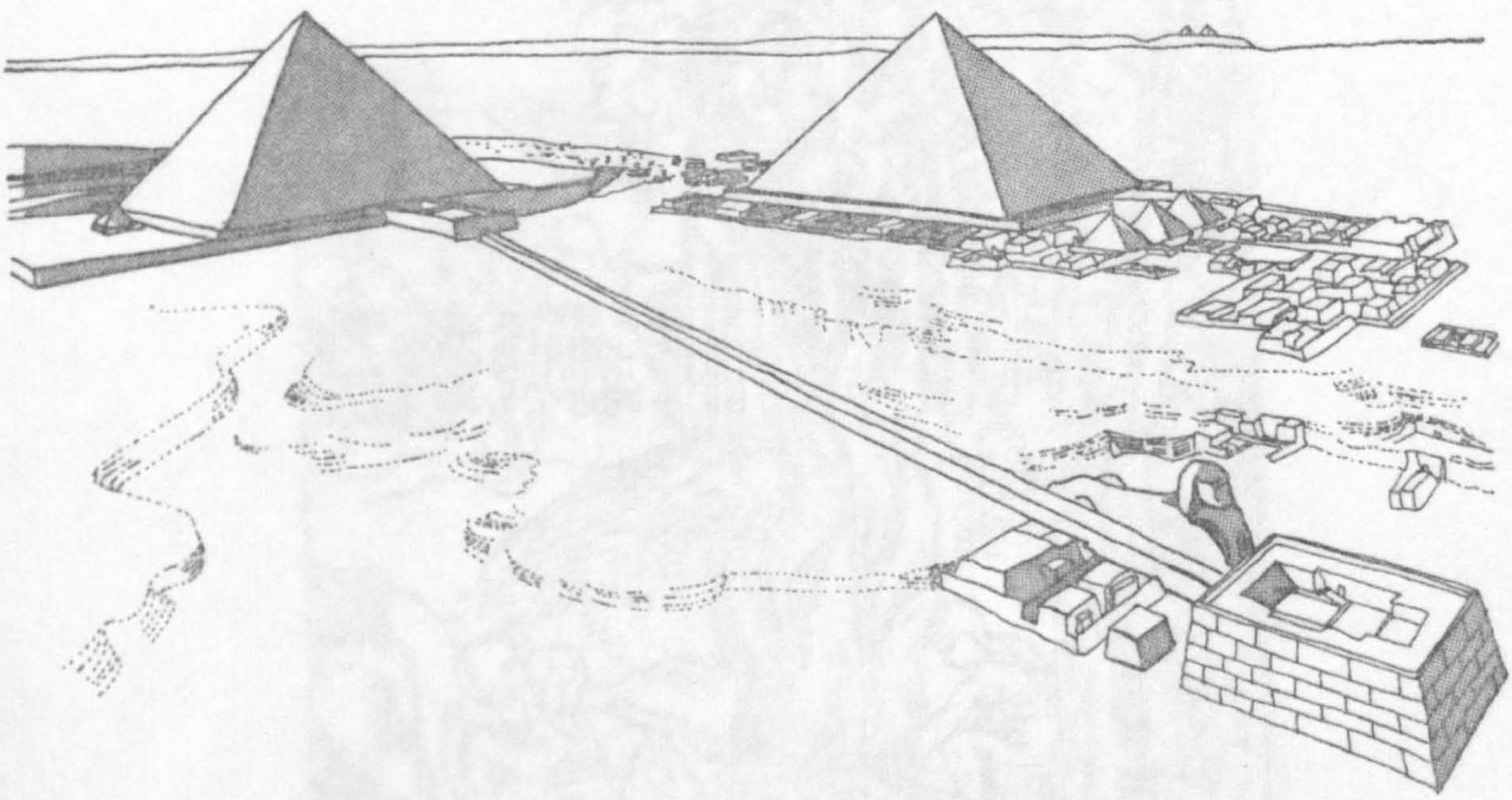
PART OF SENMUT CEILING representing the relation between man and cosmos

At every step of his evolution, man found himself caught in a dilemma; every time he believed he has reached the apex of civilization he was faced by a new and greater void; he always found himself and the civilization he built threatened with forces of his own creation. He frantically searched for remedies to rid himself of those forces of destruction which threaten to deprive him of his cherished dream of ultimate bliss but discovered that his world view lacks definitive criteria to help him judge between 'right' and 'wrong', and his learning and expertise failed to give him universal criteria to distinguish between 'good' and 'bad'. His only refuge was in myth, magic and religion which gave him the stability he needed; but whenever he detached himself from his traditions and social values, change with its pace swept him off his feet, and nothing tangible and lasting remained. Human history is not so much of biological but of social evolution, of continuous cultural transformation. Insofar as humans can only be comprehended in terms of their history and this history is one of societies, new modes of explanation are needed, mythological, religious, symbolic, intellectual, cultural and social descriptions become superimposed at a hierarchical level above that of neurobiology and physiology.

1.3. MYTH, MAGIC and RELIGION

Premythological man was completely embedded in the world that surrounded him, fulfilling his basic needs, he was what may now be called the infant of history, he was so engulfed by his will to survive that he did not have time, and probably no mental capability to contemplate. To him the animal was a superior being. Then there was what may be called a revolution in the intellectual history of man, the huge transformation from the zoomorphic to the anthropomorphic age. Myths grew out of this transformation and Giedion points out that, "It would be hazardous to assign any precise dates, yet from their content, the conflicts they embody, and the contexts in which they are described, we may assume that they roughly coincided with the first formal communities"(7). Myths are based on the relationships and destinies of men, or men and gods. In Myths, time, or rather the succession of events play a determining part in the eternal polarity of life and death, and are always in direct relation to the cosmos. In fact, stars and heavenly bodies become themselves the personifications of deities. This mingling of men and the cosmos is the prime characteristic of myths that attempted to answer the great questions of existence. Myth's character is one of repetition when it represents the cycle of growth and decay of nature and human beings (the Osiris myth); the cyclical conception of time lifts the stories of the gods out of the linear time, and presents them as a circular form of existence revolving on itself in such a way that they appear to happen nowhere yet they happen everywhere. The beginnings of primitive art are rooted in this quest of human existence, in the polarity and continuity of life and death.

Of course to translate art into mythology and then examine mythology literally to understand art is a very futile approach to human understanding. But still understanding the encoded could help in understanding the code chosen. A typical example is Egypt, which seemed to be rooted in order and regularity, the character of the land was incorporated into the myths of creation. In Egypt everything was earth bound and related to earthly existence, life in the beyond was a copy of life on earth, what had been temporal on earth was transferred as it is to eternity without changing its character. The arts were a resonating encodement of the myths, beliefs and social state. What always interested the Egyptians was not the elaboration of internal space, but placing volumes in space, making immediate contact between man, structure and cosmos. The pyramids are the ultimate triumph of this relation, human endeavour has never achieved with such simplicity the sublime materialization of man's irrepressible urge to link his fate with eternity.



RECONSTRUCTION OF THE PYRAMIDS OF KHUFU & KHAFRÉ

It seems that even when the early Egyptians were still primarily dependent on hunting for food, they had learnt that the physical conditions of the Nile valley could best be exploited by men grouped into settlements. The soil was fertile, but if it was to produce crops it had to be carefully irrigated. Organized communities developed early in order to meet this need, and social and political systems were inevitably connected with forces of fertility and life.

THE INVENTION OF FIRE (after Fra Giocondo)

Magic manifested itself since the beginnings of self awareness, it was the translation of myths into rituals. It was basically developed with the discovery of fire. The relation between man and fire is fascinating as it was an element that changed the history of mankind. In general, different cultures used fire for warmth, cooking, safeguarding and drying. But fire was also considered as a very special mysterious power that transforms and affects deeply elements and people, and so it was related to worship and magic. Fire became a symbol and it took its central position in the shrine and the hearth. The home was a space surrounding the hearth, and until now the residues of this composition appear in the association of the hearth and home. The study of the continuity of these primeval beliefs that lived on with remarkable constancy during the cultural evolution of man could help elucidate the problems of change which "contain the seeds of future development"(8).

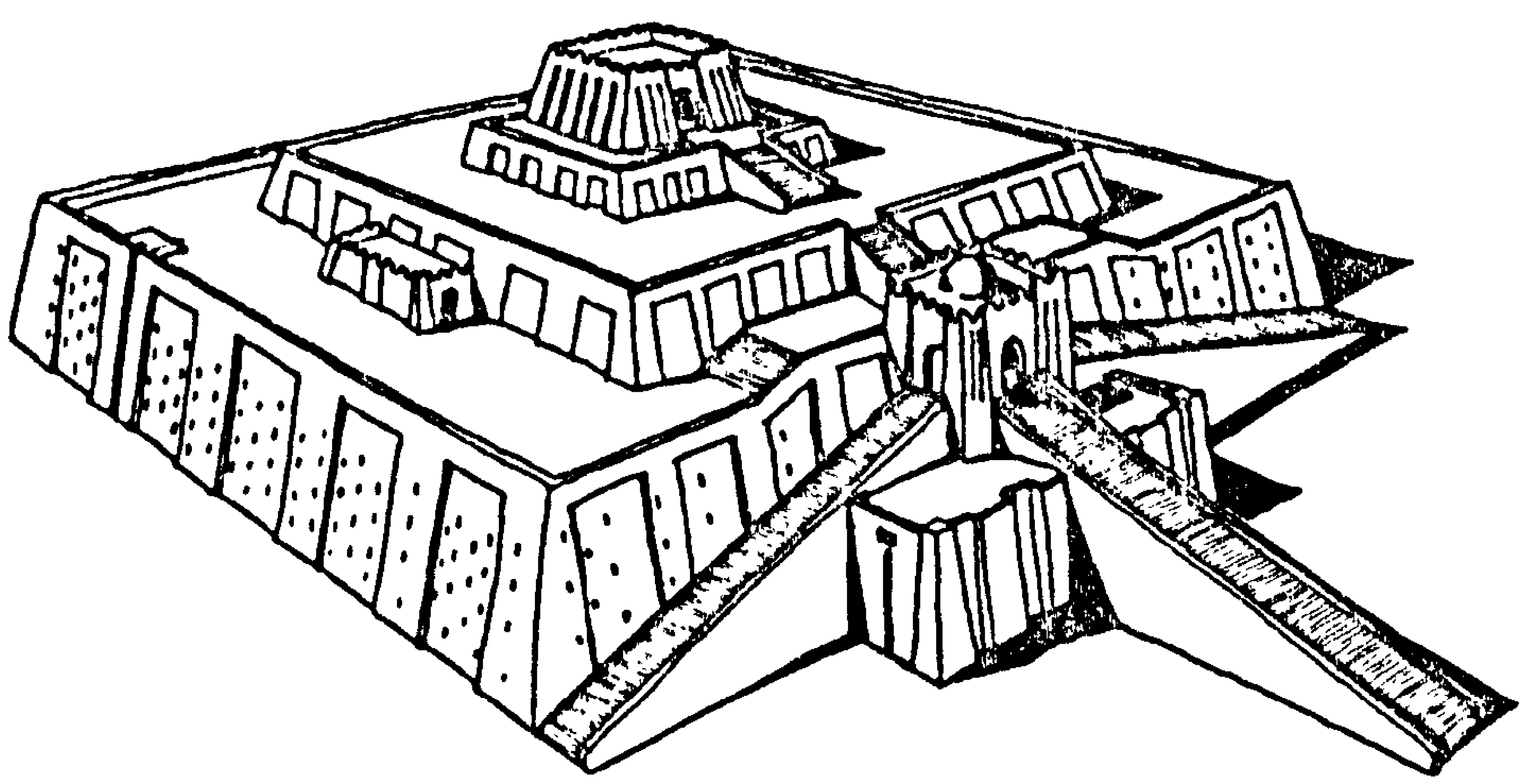
Alchemy was much more than a set of tricks or sympathetic magic; it was a theory about the relation between human life and the world. To the alchemist there was a sympathy between the microcosm of the human being and the macrocosm of the universe. The universe and the human body are made of the same materials, principles and elements. So magic became necessity, a link and a way of life of the people, it manifested itself in all social relations, and consequently on architecture. The magical influence was so strong that it dominated the value system, and basic needs and aesthetic desires yielded to the more powerful magical quality.

In so far as one can infer anything from archeological finds about people's ideas, their concepts of life and death, it may be said that the prevailing view of life was a magical one in the early stages of all primitive cultures. At this level man was unable to perceive any separation between his own ego and the surrounding world, nor did he distinguish between earthly phenomena and the incomprehensible powers of nature. Death seemed to him inexplicable, time and space were unfamiliar concepts, he believed that magical forces were latent in nature and in the objects by which he was surrounded. He was afraid of their incomprehensible effects and worshipped them as fetishes, as a reflection of eternal forces, trying to influence them by invocations. The effects of the cosmic forces of nature was seen in the succession of day and night, in the flood and rain which brought fertility after drought, and in the rythmic sequence of the seasons. In this play of cosmic forces, early man soon came to recognize the divine forces which he worshipped.

Mythical and magical relationships of the human being with external divine powers gradually turned into internalized connections of rational ideas and concepts, however, "a view of the world as imbued with forces, which one sought to influence by magic means, is not characteristic of the prehistoric period alone. The popular beliefs and also the great religions which evolved over the millenia never completely shook off this magic outlook on life"(9).

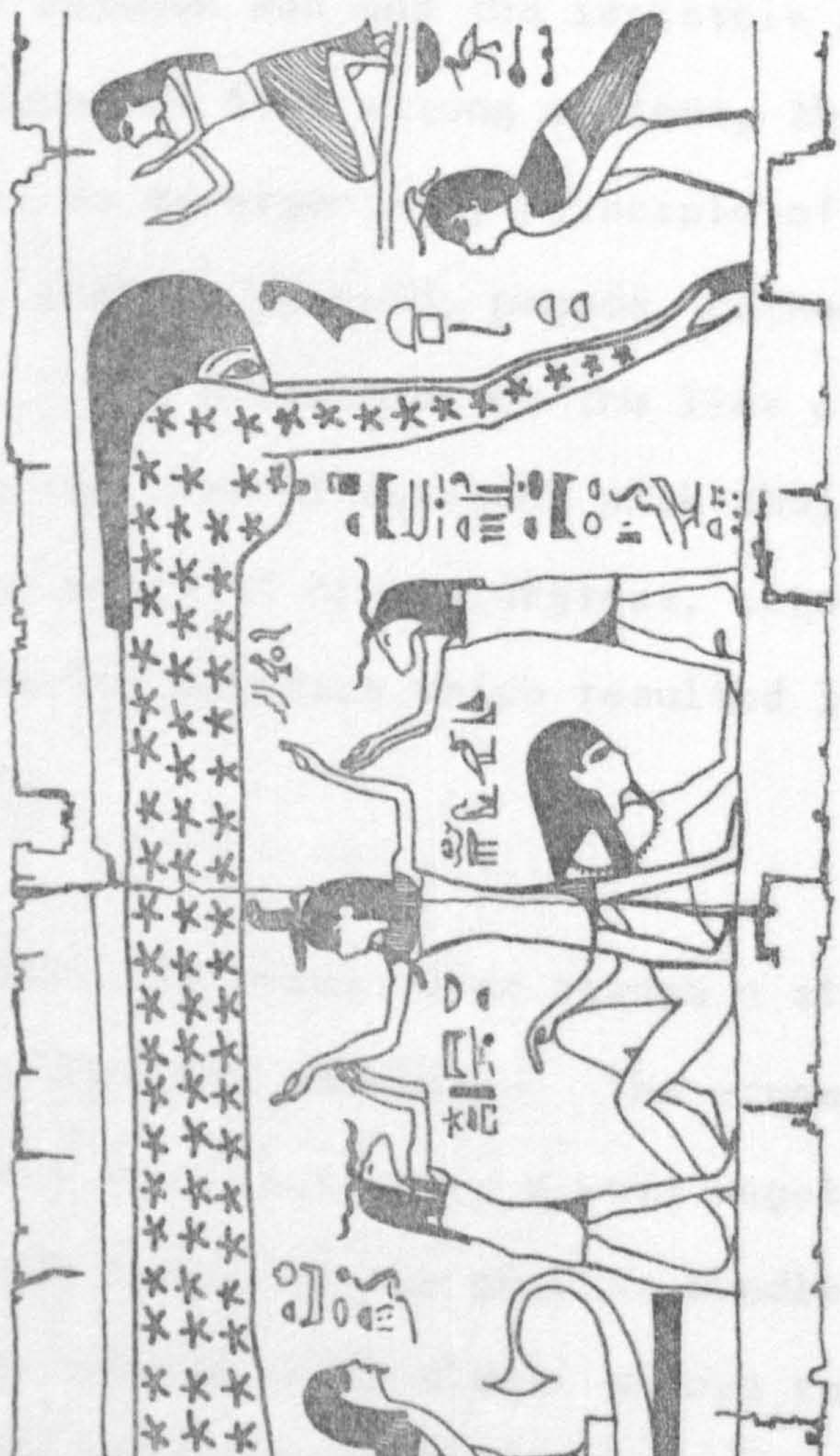
As the primitive world was a dynamic whole characterized by a relative lack of differentiation in the spheres of reality, the modes of symbolization were also unified in myth and magic. A cognitive understanding of the world was unknown and the environment was believed to consist of friendly and hostile objects which were associated to good and bad forces. Later development produced a differentiation of symbol systems which in general can be classified as descriptive and nondescriptive symbol systems. The main descriptive systems are science and philosophy, and the most important nondescriptive systems are art and religion (10). Whereas the former aim at a cognitive and instrumental understanding through advanced and systematic abstraction and generalization, the latter work with generalizations of a more concrete kind in an attempt to grasp the totalities and processes which seem directly inherent in nature and human life.

Religion formally started to dominate the scene with the rise of the first high civilizations. However, religion then was just an extension of the prevailing prehistoric mythical and magical rites. Rites then were far stronger than any clearly defined and rigidly fixed dogma, which would have been contrary to the spirit of the whole religious structure as a dogma by definition is rigidly fixed and must be obeyed in letter and in spirit, and accordingly would not have permitted the contradictions that were found. For example, in the Ancient Egyptian beliefs; how could a dogma have been established when in Egypt three or four deities existed simultaneously, each being the one supreme creator of the universe? And though the philosophy underlying the theological interpretation of some gods like Ptah might have pointed the way to monotheism, "he is the primordial spiritual force whose field of operation lies in the transcendental world" (11). These philosophies were only restricted to small groups of the social elite with intellectual interests, whereas the broad masses were more readily drawn to the overpowering strength of rites expressed in the festivals around which religious life circled.



RECONSTRUCTION OF THE ZIGGURAT AT UR

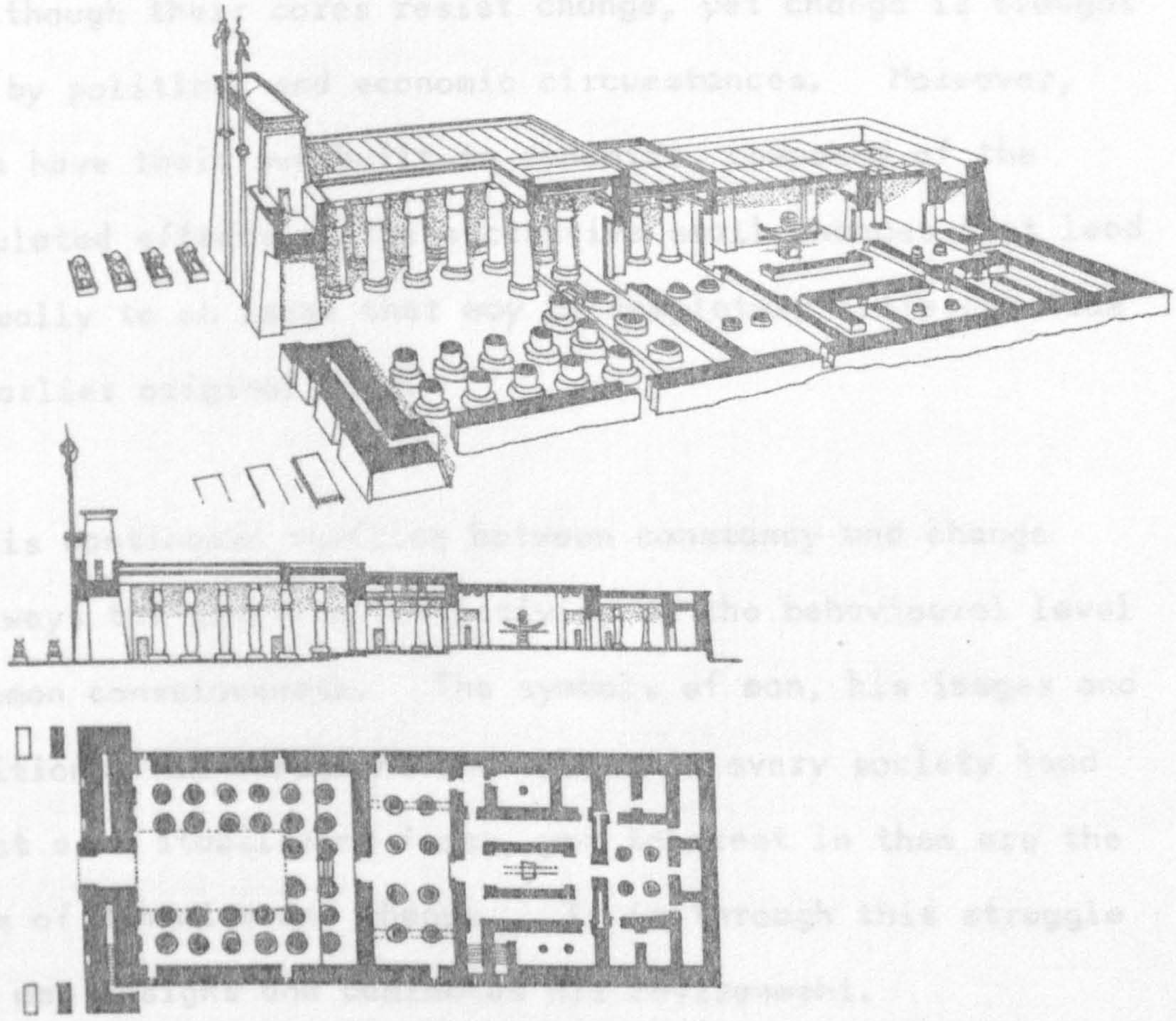
With the beginning of the religious feeling, one of the important changes from prehistory with its equal rights of all directions appeared the supremacy of the vertical as the organising principle to which everything had to be related. The pyramids, ziggurats and obelisks expressed the vertical as the connecting link upwards with the cosmos and downwards with Earth. According to religious thought, the vertical was the direction to heaven, the dwelling of the gods and the



NUT, GODDESS OF THE SKY

ancestors who lived alongside them. So, the vertical form was a physical link between man and the invisible powers of the universe. Because of that strong content, the vertical lasted beyond styles as an organizing principle of form, and survived as fetish, menhir, pyramid, pagoda, cathedral spine and mosque minaret. The horizontal as the line of repose and the vertical as the line of movement with their strong relation through the angle of ninety degrees, acquired an extraordinarily powerful position which resulted in the notion of axis and symmetry.

The Egyptian temple was among other things a stone model of the landscape of Egyptian theology. The ornamental scheme of the columns was practically always vegetal in the form of the palm, the lotus, or the papyrus bundle. Such columns supported a ceiling which almost always carried some reference to the sky, hence recalling the cosmic image of the table top sky supported on tree legs, and echoes the myth of the goddess Nut, whose body sprawled over the Earth in the form of the sky. The usual central path of the temple, which represented the Nile, was flanked by lotus pillars. This path also rose to the highest point of the temple floor representing the primeval hill which first arose from the chaotic mud of creation. This plan, however, was only a topological scheme which allowed for many variations.



THE TEMPLE OF KHONSU

Theological systems are usually developed to clarify religious beliefs, and since religions evolve on relatively fixed patterns of ritual, there is inherent in an established religions a strong element of inertia once doctrines have been defined. Religious art tends to create its own fixed imagery, and since the faith becomes identified with its theology and ritual, its art cannot depart abruptly from traditional forms. But religions also function in another dimension. Religions do respond to the constantly shifting configurations of the societies with which they are associated, and although their cores resist change, yet change is brought about by political and economic circumstances. Moreover, images have their own built-in dynamics, composed of the accumulated effects of the successive small changes that lead eventually to an image that may be completely different from its earlier original form.

This continuous conflict between constancy and change is always the generator of activity on the behavioural level of human consciousness. The symbols of man, his images and traditions, his religions and values in every society tend to act as a stabilizing force, yet inherent in them are the seeds of dynamism and change. It is through this struggle that man designs and dominates his environment.

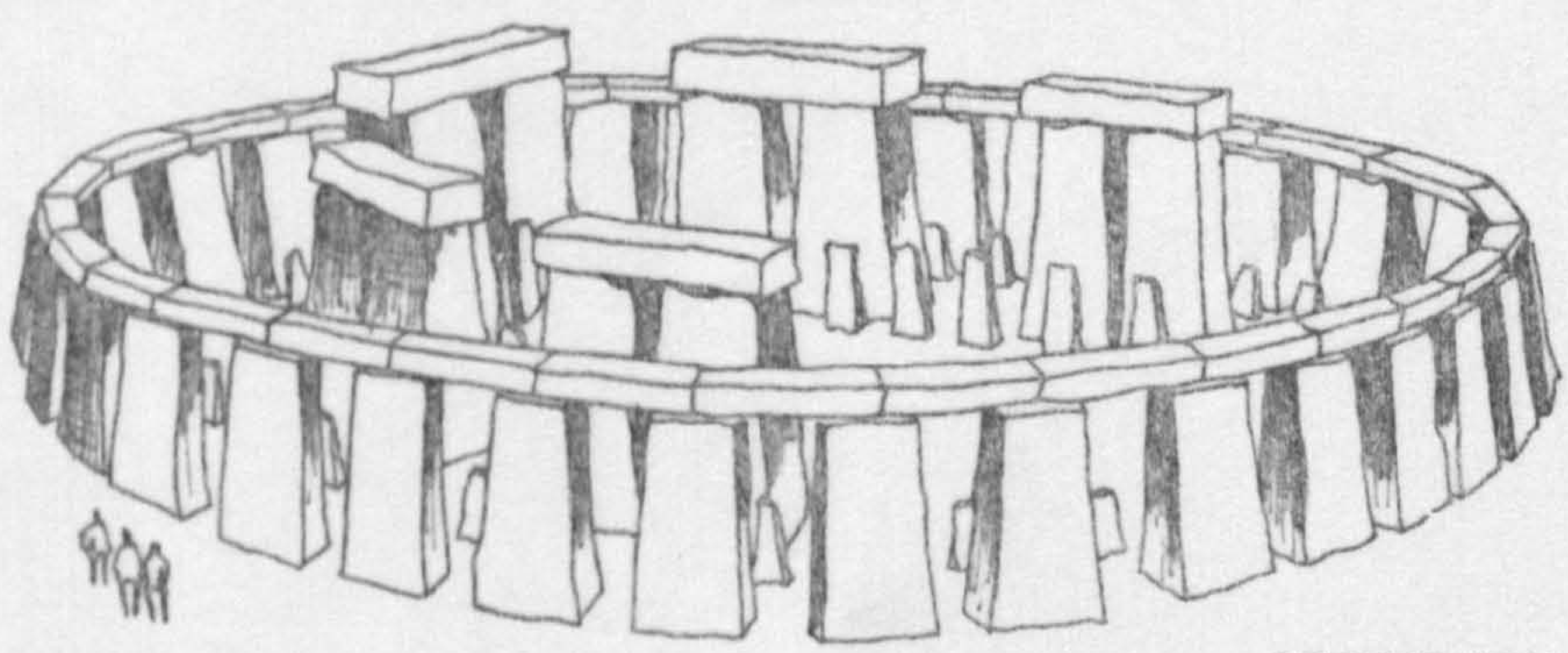
1.4. SIGN, SYMBOL and IMAGE

The world may be viewed as a communication network, a myriad of 'to whom it may concern' messages. Everything that exists or happens in the world emits its characteristic identifying signal. These signals or messages carry all the information of the universe. Through evolution, each organism has developed a concern for those signals which are essential to its living functions and its survival as a species. The better the species is equipped to select and analyse the relevant message, the bigger its possibilities are for survival. The history of mankind is a series of attempts to decipher those cosmic messages and signals, and to deduce out of them a set of human symbols. That is, a matrix of meaning relating to the physical world.

Symbol is defined, in the Oxford dictionary, as the thing regarded by general consent as naturally typifying, representing or recalling something by possession of analogous qualities or by association in fact or thought. Yet, 'Signals' and 'Symbols' belong to two different universes of discourse. A 'Signal' is a part of the physical world of being, a 'Symbol' is a part of the human world of meaning. 'Signals' are operators, 'Symbols' are designators.

For animals signals would appear to be the most essential, perhaps with the only meaning. For man things are different, the "raison d'être" of the symbol lies in the human urge to express that which is inherently inexpressible. During his evolution from prehistory to the first high civilizations man needed a complex set of symbols, more than just means of recognition. It was then that symbols were abstracted, and developed spiritual contents of their own, becoming in turn abstract concepts in themselves.

For every culture there is a variety of aesthetic symbols which members of that culture understand, relate to and find enjoyable. They can and do respond to these symbols according to their aesthetic significance. The sensibilities of each cultural group are created and communicated through their arts, which provide the selective awareness and the patterned perceptions with the feelings by which members of the group relate to and communicate with the world and other people. Art and architecture are more than shape or form, they are embodied souls, and can only be understood when seen against their cultural, psychological and symbolic background. The appreciation of architecture is in the ability to conceive the vast symbolism that it represents.



STONEHENGE

One shall never know when man first became a maker of images, nor can one know with certainty what kind of images first emerged as that dawn creature moved into self awareness. But surely for a long time images glided through the mind and consciousness of that early man without being fixed into concrete forms. These shadows became physical only when awareness of identity and continuity of humanness made man strong enough to attach some significance to the images of the mind as the signals of a vital process. This happened when man first realized his need to live in a social order. It was the appearance of the formal society that gave rise to the physical form of those images that were embedded in man's consciousness.

1.5. FORMATION of SOCIETY and SOCIAL ORDER

The history of man is divided very unequally. First there is his biological evolution during a period of several million years. Then his cultural evolution where the thread of civilizations are crowded in only a few thousand years. It took about two million years for man to change from Australopithecus to the modern Homo sapiens, and though this biological pace is fast, the cultural evolution is more striking. For it took much less than twenty thousand years for home sapiens to become artists, scientists, builders for the future, eager explorers of natural fact and human emotion, and immensely richer in experience and bolder in imagination.

"Skulls and skeletons of Australopithecus that have now been found in largish numbers show that most of them died before the age of twenty" (12). Parents had no time to raise their own children, so a kind of social organization must have developed to look after the young. An order to hand them their knowledge must have been established so they may play an active part in the society that has been formed. This probably was the first breakthrough of human development, as without this organization each generation would have had to start from scratch, and the speed of cultural and intellectual evolution of man would have been much slower that that which actually took place. This huge step in the evolution of man led to the formation of societies as assemblages of people in which each man is expected to be himself and to interact with his fellowman. He is no longer thought of as having a definite individualistic place in the universe.

A number of different models have been developed by sociologists to account for the formation and development of societies, they may be summarized as follows :

1. Physical science models : where society is seen as an astronomical system in which human beings are treated as solid bodies on which concepts such as space, time, attraction, repulsion, inertia and force are applied. These concepts introduce a misleading precision into the explanation of social order.

2. Evolutionary models : where society is seen as progressing by definite steps towards a final stage of perfection. Marx and Engels produced the best known evolutionary model based on five steps of social evolution namely; a) the primitive Eden, followed by; b) slavery; c) feudalism; d) capitalism, and finally; e) socialism in which, idealistically, no one is exploited and the individual is encouraged to develop towards a state of self realization.

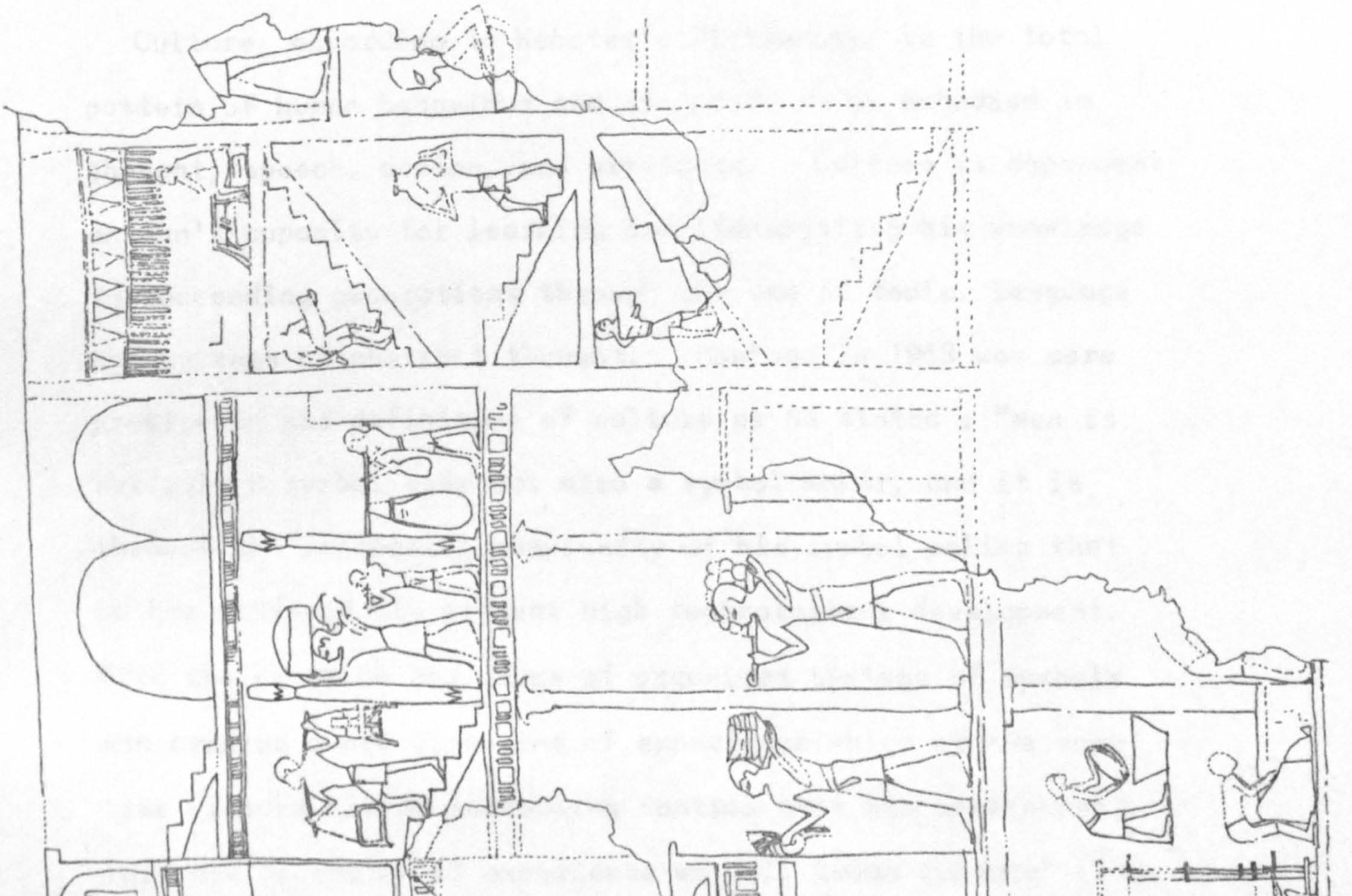
3. Organismic models : these depend on analogies with living organisms, with particular reference to structure and function. Traffic, for example, is compared to circulation systems; communication networks to the nervous system;

and cities are born, grow, reach maturity and die. These analogies are useful in understanding how societies work as a system, however, if drawn too far they fail to reach a level of usefulness, because of the inherent differences between the living cell which can regenerate itself compared to the dynamics of society in terms of aspirations and needs.

4. Equilibrium models : which are special cases of organismic models. Societies are compared to organisms maintaining themselves in a state of near equilibrium. It is also suggested that in a society agreement is not reached by consensus, and that progress depends on an endless struggle between the privileged and the deprived.

5. Mathematical models : recently as a result of the increasing availability of computers, sociologists have turned increasingly to the building of mathematical models. Nevertheless, mathematical modelling carries a number of hidden dangers. Like the behaviourist, the mathematical modeller tends to think that his techniques are neutral, but the fact that one is using a model at all is a declaration that one has chosen to see the world in a simulated particular way.

In whatever way a society has developed, and whichever model is applied to the workings of the social systems, an assemblage of ideas and activities and a whole body of customary beliefs and material traits constituting a distinct culture appear and develop for each social group. It is through this mental nature that exists in the minds of the members of a society and not through its structural or physical nature, that social organization can be really understood. This is due to the fact that the physical environment reflects the image of the real world as it exists in the mass consciousness of the individuals. Therefore, works of architecture reflect the state of a particular people at a particular time, their understanding of their world through science, art and religion; the nature of their institutions and their ability to express their culture.



ANCIENT EGYPTIAN MULTI-STOREY DWELLING

1.6. MEANING of CULTURE and CULTURAL ATTITUDES

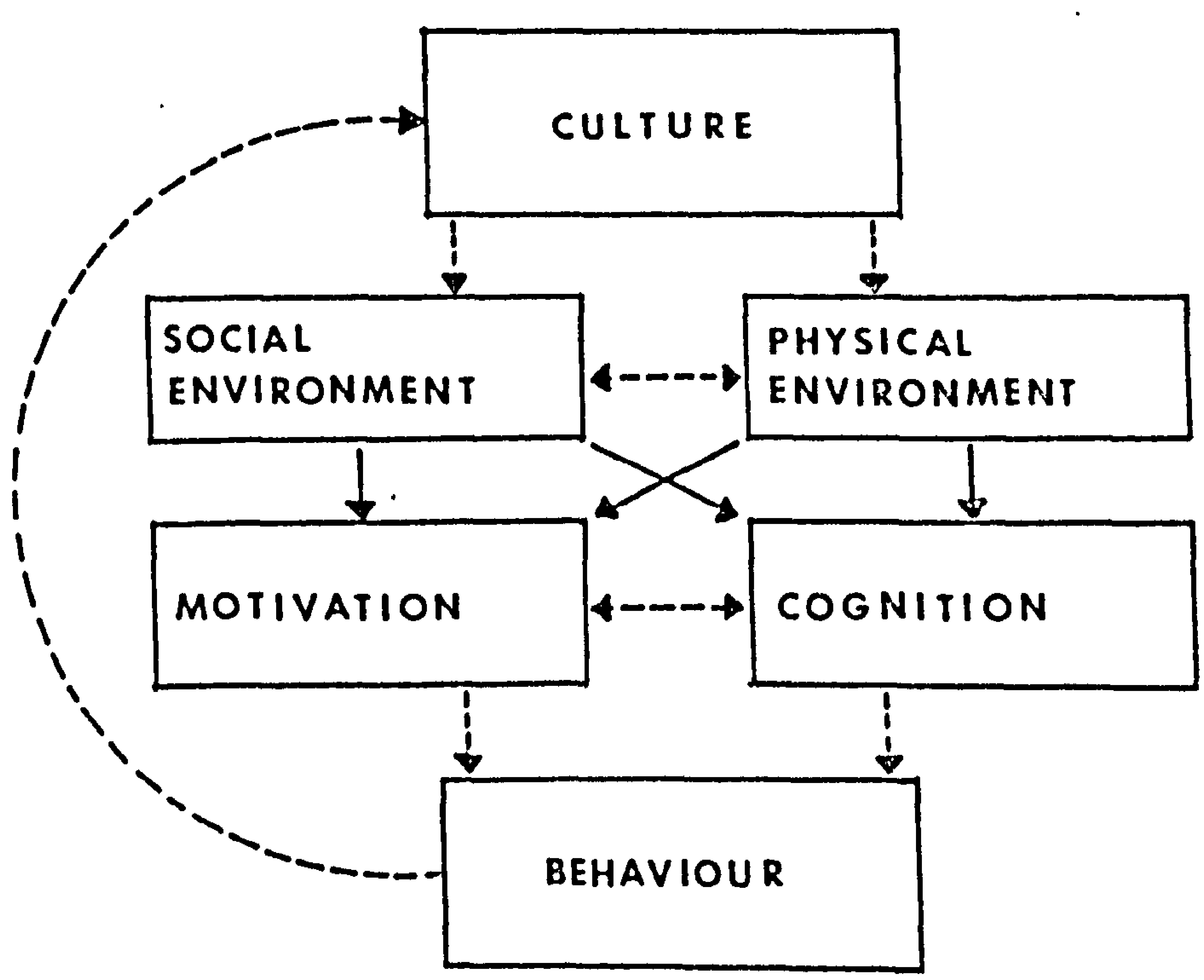
Culture, according to Webster's Dictionary, is the total pattern of human behaviour and its products as embodied in thought, speech, action, and artefacts. Culture is dependent on man's capacity for learning and transmitting his knowledge to succeeding generations through the use of tools, language and systems of abstract thought. Montagu in 1968 was more precise in his definition of culture as he stated : "man is not only a symbol user but also a symbol maker, and it is through the increasing complexity of his symbol making that he has achieved his present high technological development. With the creation and usage of organized systems of symbols man created a new dimension of experience which at the same time yielded him an increasing control over his environment. This new dimension of experience we call human culture" (13). Wallace in 1961 (14) identified with the view that culture is realized in the mutually predictive cognitions of the members of a society. Goodenough in 1951 (15) advocated a related position which equates culture not with objects, behaviour, people or emotions per se, but with the structuring of these things in people's minds. The results of adopting such a view of culture are that the focal concern becomes the shared cognitive processes of the people and their culturally meaningful systems of behaviour.

Factually a culture is made up of the activities of human beings. It is a system of interlocking and intersecting actions, a continuous functional pattern, and as such, it is intangible and invisible. It has physical ingredients and physical symptoms, but all such items are the fragments that represent the total pattern of life only to those who are acquainted with it and may be reminded of it. Culture is more like a tool than it is like a static accumulation of treasures. It is something that men make and use, it is a changing network to which every member of a community makes a contribution, and which in turn moulds every member of the community. The sum of a culture is inevitably greater than its individual parts, but it only becomes real, only exists at all, when it comes alive in the actions and imaginations of men.

No two peoples are found to have exactly the same way of life, and one must be content, as Shafer states, to "note the differences between peoples without trying to explain them, they cannot be ordered intellectually into concepts, but they can be observed and taken in" (16). The issue of how much diversity there is, and to what extent distinctive ways of life are likely to survive, are critical problems that need factual information and theoretical explanation. Social change has greatly accelerated in the last few decades and has compounded with cultural contacts. Naturally, this had an effect on the authenticity of every culture. Though impregnated with external effects yet still each culture has its own distinct characteristics. The designer is faced with the question of the results and possibilities of such an interaction between different cultures, and the extent of adaptation to their different values and levels of achievement. It has always been the dream of humanity to bring all the different types of thought together into one enormous system of logic. That day is still very distant, although mathematics still keeps on opening up new types of logical structure for exploration. Yet, if even a complete system of thought did exist, in which all types of logical processes were included, it will still remain true that each application will call for a particular selection of methods, and an intellectual pattern appropriate to the behaviour of its subject matter.

1.7. CULTURE'S INFLUENCE on BEHAVIOUR

The family is an institution of culture and acts in most respects as its agent. It transmits and translates social messages by delineating the boundaries of the possible, instilling religious convictions, and dictating social norms. It is in short the supreme instrument of internalization, which is to say, of socialization. The family is the individual's first cultural input. It is his school, state, god and sometimes it may also be the agent of craft or profession, defining social placement and economic expectations. The family fits squarely into the world of privacy, giving cultural imperatives a particular and often highly individual twist.



RELATION BETWEEN CULTURE & BEHAVIOUR after Serpell

Similarly an individual incorporates the shapes of his family, his craft and his culture. He stretches as it were, across all his worlds. But his character is a unique mixture of idiosyncracy and conformity. He is never simply a receptacle for external influences, and may not always be an effect but often a cause. The individual could make history happen as both his worlds of perceptions and realities, are not solely constraints on his actions but also platforms for the exercise of his choice.

Culture has always been conceived of as affecting motivation at the level of the total personality, of attitudes and of specific motives. It has been conceived of as affecting cognition at the level of the broad structure of the intellect and of specific processes such as reasoning, communication and perception. The aspects of culture which might exercise such an influence include social and physical characteristics of the environment. These causal relationships mediate the relation between culture and behaviour.

Language is a very obvious candidate for emphasis as a mediator between culture and behaviour. Not only is language widely regarded as one of man's most distinctive characteristics within the animal kingdom, but it is also a widely recognized distinguishing characteristic of different cultures. There is certainly a strong link between culture and its expression in language. Research on the comparison of languages tend to undermine the existance of any simple continuum from primitive to sophisticated, or from simple to complex languages. The relation is not a simple linear evolution, yet an essential observation is that as a new artefact or process comes within the scope of the culture's need for communication the language adapts accordingly.

In the transmission of language from one generation to the next there occurs a very fundamental kind of socialization. The child is not merely taught how to use language to express his ideas, but he is also taught in this process how to think and form those ideas. By the end of this process he sees, hears, and experiences very largely as he does, because the language habits of his community predispose certain choices of interpretation. At the psychological level this theory of linguistic relativity suggests a very intimate connection between language and culture on the one hand, and perception, thought, and behaviour on the other. It is worth pointing out that people respond actively and often creatively to environmental stimuli, they shut some out and modify others through symbolic and other socio-cultural mechanisms. Their responses to these stimuli depend on the meaning they attach to them which in turn is dependent on their cultural background (17).

Architecture has and always will, directly or indirectly, reflect the cultural values of its builders. However; as cultures are in a dynamic state, the architecture produced by any culture should change accordingly. And since architecture is the product of culturally influenced behaviours, one may predict the trends in architectural form that would be most appreciated by that culture. Canter states in 'Psychology and the Built Environment' that, "The fact that no organism can be understood in isolation from its habitat is a truism.....However, our particular concern is that civilized man is to a high degree different from other species in that he constructs and controls his own environment. His capacity to do this is not instinctive it is acquired by experience and transmitted through his culture. Its range and power is increasing with modern technology at an exponential rate. Having made an environment, man can reflect on its consequences and store this information to be fed back, giving the option of an environment with the same or different consequences next time" (18).

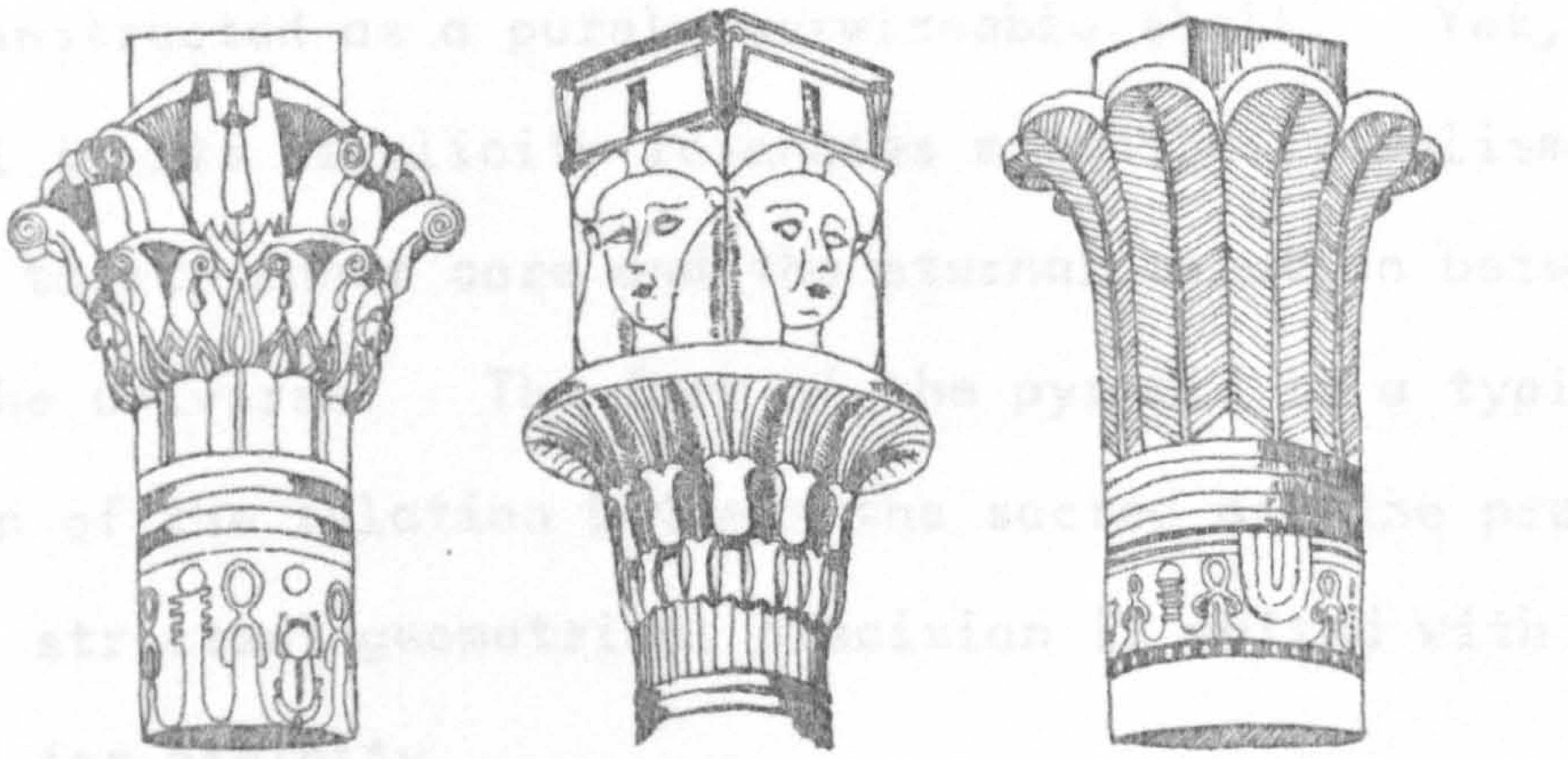
Although personality is an individual characteristic, the people in one cultural group behave and act differently from those in another group. This predominance of certain traits may be termed the 'modal personality' of a culture, which is different from the group stereotype images where all people of the same culture are believed and expected to fall into one mould and pattern of behaviour. The conflict between the desires of the modal personality and the theoretical designer is the conflict between the projection of cultural attitudes and expectations on the one hand, and the imposing of certain beliefs and design patterns on the other.

Desirability cannot be an extra-cultural attitude, it must come from within the cultural context rather than being imposed from the outside, or the result would be one vast moral structure that is not believed in or followed, whereas cultural values because they are the outcome of all the forces acting in a society and its aspirations are the only true links that gather people even beyond what may be considered as scientific truth. Moreover, all cultures make a selection of their own cultural institutions, which as Ruth Benedict (19) states, "each from the point of view of another ignores fundamentals and exploits irrelevancies". Yet each may be considered successful in its own right and in its own context. Similar choices apply to architectural form and the objectives desired from the design process.

1.8. BEGINNINGS of ARCHITECTURE as a CULTURAL SYMBOL

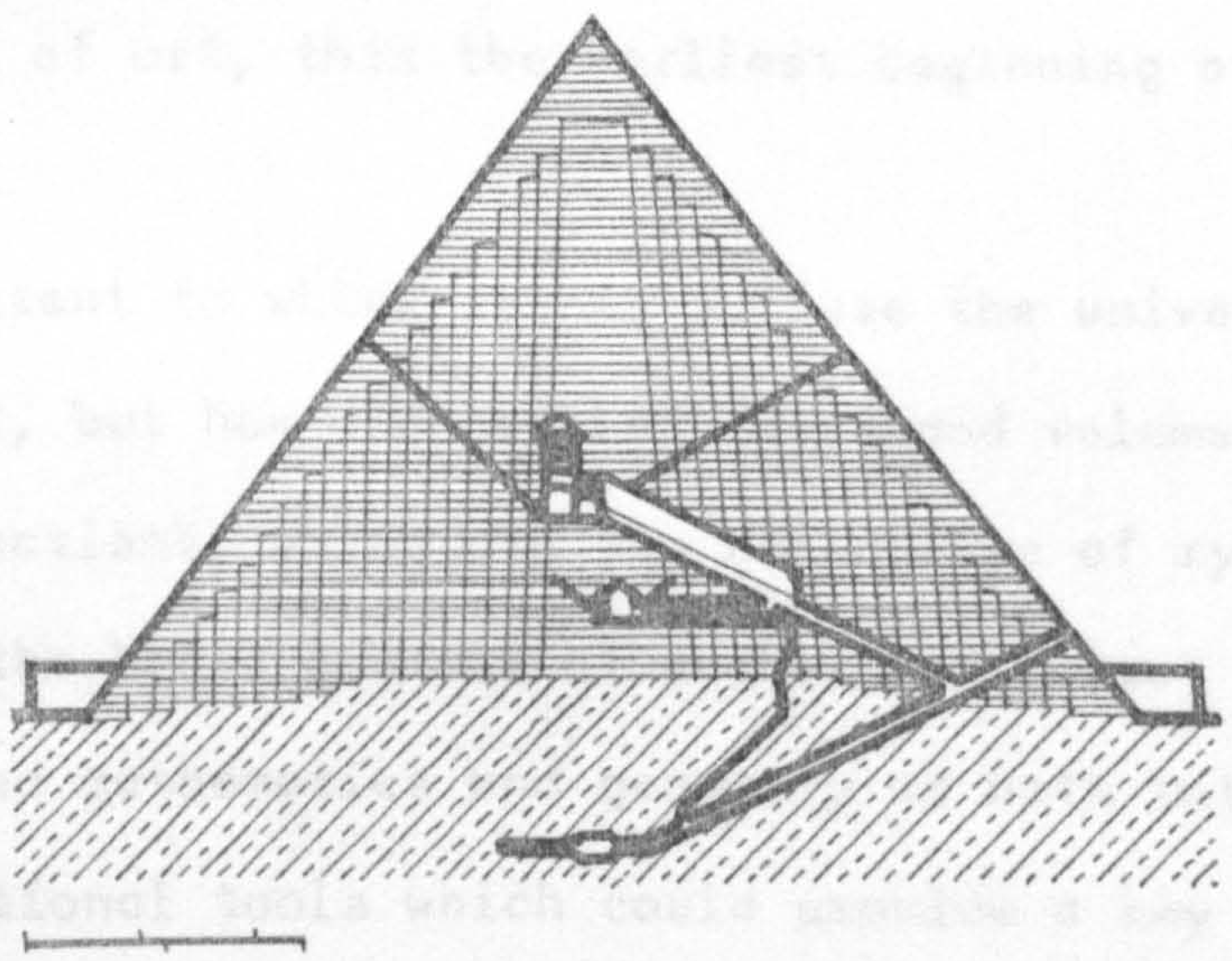
Understanding architecture requires an openness to the architect's vision and a keen perceptual awareness and sensitivity, but it also is incomplete without a knowledge of the historical situation, the social context and the prevailing ideas of the age during which the architectural forms were created. One must keep in mind that man responds to and expresses a reaction to the surrounding social conditions. As a consequence, the architectural forms of a particular period is usually related to the prevailing conditions of the time, either expressing them or opposing them.

To consider the beginning of art one has to start from the conceptual and the essential nature of art itself. This basic nature of art is to give shape to what is objective in itself, such as the physical world of nature and the external environment of the spirit, thus building into what has no inner life of its own a meaning and form. This meaning and form remain external to it because they are not immanent in the objective world itself. Whole nations have been able to express their culture, religion and deepest needs through building, or at least in some constructional way. Ancient schools of building carried forward sacred traditions and magical customs, and it was those which implied the forms. Furthermore, ornament and decoration had real purpose and meaning, they were subservient to the ultimate spiritual content of the architectural form.



EXAMPLES OF ANCIENT EGYPTIAN COLUMN CAPITALS

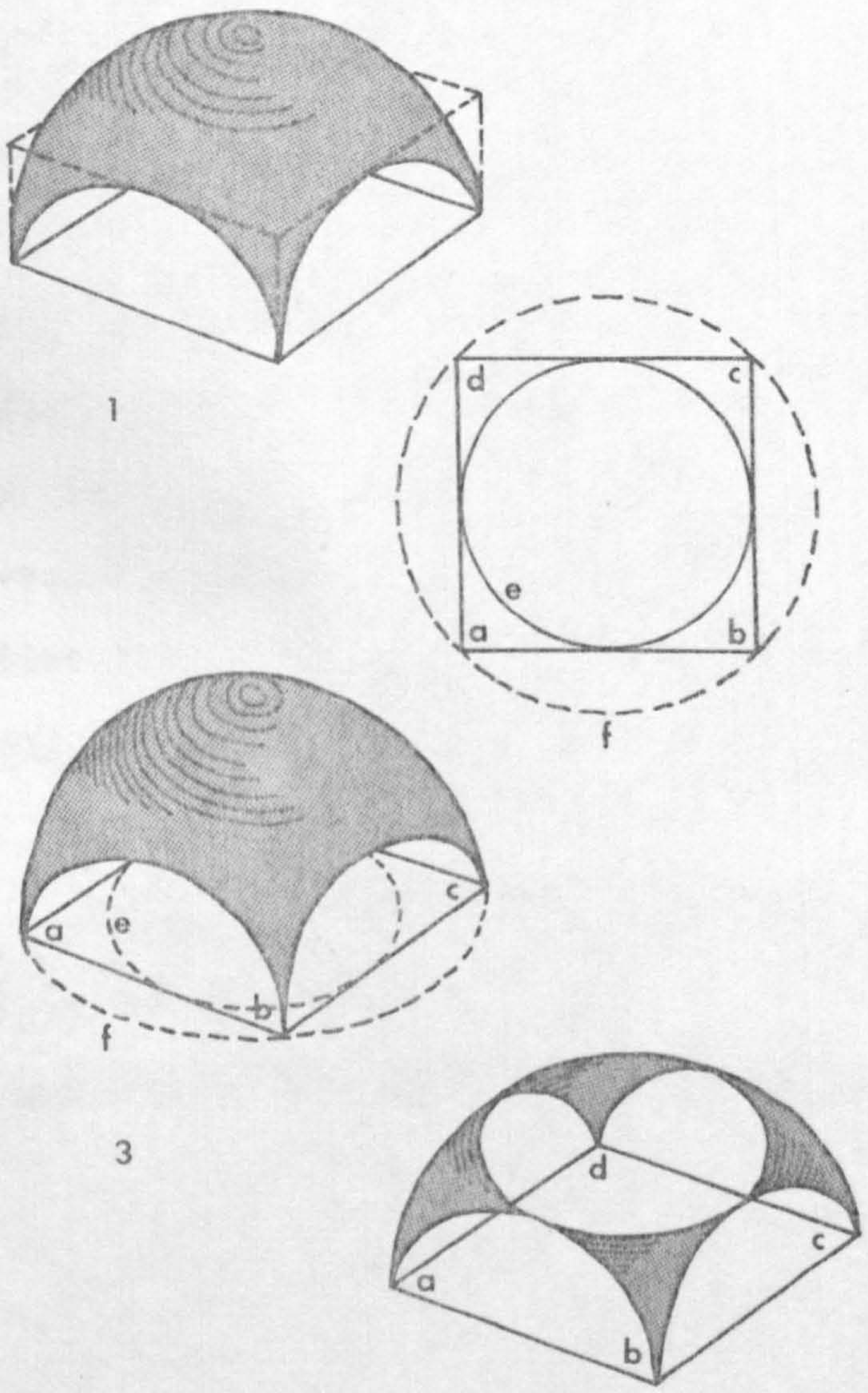
If one is to look closely at ancient Egyptian Architecture, symbolic meanings will be seen to be clearly interwoven with their space and form throughout. Sculpture has not worked itself free from architecture. And architectonic features, like proportions, distances, number of columns, walls and storeys were so treated that their relations do not have their proper purpose in themselves, their symmetry, rythm or beauty, but are determined symbolically. The Egyptian pyramids at Guiza are the first incidents of the most importance in architecture, where the relation between the spiritual, as the inner meaning portrayed on its own account, and the corporeal shell placed around it as a purely architectural enclosure were completely interwoven. The essential thing, the symbolic and spiritual centre, is a person, an objective individual who appears significant on his own account and expresses himself in distinction from his habitation which thus is constructed as a purely serviceable shell. Yet, this shell in its simplicity resonates a subtle symbolism referring to its inner core and the eternal relation between man and the universe. The form of the pyramid is a typical expression of the relation between the sacred and the profane, where the strictest geometrical precision is united with a longing for eternity.



SECTION THROUGH THE PYRAMID OF KHUFU AT GUIZA

The Egyptians' optimistic approach to the hereafter shows their special gift for overlooking, or at least lightening, the dark side of human destiny. Life on Earth was just a beginning, death was but a way station, a bridge to an eternal and wonderful existence. The rise of stone architecture can in the first instance, be attributed to the Egyptian conception of the nature of death. The first appearance of the man made temple is synonymous with the appearance of monumentality in architecture, the old longing to establish contact with the invisible forces was, for the first time, given an architectural form. Giedion (20) states in 'The Eternal Present' that, "The organization of the interior space of the temple before 3000 B.C. testified to the desire to attain direct contact with invisible powers with no intermediary aid of anthropomorphic deities. This represented just as great an achievement of the creative imagination as the first drawings of Aurignacian man. That was the earliest beginning of art, this the earliest beginning of architecture".

The extent to which rythms suffuse the universe has been hinted at, but how did people understand volume repetitions and connections, which are the components of rythm, if not through the basic grammar of number and form. The ancients recognized mathematics and geometry as both rational and super-rational tools which could provide a key to the system of order they believed was underlying the universe. One can detect the primal grammar on which man's perception and the evolution of his consciousness is founded, in the symbolism of numbers and geometry. The square symbolized the Earth of matter and rationalism, while the circle symbolized the encompassing world of spirit and feelings. This duality dominated human life, seeking to harness ideals for practical necessities, and balancing the demands of logic with the demands of the heart. Thus squaring the circle and circling the square were the architectural as well as the philosophical pursuits of the sciences of ancient religions.



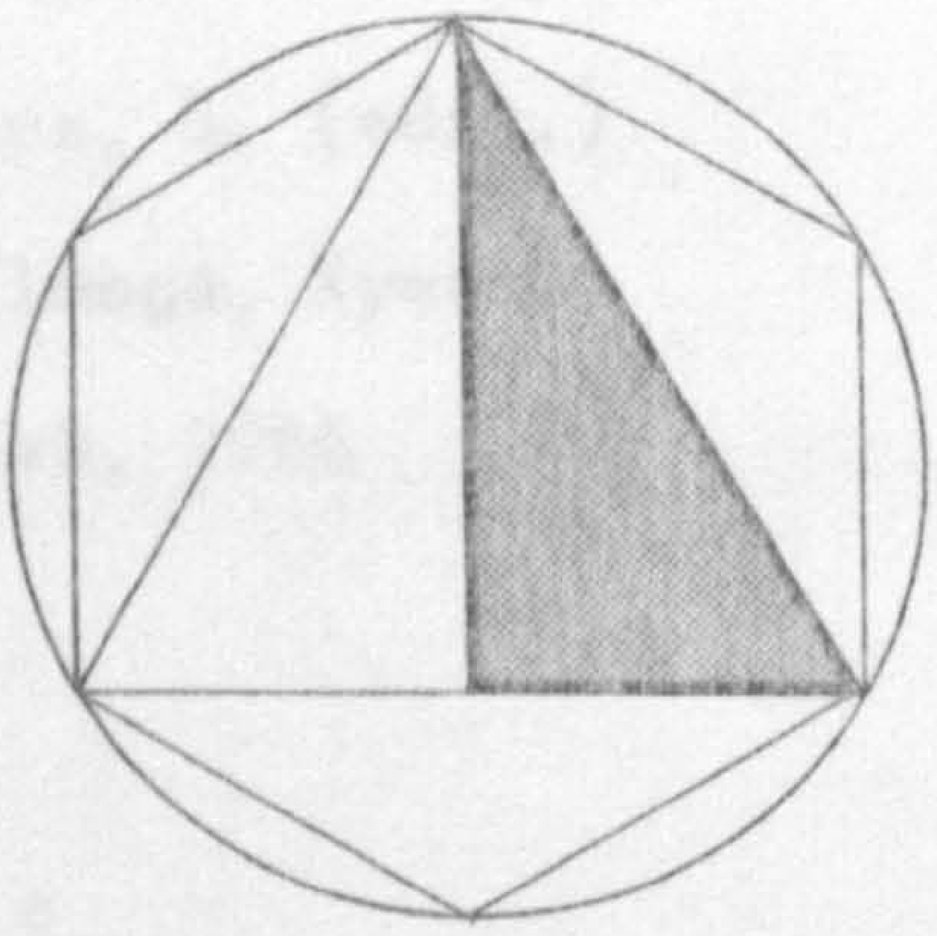
EVOLUTION OF THE DOME AND PENDENTIVE

Sacred geometry concerned itself with the order in space whereby existence unfolds with maximum harmony through successive modes of energy. The earliest perceptions involved the ordering of forms in space, which is probably the reason why all human discussions of religious and supernatural experiences are full of the term 'dimensions'. Sacred geometry delineated how dimensions of vision unfolded, its basis was the sphere or the circle, whose shapes both as infinity and totality resonate life. Once a circle has moved one radius distant from itself it produces the archetypal symbol 'vesica piscis' from which spring all other geometric forms, such as triangles, squares, and the 'golden mean' rectangles which were used abundantly in sacred architecture. The fusion of two spheres of equal size produces a three dimensional vesica piscis, which in turn generates all the basic crystalline three dimensional forms which were subject to much philosophical debate since Plato uncovered their inner rythms.

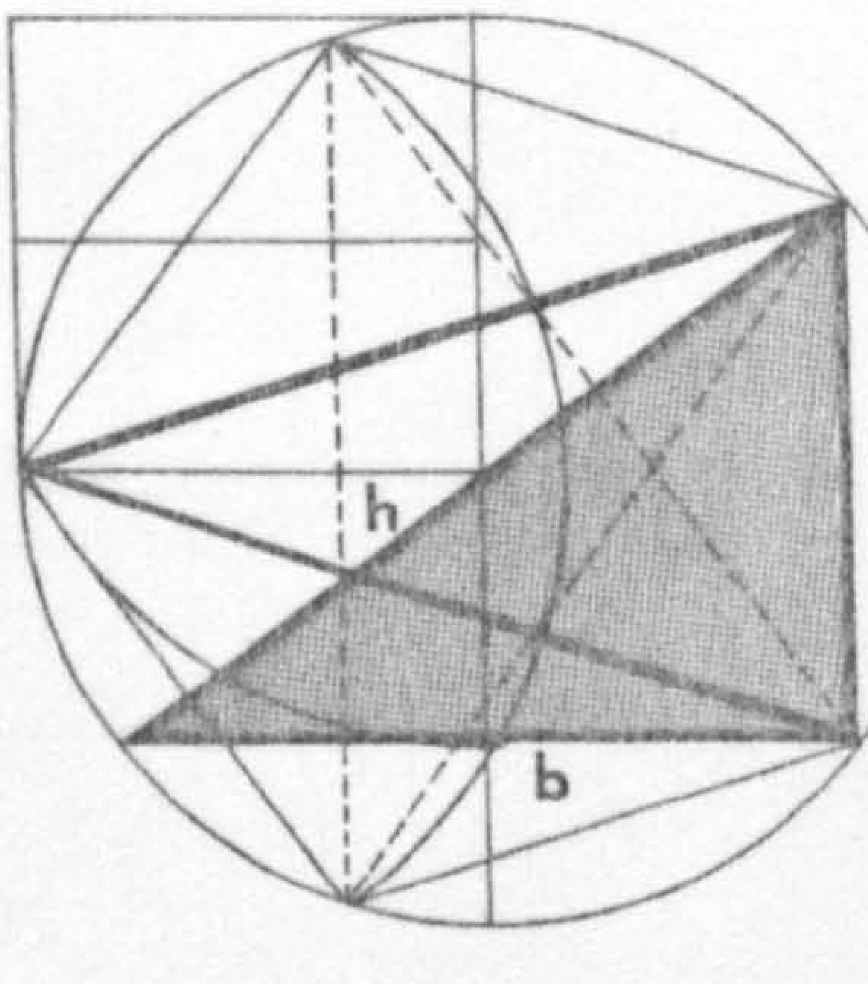
The fact that certain harmonic shapes resonate to cosmic frequencies emerges from the understanding of the forms and numbers which the ancients sought to follow in their architecture and which was designed to resonate the life sustaining powers of the universe. However, each culture and civilization had its own value system and scales, on which all aesthetic as well as ethical values were measured. It was this three way relationship between the absolute universal rythms, the individual and cultural values, and the architectural output in a society, that determines the understanding of architectural form and the design activity required for its conformation.

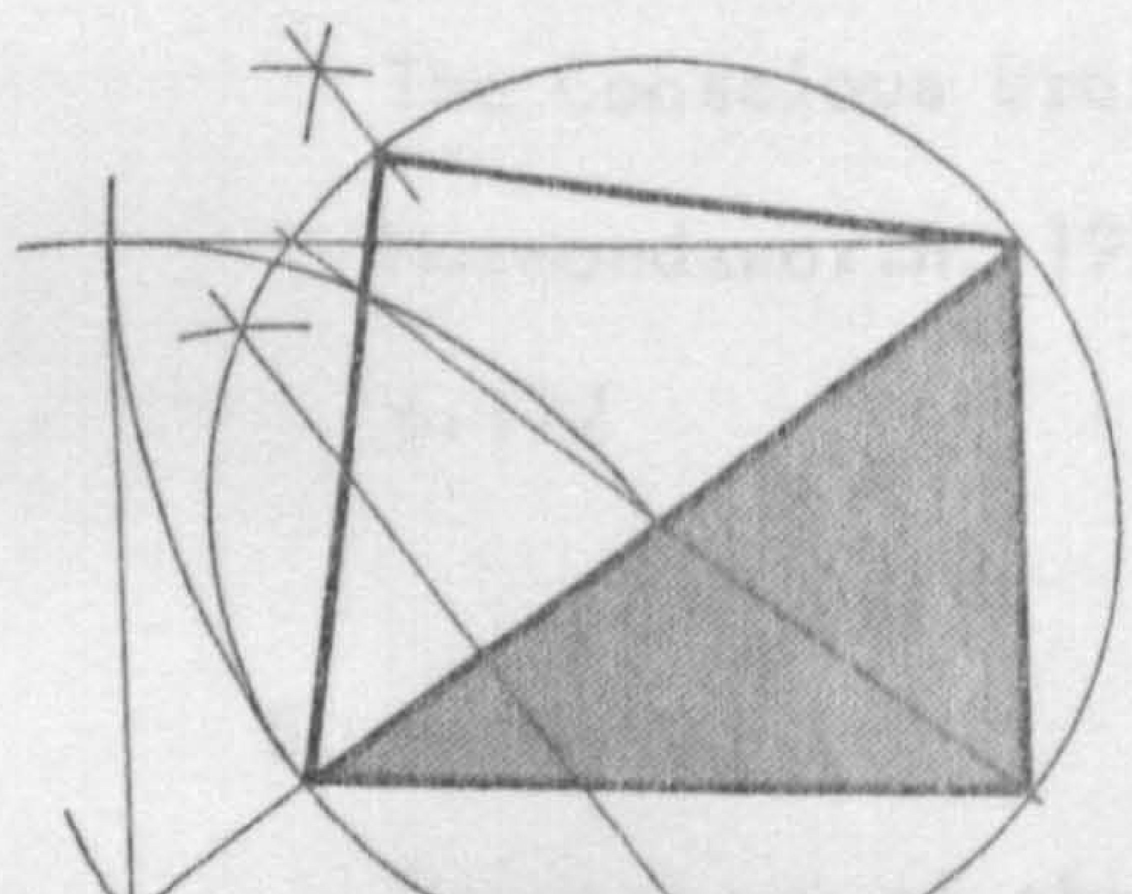
FIBONACCI SERIES IN THE STRUCTURE OF NATURAL FORMS

TIMAEUS TRIANGLE;
$\sqrt{3}$, angles 30° & 60°

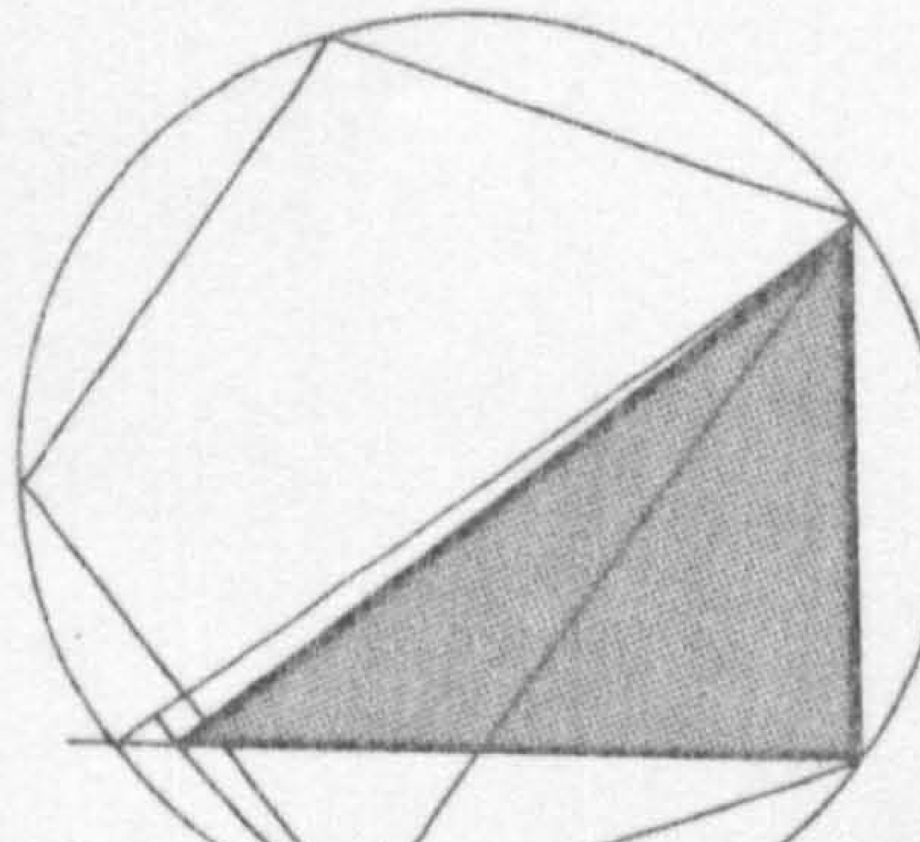


HARMONIC
TRIANGLE;
h & b related
like royal
& little cubits





PYTHAGOREAN
TRIANGLE;
(3 - 4 - 5)



PRICE TRIANGL
$\sqrt{\phi}$, meridian
section of th
Great Pyramid

REFERENCES

1. Eddington, A.S.
The Nature of the Physical World.
Cambridge, 1928
p. 251

2. Koestler, A.
The Act of Creation
London, 1969
pp. 241-242

3. Foerster, H.V.
From Stimulus to Symbol
in Kepes, G. (edit.)
Sign, lmage, Xymbol
New York, 1966
p.42

4. Rose, S.
The Conscious Brain
Harmondsworth, 1976
p.172

5. Marc, O.
Psychology of the House
London, 1977
pp. 68-69

6. Term first used in this context by Kuhn, T.C.

7. Giedion, S.
Symbolic Expression in Prehistory and the First High Civilization
in. Kepes, G. (edit.)
op.cit.
p.84

8. Giedion, S.
The Eternal Present
London, 1964
p.2

9. Woldering, I.
Gods, Men and Pharoahs
New York, 1967
p.12

10. Schulz, C.N.
Intentions in Architecture
London, 1963

11. Woldering, I.
op. cit.
p. 48

12. Bronowski, J.
The Ascent of Man
London, 1976
p.59

13. Montagu, M.F. (edit.)
Culture, Man's Adaptive Dimension
Oxford, 1968
p.102

14. Wallace, A.
The Psychic Unity of Human Groups
in Kaplan, B. (edit.)
Studying Personality Cross Culturally
London, 1961

15. Goodenough, W.H.
Cultural Anthropology and Linguistics
Georgetown, 1957

16. Schafer, H.
Principles of Egyptian Art.
Oxford, 1974

17. Dubos, R.
Man Adapting
New Haven, 1966

18. Canter, D. and Lee, T.

Psychology and the Built Environment

England, 1974

19. Benedict, R.

Patterns of Culture

Boston, 1959

p.24

20. Giedion, S.

op.cit.

p. 214

Chapter Two

Architecture and Human Values

2.1. THEORY and MEANING of VALUE

The history of culture can be understood simply as a history of human values, a history of changing theoretical and motivational systems, of ultimate justifications of human evaluations. It is possible to give an account of cultural history from the point of view of ideas considered, at a given time, to be the final justifications of human actions.

'Value' is an ambiguous term, both in everyday speech and in philosophical literature. The following definitions of 'value' are quoted from a list compiled by Rescher (1), though comparatively short, the list is long enough to exhibit the great diversity in the conception of 'value' as well as the looseness with which the term is used;

-"A thing has or is a value if and when people behave toward it so as to retain or increase their possession of it".

G.Lundberg

-"Anything capable of being appreciated is a value".

R.Part

-"Values are the 'observe of motives....the object, quality or condition that satisfies the motivation".

R.T.LaPierre

-"Values are any object of any need".

H.Becker

-"(A value is) a desideratum or anything desired or chosen by someone at sometime -- operationally : what the respondent says he wants".

S.Dodd

-"By a social value we understand any datum having an empirical content accessible to the members of some social group, and a meaning with regard to which it is or may be an object of activity".

F.Znaniecki

-"(A value is) a conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable which influences the selection from available means and ends of action".

C.Kluckhohn

-"(Values are) the desirable end states which act as a guide to human endeavor or the most general statements of legitimate ends which guide social action".

N.J.Smelser

-"(Values are) normative standards by which human beings are influenced in their choice among the alternative courses of action which they perceive".

P.E.Jacob

It is not the intention of this thesis to prejudge the theoretical or empirical status of values. However, it is necessary to define a foundation for a theory of value as will be used henceforth. Accordingly, value may be thought of as one of the following three different categories :

a. Axiological value : X is an axiological value only if X is a judgement ascribing the quality of valuableness to objects, properties or states of affairs, and constituting within the given value system a final justification of other judgements of the system.

b. Quantitative value : a quantity of substance, or a measurable degree of a property, to which the quality of valuableness is attributed within a given system of evaluation Y, on the basis of a value principle.

c. Attributive value : any object or property, to which a value principle, accepted within the given system of evaluation Y, ascribes the quality of valuableness, is an attributive value, or has value in the attributive sense, within this value system.

However, as subjective value is a property of the subjects, and objective value is a property of objects, neither in isolation is the entire value. The whole relational complex referred to as I.R.O. where I is the interest of the subject, O is the object of the interest, and R is the relation between both, is the only actual and complete value.

Traditionally, most attempts to develop an exact formal theory of evaluation have concentrated on the concept of preference. Philosophers, economists, and psychologists, however much they may have disagreed about the other aspects of the problem of value, have usually agreed in regarding the concept of preference as occupying a central part of the subject. The main problem of the socialization of individual preference is that of finding a plausible technique to distill a social preference ranking out of the matrix of the individual preference rankings.

The role of preference in the understanding of values has in the recent past been much debated. Some philosophers argue that preferences are not to be identified with values, they believe that values are given stability and solidity by their relationship to benefits, while preferences can be things of the fleeting moment, and so, things which prejudice consciously reckoned benefits. From that, they deduce that human welfare is not to be extracted from preferences, they will not even equate human welfare with 'preference in the long run'. They see the principal use of preference, not in the making of decisions but rather in the choosing of decision makers.

However, this argument has some inherent contradictions. It is generally recognized that while societies undergo transformations values tend to change, and vital choices of values must be made. This process is two way, for when values change they strongly affect the welfare of the individuals and that of the societies. And though this is the case, empirical investigators have failed to make available a method or a conceptual apparatus suitable for specifying values, value systems, or value changes concerning individuals or societies at any given time, let alone predicting or assessing the desirability or undesirability of any anticipated changes.

The history of man shows that human consciousness, through selectivity, was capable of a choice of values that insured the positive evolution of human species. Hence 'preference in the long run' should be equated to human welfare. The main difficulty is in determining individual welfare functions on the basis of actual preferential choices, and consequently aggregating individual welfare functions into social welfare functions. However, if this difficulty is to be overcome, and the factors that favourably or unfavourably affect the quality of life in a society are identified, this will directly raise the issue of the ethical results of their manipulation in relation to social freedom.

There are two main concepts of social freedom, one negative, a bill of immunities, and the other positive, a schedule of resources and opportunities. Some compatibilists argue that if our actions are determined by our wants and volitions then we are free. Berofsky indicates that others, "who are impressed by the results of psycho-analysis assert that it has shown that much of our behaviour is governed by unconscious motives and desires and that even if we are free if we act as the result of some conscious want, we are not free if we act as the result of an unconscious want or motive" (2). The need for inward and not merely outward freedom is exemplified by such novels as 'Brave New World'. Are the characters in Aldous Huxley's novel free or not? If by freedom it is simply meant that a person is able to do what he wants to do, one would have to say they are free. They do what they want, but their wants and desires have been 'programmed' into them, hence they lack all inner self-determination, and the opportunity of choice.

Basically, there are two lines of argument used to justify equality of human rights for freedom and choice :

a. sameness : that all people are basically the same, the differences among them are superficial, and are due to the reason that some individuals have not been given the opportunities offered to others to reach fulfillment of their potential. But this argument emphasizes only the similarities, which undoubtedly exist, and does not accommodate for the differences in value systems of different groups.

b. different but equal : meets this problem by suggesting that each cultural group should specify its own set of objectives and be given equal opportunity to attain its chosen ideals.

One must not overlook, here, the fact that inner freedom is not achieved except by offering all the possible alternatives. It also should be clear that due to the continuous contact between the different societies and cultures, there will be a process of what might be called 'acculturation', which is the acquiring, by a certain cultural group, cultural aspects of another through cross-cultural communication. The importance of this interaction is that it safeguards freedom of choice, and validates preference as a guide to welfare and desirability. This is due to the fact that either of the extremes; universality on the one hand, and isolation of cultural communities for the sake of preservation on the other, will result in depriving the society totally or partially of some options, and accordingly decreasing the spectrum of freedom drastically.

2.2. ETHICAL and AESTHETIC VALUE JUDGEMENT

Of all kinds of value judgements, it is the aesthetic which is most difficult to analyse. It troubles those who wish to show that the content of value judgements may be a subject of rational discussion, and would not like to regard valuation as an expression of feelings and irrational attitudes. Some philosophers, like S.Hampshire (3), argued against the meaningfulness of a logical analysis of aesthetic evaluations mainly by separating and contrasting aesthetic and ethical evaluative judgements. The arguments for the difference between aesthetic and ethical judgements to undermine the possibility of any logical assessment of aesthetic evaluations are certainly not final. It is possible that the implications of the differences between aesthetical and ethical value judgements may indeed tilt the balance for a meaningful view of aesthetics as an evaluative judgement in a certain cultural context. The following table shows the main differences and their possible implications :

Differences between Aesthetics and Ethics as evaluative judgements	Implications of such differences pointing to the possibility of a logical analysis of aesthetic evaluation
a. The value-principles of the general rules of evaluation is greater in ethics than aesthetics, and the general assumptions are more accepted in ethical than aesthetic appraisals.	a. The fact that the consequences of disagreement in aesthetic matters are usually less important does not mean that men do not strive to settle such disagreements and frequently they succeed.
b. Actions subject to ethical evaluation are regarded as repeatable and comparable, while all aesthetic objects are generally considered unique.	b. Strictly speaking no human action subject to moral evaluation is repeatable and the stated difference can only be judged quantitatively and not qualitatively.
c. The variety of objects subject to aesthetic evaluation is much larger than those subject to ethical judgement.	c. This is true, but the applicability of one term to all of them is a symptom of the existence of a common ground for evaluation.

d. The links between given ethical judgements are much stronger than aesthetic judgements.

d. The fact that aesthetic judgements do not rest on the acceptance of certain more general assumptions should not be a hindrance to follow their philosophical implications.

e. The determinants of ethical evaluations are bio-psychological, while those of aesthetic appraisal are historical and cultural.

e. The historical and cultural determinants place aesthetic evaluations within given social contexts and point to the fact that they are not arbitrary individual reactions.

f. Ethical judgements rest frequently on negative preferences (avoiding), while aesthetic evaluations are based on positive preferences (achieving).

f. The positive 'unity of direction' of aesthetic appraisal constitutes a unifying element and not an obstacle in the understanding of aesthetic value judgements.

Najder in 'Values and Evaluations' asserts that, "Psychological, historical, and anthropological data indicate that the aesthetic lies between attitudes magical and religious on the one hand, and purely sensual on the other. The family of aesthetic attitudes neighbours on the one side the family of mystical and transcendental attitudes, on the other side the family of sensual and erotic attitudes" (4). In this bipolar division the links between the two poles are always preserved, and the freedom to oscillate between them is an essential factor of the aesthetic attitudes. However, this concept could best be tested and more precisely formulated within the fields of cross-cultural psychology and anthropology.

In design, a most important role is played by anticipation in aesthetic evaluation, mainly through the expectations that determine the approach to a given aesthetic object. For ethical value-judgement a similar role is played by the concrete physical and human circumstances circumscribing the evaluated fact. Anticipation is an attitude, it may involve on the one hand conscious expectations, and on the other, habits, training, tradition and unconscious associations (5). As was mentioned before value-principles in aesthetics tend to evoke a positive aesthetic reaction, and at least in this respect are more homogeneous than in ethics. This plus the assumption that aesthetic evaluation tend to be affected by anticipation makes one believe in the possibility of predicting the probable reaction to a given aesthetic object on the part of persons belonging to a certain cultural milieu, considering that enough knowledge of their value language is known.

The view held by most value philosophers is that strictly speaking, a judgement is true or false only with respect to its direct content and irrespective of the situational context of its utterance. The argumant of this study is that culturally misplaced judgements, though assuming their theoretical truth, may be contextually absurd. Specialists in education have demonstrated that aesthetic interests and issues cannot be isolated within the whole of man's thinking and behaviour, and that there is almost no field of human activity from which they are absent. Historians of culture can list innumerable instances of the intertwining of aesthetic, moral and ideological factors. In his essay on 'Visual Metaphors of Value in Art', E.H.Gombrich demonstrates that art is permeated by non-aesthetic, but mainly moral value, and that separating them is impossible since their linking reflects the fact that individuals experience and express them 'synaesthetically' (6).

2.3. OBJECTIVITY and VALUE JUDGEMENT

The following quotation from a letter by Schiller published in 1795 reflects the intentions of this research in relation to the problems of objective aesthetic judgement,

"Beauty is therefore indeed an object for us, because reflection is the condition under which we have a feeling of it; but at the same time it is a state of our subject, because feeling is the condition under which we can have a perception of it. It is therefore a form, because we contemplate it; it is life, because we feel it. In one word, it is at once our state and our act. And just because it is both of these at once, it serves as a triumphant proof that receptivity by no means excludes activity, nor matter, form, nor limitation, infinity -- that therefore the necessary physical dependence of man in no way destroys his moral freedom. It proves this, and, I must add, nothing else can prove it. For as in the enjoyment of truth or of logical consistency feeling is not necessarily one with thought, but follows accidentally upon it, such feeling can only prove that a sensuous nature may be sequent upon a rational one, and conversely; not that both can exist together, not that they can act reciprocally upon each other, not that their union is absolute and necessary. Just the opposite inference would be more natural. The exclusion of feeling while we think, and of thought while we feel, would lead us to infer the incompatability of these two natures, as in fact the analytic reasoners can adduce no better evidence that pure reason is realisable in humanity than that it is imperative for it to be so. But as in the enjoyment of beauty or of aesthetic unity there takes place an actual union and interpenetration of matter with form and of receptivity with activity, this very fact demonstrates the compatability of the two natures, the realisableness of the infinite in the finite, and therefore the possibility of the most sublime humanity" (7).

Moral and aesthetic judgements do not occur in vacuum, and for this reason it is important to analyse them bearing in mind the context and the society in which they were issued. Any society has two basic characteristics, which are its organic and mental natures. As a structure, society may be conceived of in terms of its organic form, but as a social organization, society exists in the minds of its members. It is important to point out, however, that any unification of a social mind exists not through agreement among the members, but through the reciprocal influence of their being mutually dependent elements within a society (8). Thus the role of interaction between the individual and his social environment is uppermost because it mediates between social determinism and individual determinism. According to this view, a problem area in a city, for example, does not represent an absence of moral values, but a different interpretation of the values which was based upon a certain interactional situation.

While society in the course of everyday interaction is seen as an organism, the organization of its institutions are traced ultimately to the individual members of the society. Thus, the most solid facts of social existence, and the most tangible ties between people, are the ideas (or imaginations) they have of one another. Those ideas that are built in the course of daily interaction. As the individual's contacts within a society increase during his life, his ideas and imaginations of the other members of his society increase accordingly. This 'evolution of awareness' creates and indicates a mental bond between the individuals of a society. It is important to stress the fact that this relationship is a mental state of communication rather than an emotional state of instinctive feeling. Petras writes, "The moral standards which the individual applies to his own conduct are always the reflection, more or less individualized, of those of his social environment, of the group, or complex of groups, of which he forms a part" (9).

Sentiments are feelings which have been raised by thought and intellect out of their instinctive state and thus become properly human. So, it is out of the mental and organic relationship with society that the individual learns sentiments. Since sentiments are learned only within the context of a social group, questions of value can arise only in relationship to a particular social situation. Thus, value decisions involve, consciously or unconsciously, the consideration of the possible response of others. Therefore, problems of value are problems of conscience, and problems of conscience are problems of social reality. Hence, it could be deduced that the individual and the society merely represent the two sides of the same coin; The differences being quantitative rather than qualitative. The implication of this to the question of the universality of value becomes obvious. There can be no universal values, because values, as all facts of social life are products of the individual's interaction with a society. Although it has always been easier to claim universality to moral and ethical values than to aesthetic, it is still true that even clearly defined moral values as courage, justice, honour.... have different meaning in different cultures. Najder states that, "Clinging to the idea of one demonstrable true and universally applicable set of values may be seen as a result of the fear of freedom : that our responsibility increases in direct ratio to the growth of our freedom is a disturbing thought to very many" (10).

It is, therefore, important that one should be able to make a choice of values. Though there is enough evidence that the social values prevailing in a community are vectors in the diagram of forces representing the physical environment, there is no proof that by manipulating the physical environment a directly proportional change in the values existing in that society is possible. It may thus be concluded that there are no simple methods of extracting the prevailing values in a society.

2.4. The DESIGNER'S CHOICE of VALUES

One of the major problems that face the designer, who possesses a degree of social awareness, is arriving at a choice of values and investigating, validating or disqualifying the choice that was actually or hypothetically made. However, there are a few methods which may be helpful in solving this problem. But as these methods supplement each other and sometimes partly overlap, it is difficult to outline them sharply. The following methods of choice of values are briefly pointed out in the most general terms only to consider their implications and the possibility available to the designer to make use of them :

a- To subscribe to a certain value, one has to be aware of all the possibilities of choice, and have the ability to reach a conscious decision based on an active, critical and analysing attitude towards the existing situation.

b- Allotting particular tasks to specialists, philosophers, sociologists, psychologists....etc.... then compiling and analysing the results and implications of their investigations.

c- Reconstructing and re-evaluating the reasoning of justifying a given judgement; when hesitating between two conflicting judgements, one frequently relies on immediate intuitive assumptions which tend to be accidental and arbitrary, therefore, this method is somewhat similar to Socrates' method of choosing as his point of departure a certain judgement about which a group of people agree, and proceed to analyse and expose all its presuppositions, contradictions and implications, thus consolidating, revising or abandoning the judgement.

d- Investigating practical consequences of the acceptance of given value systems, these consequences may be technical, economic, social or otherwise, and they have to be studied and predicted by experts in each field, the main role of the designer would be to draw conclusions and take decisions based on the results of their work.

e- While investigating the results of a choice of value system one has to take into account not individual cases, and not only even groups of such cases, but the whole system as historically functioning in a concrete socio-cultural context.

f- Undergoing 'self-testing' of a judgement, which could be equivalent to the role of 'feedback' in cybernetics; this is an operation in which the input (values and norms) is to be confronted with the output (consequences of the choice), with the intention of correcting the proposed value system.

g- Attempting to determine the natural and normal needs, capabilities and reactions of man. The most appealing form of this method is to conceive of the human nature as displaying constant characteristics, and deduce from this conception a universal inventory of human needs and desires. However, at the present stage of our knowledge of man and environment, this ultimate answer seems impractical, expecting to determine values applicable everywhere and always is surely too much. Finding them for here and now, and for the lifespan of the next few generations, is a heavy enough burden. Therefore it is important to work out, with the help of psychologists, sociologists, ecologists, and ethologists the criteria of 'normalcy' applicable in a given society and culture.

These methods, at least in their broader terms, have been applied in the practice of architecture since man started to build. The choice of values has always been an intuitive and uncomplicated procedure as it was a direct outcome of the cultural, religious, political and social context of the times. The architect had and should always apply the prevailing values of the society in which he is designing.

2.5. The EMERGENCE of the TERM AESTHETICS

The publication that gave Aesthetics its name was a book published in 1750 called 'Aesthetica', written by the rationalist philosopher Alexander Gottlieb Baumgarten, a follower of Leibnizian speculation. Measured by the standard of Aristotle's 'Poetics' Longinus' 'De Sublimitate', Kant's 'Critique of judgement', or Hegel's 'The Philosophy of Fine Art', this book by Baumgarten has no great value except perhaps for its title, for within half a century the philosopher Immanuel Kant and the poet Friedrich Schiller had adopted 'aesthetics' and used it in the titles of their own writings on the subject. Baumgarten neither invented the word 'aesthetics', nor created the field of speculation to which he applied the name. He merely adopted the name from classical philosophy and adapted it to an area of speculation in which the issues had been clear and significant from ancient times.

It was the Greeks who had set the pattern for speculation in Philosophy of Art and in Aesthetics. Aristotle discussed not only 'criticism' but 'taste' as well and so anticipated one of the great controversies of modern times. Plato's theory of 'mathematical beauty' anticipated not only Vitruvius and Leonardo da Vinci but Le Corbusier as well. Plato asked whether 'beauty' may be limited to objects seen and heard, and Hegel repeated the question. He also asked whether art and play may not be identical and whether both may not have a value as pedagogical techniques; these questions were also investigated by Schiller. Longinus wrote of 'sublimity', and the word served not only to subordinate 'perfect precision' as one of the criteria of works of art, but its implications were of great importance for Hegel and Kant. Heraclitus brought the problem of the 'relativism of judgements' into the area of beauty. Philostratus formulated a 'theory of imagination' in opposition to that of 'imitation', and he did so in the third century A.D. The ancient theory of 'inspiration' was put forward by Socrates, Plato and Leone Ebreo, and it reappeared in the writings of Schopenhauer, Nietzche and Croce.

This is not to deny that there are basic differences between ancient and modern speculations. Generally, ancient theory assumes that a work of art is an objective stimulus that induces a response, while the modern speculates that it is an image proceeding from the maker inducing a subjective experience. However, modern speculation ordinarily impregnates the theory of imagination with one of symbols or forms, an elaboration of the ancient interpretation of the stimuli that induce the experience. Such remnants still exist in theories like the Gestalt Theory. The importance of the introduction of this term was the possibility it gave to distinguish objects that are solely within the realm of 'aesthetics', and those that, although are works of art, are not within its province. Nahm summarizes what occurred in the last half of the eighteenth century by mentioning four issues that emerged and whose emergence was hastened by the gradual adoption of

Baumgarten's terminology, "In the first place, it became clear that it was possible to rid Art of non-aesthetic definitions and objects. Secondly, there accurred an increased specification of the differences between art and fine or free art. Thirdly, there emerged more precise ways of defining and systematizing, as well as of bringing within the scope of a single systematic philosophy, of such hitherto but loosely related terms as taste, genius, art, fine art, imagination, making, creating, sublimity, beauty, tragedy, comedy, existence and media. Finally, the issue of the problem of the relation of fine art to feeling began to be faced" (11).

2.6. HISTORY of AESTHETICS

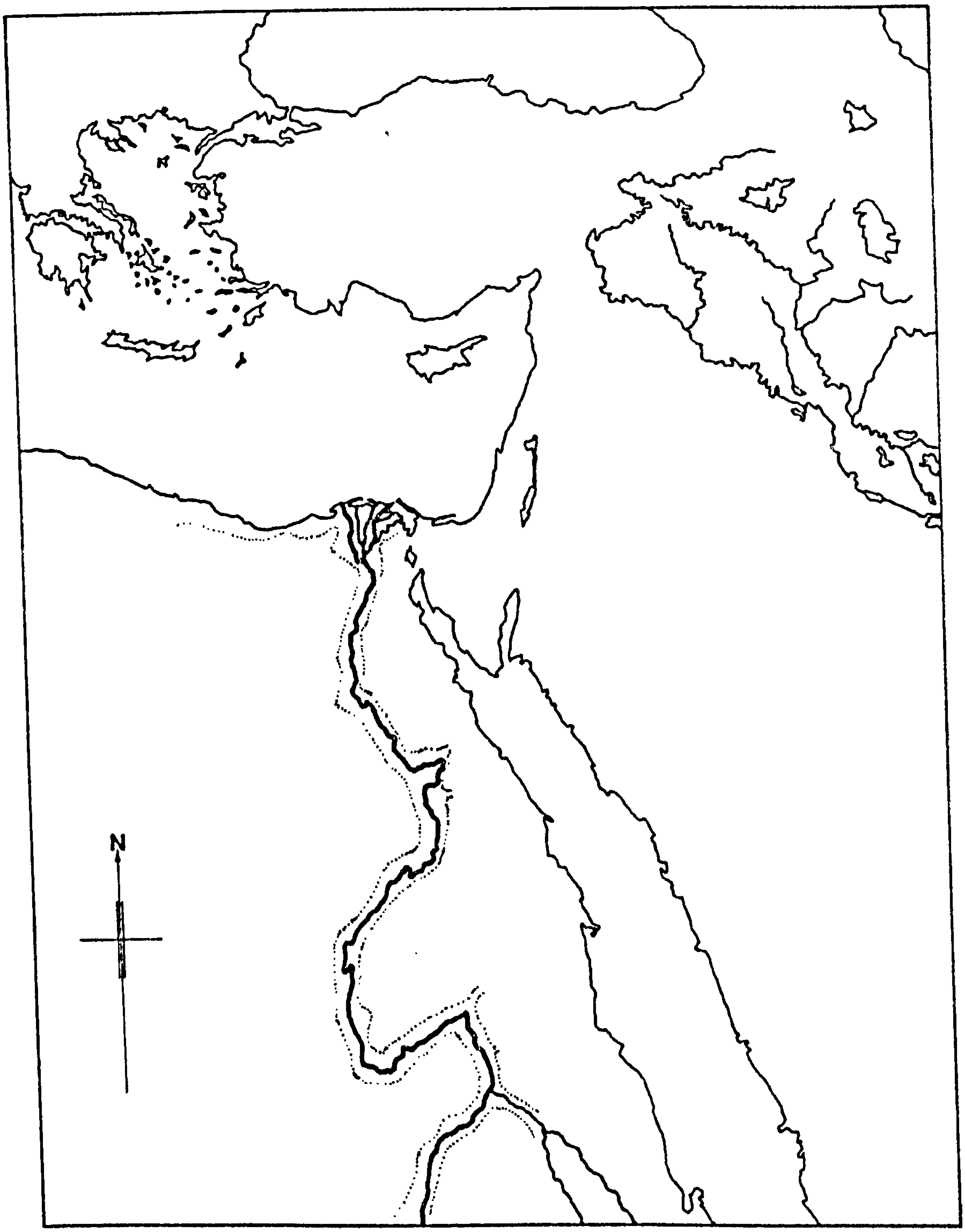
If 'aesthetics' means the philosophy of the beautiful, the history of aesthetic must mean the history of the philosophy of the beautiful, and it must accept as its immediate subject matter the succession of systematic theories by which philosophers have attempted to explain or connect together the facts that relate to beauty. But this is not all, it has been found necessary in a historical treatment, even of logic or of general philosophy, to bring them into continuous relation with the concrete life that underlies the formal conceptions which are being passed in review. The speculations of every age arises on the one hand from the formal teachings of the past, but on the other from the actual world as it urges itself upon consciousness in the present. As the history of logic and general philosophy cannot be totally dissociated from the history of science and civilization, so the history of the ethical and aesthetic ideas is necessarily treated in the same connection with the history of moral values, fine art and architecture.

When one attempts the task of tracing the aesthetic consciousness through the stages of its development, one is faced by a concrete material not of mere antiquarian interest, but constituting a large proposition of what is valued in its own right and for its own sake in the surroundings of the present times. The history of fine art and of architecture is the history of the actual aesthetic consciousness, as a concrete phenomenon. Aesthetic theory is the philosophic analysis of this consciousness, for which the knowledge of its history is an essential pre-requisite. The history of aesthetic theory, moreover, is a narrative which traces the aesthetic consciousness in its intellectual form but never forgets that the central matter to be elucidated is the value of beauty for human life, no less as implied in practice than as explicitly recognized in reflection. This branch of the history of philosophy promises not merely a theoretical interpretation of what is past and gone, but provides some aid at understanding the mechanism of the appreciation of art and form. To illustrate the above argument and to come to a better understanding of the architectural aesthetic consciousness, a survey of the history of culture and architectural aesthetics follows.

2.7.A. The ANCIENT EGYPTIAN CULTURE and VISION

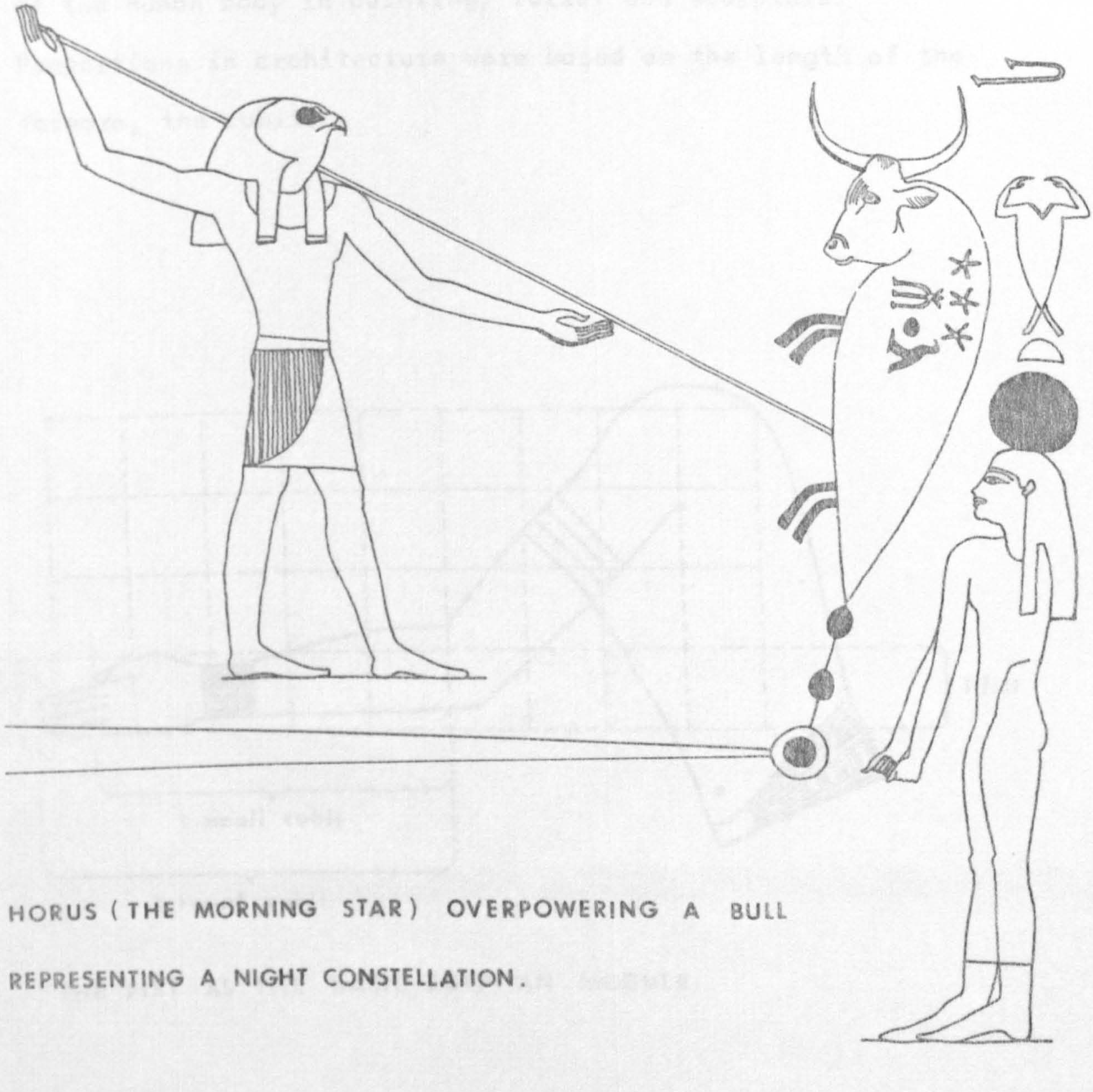
Enough has been disclosed to show that a highly developed culture existed in Egypt by 3000 B.C. In assessing this culture it must be remembered that this is done on evidence which has survived 5000 years of destruction by nature and man. But as Emery states, "even in their ruined state the magnificent monuments of Sakkara, Abydos and other sites show that they were built by a people with an advanced knowledge of architecture and a mastery of construction in both brick and stone" (12). Many historians have placed a great importance on the geographic situation of Egypt as an influential aspect of the formation and evolution of the Egyptian social order and intellect. Stretches of sand alone cannot support life, let alone a culture. It was the Nile with its snake like movement that divided Egypt into two flanks of arid desert separated by a thin fertile strip and inspired Herodotus' famous phrase, "Egypt is the Gift of the Nile". This geographic division with the sun rising from behind the Eastern desert and fading into the Western desert was the first contradiction facing the Egyptian. Through the Nile the Upper Egyptians and the Lower Egyptians met and reacted on one another, which resulted in another kind of social contradiction.

It is in the Egyptian nature that the destiny of the Egyptian lies. This nature made the simple Egyptian peasant read deeply in the 'Book of Creation', and it was there that



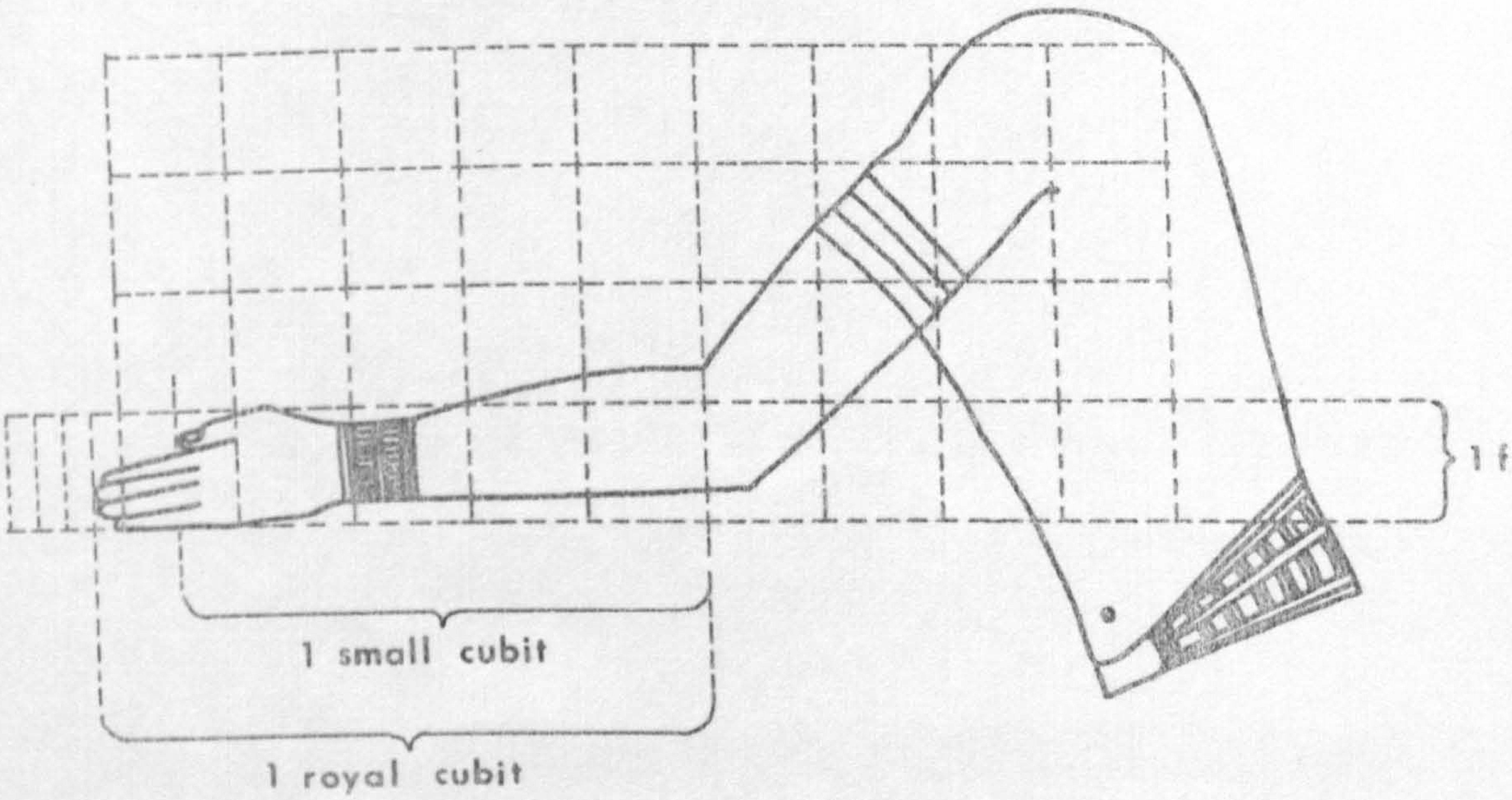
MAP OF EGYPT

the first beliefs of humanity arose. The finest pages in Egyptian intellect are the description and representation of the earth and man's devotion to it, or rather the feeling charged indescribable moments when man surrenders completely to the beauty of the world about him. When the gap between subject and object is narrowed to nothing, man feels himself included, for a moment, in a great harmony. A benevolent Creator allows his creatures to feel his love for them through the unheard music which arises from all things. These moments of plentitude and peace were abundant in a country of scholars who looked upon the world as a book whose pages are best turned by sowing the seed and waiting for it to grow. They sought wisdom under the open sky, in daily contact with reality rather than poring over books. However, peasant wisdom knows that man has his limitations, that each day's is endangered by forces beyond human control. This oscillation between his belief in his anthropomorphic existence -- as opposed to the zoomorphic state before the rise of the first high civilizations -- and his belief in greater powers that ruled the universe and controlled his fate, was one of the most important contradictions that faced the Egyptian.



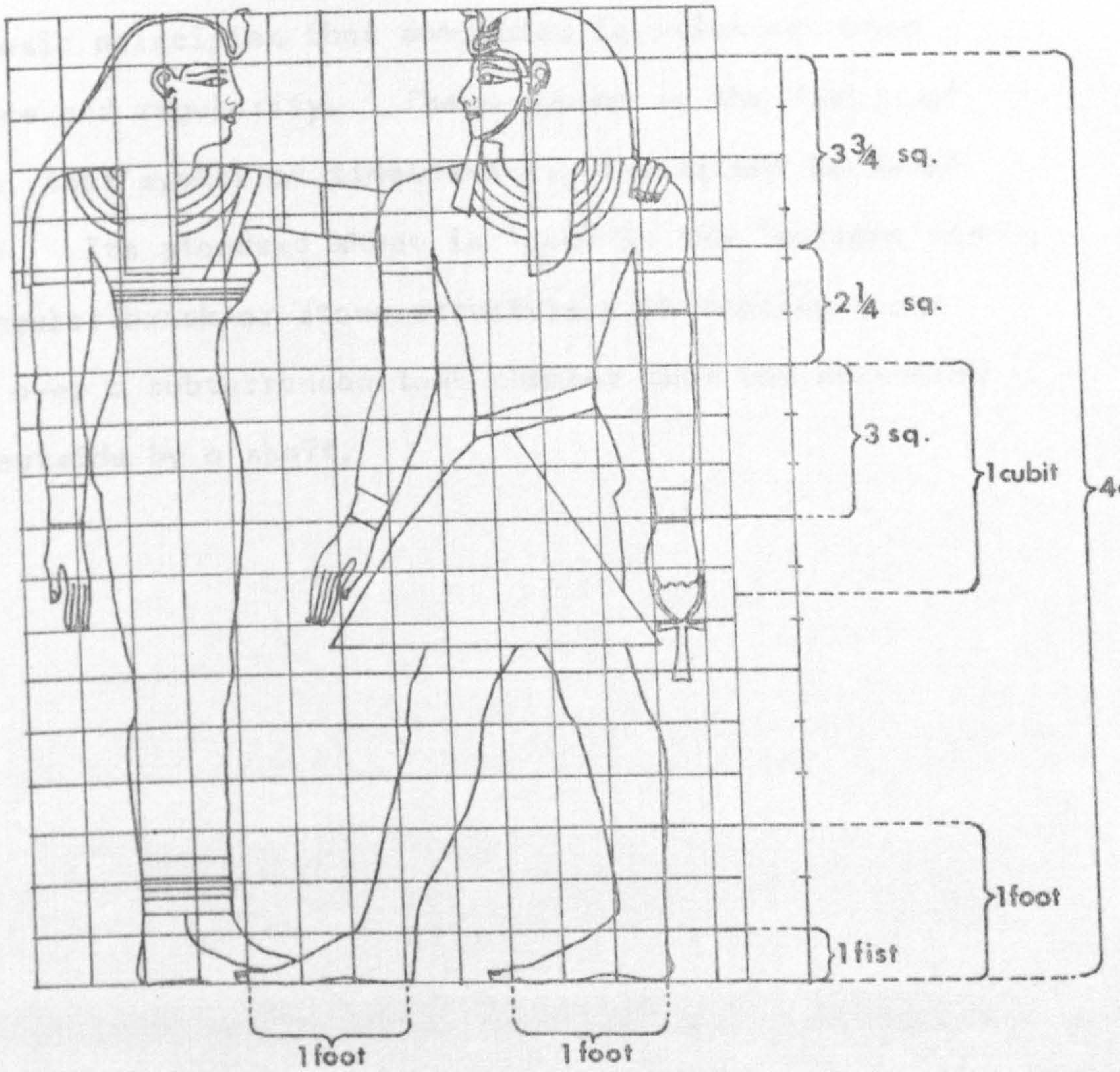
HORUS (THE MORNING STAR) OVERPOWERING A BULL REPRESENTING A NIGHT CONSTELLATION.

For the Ancient Egyptians there was no philosophy of art or aesthetics in the literal sense of the word. But their canon of scales was so well adapted to their feel for beauty that it lasted for thousands of years with minor changes, having all the time the greatest impact on the feelings of the Egyptians. The Egyptians invented grids based on the dimensions of the human hand to establish correct proportions of the human body in painting, relief and sculpture. Proportions in architecture were based on the length of the forearm, the cubit.

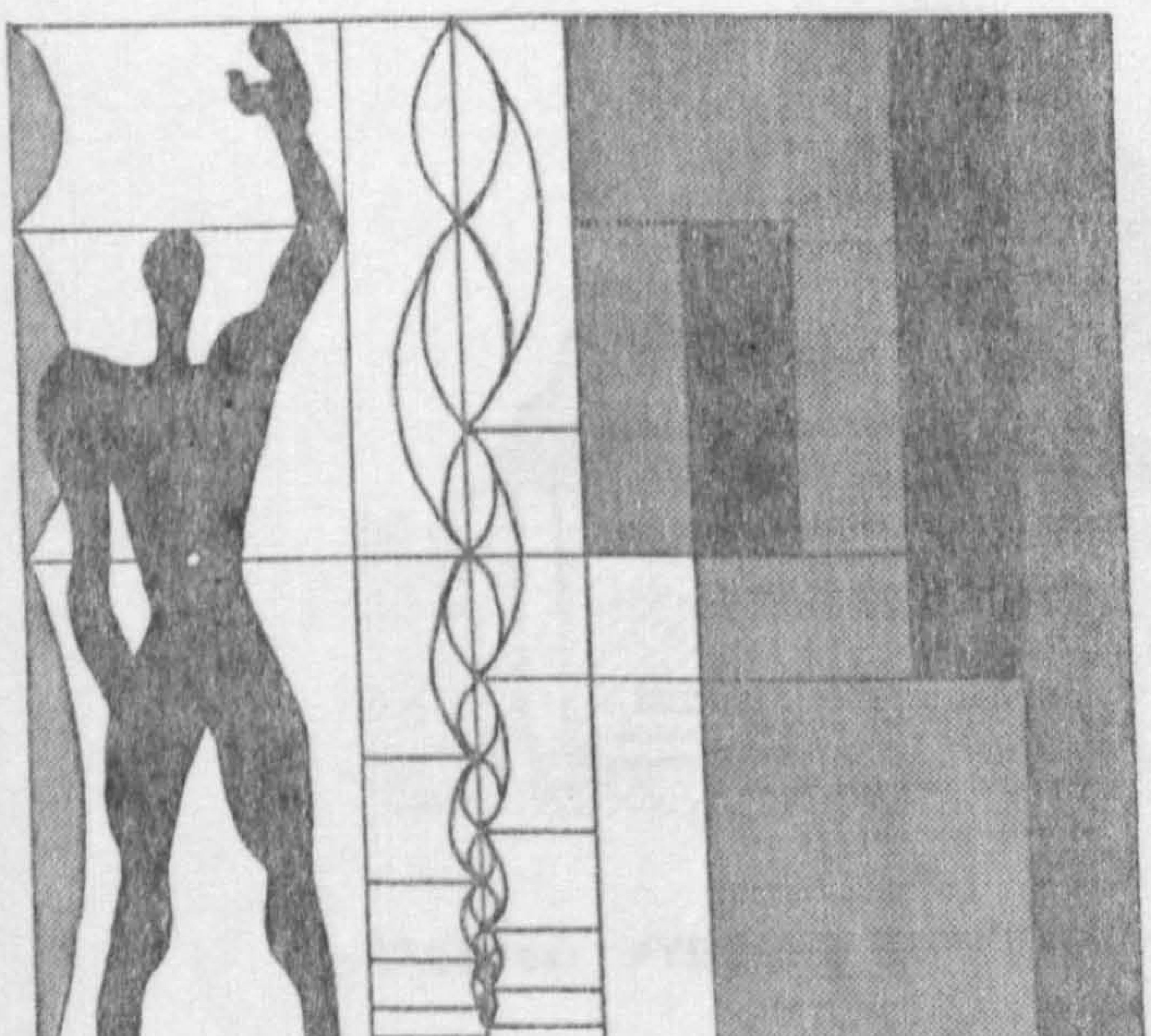


THE FIST AS THE BASIC EGYPTIAN MODULE

Thus Egyptian architecture was a projection of the proportions of the human body transposed into a larger -- but still human -- scale. Man and man's artifacts were closely interlocked. Badawy (13) points to the consistent methodological use of proportions leading to a harmonic system of architectural design. This stability influenced the early Greek philosophers like Pythagoras who came in contact with the Egyptian civilization. Its effect also extended to more recent philosophers like Hegel and influenced their line of thought concerning the absolute in beauty and sublimity.



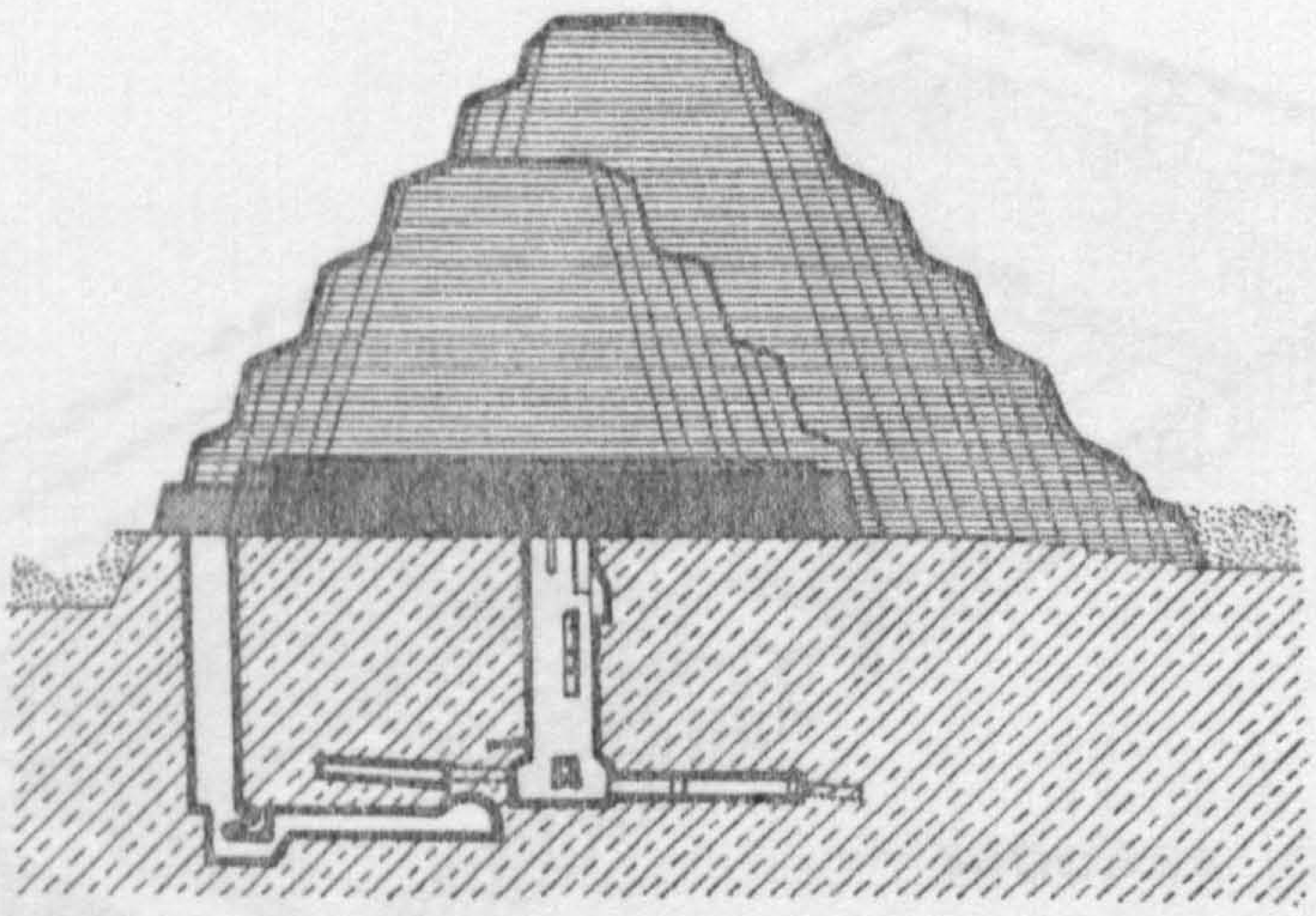
THE HUMAN BODY AND
THE SQUARE GRID
IN EGYPT



THE MODULOR :
LE CORBUSIER

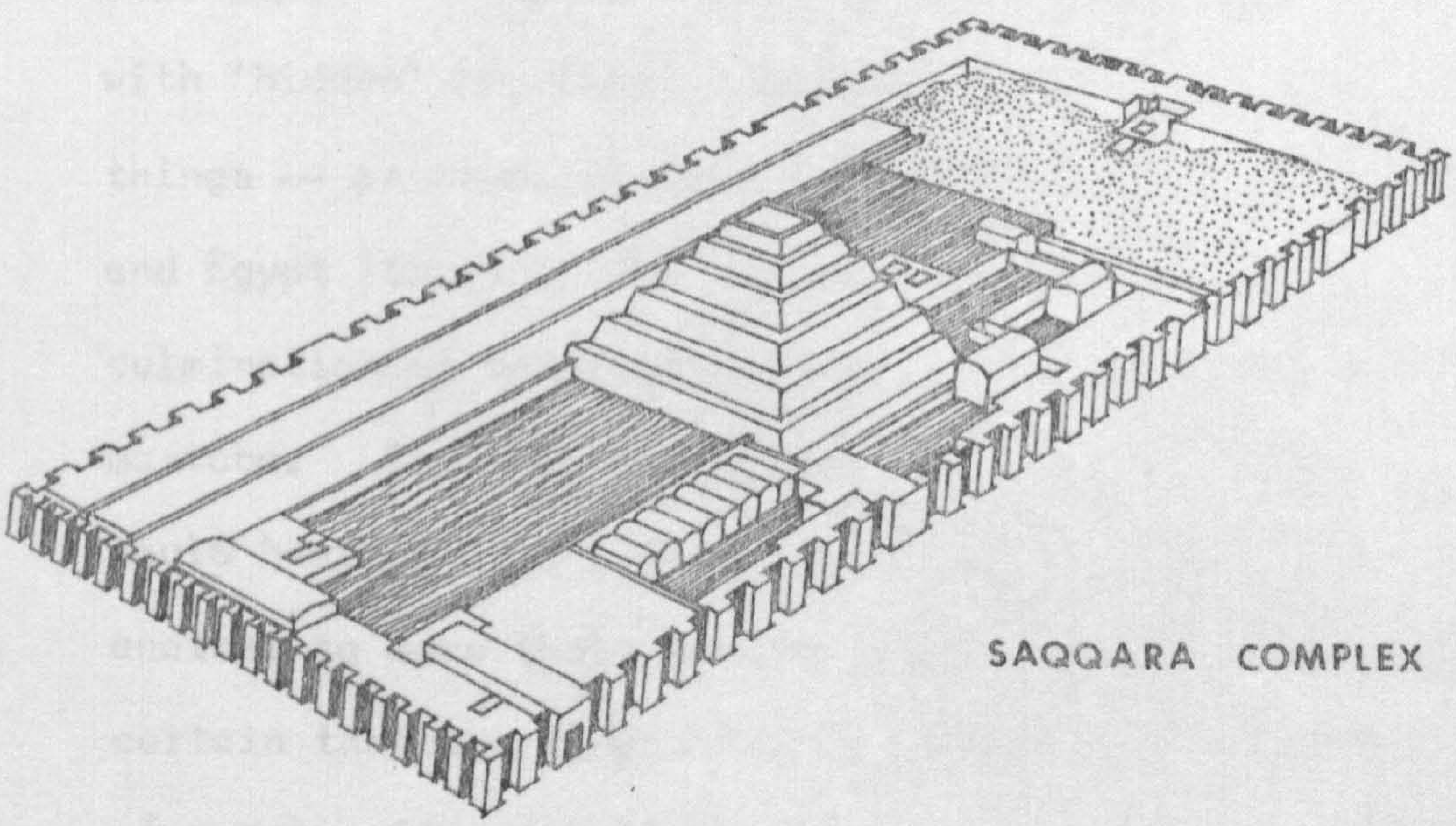
2.7.B. RESONANCE of the EGYPTIAN AESTHETIC PHILOSOPHY in ARCHITECTURE

The basic principles that dominated Egyptian art were permanence and regularity. These appear in the design of the tomb, that symbol of timelessness, the silent house of the dead. Its standard shape is found in the 'mastaba' as a rectangular brick or stone structure with sloping sides erected over a subterranean tomb chamber that was connected to the outside by a shaft.

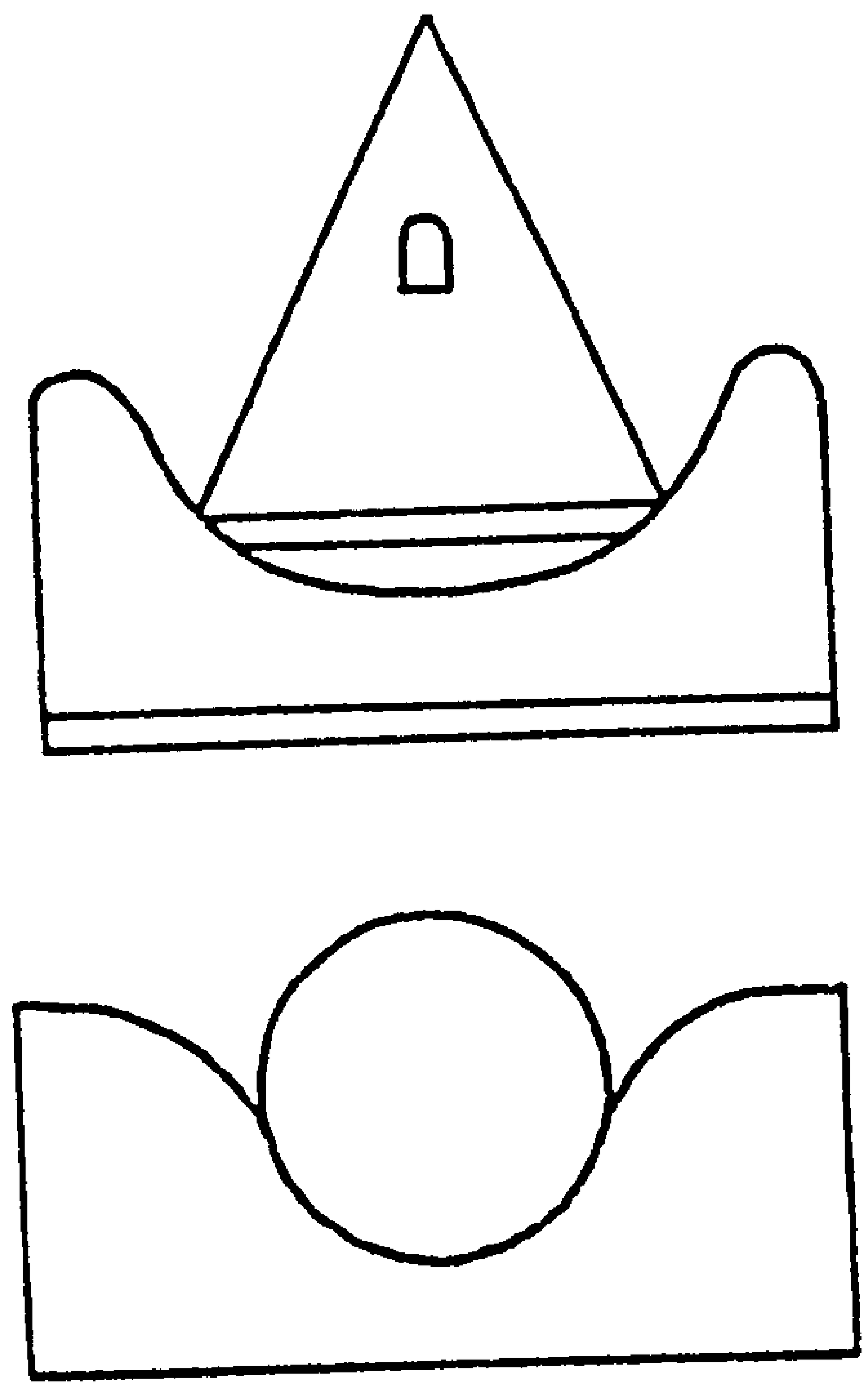


STEPPED PYRAMID OF ZOSER AT SAQQARA

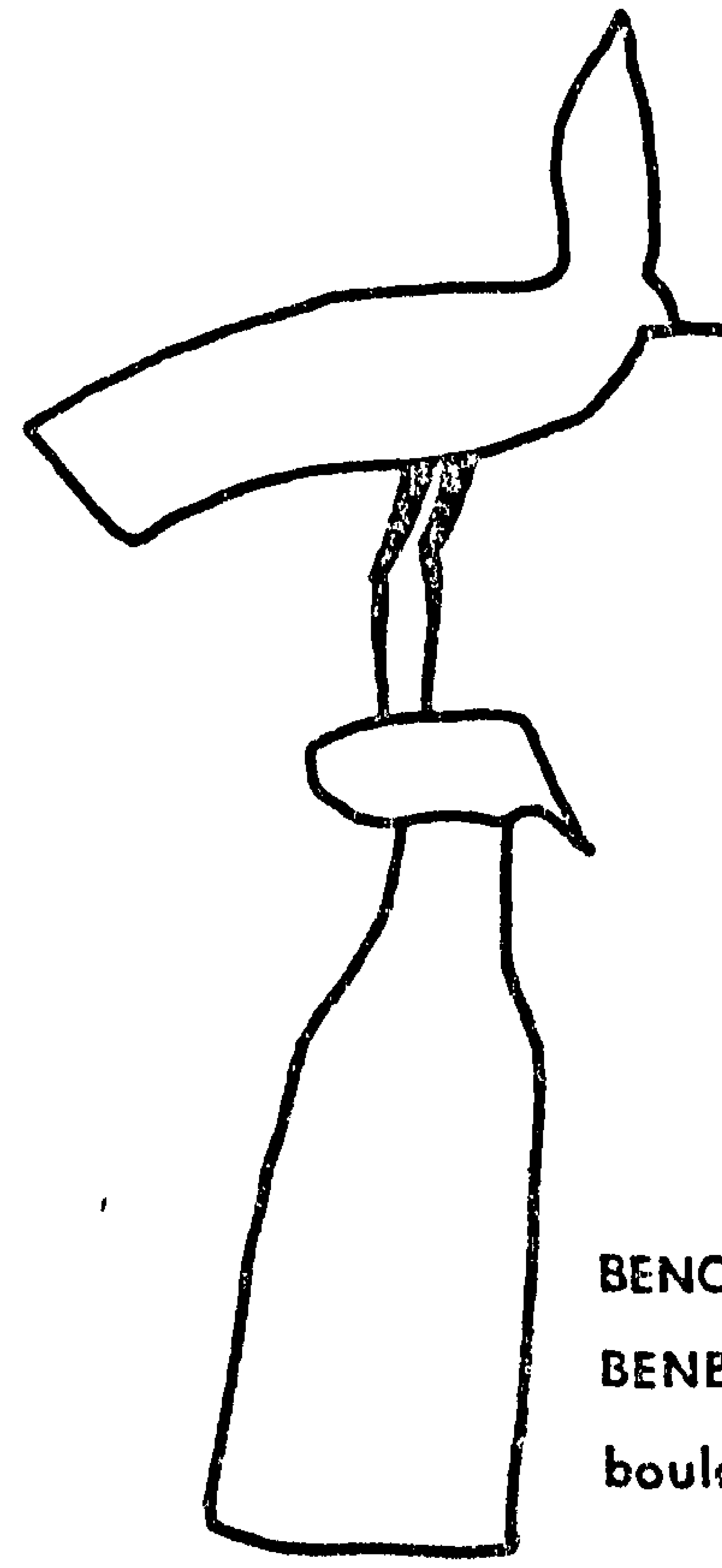
The form was probably developed from mounds of earth or stone that covered earlier tombs. About 2750 B.C. the stepped pyramid of king Zoser of the Third Dynasty was raised at Saqqara, the ancient necropolis (city of the dead) of Memphis. Possibly Egypt's oldest stone building, the stepped pyramid was the first monumental royal tomb. In form, it is a piling of mastabas of diminishing size one upon another.



SAQQARA COMPLEX

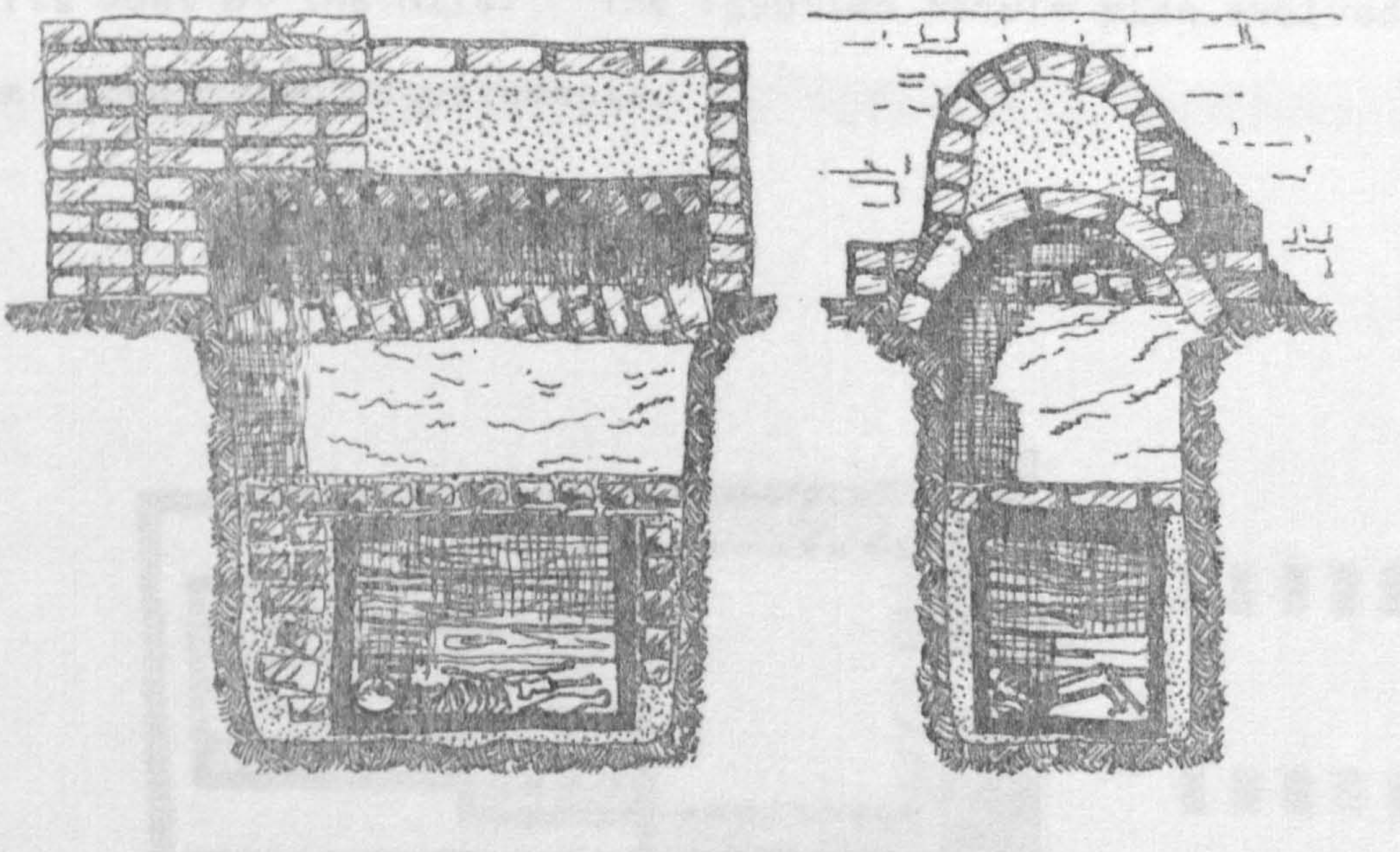


RELATION OF SUN DISC AND PYRAMID



BENOU (the phoenix) on BENBEN (the first boulder of creation)

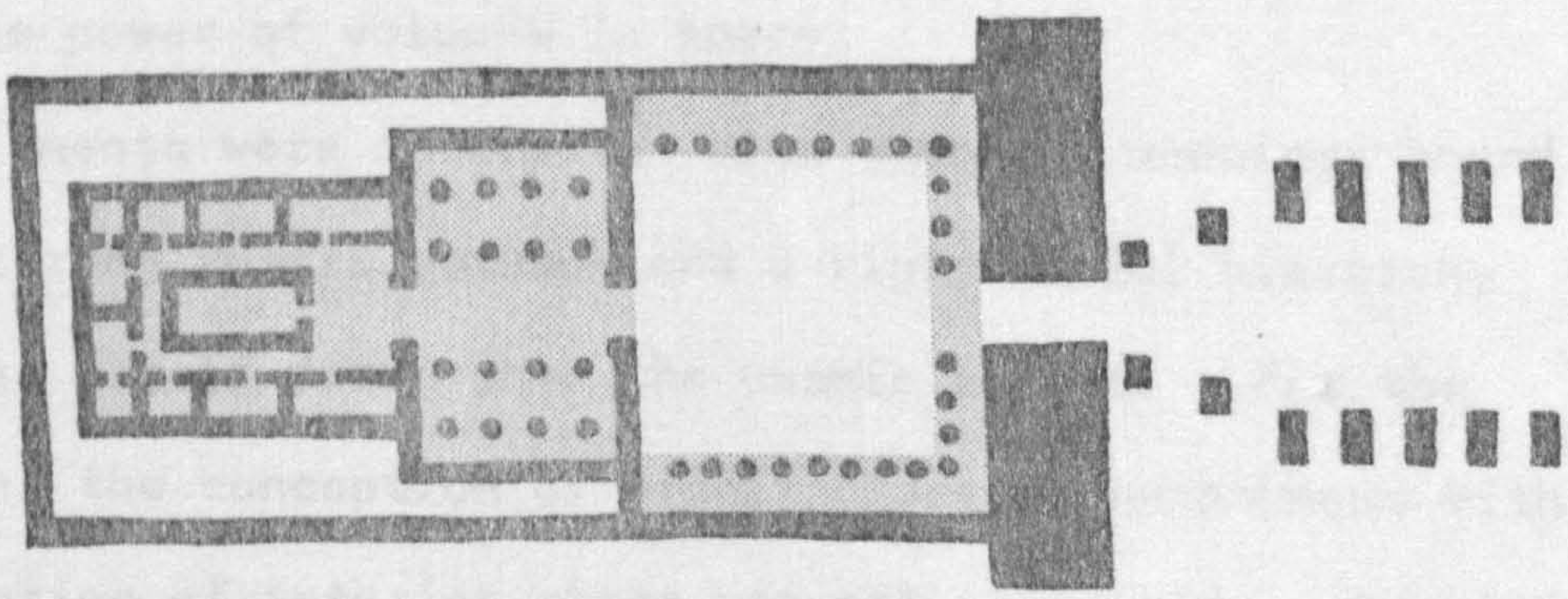
During the Fourth Dynasty the three pyramids of Guiza were built. They have been associated with mystery, and with 'hidden' knowledge, and have served as symbols for many things -- primeval wisdom, eternal stability, the arts of magic, and Egypt itself. The pyramids of Guiza represent the culmination of an architectural evolution that began with the mastaba. They did not evolve out of necessity as kings could have gone on indefinitely piling mastaba one upon another to make their massive tombs. Rather, it is almost certain that the kings of that period came under the influence of nearby city of Heliopolis, which was the seat of the powerful cult of Rá, the sun god. The fetish of Rá was a pyramidal stone, the 'ben-ben'. The pharoahs by then considered themselves the sons of Rá and, hence, his incarnation on earth. Therefore, it would have been only natural that they believed that the spirit and power of Rá residing in the pyramidal 'ben-ben' would preserve the pharoah's divine spirit and body within the pyramidal tomb. The pyramid form, then, was an invention inspired by a religious conviction rather than the result of a formal evolution. The success of the structure is thus a result of the translation of this religious demand into a formal design, the proportions and immense dignity of which was so consistent with its socio-cultural function.



VAULTED GRAVE (first dynasty) SAQQARA

Although the Egyptians knew the arch and the vault and had used them occasionally in predynastic tombs, they rarely used them again after about 3000 B.C., the beginning of the dynastic period. Egyptian architects preferred the static forms of the post-and-lintel system, which express better than any other structure the changeless and eternal. This also sustains the argument that it was the social and cultural needs rather than the logical functional needs that affected the evolution of architectural form.

If the most impressive monuments of the Old Kingdom are its pyramids, those of the New Kingdom are its grandiose temples. Burial still demanded the elaborate care shown earlier, but following the tradition of the Middle Kingdom, kings and nobles hollowed their burial chambers deep in the cliffs west of the Nile. The Egyptian temple plan evolved from ritualistic requirements.



TYPICAL PYLON TEMPLE

Only the pharoah and the priest could enter the sanctuary. A chosen few were admitted to the hypostyle hall. The mass of the people was allowed only as far as the open court, and high walls shut off the site from the outside world. The Egyptians did not deviate from this plan for hundreds of years. Gardner writes, "The corridor axis, which dominates the plan, makes the temple not so much a building as, in Oswald Spengler's phrase, 'a path enclosed by mighty masonry, like the Nile that it almost symbolizes, the corridor may have been an expression of the Egyptian concept of life.' Spengler suggests that the Egyptian saw himself moving down a narrow, predestined life-path that ended before the judges of the dead. The whole of Egyptian culture can be regarded as illustrating this theme" (14).

The four elements whose combination built up the Early Egyptian space conception are summasrised as :

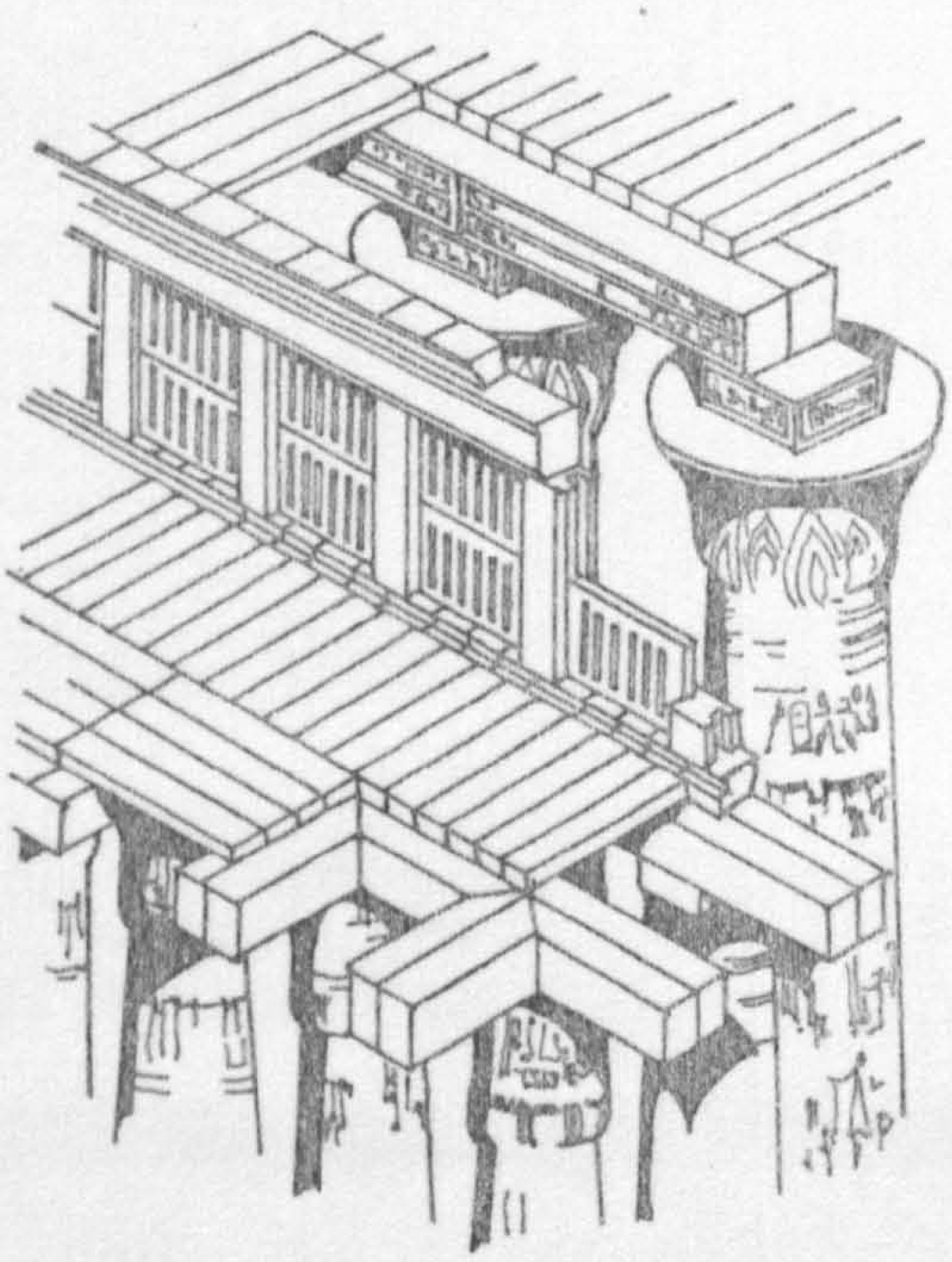
a. abstraction,

b. the supremacy of the vertical,

c. the plane surface, and

d. the power of volumes in space.

These elements were interwoven with symbolic meanings bound with a strong cosmic outlook and a rigid social hierarchy which was itself drawn into the cosmic aspect. For the Egyptians the conception of architecture as synonymous with the creation of interior space was not plausible. Architecture was an expression of the interconnection of cosmos and man, of volumes in space. Even in temples the hypostile halls were thickly filled with a forest of columns so that the impression of the space, despite its considerable size, was greatly diminished. The attitude of the Egyptians towards interior space may be inferred from their handling of columns and lighting.



CLERESTORY DETAIL ; KARNAK

It may be concluded that in the case of Ancient Egyptian artistic expression and representation, the act of conception was far more important than perception. It was a situation where artists represented what they conceived to be real rather than what they perceived. They brought to the making of their images and architecture conceptions that have been instilled in them by their culture. They understood the visible world in certain unconscious, culturally agreed-upon ways, and thus brought to the artistic process ideas and meanings out of a common stock. They recorded not so much what they saw as what they knew to be.

2.8.A. OUTLINES of the GREEK AESTHETIC THEORY

Basically there are three principles which are responsible for determining the enquiries of all Greek thinkers concerning the beautiful. Regardless of historical development; these principles are arranged in an ascending order according to their aesthetic value, as follows :

a- Moralistic Principle

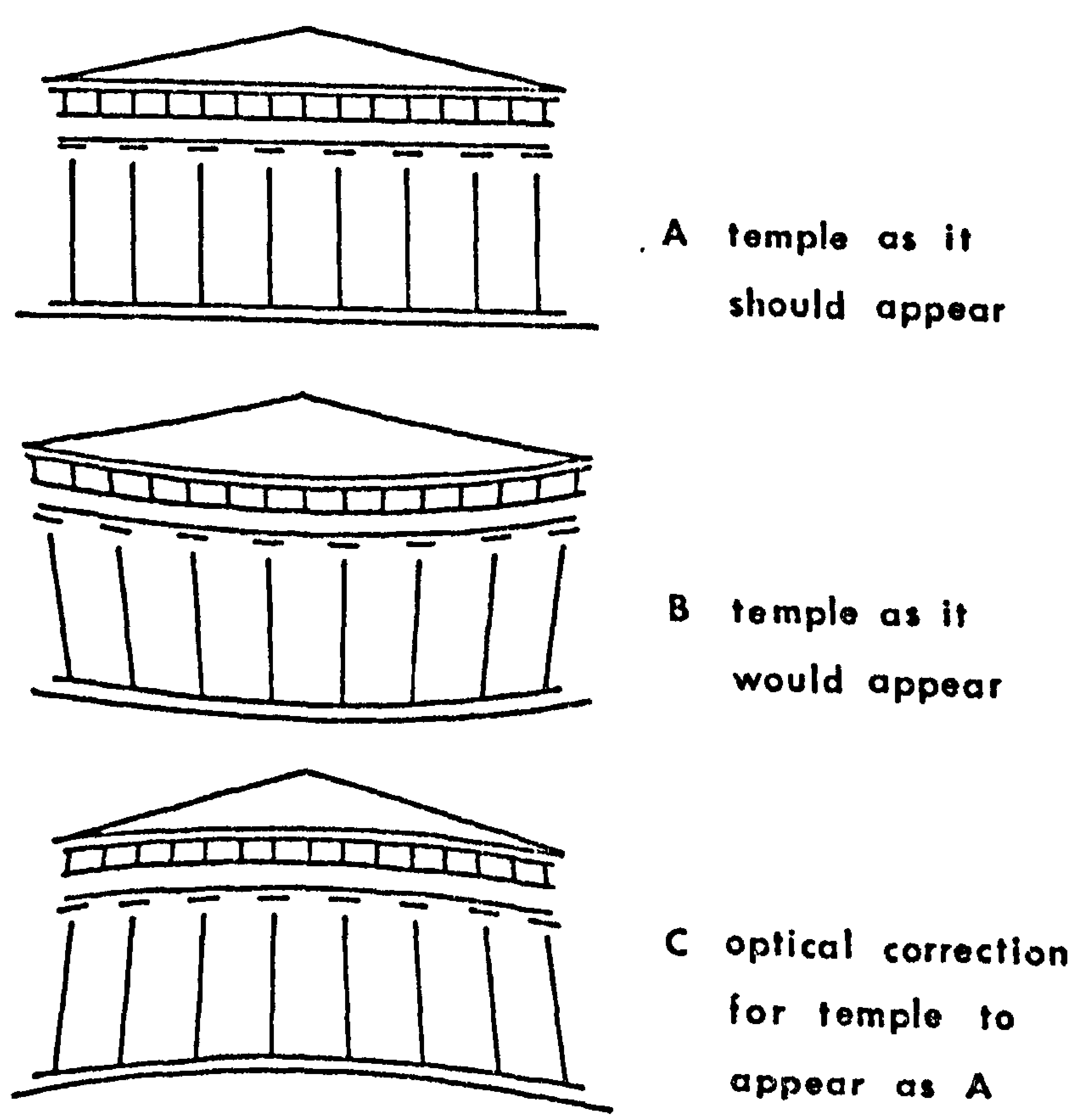
If artistic representation is related to man only as a reality, then to represent an immoral content is only to double the examples of immorality, and to strengthen, by suggestion, the incitement to it. In other words, it follows that, morally, the representation of art must be judged, in respect of its content, by the same moral criteria as real life.

b- Metaphysical Principle

If artistic representation differs from the nature which it represents only in the degree and completeness of its existence, then it differs only for the worse, and is a purposeless reduplication of what already was in the world. In other words, it follows that, metaphysically, art is a second nature, only in the sense of being an incomplete reproduction of nature.

c- Aesthetic Principle

If artistic representation does not have a deeper content than the normal object of perception which it represents, then there can be no explanation of beauty involving any deeper attributes than those which normal perception is able to apprehend in physical reality. In other words, it follows that, aesthetically, beauty is purely formal, consisting in very abstract conditions, as for example in elementary geometrical figures.



PARTHENON ; OPTICAL CORRECTIONS

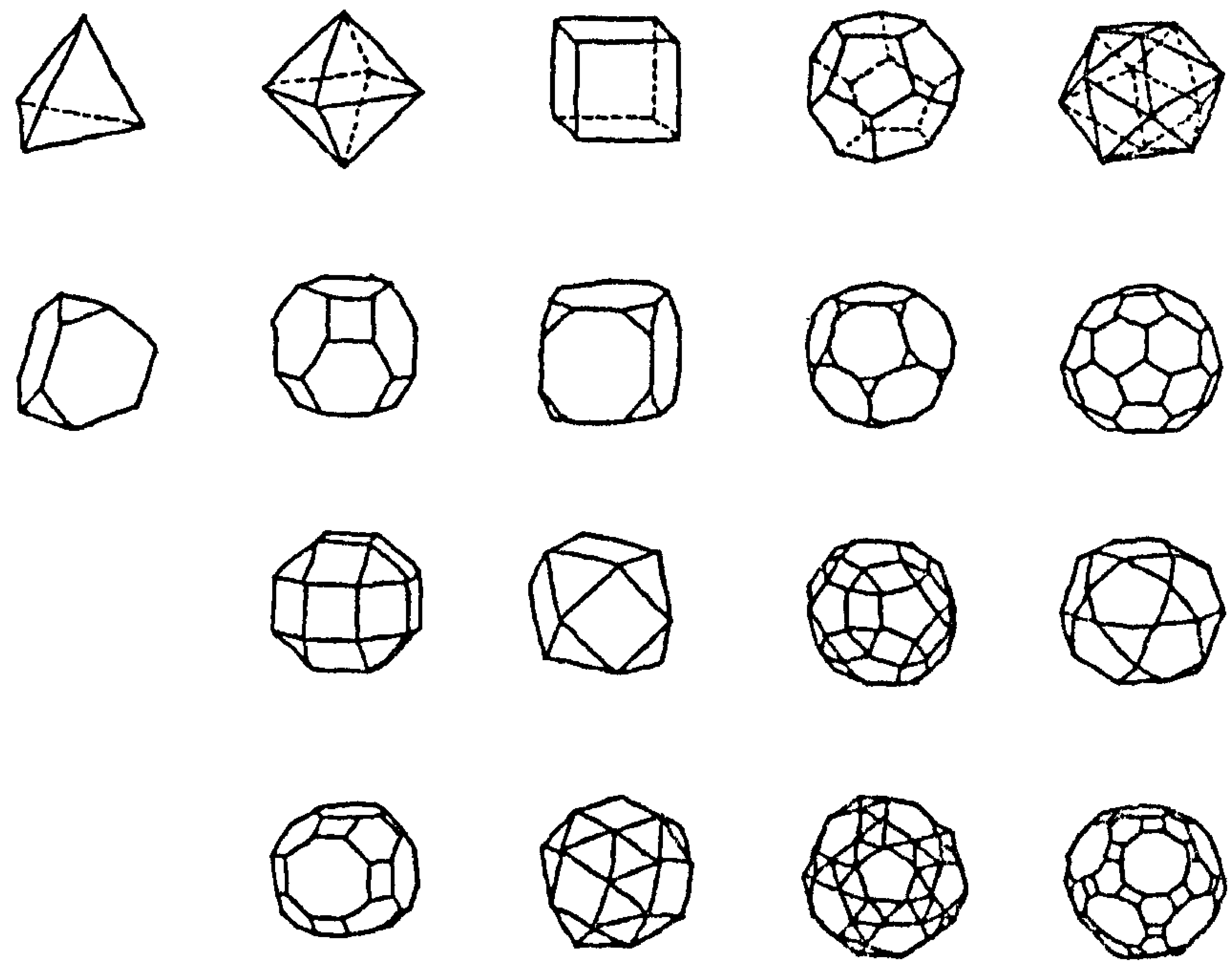
2.8.B. PYTHAGORAS to SOCRATES

Heraclitus of Ephesus brought judgements of works of art within the pattern of his philosophy of a universe undergoing ceaseless transformation, one in which all judgements of natural and artistic objects are held to be relative (15), although a hidden law of harmony governs the constant change. In contrast, Pythagoras -- who is said to have travelled to Egypt, and obviously was influenced by the prevailing thought there -- formulated a theory that has served for millenia as the pattern for the explanation of beauty in objective and mathematical terms. The most deeply rooted and widely received Greek interpretation is that art is mimetic or imitative. This has been expressed as early as the middle of the sixth century B.C. by Xenophanes. Democritus, a contemporary of Socrates, believed that the artist is inspired, and that was the only exception to his general philosophy that everything occurs of necessity and not at random. Then there were the Sophists who were professional teachers of rhetoric. Nahm writes, "the principal thrust of the Socratic and Platonic attacks upon the Sophists was directed against the scepticism with which they sought to imbue their hearers. The basis for the criticism was, however, the subjectivity to which they reduced all processes of knowing" (16).

Socrates was a remarkable philosopher on art, though the fact that Plato has made Socrates the central figure in most of his Dialogues has caused the difficult problem of determining what in Plato's philosophy is Socratic and what is his own. Socrates was not interested in insisting on the validity of fixed concepts in the face of the diversity, variety and individuality in the work of art. The recurrence and re-emergence of these early Greek philosophies is one of the most fascinating aspects of the philosophy of art and aesthetics.

2.8.C. PLATO and the THEORY of IDEAS

Plato was born in Athens (427 B.C.), he became a disciple of Socrates, and established the theory of Ideas, elaborated, defended and altered it. In Plato's view, Ideas exist in a suprasensible world, in separation from the world of becoming. Like Xenophanes he wrote of art in terms of imitation, like Herarclitus he assumed that the judgement of the work of art is subjective and relative, and like Socrates he sharply distinguished between percepts and concepts, but unlike him, he affirmed the separate existence of concepts as universals or Ideas and asserted that Ideas are the ground for truth. However, Plato's speculations are not merely a compilation of the thoughts of his predecessors, but rather a systematic philosophy of infinite variety and complexity. "Imitation is an integral part of Plato's mature metaphysic of beauty and art. One direct approach to an interpretation of the Platonic Philosophy of Art and theory of beauty consists in examining in Plato's reiterated assertions that art is mimetic, this in contrast to the frequently expressed conviction that creativity in art is at least conditioned by inspiration; that the experience of beauty is a communion with the Idea of beauty (Symposium 210); that in contrast, an initation is an imitation of an imitation (Republic X); i.e. a copy of what is produced by such an artisan, as a carpenter or maker of chariots, and that in turn the artisan copies the ideas. In contrast, beauty has no external relations. Its essence is in itself (Symposium 211A) and not in another" (17).



PLATONIC SOLIDS (row 1)

ARCHIMEDIAN SOLIDS (rows 2,3,4)

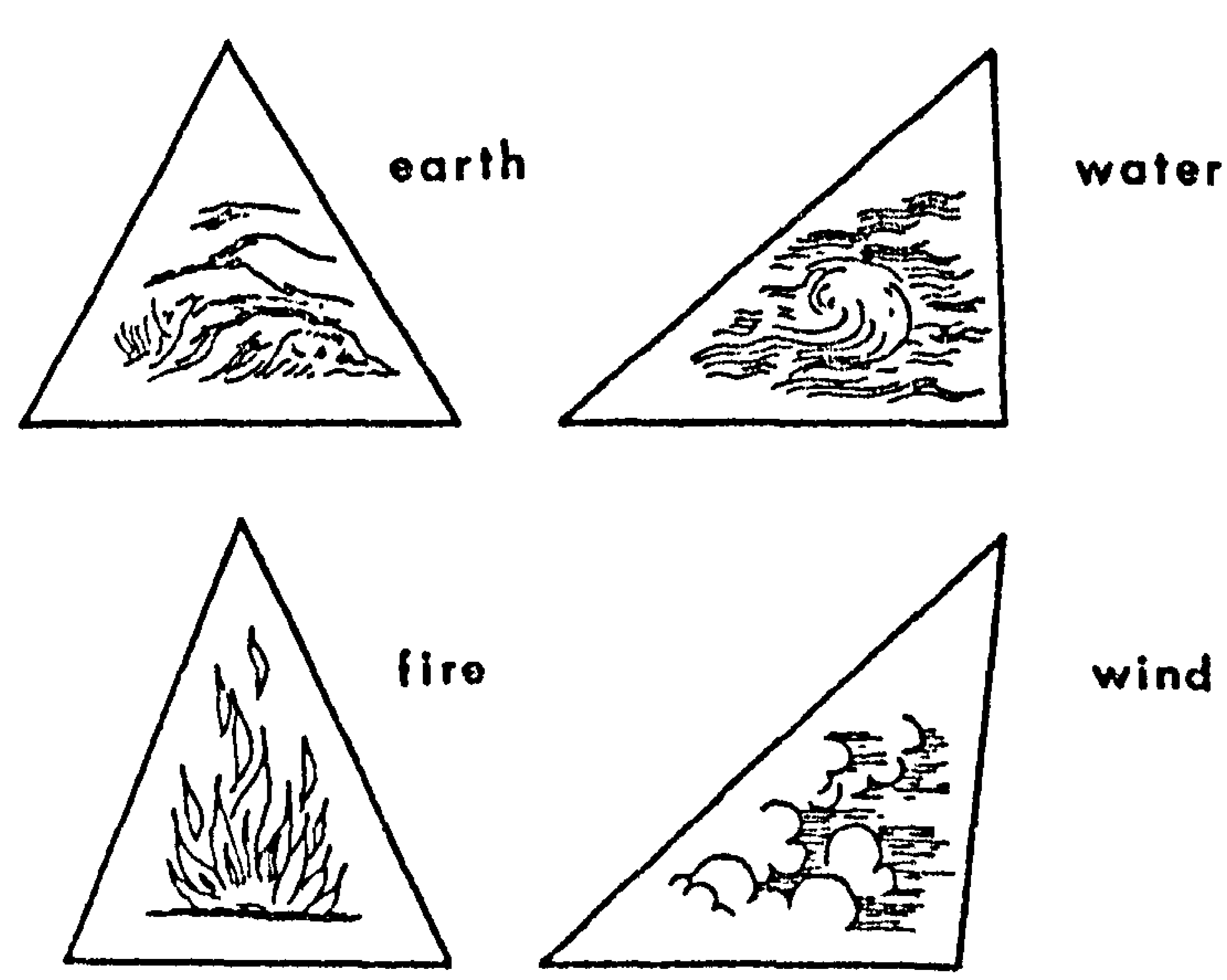
For Plato there were three levels of existence descending from the eternal to the temporal then the spatial. His argument was that salvation is only possible by undertaking the arduous ascent to the world of Ideas, and only then can truth and reality be attained.

Eternal	The Idea	First level
Temporal	The Universe as a copy of the Idea that existed...... The Demiurge makes the cosmos after the pattern of already existing ideas.	Second level (imitation)
Spatial	The imitative artist as thrice removed from truth and being, he neither knows the subject matter he copies nor does he practice an intelligible technique.	Third level (imitation of imitation)

Plato maintained that men who have or can experience the idea of Beauty have achieved immortality, but the imitative artist struggles with falsehood and his life is a form of bondage, searching only for images of beauty to copy them. Therefore, he wanted a free artist and an art in which the objects are not relatively but absolutely free. These constraints led him to argue that pure solid geometrical forms are absolutely beautiful because they do not tend to imitate or copy anything existing on the second level.

The rigour of Greek mathematical speculation is most evident in Greek philosophy of art in the Pythagorean theory of 'harmonia' and in the application of that theory not only

to the pleasing sounds made by striking tautened cords but also in cosmology that endowed the language with the phrase 'the music of the sphere'. In the speculations of Pythagoras and his followers the search for a beauty definable in mathematical terms without reference to end or purpose begins. These speculations lead directly to Plato's conception of a beauty, the essence of which is in itself and not in another. His search for absolute beauty leads him to assert that there is not only an Idea of Beauty but that there are absolutely beautiful, non-mimetic mathematical forms.
The following quote from 'Philebus' illustrates this belief, "I do not mean by beauty of form such beauty as that of animals or pictures, which the many would suppose to be my meaning; but, says the argument, understand me to mean straight lines and circles, and the plane or solid figures which are formed out of them by turning-lathes and rulers and measurers of angles; for these I affirm to be not only relatively beautiful, like other things, but they are eternally and absolutely beautiful" (18).



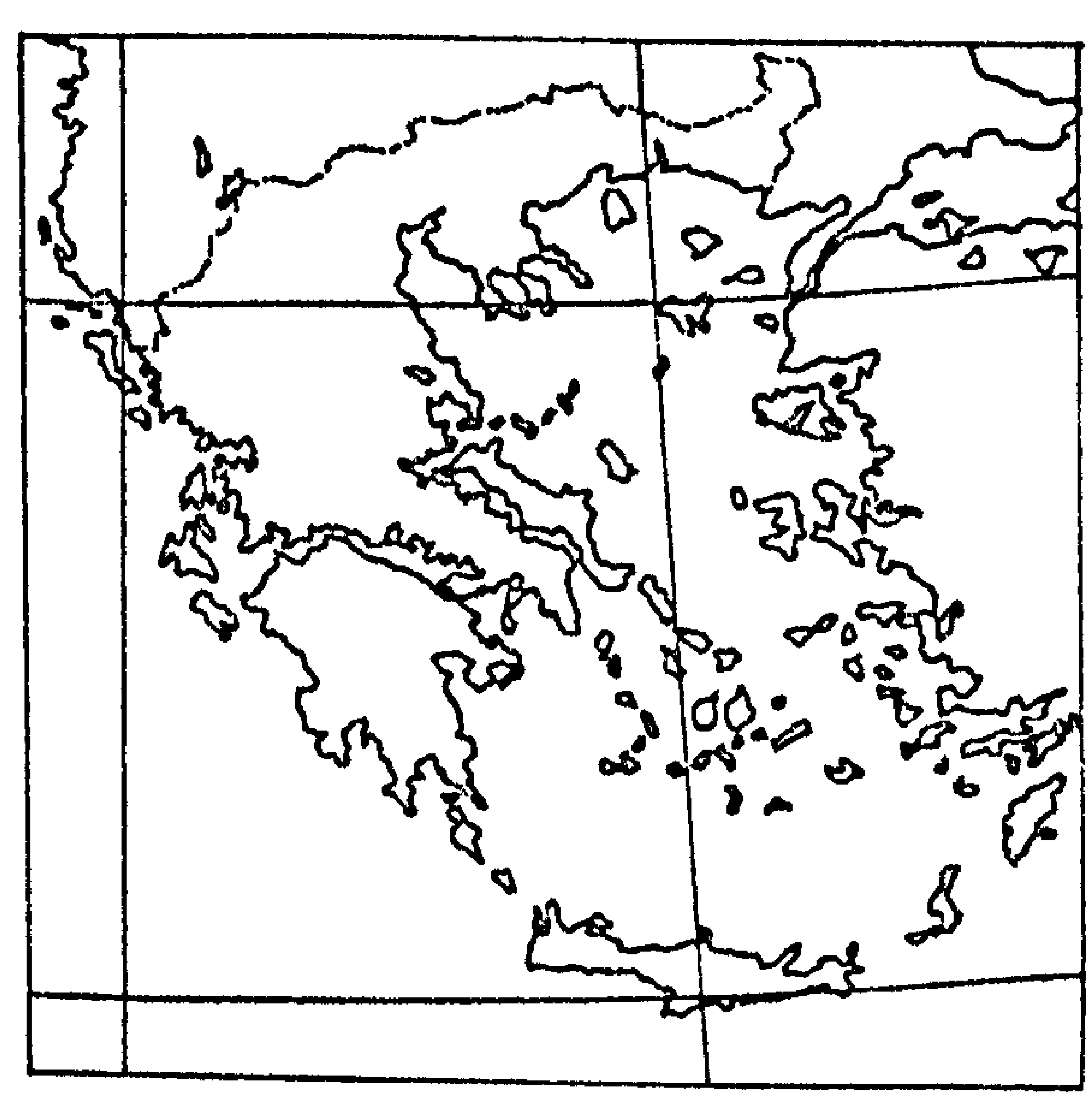
THE ELEMENTAL TRIANGLES OF PLATO

2.8.D. ARISTOTLE'S INFLUENCE

Aristotle's 'Poetics' is one of the most influential volumes on the philosophy of art and aesthetics. He was clearly interested in the metaphysics of beauty, and incorporated into his own philosophy the theory of universals. He denied the transcendence of the forms and was consistently critical of the separation of universals from things. But, although he was a disciple of Plato he left behind the theory of imitation. Aristotle writes, "Figures and colours are not imitations, but signs, of moral habits, indications which the body gives of states of feelings" (19). It is not strange that Plato, after whom the five geometrical basic solids are named, and over the gateway of whose Academy was written, "Let no one enter who is not versed in mathematics", should have been radically influenced by the Pythagoreans. It is interesting, however, that Aristotle, who prefers biological to mathematical sciences, should display in his 'Metaphysics' a fascination for these early philosophers; in fact his own definition for beauty is basically Pythagorean, "The chief forms of beauty are order and symmetry and definiteness, which the mathematical sciences demonstrate in a special degree" (20). It is obvious that the Pythagorean line of thought permeated continuously the Greek philosophies of art and aesthetics. It is also a fact that Pythagoras was influenced by the Egyptian notions in this respect, which may well explain the reason for the continuity of the architectural space conception -- which was concerned with the emanating power of volumes, their relations with one another and their interaction -- which bound the Egyptian and Greek developments together. However, the translation of this conception into architectonic features resulted in different interpretations due to the different cultural climates. For instance, the Greek temples with their shadow creating porticos and their elaborately plastic entablatures and pediments are as different from the Egyptian temples as the flat Egyptian sunken reliefs are from the fully rounded and modelled Greek statues.

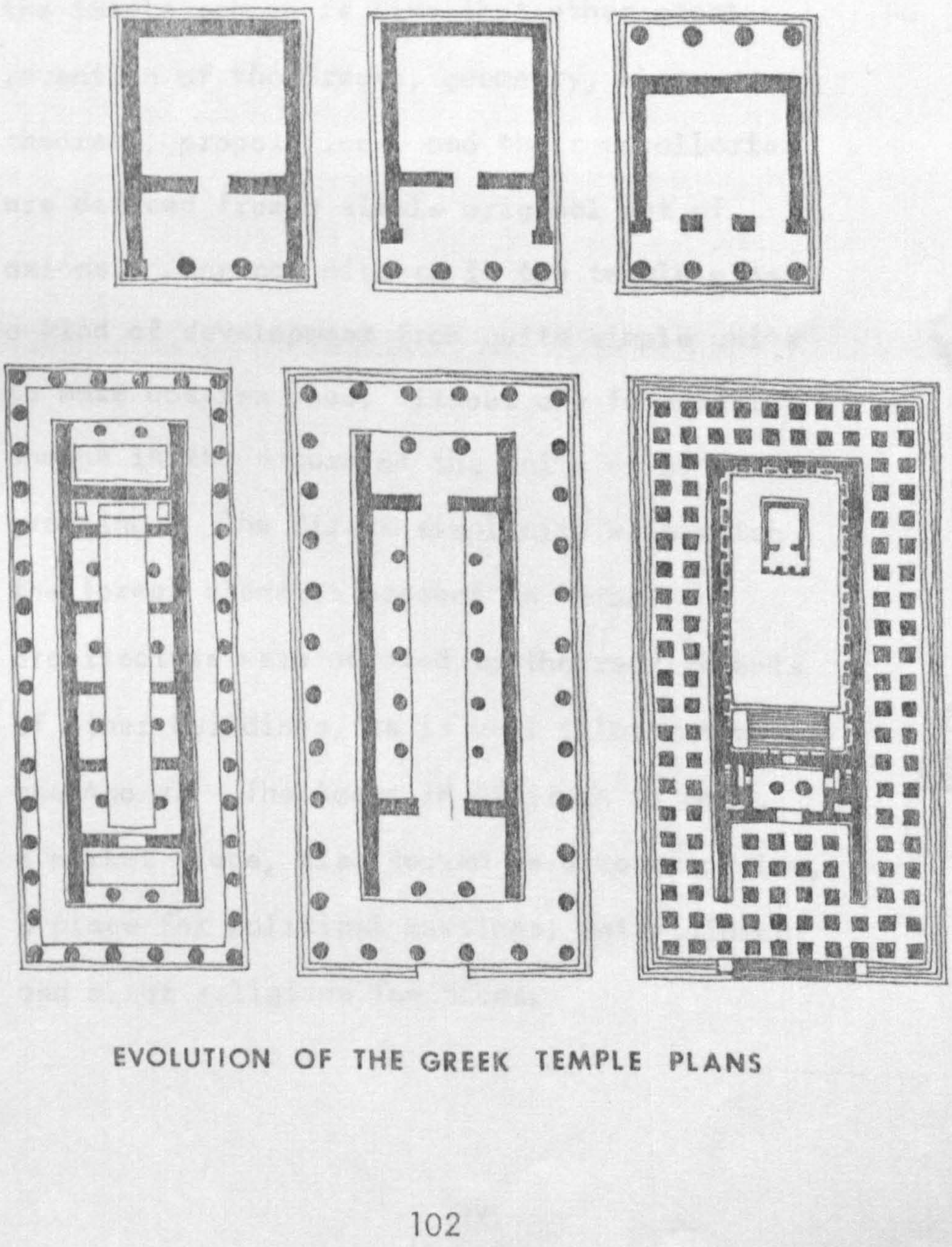
2.8.E. GREEK PHILOSOPHY and ARCHITECTURE

The order of both nature and reason to the Greeks was beautiful and simple, and the beauty of things was one with their knowledge of them. In contrast to Egypt, with its long horizontal plain between desert plateaus and its constant sunshine, Greece is a country of diversified geography and climate. It has a rugged coastline and mountains that divide it into small units. The climate is cold in winter, and hot in summer. The Greeks, with their joy in nature worshipped it. Their gods assumed human forms, but whose grandeur was not free from human weakness, unlike the gods of Egypt, their only real difference from men was that they were immortal. Man became the centre of the universe for the Greeks.



MAP OF GREECE

The constants of Greek culture were man, nature and reason, and they understood goodness to be the harmony of all three. The achievements and the development of the Greeks should be understood as related to this conviction. Development was basically inherent in their culture as opposed to the conservatism of Egypt, where the pattern of ritual and form was not to be broken. Change in Egypt occured, when it did, despite the pattern of the culture as a whole, but Greek art and architecture display much more readily discernible stages of evolution. Greek architecture began primarily as simple shrines to protect the statues of their gods.

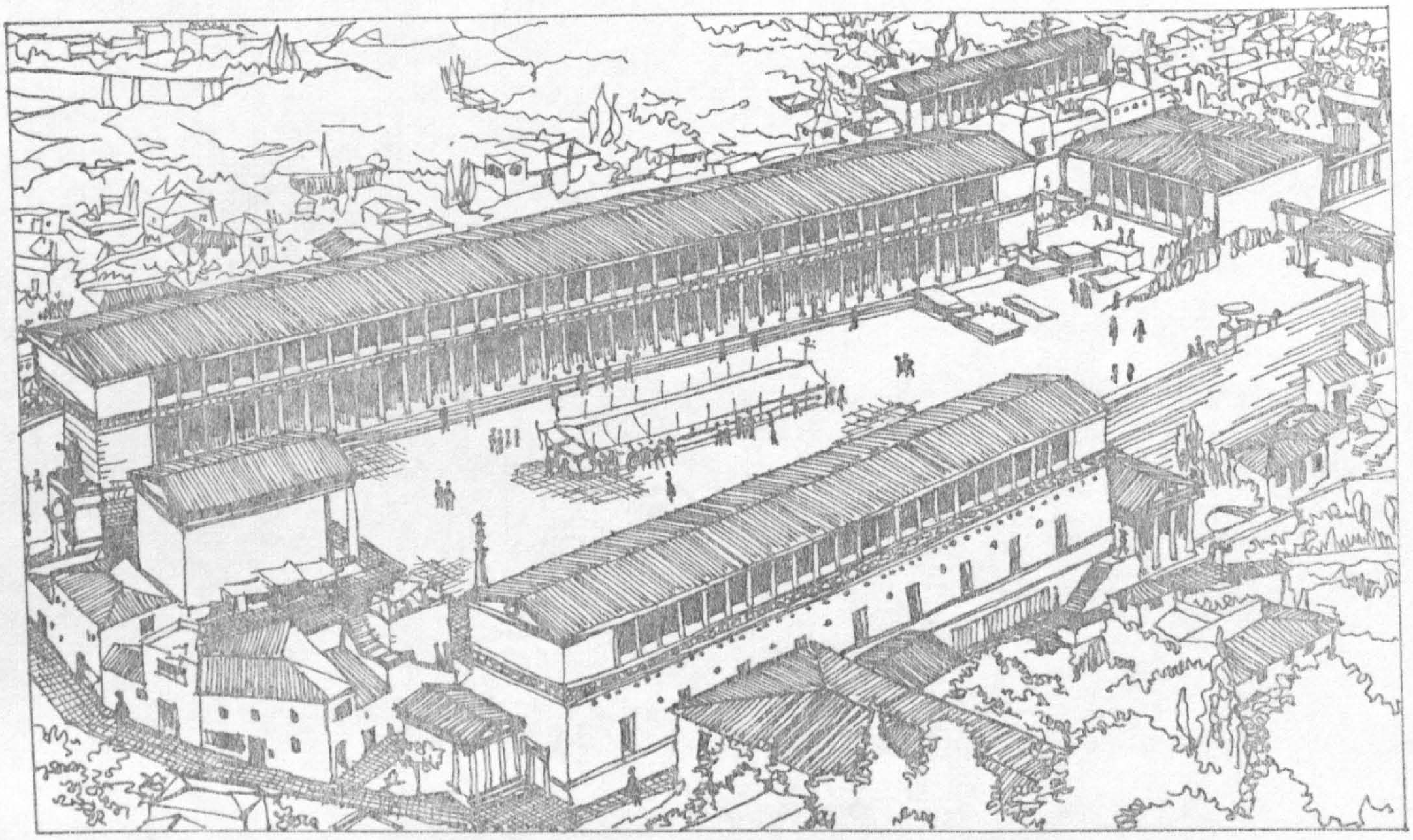


EVOLUTION OF THE GREEK TEMPLE PLANS

More and more attention was given to these shrines until the qualities of the gods became embodied in the structures themselves. The buildings were conceived of as sculptures, abstract in form and possessing the power of sculptures to evoke human qualities.

CARYATID; ERECHTHEION

Greek architecture, like classical music, has a simple core theme from which is developed a series of complex, but always quite intelligible variations. The development of the temple scheme is like that other great invention of the Greeks, geometry, where theorems, propositions, and their corollaries are deduced from a simple original set of axioms. One can discern in the temple plans a kind of development from quite simple units to more complex ones, without any fundamental change in the nature of the units or of their grouping. The direct simplicity with which the formal elements present in temple architecture were adapted to the requirements of other buildings, as is well illustrated in the Agora. The Agora in addition to being a market place, also served as a court of law, a place for political meetings, entertainment and minor religious functions.

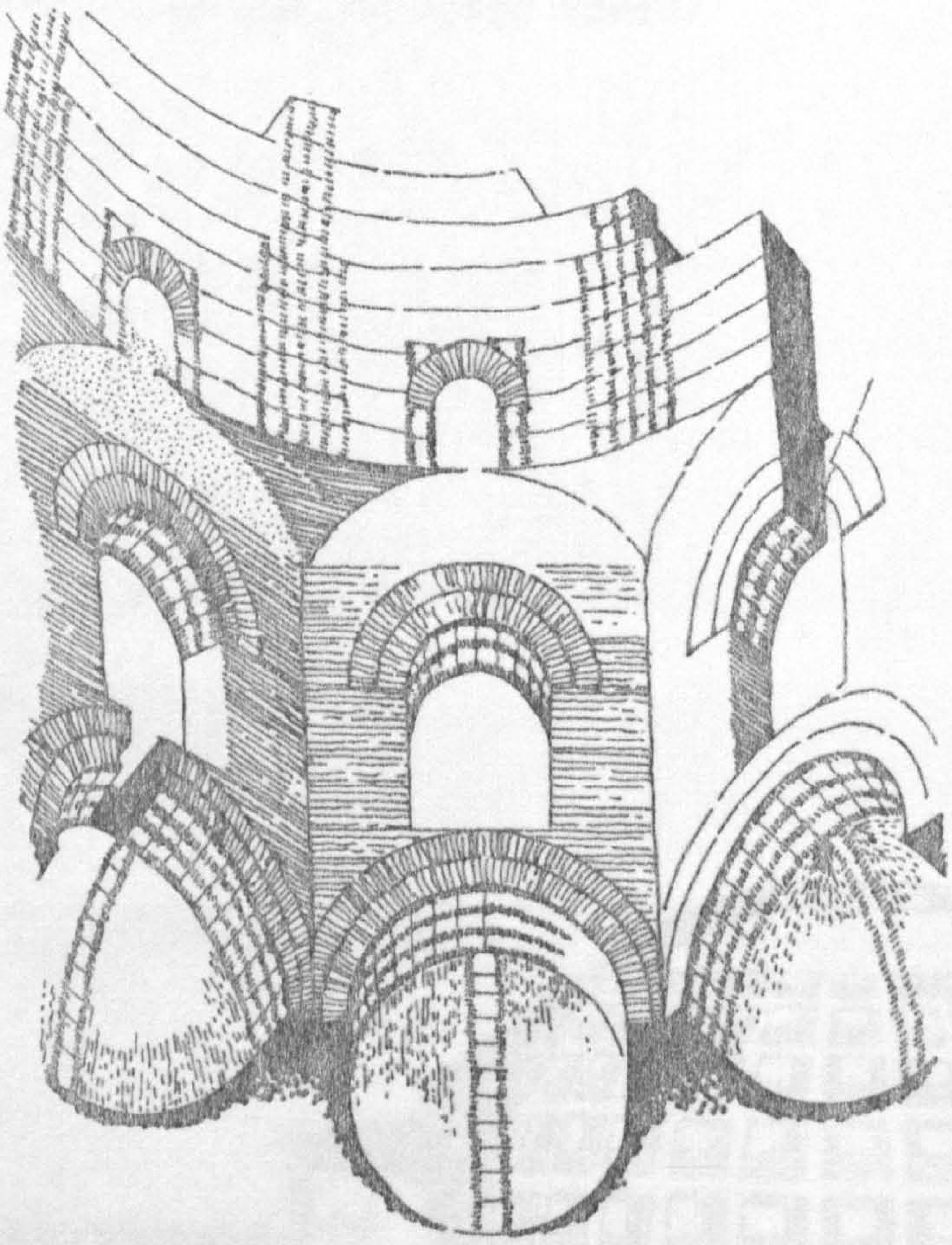


THE AGORA AT ASSOS

Ideal proportions for the component parts of the design were calculated in multiples of the 'module' equal to half the lower diameter of the column. The Greeks spent great effort to achieve ideal forms in terms of regular numerical relations within the rules of geometry. Proportion in architecture and harmony in music were much the same to the Greek mind, and indeed both reflected and embodied the cosmic order of their culture.

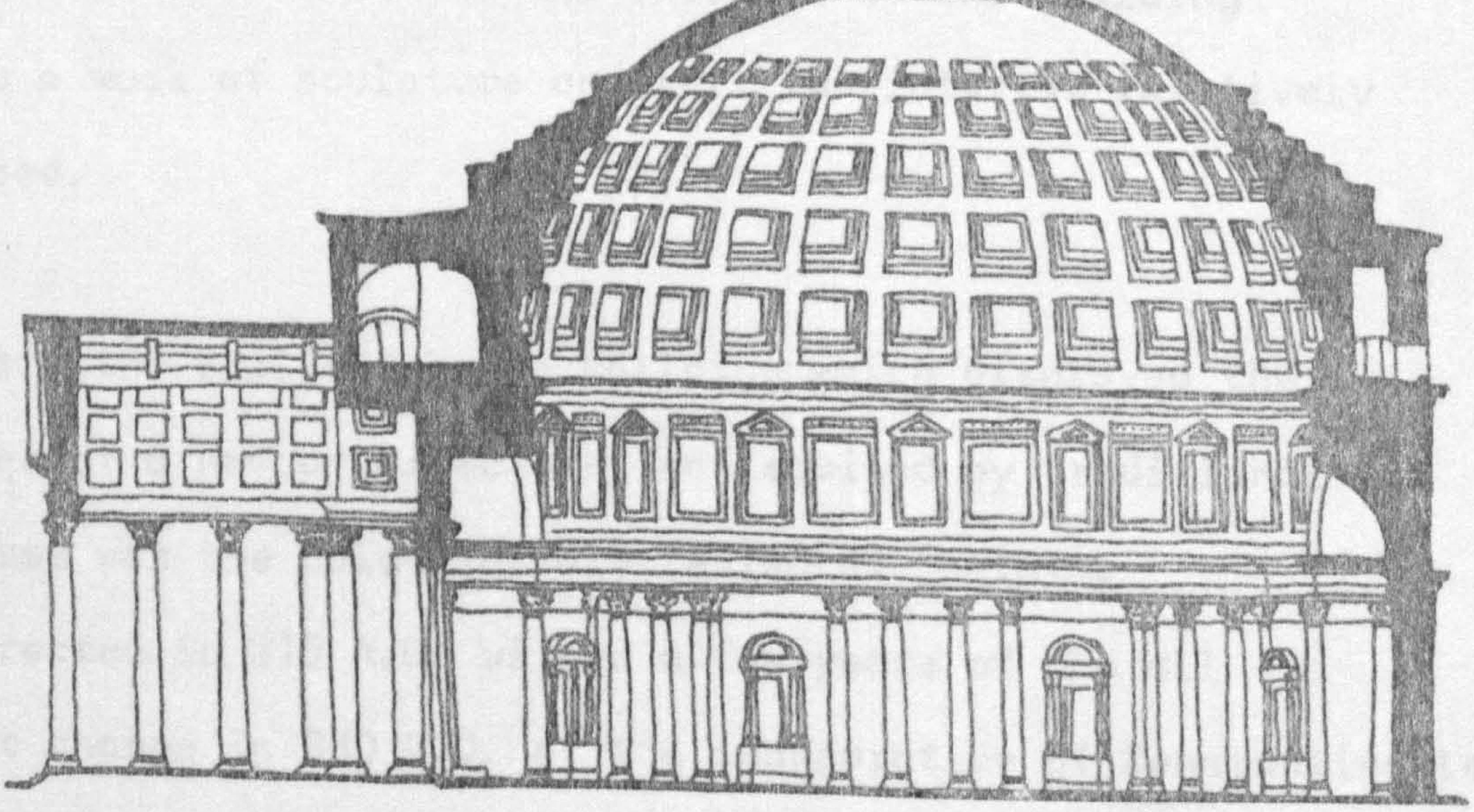
2.9. ROMAN ATTITUDES to ARCHITECTURE

The main energies of Rome were devoted to conquest and administration, and Roman architecture takes its character mainly from the imperial role the Roman state was required to play. During the Republican period (from the fifth century B.C.) the Roman identity is first and most fully expressed in architecture and city planning. Unlike the religious architecture of the other civilizations (Mesopotamia, Egypt, Greece) that preceded it. The Roman temple was not particularly inventive or conspicuous, as the Roman builders concentrated more on the imposing and utilitarian civic structures which were more coherent to their kind of culture. This was basically an urban culture where Rome reached the size and complexity of a modern city and the communal needs of its inhabitants were multiple and urgent. The manner in which the architects and planners of Rome satisfied all these requirements and the character of the buildings which they devised were remarkable in the utilization and use of all the available knowledge in structures and technology of materials. In the first place they seized on the great invention of the arch. They did not invent it themselves since it was known in ancient Egypt, and appararently not uncommon in Babylonia, but they were the first who developed, refined and use it with aesthetic and ordered proportionality and not just as an ugly necessity. But it was the use of concrete which provided the key to the development of Roman architecture, and when the technical adaptation of the new material was achieved, buildings on a magnificent scale became possible.



VAULT IN THE MINERVA MEDICA ; ROME

The architectural space conception naturally had to shift its interest from the external interplay of volumes in space to an introvert space conception. The powers of vaults and domes in heightening religious and secular experience appeared in conjunction with the symbolic relationship of interior space to the cosmos, much the same as the powers of volumes in space were manifested in the earlier high civilizations. From that time on, the concept of architectural space was almost indistinguishable from the concept of hollowed out interior space.

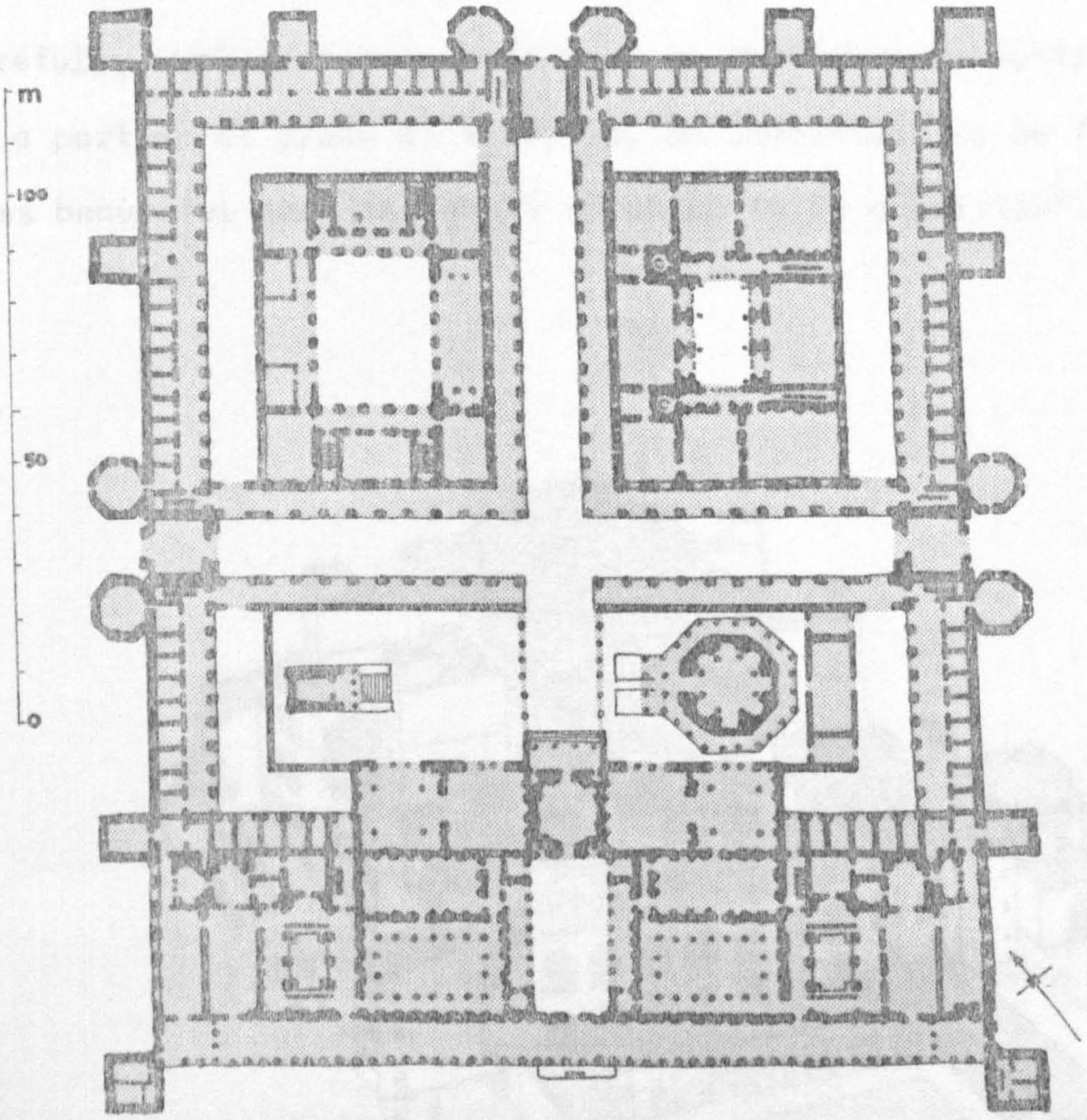


THE PANTHEON; ROME

2.10. HELLENIST and MEDIEVAL PHILOSOPHIES

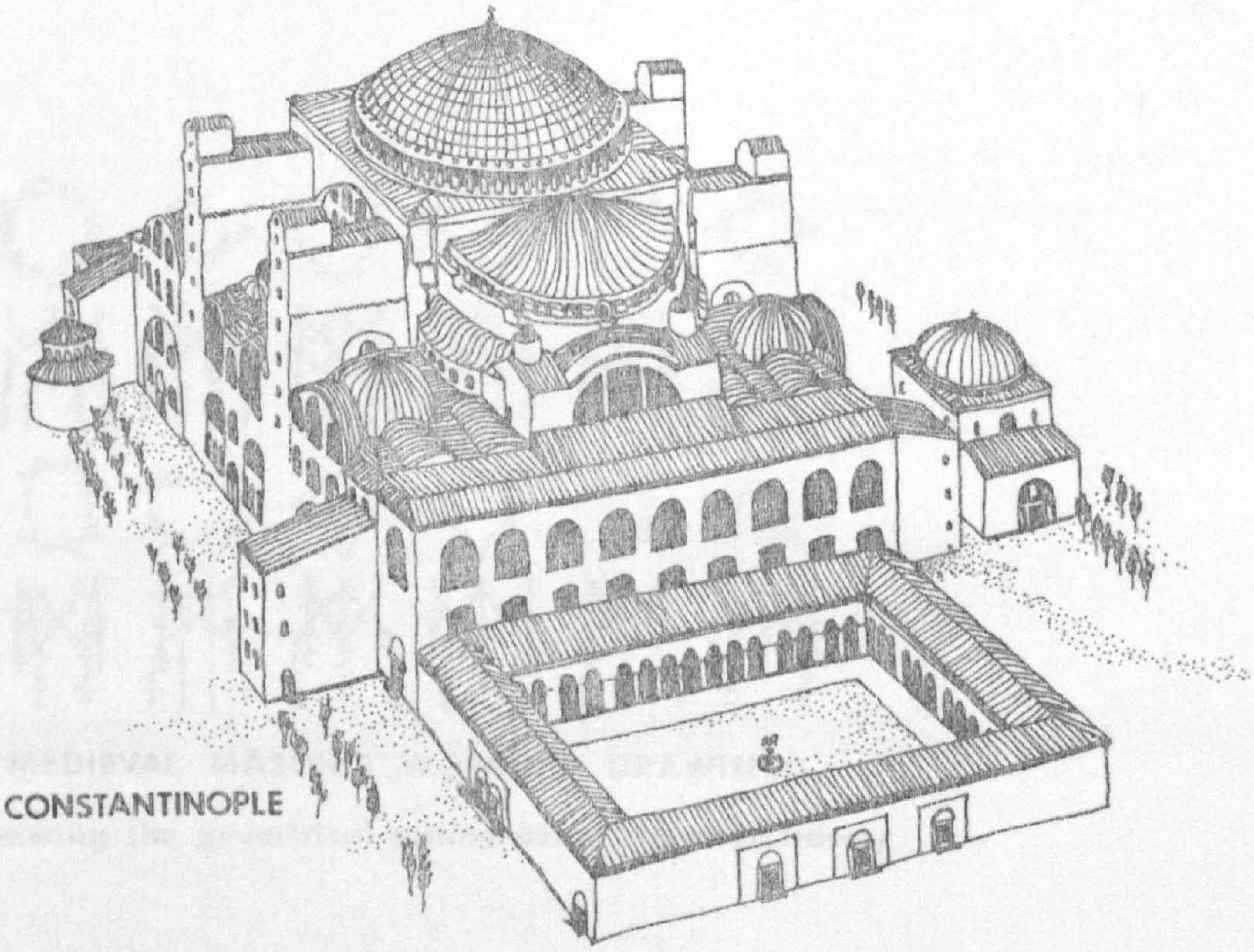
For six centuries at least after the death of Alexander the Great, the civilization which had its roots in Greece was the civilization of the world. A definite answer as to the date that it ceased to be so cannot be given, as new principles usually emerge in history and obtain supremacy gradually and not in one blow. The greater variety, complexity and sophistication of the Hellenistic culture called for an architecture on an imperial scale and of wide diversity. In fact, the architecture of this period was the real prototype for the Roman architectural style. Great scale and ingenious development of interior space marked the Hellenistic architecture. This complex spatial planning of large interiors lead directly into later Roman practice and marked a sharp departure from classical Greek architecture, which stressed the exterior of the building almost as a work of sculpture and left the interior relatively undeveloped.

However, the earliest known building which displayed the principles of a new architecture, undisguised by traditional Greek forms was the palace of Diocletian at Spalato. It was erected in 313 A.D. within a few years of the all important change in 330 A.D. of the inauguration of Constantinople as the seat of government for the Roman empire. One may also add, that Plotinus, who died in 269 A.D. had, as the last great Hellenic thinker, broken the bonds of the ancient theory



PALACE OF DIOCLETIAN ; SPALATO

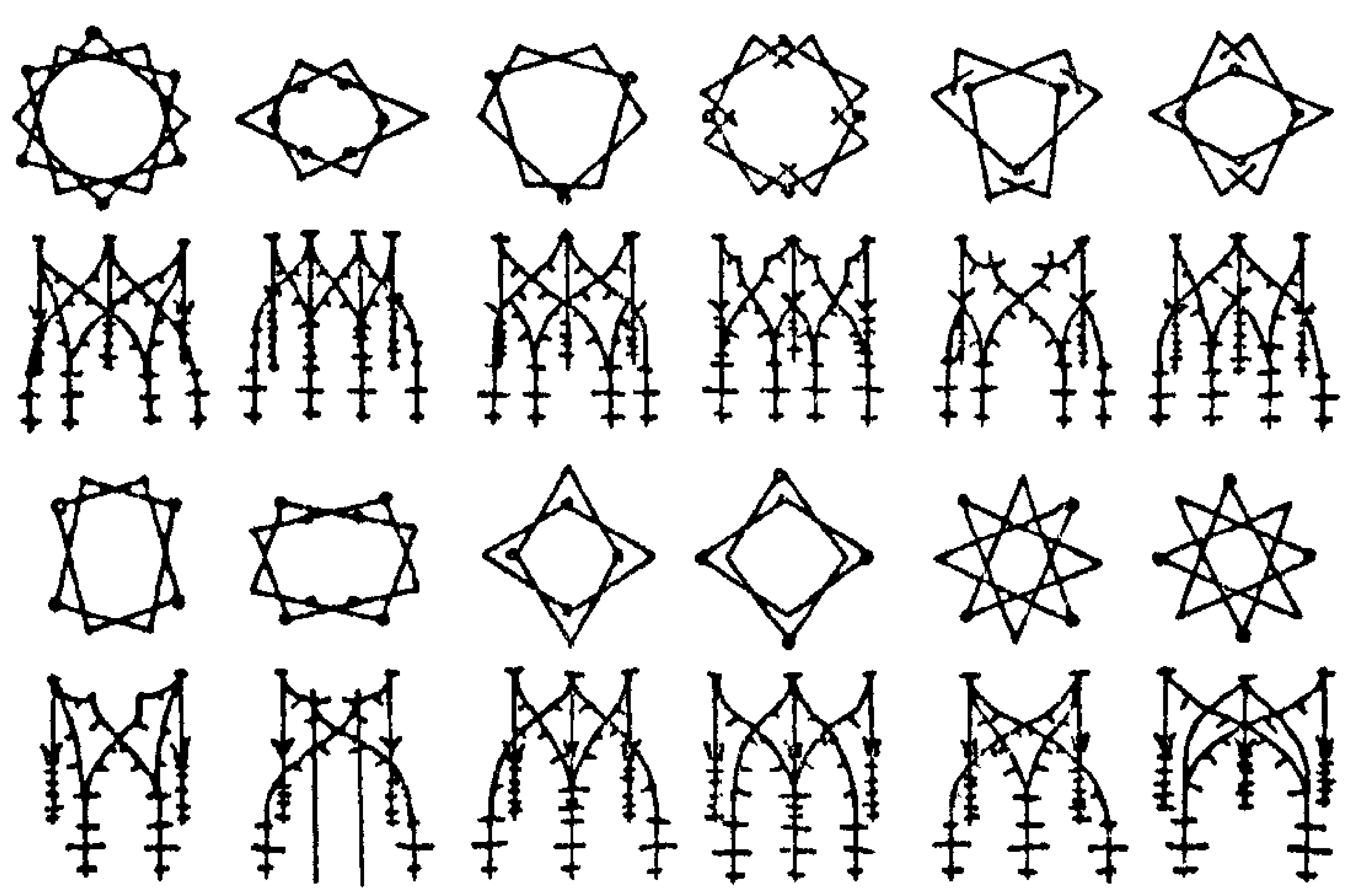
concerning the beautiful. Later at the close of the fourth century, St. Augustine, was to announce that "when the soul has properly adjusted and disposed itself, and has rendered itself harmonious and beautiful, then will it venture to see God, the very source of all truth and the very Father of Truth..... I shall say no more, except that to us is promised a vision of beauty -- the beauty of whose imitation all other things are beautiful.... it is inevitable that all things come into being in accordance with order.... In this world of sense, it is indeed necessary to examine carefully what time and place are, so that what delights in a portion of place or time, may be understood to be far less beautiful than the whole of which it is a portion" (21).



St. SOPHIA; CONSTANTINOPLE

For St. Augustine architecture was the visual expression of the numerical ratios of basic cosmic laws, and no beautiful architectural form is conceivable unless the numerical rules have been applied and unless their presence is apparent to the observer. It is true to say that

St. Augustine's philosophies, to a large extent, shaped the Middle Ages and inspired the movements that led to the building of the Gothic cathedrals. Through an understanding of the meanings of proportion and symmetry in relation to fundamental ideas, these cathedrals were not merely symbols of the cosmos but a re-structure of the universe.

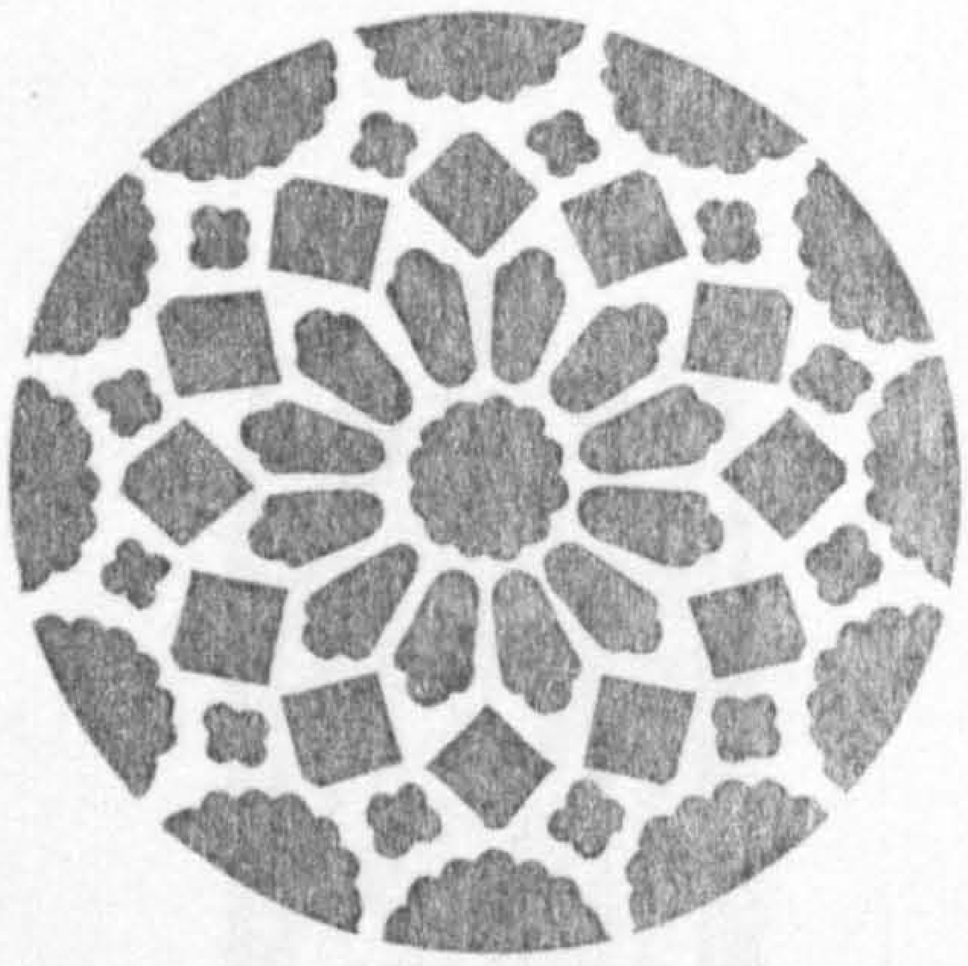


MEDIEVAL MASON'S WORKING DRAWINGS

showing the geomtrical setting-out of columns & tracery

The cathedrals were true models of the medieval universe , where great interest was taken in modelling internal lighting so as to strengthen the shaping of architectural space.

North Rose

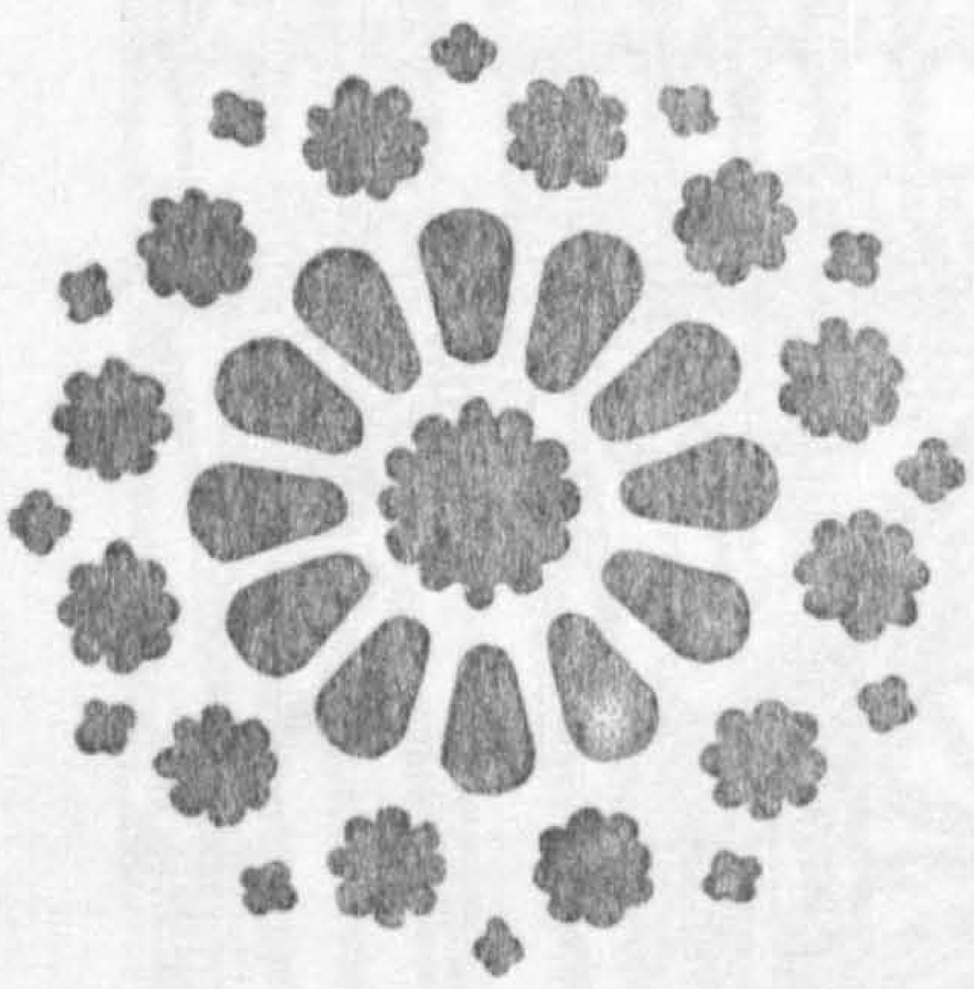


CHARTRES CATHEDRAL

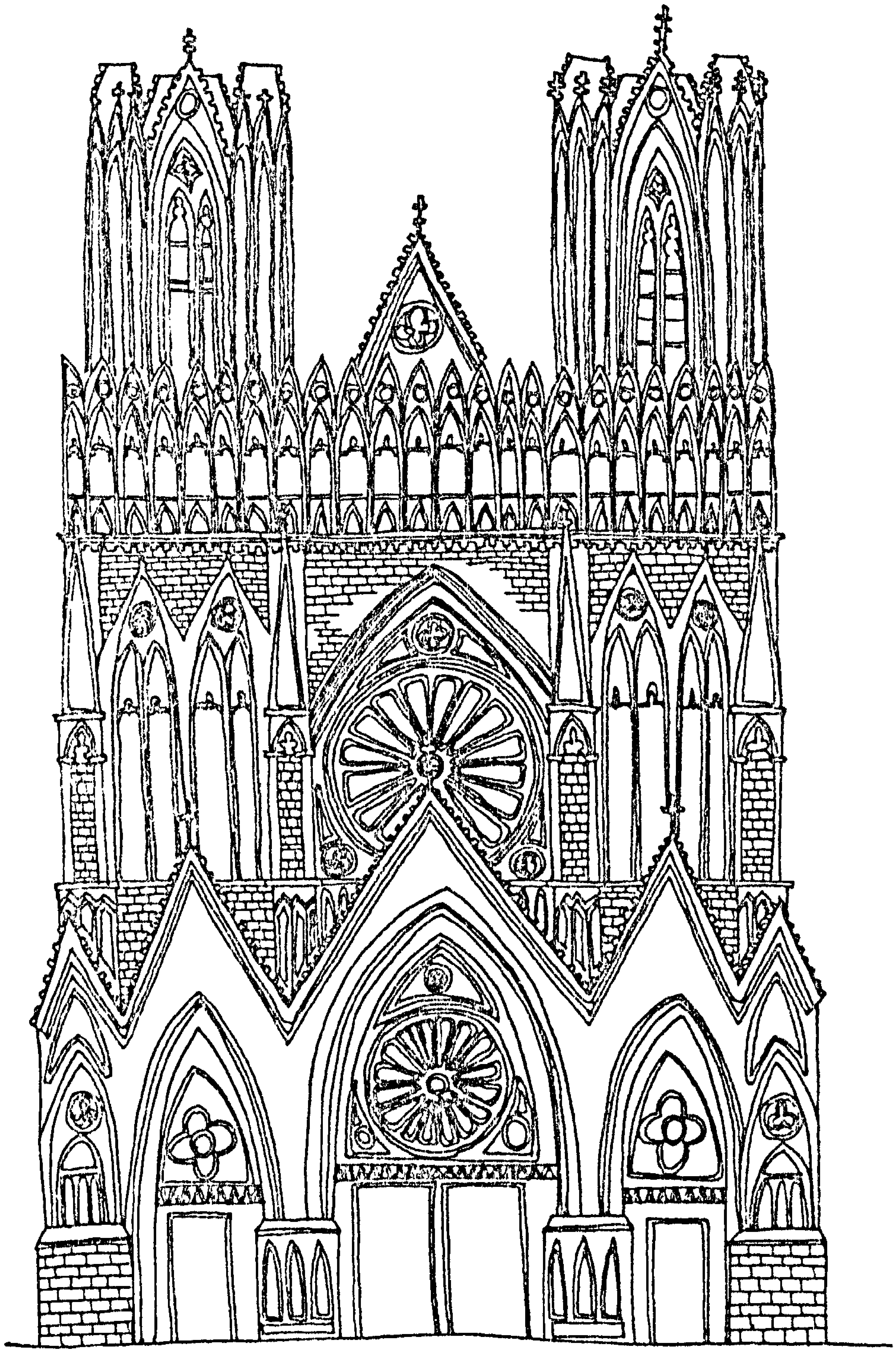
The north window is in light-diffusing blue tones ; the west rose is in dark red light-constricting hues.

The west façade is the main entrance, associated with the symbolism of the Last Judgement which precedes the access to Heaven.

West Rose



The modelling of light was part of their meaning and the supreme goal of architecture as a design of interior space continued. However, the relation of interior and exterior space started to be realized and the modelling of the exterior volumes by means of light and shade had its most dramatic development in the flying butresses, perforated spires, and concave portals of the Gothic cathedrals. These masses in space acted like arrows directing the eye to the interior and linking the interior to the universe.

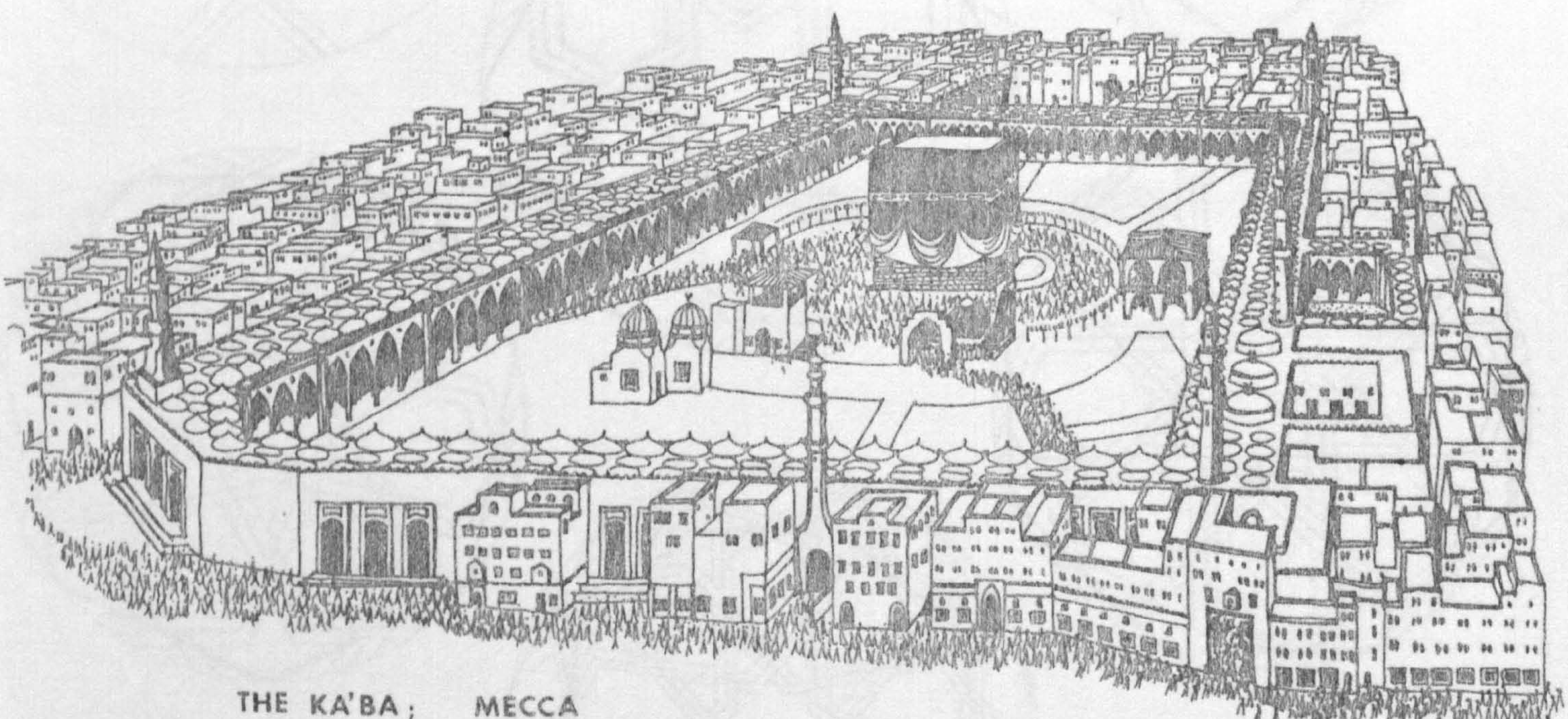


RHEIMS CATHEDRAL

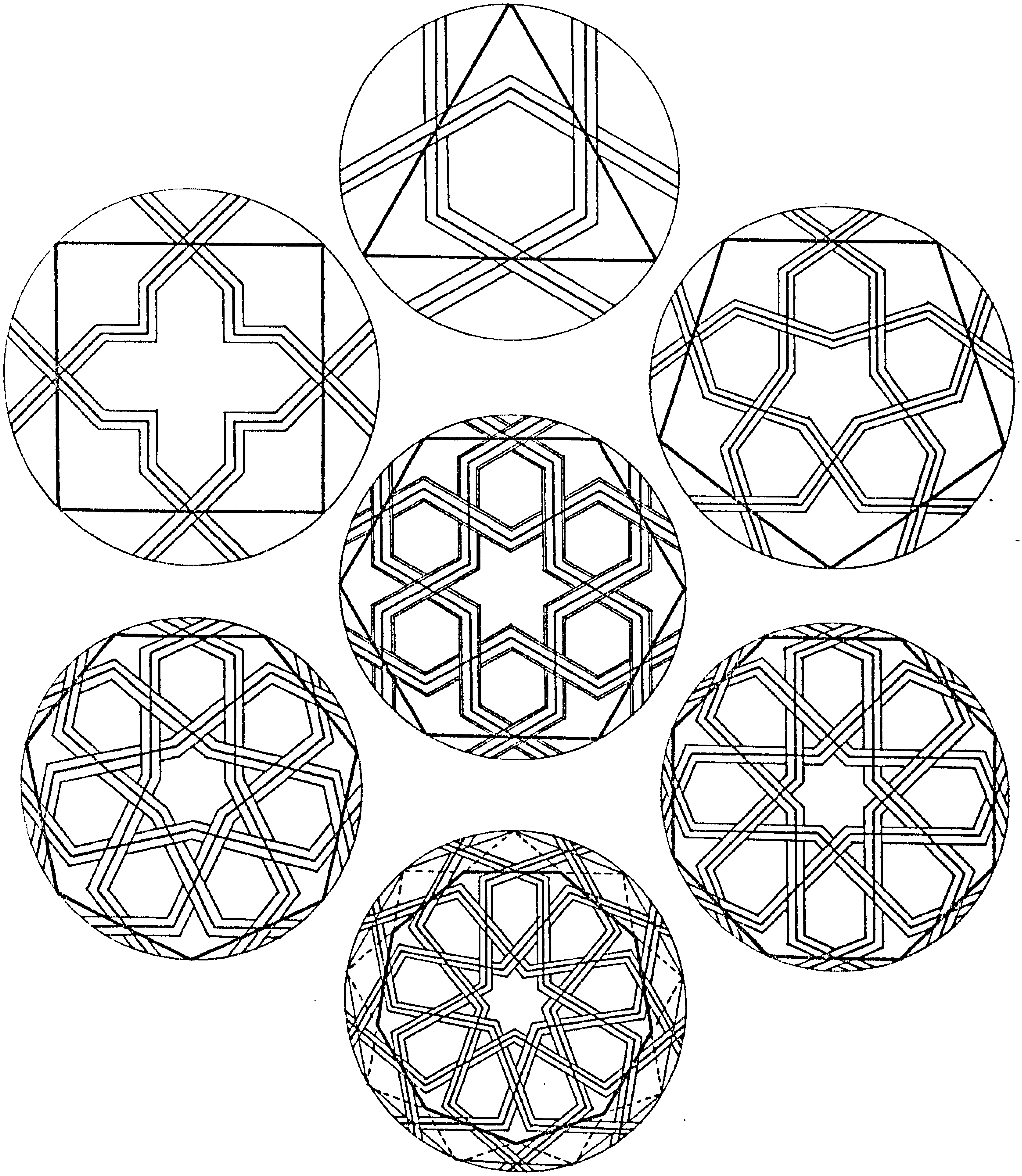
2.11. ISLAM and the UNITY of the PRINCIPLE

'La Ilaha Illa Allah' (no Deity except God); this fundamental formula of Islam consists of two pairs of words. While each word represents a degree of reality each pair denotes; the negation referring to the manifest domain, and the affirmation referring to the supraformal and the Principle together (29). This supreme truth manifesting itself as a paradox in the human mind reminds man of his inherent limitations. This basic idea may be expressed as no Deity but God, no part without the whole, no reflection without the source, and no dimension without all dimensions. Nasr states that, "Ultimate reality is at once Absolute and Infinite, the source of all being, of all consciousness and of all life. Itself beyond form, it speaks to mankind through revealed forms which, while externally bound and limited, open up inwardly towards the Boundless. Through revelations of this Word or Logos come into being the sacred traditions which although outwardly different are inwardly united into a Centre which transcends all forms. They are, however, the bridge from the periphery to the Centre, from the relative to the Absolute, from the finite to the Infinite, from multiplicity to Unity" (23).

The traditions of Islam revolve, on the one hand, around the unity of the Principle and the nothingness of everything else before the greatness of the One who ultimately alone exists, and on the other, the multiplicity as so many reflections of the Unity which is both the origin and the end of the order of multiplicity. Islamic spirituality had to develop an art form conforming to its own reality as well as to its essence. The resultant configuration was an uniconic art form in which the spiritual world was reflected in the sensuous world not through iconic form, but through geometry, rythm and calligraphy which reflect the Divine Unity.



THE KA'BA; MECCA

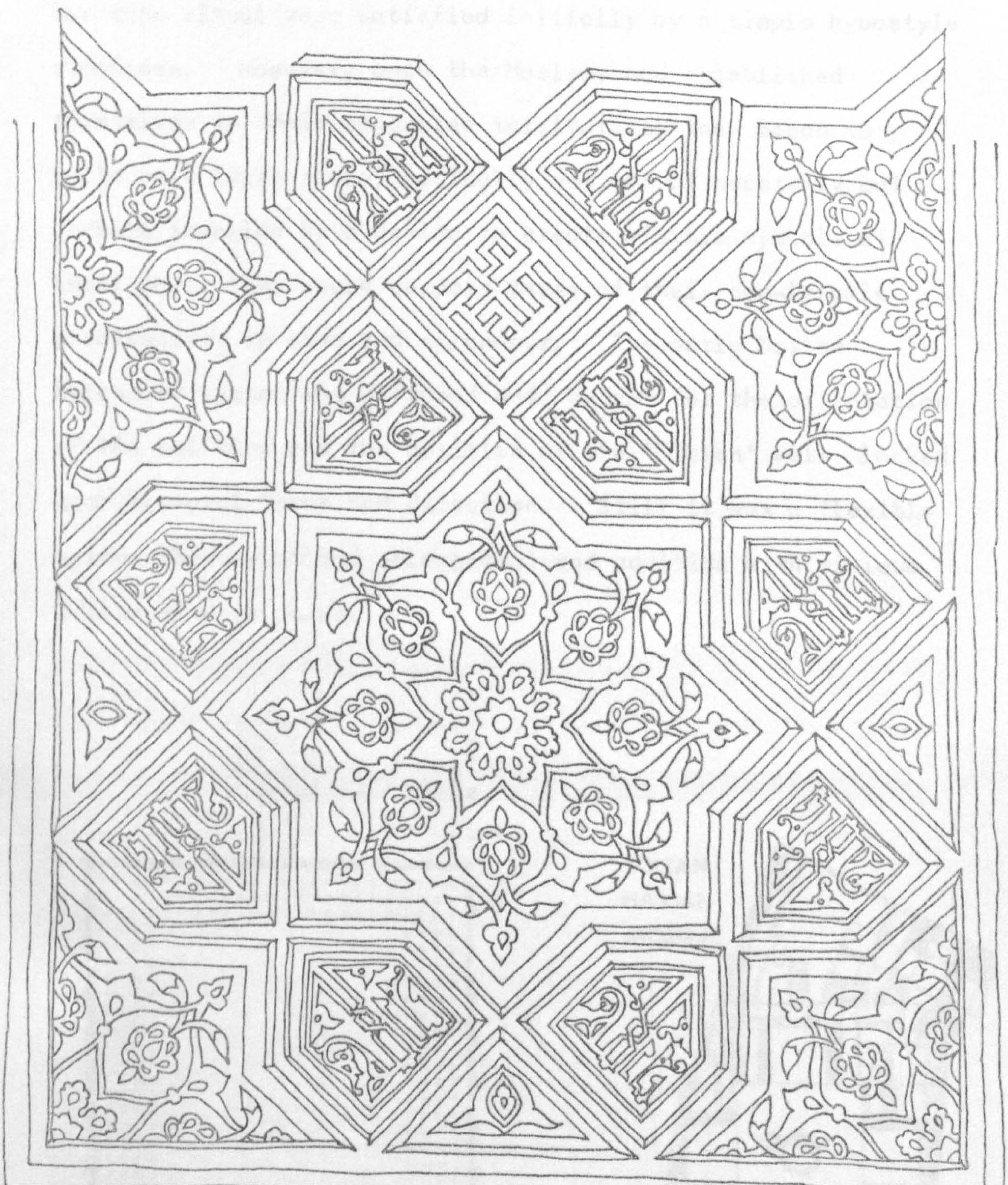


BASIC GEOMETRIC FORMS AND ISLAMIC PATTERNS.

To understand the underlying principles of lslamic art, one must consider carefully the philosophical implications of those primary moves of geometry. For instance, the nature of the point as the simplest origin of geometry, is an example of the physical versus the metaphysical in lslamic philosophy. Is it possible that a point has no dimension except if it were metaphysical? And how can it occupy space if space has not yet been created from its unfolding?.

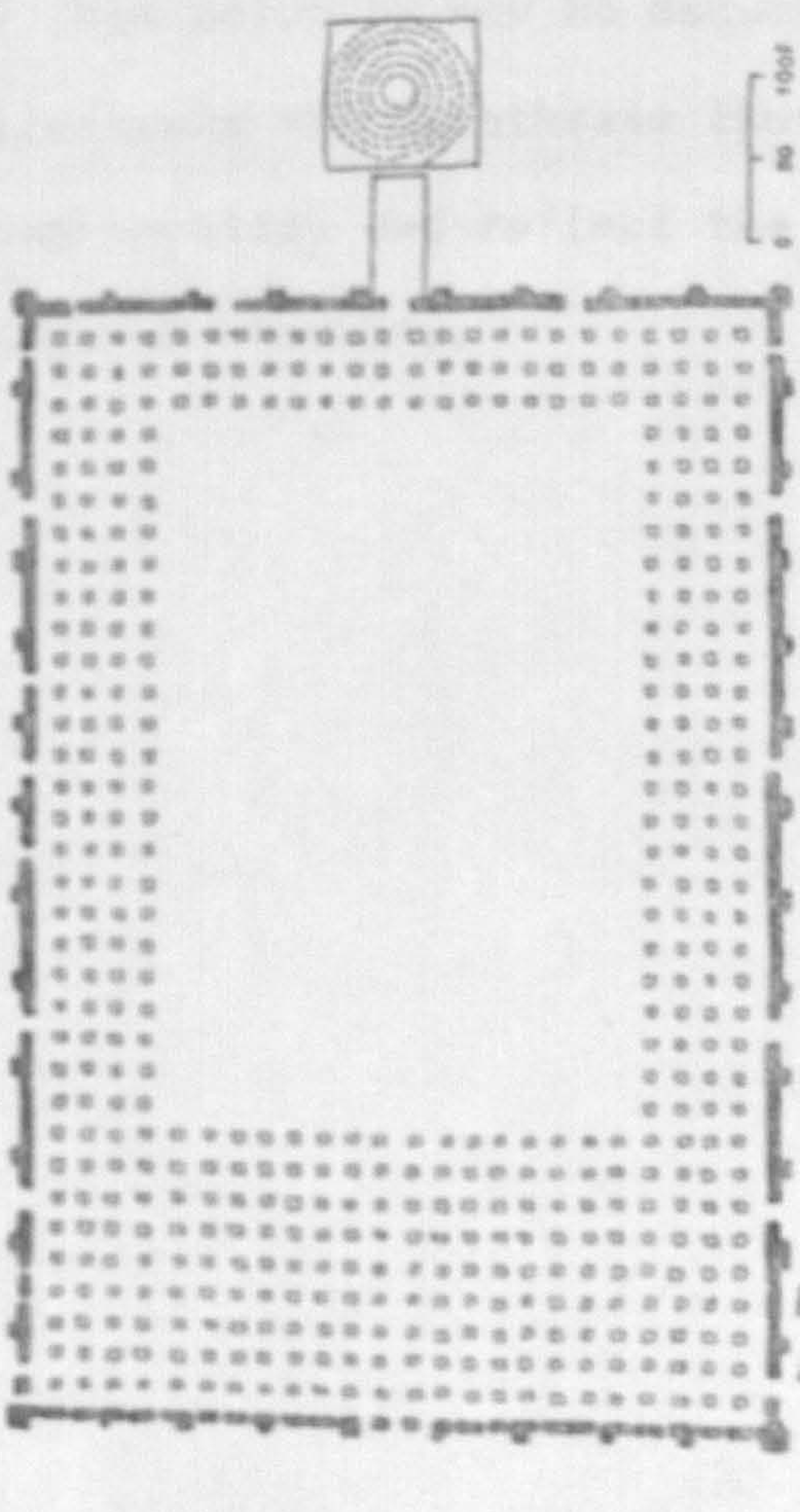
In the architecture of lslam it is geometry which provides the link, whether between a city and a citadel within it, or between the citadel and the buildings within it, or between the buildings and the doorways, windows, walls, and screens within them. lslamic buildings were more than just edifices, they were symbolic, philosophic, geometric schemes which expressed cosmic laws for their users, from the form in general to the minutest detailed pattern. This serves as an indication of the manifest doctrine of macrocosm and microcosmic reflection. Nevertheless, though all architecture was dominated by the single Truth, allowance was made for application in different areas and regions.

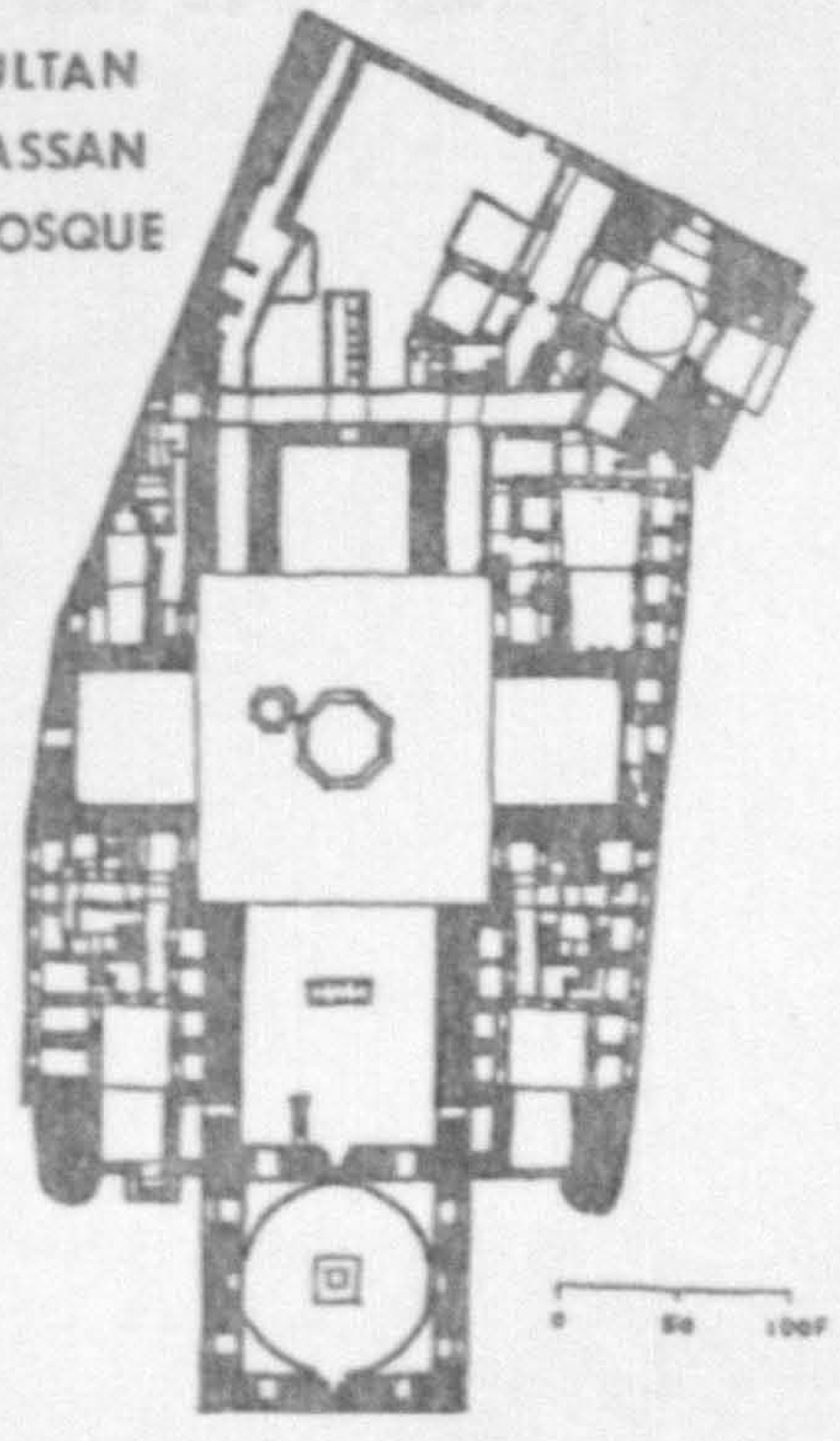
Moslem religious architecture was closely related to Moslem prayer, the performance of which is an obligation for all Moslems laid down in the Koran. Prayer as a private act requires neither ceremonial rituals nor a special locale; only the Qiblah (the direction towards Mecca) is important.



EXAMPLE OF POLARITY OF CRYSTALLINE FROZEN SHAPES AND FLUID WARM PATTERNS AS AN IMAGE OF ETERNITY

However, for prayer as a communal act, a simple ritual was established by the first Moslem community. The requirements for this ritual were satisfied initially by a simple hypostyle structure. However, once the Moslems had established themselves in their conquered territories, they began to build on a large scale, basically not out of necessity but perhaps impelled by a desire to create visible symbols of their power that would surpass those of their non-Islamic predecessors in size and splendour. The early Moslem hypostyle system was diffused and, except for the orientation of the building and the position of the 'Qiblah' wall, lacked architectural focus and direction. Still it was a flexible system that permitted enlargement and addition with minimum effort or disruption.

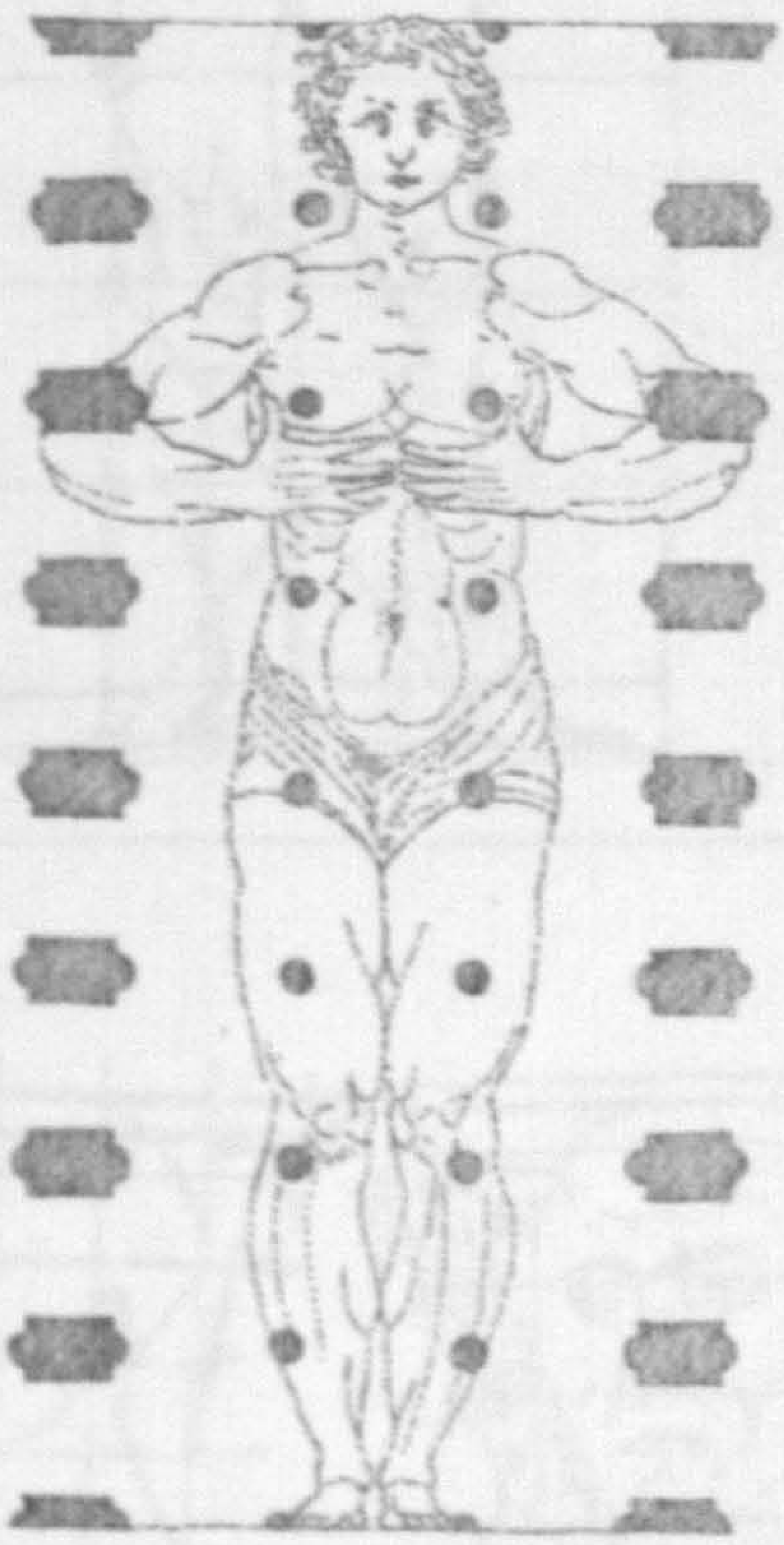

MOSQUE AT SAMARRA


SULTAN HASSAN MOSQUE

Early Islamic buildings had wooden roofs, and the experiments with arch forms and domes were motivated not by structural necessity as much as by a desire to create rich and varied visual effects. Most of the design elements of Islamic ornament were based on geometrical and botanical or calligraphic motifs, which were rarely intermingled with human or animal shapes. These natural forms often became so stylized that they were lost in the complex tracery of the pattern. These 'arabesques' formed a pattern that would cover the entire building surface. In the Islamic pattern the relationship of one form to another was more important than the totality of the design and the polar symmetry of geometrical and botanical or calligraphic forms were to be the most fundamental underlying aspect. Thus there were crystalline frozen shapes, or conversely fluid warm outlines. The implications of this polarity may be deduced from the example shown which illustrate the hypothesis that frozen and moving shapes are complementary and reflect the concept of time as a flowing image of eternity.

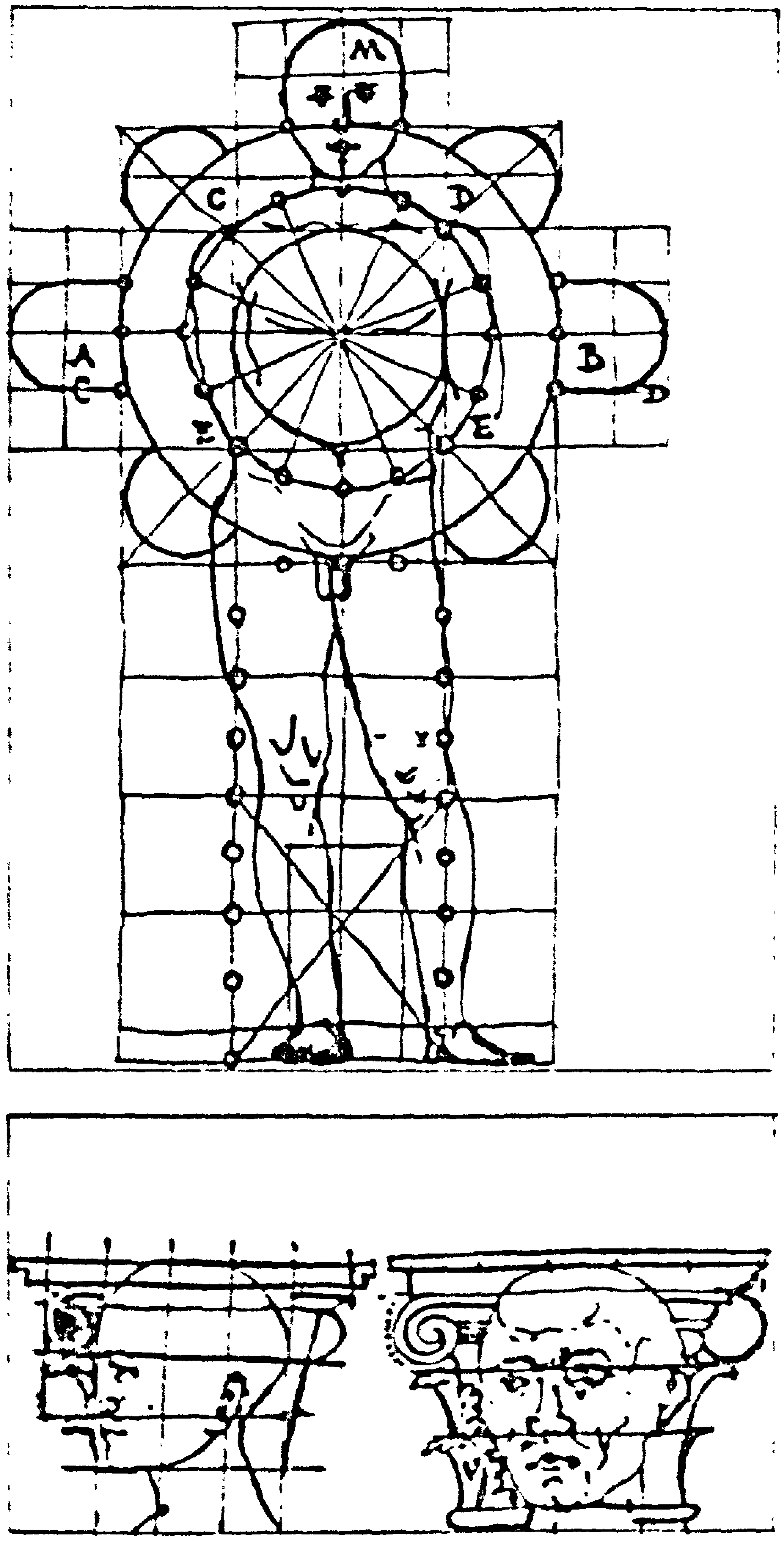
2.12. RENAISSANCE and the SHIFT in the CONCEPT of HUMAN FREEDOM

The basic issue that intrigued the philosophers of aesthetics during the Renaissance period, like Leone Ebreo and Leonardo da Vinci, was the shift that happened to the human thought concerning the interpretation of the artist as one who creates a work of art, as opposed to the classical view of the artist as a maker. Gilbert and Kuhn suggest that, "The artist's invention has subtly shifted from finding what is already there, though hidden, to selecting or creating or fashioning a mental image by human strength alone" (24). The shift from making to creating was in fact from one conception of freedom to quite a different but no less radical one. The theory of making presupposed an artist free to choose or to select, the theory of creating assumed an artist free to originate. It should be noted, however, that such writers as Marsilio Ficino and Leone Ebreo wrote of artistic creation within a Platonic tradition and that for them the artist was not yet regarded as free of some of the restrictive metaphysical and theological implications they had inherited not only from Greek speculation but also from the Hebraic and Christian traditions of deity.



PERFECT BODY & TEMPLE

Since the beginnings of the Renaissance age, attention was directed to a greater understanding of the physical problems facing the artists. It was believed that the achievements of the present were rendered possible by a recovery of those of the past and that the past was 'reborn' in the present.



IDEAL PROPORTIONS CAN BE TAKEN FROM THE HUMAN BODY AND APPLIED TO ARCHITECTURE
after Francesco di Giorgio

The mathematics and geometry which Brunelleschi, among other architects, required in calculating his architectural works also led him to pioneer a carefully calculated system of perspective construction. This eventually resulted in a new approach and understanding of three demensional space and forms, and a new aesthetic ideal based on the search for rational and harmonious proportions derived from geometry and structural logic.

The sixteenth century was the century not merely of the Renaissance but also of the Reformation. When the reformed Churches of Luther and Calvin found themselves against so much of the very content of traditional religious art, they ecclesiastically controlled this kind of art by stopping it altogether. Parallel to the religious protest of Luther and the growth of Protestantism, the weakness of the Holy Roman Empire as an effective political institution and the dissappearance of a Universal Church, new national states in England and France were consolidating. Thus within the years 1400 to 1600 A.D. a re-evaluation of the culture of classical antiquity took place resulting in a classical revivalism in architecture. However, the clearest expression of the demonstrable order which the Renaissance highly valued was the central plan, in which all the sections are in fact equal and focus on to a central point. The aesthetic pleasure to be found in such an arrangement was partly an intellectual one, but the central plan tended to bring with it a quality of complete homogeneity that was also apprehended sensually.

2.13. The RATIONALISTS and the BAROQUE

Descartes, Leibnitz and Spinoza are the most renowned of the rationalists. They were the philosophical link between the Renaissance and the eighteenth century philosophies and may be assumed to be the first to put down the basics of modern philosophy. Their philosophies have a common model in mathematics, however, theirs' was not a rich Philosophy of Art. The most interesting views on art of the three were the views of Spinoza, who insisted that beauty was a subjective attribute, "Beauty is an idea highly confused; that objects we call beautiful should properly be described in terms of the motion of nerves; and that beauty is a word that is in fact, a universal not formed by all persons in the same way. The meaning varies with the individual because in each instance the notion is formed in terms of the way the body is more frequently affected and in which the mind more easily imagines or recollects" (25).

Broadly, the seventeenth century was an age of authority, the eighteenth an age of scepticism. However, the spirit of scientific enquiry which eventually undermined authority first appeared early in the seventeenth century, while the authoritarianism that determined the social structure persisted almost unchanged until the French Revolution. The Counter-Reformation had far reaching consequences in using art as a means of propaganda. The age of the Baroque has been identified with that of the Catholic reaction to the advance of Protestantism, Kitson indicates that, "there is a predictable relationship between the more emotional and rhetorical — in general the more baroque — forms of art in the seventeenth century and the patronage of courts and the Catholic Church" (26). The Seventeenth century deference to authority found direct expression in the arts. Firstly, by appealing to the classical sources both in theory and practice. Secondly, in the dominance of the doctrine of the hierarchy of categories — the baroque church façade or figure composition was modelled on a hierarchical system with a climax near the top, and each element related to the others in a descending order of importance.

The central aesthetic doctrine of the period was the belief that art is a mode of imitating ideal nature, because it was held, following Plato and Aristotle that actual nature was always imperfect in some way. However, it is necessary to point that the Baroque with its dynamic treatment of space, movement, light and shade, had no specific aesthetic dogma. This was even more true of the Rococo, which was a consciously anti-theoretical movement.

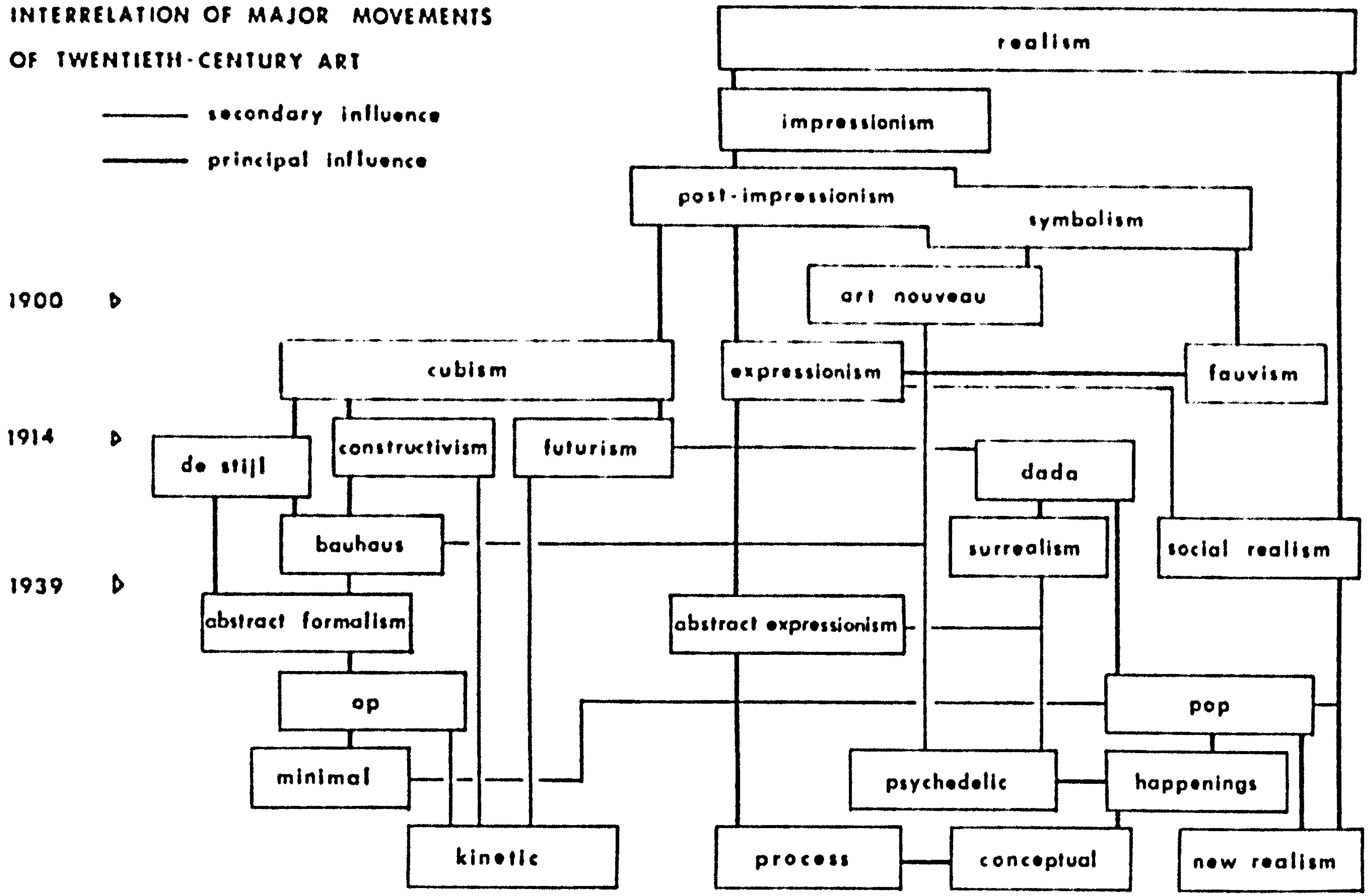
Scepticism and the general distrust of all dogmas and systems based on sources other than sense experience found a perfect reflection in the Rococo. Rationalism, which was the other component of eighteenth century thought, led to a classical revival and eventually to Neo-Classicism, which was at heart an intellectual and philosophical movement, fostered by new ideas which partially and not always successfully found expression in practice. In architecture the neo-classical period was an age of unrealized and unrealizable projects, though these might also be attributed to its romantic tendencies.

2.14. LEADING to the TWENTIETH CENTURY

The idea that the design of a building should express its function existed before the nineteenth century; but until the neo-classical period it was not the forms themselves as the way they were used that were expressive. The circular plan and simple mathematical proportions of the ideal Renaissance church symbolised the perfection of God; the dynamic rythms, contrasting curves and upward soaring movement of the Baroque church facade conveyed the power and glory of Catholicism (27). Architects and philosophers like Ledoux and Laugier, by the end of the eighteenth century, argued that architecture should return to the first principles, it should be rational and functional. Laugier visualized the first primitive hut as consisting only of upright pieces of wood suggesting the idea of columns, horizontal pieces resting on them suggesting entablatures, and finally inclined branches constituting the roof and providing the idea of a pediment. To him these were the only necessary forms for architecture, and that was the final challenge to Vitruvius's authority.

With the arrival of the industrial revolution, the age of the machine was introduced. As science and technology challenged old views of the physical world, so political and social revolution, challenged the absolutisms of Church and Monarchy, setting up such new values as democracy and

INTERRELATION OF MAJOR MOVEMENTS
OF TWENTIETH-CENTURY ART



social justice. The scientific, technological, political, social, economic and cultural revolutions that were triggered since the early nineteenth century characterize the temperament of the modern world; a mixture of restlessness, obsession with progress and novelty, and a ceaseless questioning and challenging of authority. The rapid obsolescence of ideas gave to life a temporary quality, and art became a sequence of 'movements' each seeking to establish its authority, and each with its own ideology. These movements are usually described in terms that aim to define their aesthetic content, form and intentions, but are rarely precise, like 'Romanticism', 'Realism' and 'Impressionism' in which the notion of doctrine is implicit in the words themselves.

Ruskin criticized the accepted criteria of beauty and aesthetic values and urged architects to rediscover the goodness and truth in their art in comparison to the establishment of a code of ethical and spiritual behaviour. Ruskin's writings together with Viollet-le-Duc's development of an architectural theory that approximated to the popular notion of functionalism, both contributed to the development of a more searching approach to the judgement of buildings in which proportion, detail or the inner meaning of the design, exclusive of its physical qualities, became a matter of secondary importance. The building's ultimate significance came to depend on its expressed technical concept and its real physical form. These ideas and doctrines affected the thought of architects like Louis Sullivan, Frank Lloyd Wright, Henry van de Velde, Victor Horta, Antonio Gaudi and Auguste Perret; who represented the various trends of progressive architecture at this time. In turn, this group of pioneers, in conjunction with the new philosophies and scientific breakthroughs that occurred at the turn of the century, opened the way for the second radical generation of the twentieth century; Walter Gropius, Mies van der Rohe, Le Corbusier and others who synthesized the multitudinous elements that had been gradually accumulating over a period of more than a century.

All through the twentieth century man has been making himself into something different from what he has been, at a cost he cannot yet estimate and with consequences he cannot guess. Societies have already placed their abandoned traditions an almost unbridgeable distance behind them, and man was left self-conscious and isolated in the stream of time. A principle of indeterminacy reigns in the world of physical science where the speeds of events approach the speed of light. The world of familiar solids and spaces thus dissolves, upon physical analysis, into waves of energy whose configurations have apparently little relation to what is seen and felt as 'real'. In such a world the stature of man, so elevated in the Renaissance, shrinks to infinitesimal dimensions. Man's central role in the classical cosmos has been further reduced by modern biology. In the nineteenth century man's privileged status in nature had been questioned by the hypothesis that he had evolved from lower forms of life. Thus, life may be determined rather than free, and man in the collective comes to be studied statistically, like the subatomic particles of physics.

A further blow to age old belief was delivered in the twentieth century by the new psychology, associated in its early development with Freud. Though it has its roots deep in Romanticism, this restatement of man's essential irrationality struck at a thousand years of explanations of human conduct, where in the new view human actions are seen as largely determined by motives operating beneath consciousness, at an unconscious level.

After the second World War, the success of experimental science has had everything to do with making meaning and truth into functions of instruments and languages. Man's knowledge of the physical world is obtained by the manipulation of instruments, and the language mediating that knowledge is usually the specialized one of mathematics. Thus meaning, truth and reality of experience and knowledge are contained in scientific media and inseperable from them. The great success of operational research methodology during the war led theoreticians to believe that all human problems can be solved by the O.R. methods, and there have been numerous attempts during the two decades following the second world war to apply those scientific techniques to architectural and environmental problems, as will be discussed in chapter four.

Plate 1 Ancient Cave Painting

Plate 3 Early Egyptian Tomb Ceiling

Plate 4 Temple at Luxor

Plate 5 Hypostyle Hall; Karnak

Plate 6 Alhambra Mosque

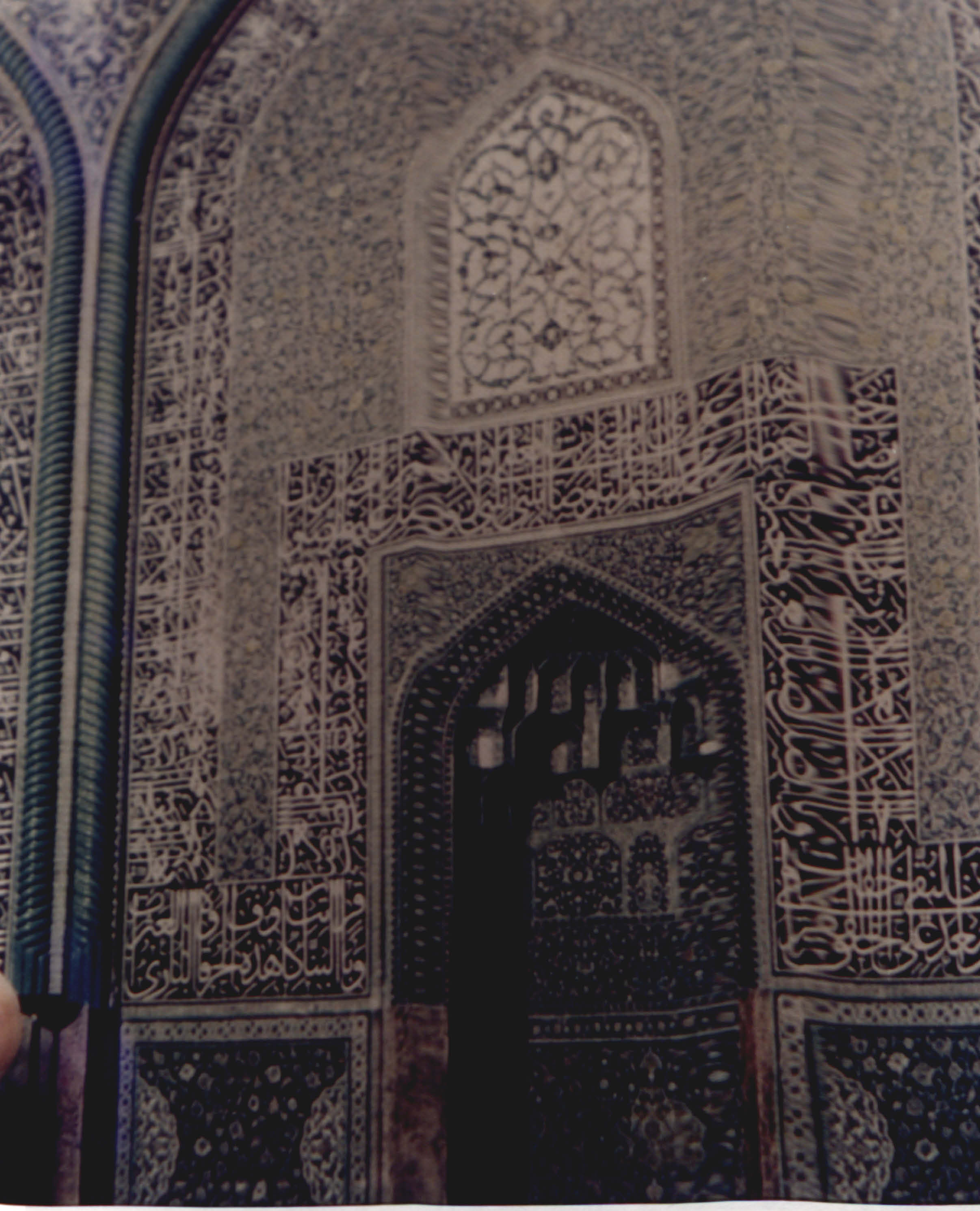


Plate 7 Lutfulla Mosque; Isfahan

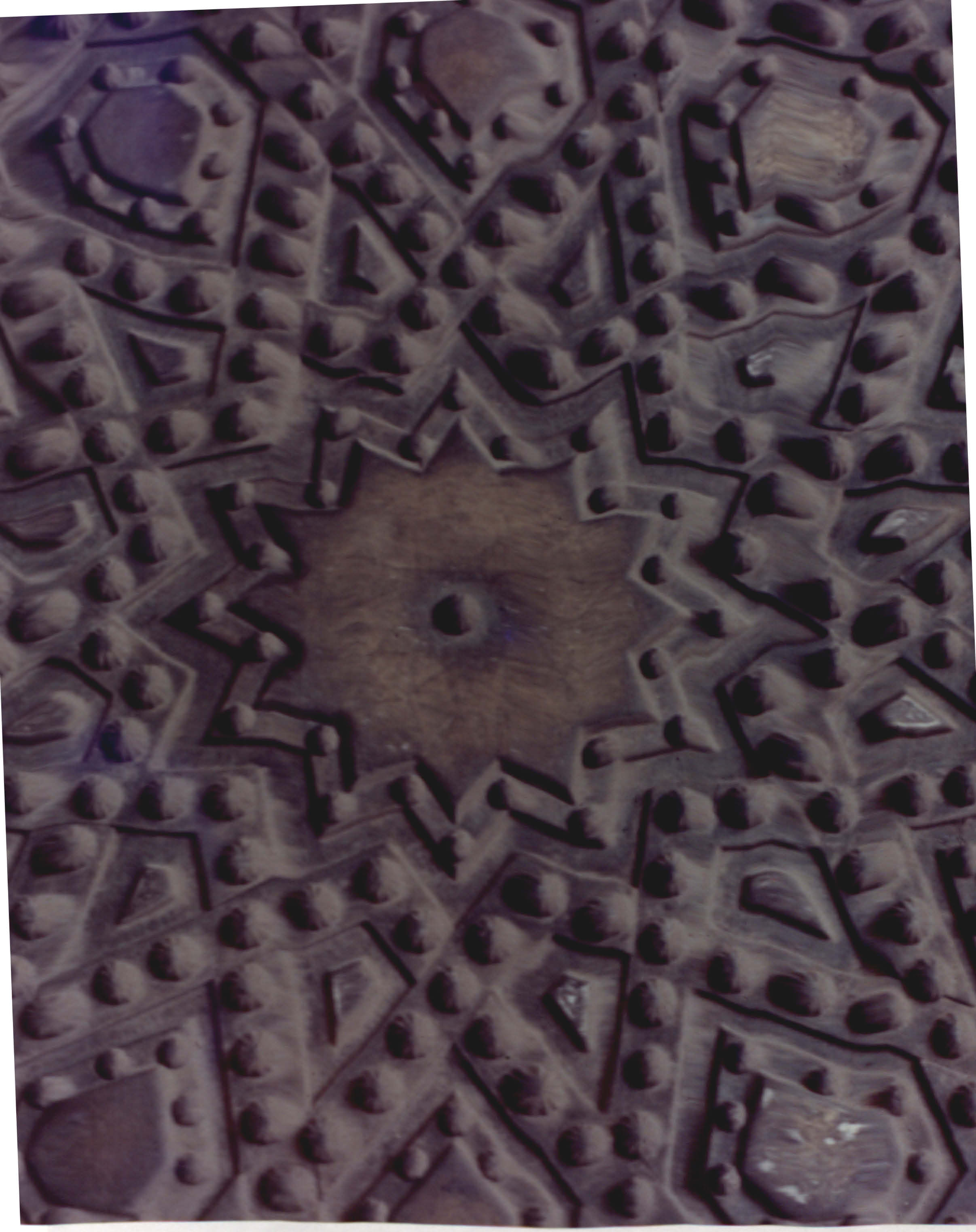


Plate 8 Door Detail; Sultan Hassan Mosque

Plate 9 Westminster Abbey

Plate 10 The Etruscan Room; Osterley Park

Plate 11 Staircase; Schloss Pommersfelden

Plate 12 The Ecstasy of St. Teresa

REFERENCES

1. Rescher, N.
Introduction to Value Theory
New Jersey, 1969
p. 2

2. Berofsky, B.
Free Will and Determinism
New York, 1966
p. 16

3. Hampshire, S.
Logic and Appreciation
in Aesthetics and Language
Elton, W. (edit.)
Oxford, 1954
pp. 161-169

4. Najder, Z.
Values and Evaluations
Oxford, 1975
p.139

5. Platt, J.R.
How we See Straight Lines
Scientific American Jan. 1962

Gombrich, E.H.
Art and Illusion
New York, 1960
pp. 68-74

6. Gombrich, E.H.
Meditation on a Hobby Horse
London, 1963
pp. 12-29

7. quoted from a letter from Schiller to Goethe which appeared in the 'Horen' 1795 after
Bosanquet, B.
History of Aesthetic
London, 1892,1917
p. 290

8. Cooley, C.H.
Social Organization
New York, 1909
p.4

9. Petras, J.W.
Social-Psychological Theory as a Basis for a Theory of Ethics and Value
quoted from
Value Theory in Philosophy and Social Science
Laszlo, E. and Wilbur, J.B. (edit.)
New York, 1973
p.97

10. Najder, Z.
op.cit.
p.167

11. Nahm, M.C.
Readings in Philosophy of Art and Aesthetics
New York, 1975
p.8

12. Emery, W.B.
The Tombs of the First Pharoahs
Scientific American July 1957
p.189

13. Badawy, A.H.
The Harmonic System of Architectural Design in Ancient Egypt
Berlin, 1961

14. Gardner, H.
Art Through the Ages
New York, 1975
p.95

15. Nahm, M.C.
op.cit.
pp.62-78

16. Nahm, M.C.

ibid.

p.41

17. Nahm, M.C.

ibid.

p.60

18. Plato

Philebus 11

quoted from

Nahm, M.C.

op.cit.

p.96

19. Aristotle

Politics 1340a19

quoted from

Nahm, M.C.

op.cit.

p.142

20. Aristotle

Metaphysics 1078b1

quoted from

Nahm, M.C.

op.cit.

p.37

21. St. Augustine
De Ordine
Russel, R. (trans.)
New York, 1942

22. for a full development of the subject see
Schuon, F.
Dimensions of Islam
London, 1969
p.146

23. Nasr, S.H.
forward to
Islamic Patterns
Critchlow, K.
London, 1976
p.6

24. Gilbert, K.E. and Kuhn, H.
A History of Esthetics
London, 1939
p.186

25. Nahm, M.C.
op.cit.
p.301

26. Kitson, M.

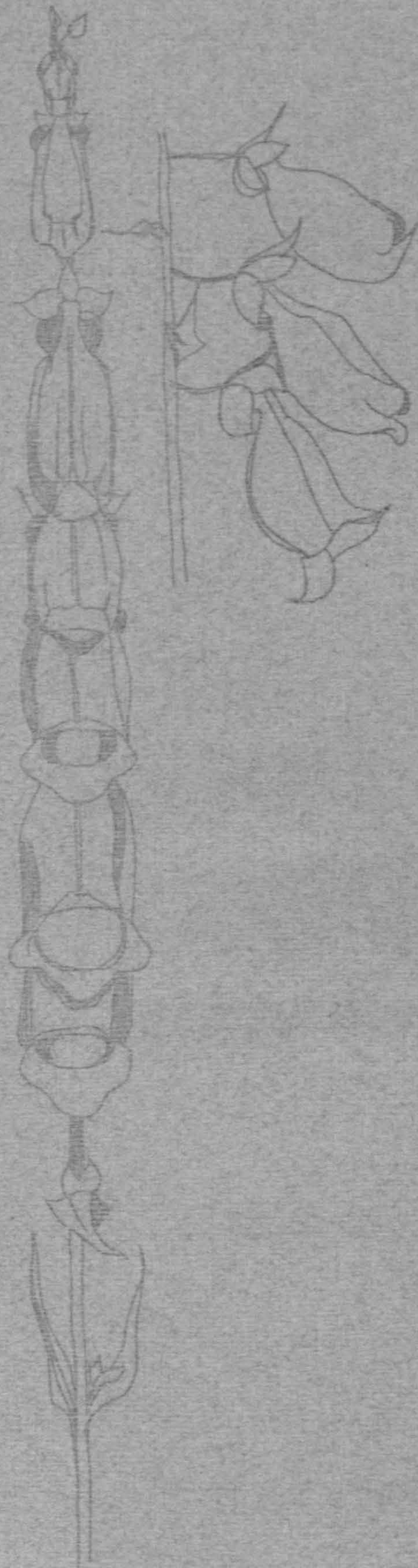
The Age of the Baroque

London, 1966

p.12

27. Kitson, M.

ibid.



Chapter Three

Architecture and Human Response

3.1. PERCEPTION

In the external physical world there are rays of energy, a wave striking the physiological body is called a stimulus, and its reaction in the mind is called a perception.
This perception is very often unconscious but it can also give rise to a particular form of reaction. Perception is about receiving, selecting, acquiring, transforming and organizing the information supplied through the senses.
An individual perceives not just because of external stimuli, but also because of properties inherent in himself. He interacts with the physical stimulus to create an experience, thus the physical stimulus is only one of the many variables controlling his perception.

There are several fundamentally different approaches to the study of perception (1) some of which are stated below :

a. Classical introspectionism

involves the analysis of mental contents, seeking the elements of consciousness and the laws of their combination.

b. The phenomenological method

emphasizes description of experience without analysis, criticism or theoretical preconception.

c. Inference-to-structure

a method whereby inner structures are hypothesized as a result of behavioural observations.

d. The physiological approach
involves direct measurement of activity in bodily structures that are supposed to underly perception.

e. Inference-from-structure
anatomy and physiology are observed directly and the psychological functions are hypothesized to be mediated by the structures.

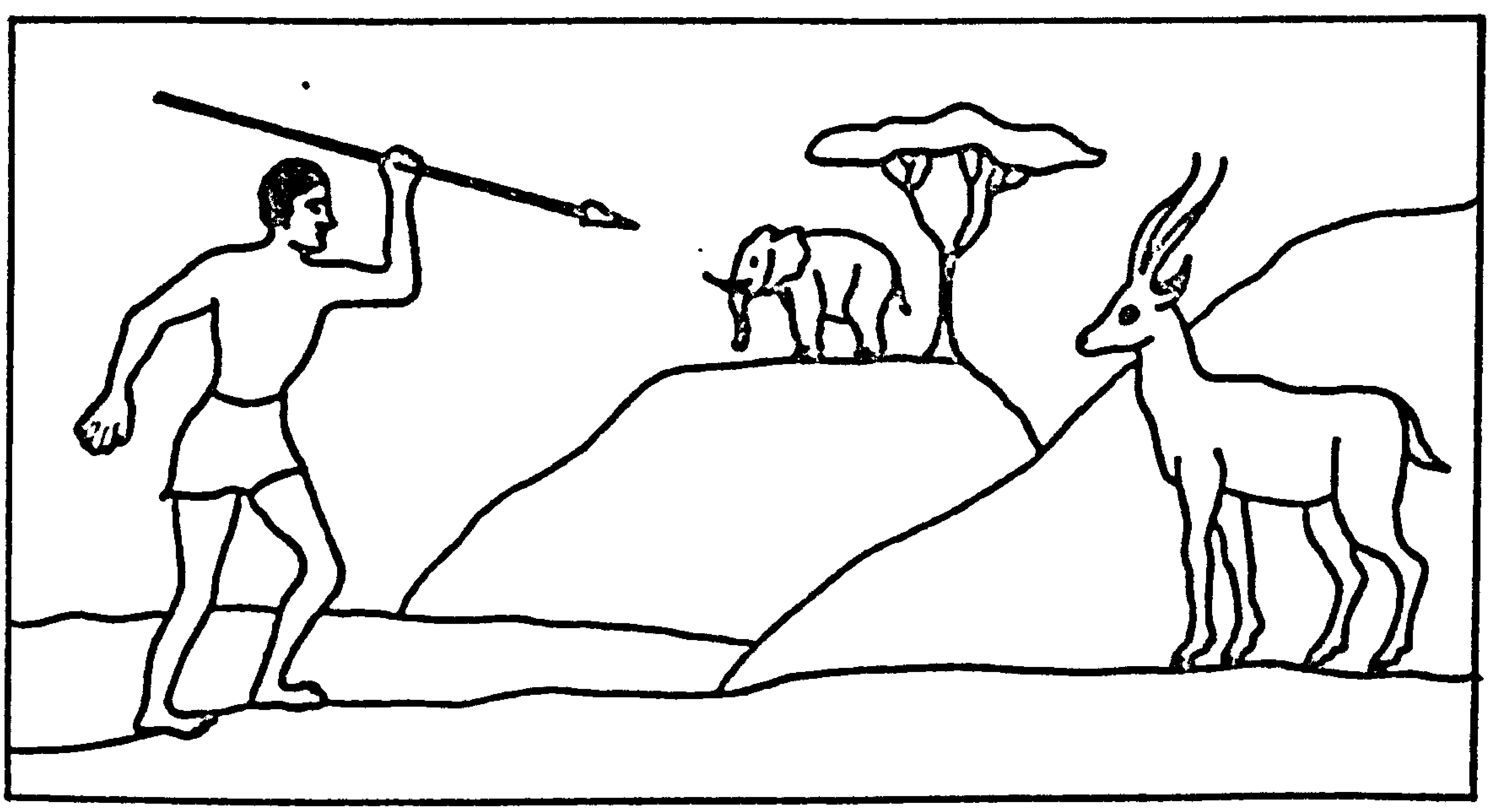
f. The functional holistic approach
emphasizes multiple determination of perception instead of focusing only on receptive structures; it turns attention to motives and expectations.

g. The synthetic approach
entails reconstructing systems that duplicate the functions of the perceptual system under study.

It is not the intention of this thesis to explore the psychology of perception in detail, but rather to express, in a general way those facets of it which have a direct bearing on the process of design. The individual is aware of the important influences and elements which make up his environment. These elements are usually familiar to him and are expected to perform in a consistent way. Should objects perform contrary to the normal expected pattern, then the feeling of stability and permanence is destroyed, and incongruity may occur. The commonness of the incongruity in design is usually the result of the designer's failure to fully justify his own design interpretation, having destroyed the identity with that which is readily acceptable. The designer's process toward justification of his design is important as it has to be transmitted to the spectator first at an emotional level, to be verified later by the spectator's physical contact and familiarity with the resulting environment. This is particularly important if it is the designer's intention to establish fresh interpretations and concepts.

Human perception is based on a total assimilation through the five senses, either singularly or collectively, depending on the situation. Whilst it is usual practice to base design themes on the sense of vision, it is important that the experience should be assisted through the balanced use of the secondary senses. To achieve this end the designer must be aware of the interrelationships between the senses and their effect on perception. Visual experience is not static -- it varies, among other things, with the change in colour and brightness of the light striking the eye and with the movement of the spectator and the objects in the field of vision.

Throughout most of human history it was widely believed that the world is as it appears to be, which may be defined as 'phenomenal absolutism'. This attitude has recently been described as "one ubiquitous and misleading attribute of naive conscious experience" (2) for it requires that the viewing organism be considered a passive receiver of stimulation, seeing what he does simply because it is there. Thus, 'phenomenal absolutism' was challenged and criticized, and an attitude of 'stimulus relativism' became a more plausible one. Perception is not solely stimulus-determined, as the viewer always brings something to his perception. This alternative to the simplistic realism of the phenomenal absolutist leads to the insistence that every stimulus is judged, evaluated and perceived by being compared, consciously or not, with the residues of previous sensory experiences.



PICTURE USED IN CROSS-CULTURAL STUDIES OF PICTORIAL DEPTH PERCEPTION

Every human organism in the process of accumulating experiences changes. Each experience leaves its mark, each subsequent experience interacts with the residues of earlier ones, so that at any point of his life span, the individual can be thought of as possessing a set of behavioural dispositions or habits which are the joint product of all his experiences to date. Therefore, whenever the individual is confronted with an external stimulus impinging on his sensory apparatus, the way in which that stimulus is perceived depends mainly on his experientially established perceptual dispositions. Much more of the nervous system than the visual cortex is involved in a visual perception. Culture obviously influences visual perception, but precisely to what degree is still to be learned. Physiological differences, which tend sometimes to be confused with cultural, may also play a role, but even so, the main thrust of the argument holds; people of different cultures see things differently.

3.2. The PROCESS of VISION

It was not until the seventeenth century that the optics of image formation in the eye was clearly expressed. This was accomplished by Johannes Kepler followed a generation later by René Descartes. Since then the analogy between the eye and the camera has been elaborated in numerous textbooks. Unfortunately this analogy, although appropriate as an account of functional anatomy, lacks precision in the study of the processes of vision as it suggests that the perceiver is looking through the back of his own retina at the pictures that appear there. The word 'image' is used for both the optical pattern projected on the retina by an object, and the mental experience of seeing that object. Thus wrongly implying that this inner image is a copy of the outer one, and that perceptual experiences are images formed by the nervous system acting as an optical instrument of extraordinary design.

Although this theory encountered many difficulties it has dominated philosophy and psychology for many years. Not only perception but also visual memory has often been explained in terms of an image theory. There is some truth in the suggestion that the mechanism of visual memory is an extension of the mechanism of vision, but that is not because both perception and memory are copying processes; rather it is because neither perception nor memory is a copying process.

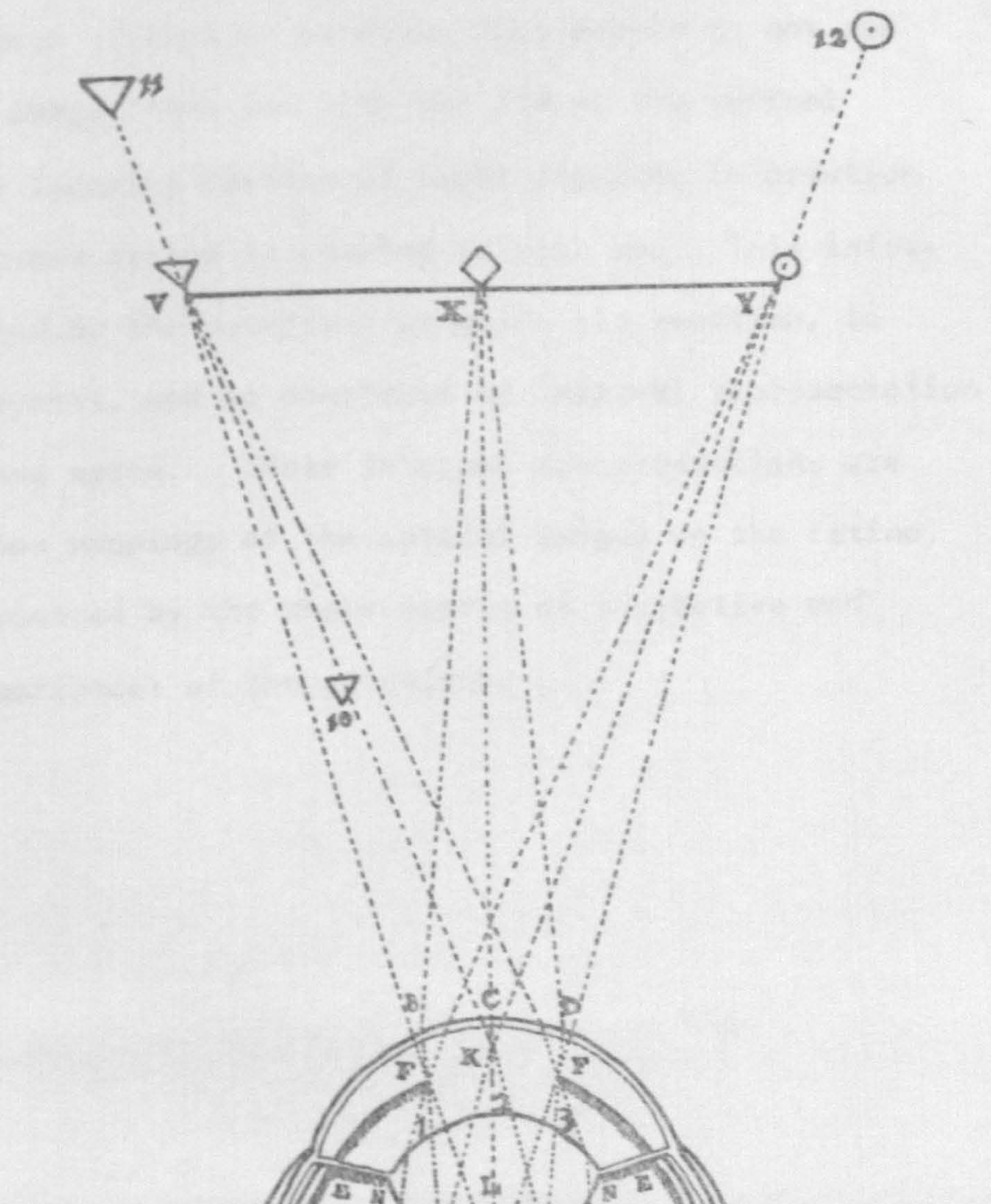


Fig. 3.2. A OPTICAL ANALYSIS BY DESCARTES

There is enough scientific evidence that people do not see the retinal image, they see with the aid of the retinal image. The incoming pattern of light provides information that the nervous system is adapted to pick up. This information is used by the perceiver to guide his reaction, to anticipate events, and to construct an internal representation of objects and space. These internal representations are not one to one mappings of the optical images on the retina, but are influenced by the whole matrix of subjective and cultural experiences of the perceiver.

3.3. A MODEL of a TOTAL PERCEPTUAL SYSTEM

A perceptual system will receive some kind of input (stimulus) from its environment, it will process this input and react by producing a particular output (response).

input (stimulus) → central processing → output (response)

The act of perception is the internal processing of sensory inputs through the internal code that the processor uses for that purpose. The carriers of this code are the neurons, which respond by propagating pulses of energy. The code itself consists both in the firing patterns of the neurons and their spatial organization. Thus the internal code used by an organism in processing a sensory input is an internal space-time representation of the external signals that constitute the input. Neisser states, "In man, in the visual system alone, there are more than a million channels. If every group of ten of these channels is assumed to be independent of every other such group, then, with a maximum firing rate of the neurons of 100 pulses per second, the neural channels could be handling up to $10^6(10^2/10)=10^7$ pulses per second. If each pulse provides one bit of information about the input, then the brain could be bombarded by 10^7 bits of information per second. This figure far exceeds our capacity to deal with information, which is limited to about 25 bits of binary information per second" (3).

Clearly one cannot process all the external signals that one receives, the information reaching the brain must be reduced considerably and the most relevant data abstracted. This is the principal function of the initial stages in neural processing : to abstract certain important features from the external signals. This ability is both physiological, as a result of the design of the human neural mechanism; and cultural, as a result of social selective forces acting on the subconscious of the individual. Therefore the relations between stimulus input and perception are indirect, complex and dependent upon the current state of the system, and this is precisely what makes the study of perception both difficult and challenging.

3.4. CORRELATION of MEANING and PERCEPTION

A meaning can be connected to a perception in one of the following ways :

a. conventional meaning : where an agreement, either conscious or sub-conscious, is made that one or the other meaning shall be given to a certain perception.

b. associative meaning : where as a result of a previous experience, a meaning is connected to a perception according to the laws of association.

c. spontaneous meaning : where a meaning may be attached to a perception according to some natural reason.

Analyzing these connections one can detect that the cultural background is almost always a major aspect of the connection of meaning with perception. So if it is desired to create an environment of permanent value, it is essential that private associations should be avoided and that search is made for either a spontaneous or a conventional meaning.
On the other hand an associative meaning oriented to a certain social pattern with a binding cultural background will also result in a milieu of permanent value.

3.5. MEANING in ARCHITECTURE

To be capable of realizing the meaning and symbolism of an architectural form, there should be a shift of attention from the object to the subjecttive experience. This shift requires certain conditions to be fulfilled for a positive evaluation of an architectural form :

a- It is necessary that the subject should be able to call the feeling in question to mind. The subject is made familiar with something which he may not be able to describe in words.

b- The feeling should be called in mind by the totality of the perception of the work. The features, or elements, are abstract, the wholeness of the work is the powerful aspect.

c- To see x as the symbol of y is to react in some way towards y as the result of perceiving x. This reaction may sometimes exist only in the mind.

d- What the subject learns from the form is what he learns from the experience of this form, the architectural form has its expression through being the 'sensuous embodiment' (4) of an idea.

When the required or expected response is presented in a familiar manner, there is immediate, and probably lasting, acceptance of the designer's interpretation. The user is instinctively aware that certain common activities or events should contain definite tasks, procedures, spatial requirements, time factors, emotional responses and behaviour patterns. The individual's hostile or even indifferent response to an aspect of the environment will usually arise as a result of the designer's violation of one of the expected associations, rather than from a lack of aesthetic appreciation on the part of that person. From a careful study of the user's responses in terms of behavioural patterns, it may be possible to develop an acceptable basis for the judgement of design, however, a basis confined to form configuration and architectural expression although of value, may in reality be superficial and of little practical use. It is necessary for the designer to appreciate not only such aspects of design as apparent and actual spatial relationships, but also to fully understand human requirements, their emotional responses and behavioural patterns in a given culture, in order to design in depth for human participation.

3.6. APPROPRIATENESS and MEANING

There is much to suggest that an important property of a building is its ability to provide an appropriate setting for its users. Some have concluded that if this is the case then the degree of appropriateness should be measurable scientifically as should its component parts. Till now there is no evidence of the development of one reliable method of measuring appropriateness. It is easy to say that by dividing the concept into its component parts they will yield themselves to resolution, but the fact is that they only present research problems in their own right, the parts being :

a. description of the building
b. description of the users
c. the relationship between the two

The greatest problem facing a researcher in this field is that in order to systematically compare the first and second parts it is necessary for these descriptions to be expressed in a quantified form. The researcher then resorts to the choice of verbal response in an attempt to systemize what it is that people say about buildings, and relate these to what they do in those buildings. The reason for this choice is that in daily life words are the most common way of appraising buildings, that they are sensitive indicators of the situation since they are predictors of action, and that they give an insight into what is going inside the people.

The semantic differential and other semantic scaling devices appear to offer possibilities as regards the meanings conveyed by architecture and how people comprehend and use it. The relation between verbal description and the inherent meaning of architecture as related to the actions of users in the built environment, however, is still controversial and unresolved. The phenomenological versus the behavioural arguments are continuing, and the main reason for the persistent use of semantic scaling is that generally it has been shown by Osgood in 1967 (5), to be valid for predicting behaviour at an acceptable level, and that according to Hershberger in 1972 (6), the method is easy to administer, score and analyse.

3.7. A CROSS-CULTURAL STUDY on the APPRECIATION of FORM

An attempt to relate different cultural and aesthetic cognitive responses to architectural form was undertaken through a cross-cultural study on the appreciation and preference of architectural form.

Male and female volunteers of similar educational background were assigned to each of three groups participating in this study, namely :

a- British subjects who are living and were educated in Britain.

b- Egyptian subjects who are living and were educated in Egypt.

c- Egyptian subjects who were educated in Egypt but lived for at least the year previous to the study in Britain.

Each group was formed of twelve subjects. The selected subjects were asked to evaluate ten colour photographic prints of different architectural forms on a seven point semantic differential scale of twenty one bipolar adjectives.
The detailed methodology, questionnaire and complete results of the study are given in Appendix A.

The results of that study support the hypothesis that in the appreciation of architectural form, cultural differences exist in two basic aspects :

3.8. EXPERIENCE and UNDERSTANDING ARCHITECTURE

One of the fundamental weaknesses in most discussions of aesthetics is the failure to relate it to experiental reality. Most philosophies of aesthetics tend to isolate it from the four dimensional matrix of experience, and most literature on aesthetics tend to discuss it as though it were an abstract problem in logic. This attitude towards the problem reaches as far back as the Greek philosophies of art, therefore, it is understandable that architectural criticism should have suffered from this conceptual limitation, and that architectural form was almost always evaluated as though it were exclusively a visual phenomenon. Architecture is totally engulfed and submerged in an exterior environment. Thus, it can never be felt or experienced in anything less than the multi-dimensional totality of its context. The primary perception of an architectural form may indeed be visual recognition, but the significance of it occurs only in a situation of experiential totality. Fitch in 'People and Buildings' writes, "In architecture, there are no spectators : there are only participants" (7).

The visual order of an architectural form can be appreciated, in part at least, in the same way people appreciate the order of a musical composition, a painting or a piece of sculpture, with the important difference that architecture is spatial. However, while the emotional content of a building may be less intense and concentrated that that of a sonata or a painting, it indeed exists, and may be enriched by awareness and study. Architecture, practical and functional as it may be, still conveys a message through its unique capability of communication during the act of experiencing it.

The appreciation of architecture is partly determined by a conception of its form. It might be argued that once one has acquired the complex body of knowledge involved in understanding architecture it will no longer be possible to treat it as the object of a simple experience, certainly not as the object of an experience that might equally be occasioned by a landscape or a natural formation. But, architecture is a mode of presentation of human ideas, and it is significant only on account of the ideas or experiences which it expresses. Appreciating architecture involves understanding a system of signs, and in this understanding is a cognitive capacity which is closely related to feelings and experiences accumulated during a long period of contact in a certain cultural framework. Therefore, the question is, how does the notion of understanding come to be applied to architecture?

One suggestion is that architecture is like a language, and needs to be understood in the way that a language is understood. This view appeals to the modern trends of philosophy as it disposes entirely of the idea that understanding architectural form is to be analysed in terms of some experience that accompanies perception.

However, the comparison of architecture with language leads to no useful theory of architectural appreciation. Although architecture is like language in containing what might be called a syntax — rules for the combination of meaningful parts into potentially meaningful wholes — it is unlike language in being intrinsically uninterpreted. In language, syntax is subservient to semantics; on the other hand, architecture has no semantics. There is nothing besides itself that architecture means, there are meaningful forms and meaningless forms of architecture, but the difference between them is not to be found in any meaning which the one has and the other lacks. Architectural meaning is more inherent in its context. because language is bound by logic and the requirements of truthful expression, it has a rigid underlying semantic structure dictating the grammatical transformations that are permitted. The rules that bind architecture are much less rigid than those that bind language to make semantic interpretation possible. What makes an architectural form meaningful is not the conformity to rule, on the contrary, this kind of meaningfulness of architectural form, like the meaningfulness of a gesture, is not something that could ever be captured by rules. It is therefore, not the kind of meaningfulness that is derived from reference and prediction.

Another suggestion is that architecture is more like pure mathematics, in that it can be understood as an uninterpreted system of symbols united only by internal rules. The central element in mathematical understanding is the ability to see that one formula follows from another, and this is quite unlike the ability to see that one element in architecture follows from its predecessor. It is also essential feature of the logical relationship 'follows from' (deducibility) that if y follows from x then it always follows from x, so that it is never wrong from the mathematical point of view; the parallel with architecture breaks down at this point. Similarly, understanding a mathematical proof is hierarchical, if each step follows from the preceding step then the conclusion follows from the chain of steps. However, it may be demonstrated that each seperate element in an architectural form is an apt sequence to the one preceding, or neighbouring, yet the perception of the whole sequence, or form, is nonsense. The understanding of a form in architecture is not consequent to understanding its parts.

Finally, it cannot be assumed that understanding architecture is a technical achievement. One may appreciate and understand architecture while being entirely ignorant of theory, while another, well versed in technicalities may show few preferences and prejudiced judgements that demonstrates his lack of understanding of what he perceives. Architecture for him may be an abstract perception the point of which is purely structural.

To answer the question of the connection between understanding architecture and the ability to form preferences of a certain kind, it is important to note that one cannot speak of animals as understanding architecture. For example, one does not say that spiders understand their structures or the sequence of what they build, the spider's architectural behaviour simply fails to reach the right level of complexity, it cannot develop its structure, it can only repeat it with the most accidental variations. Moreover, and perhaps this is the most important feature, one cannot give any sense to the idea that a spider has chosen that special structure from the alternatives available to it simply because the form appeals to it; for the idea of choice has no application here, one cannot think of a spider as trying out different designs to see which one appeals to it most. A man on the other hand, will prefer one form to another, certain things look right to him and others do not, and it is by virtue of this fact that the concept of understanding comes to be applied to architectural appreciation.

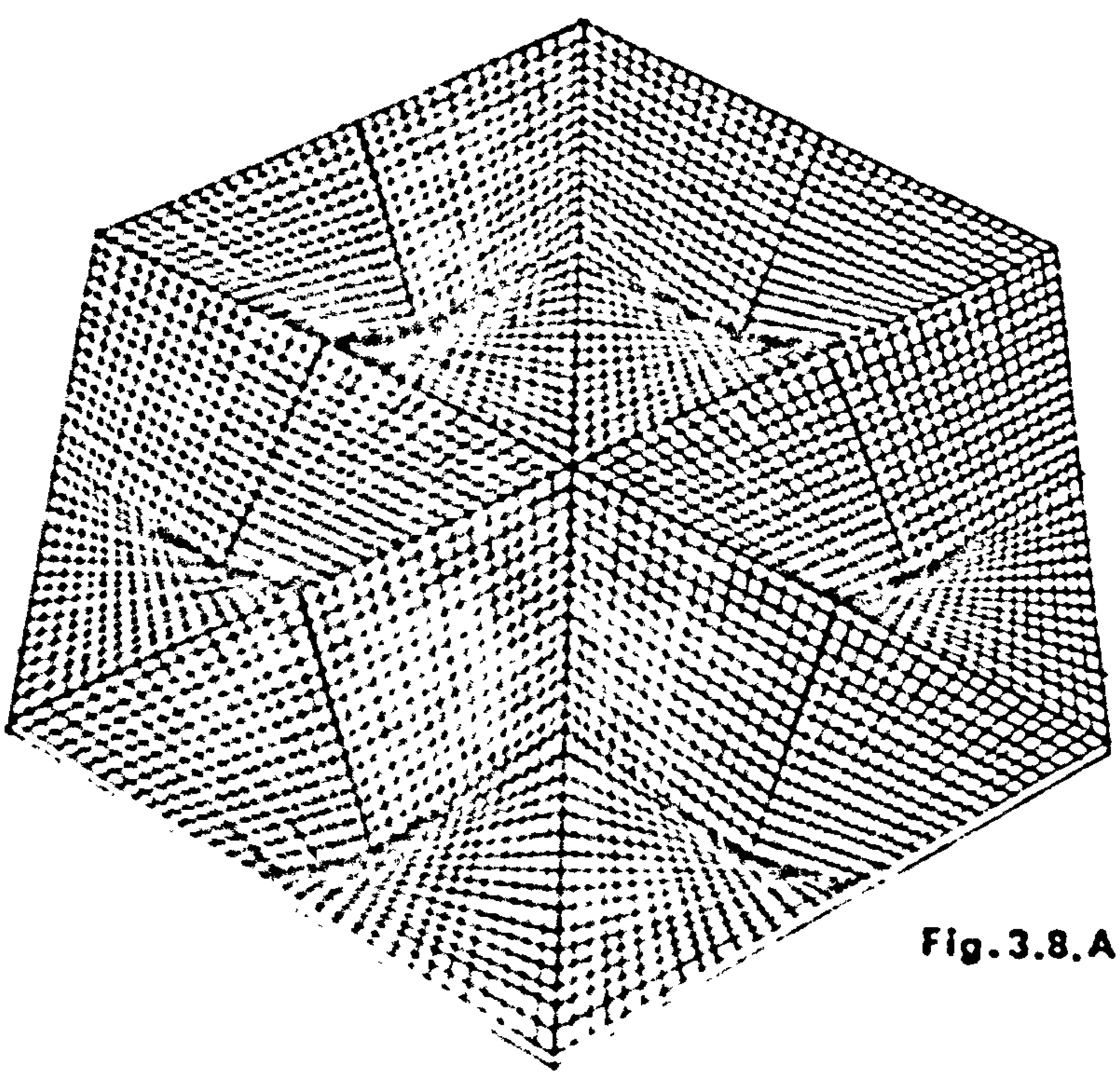
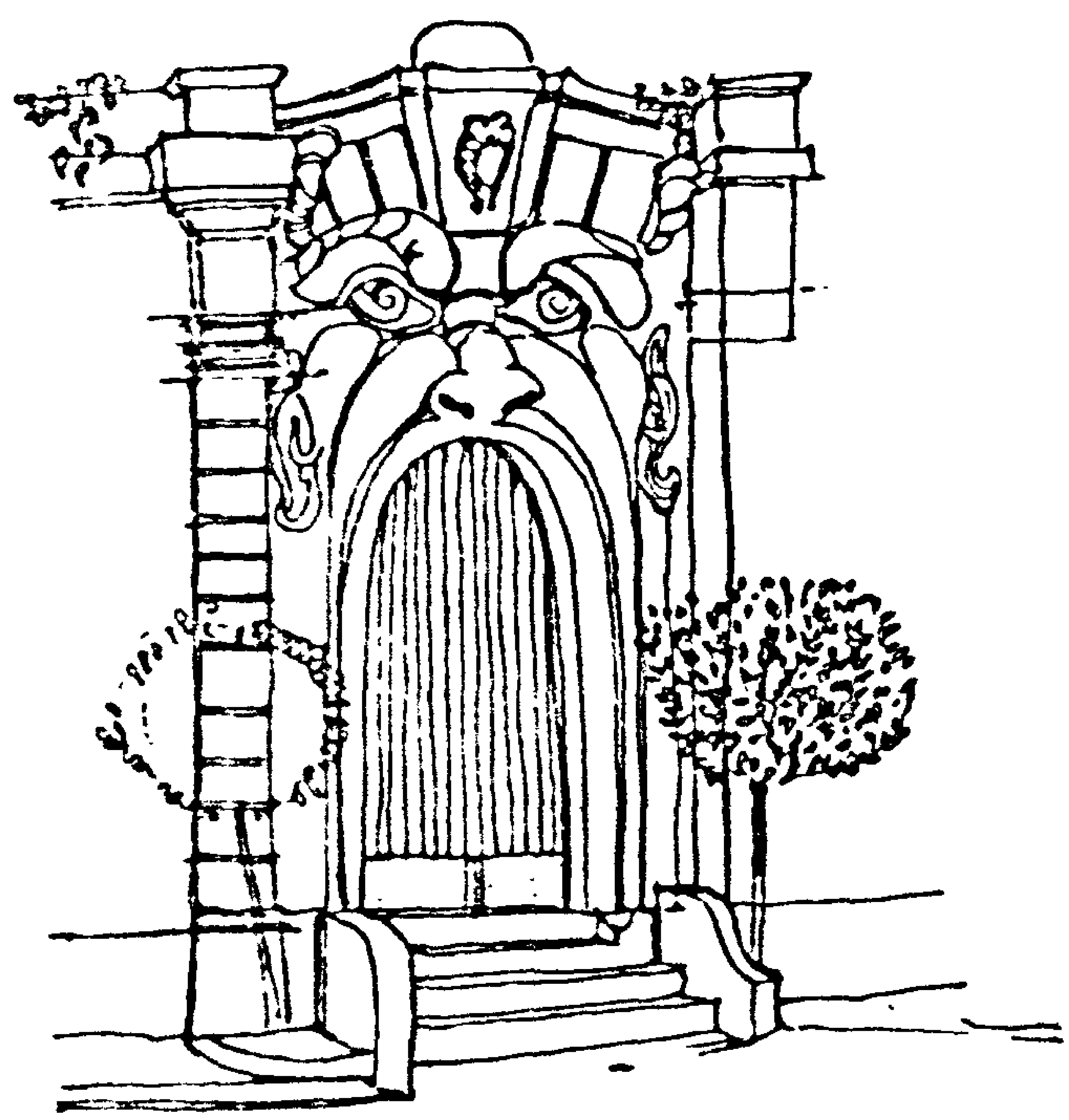


Fig.3.8.A. HYPERBOLIC PARABOLOID

The most sophisticated expression of architectural understanding is man's ability to design. The act of designing is something that no other being but man can do. A man feels that the development of a certain form is right. Understanding architectural form involves a sense of rational development, elements and forms are felt to connect with each other in a coherent manner. And it is only through observing the development of architectural form and how people understand and relate it to their desires and needs, that an attempt can be made to formalise the design activity.



3.9. DEFINITION of FORM and FORCE

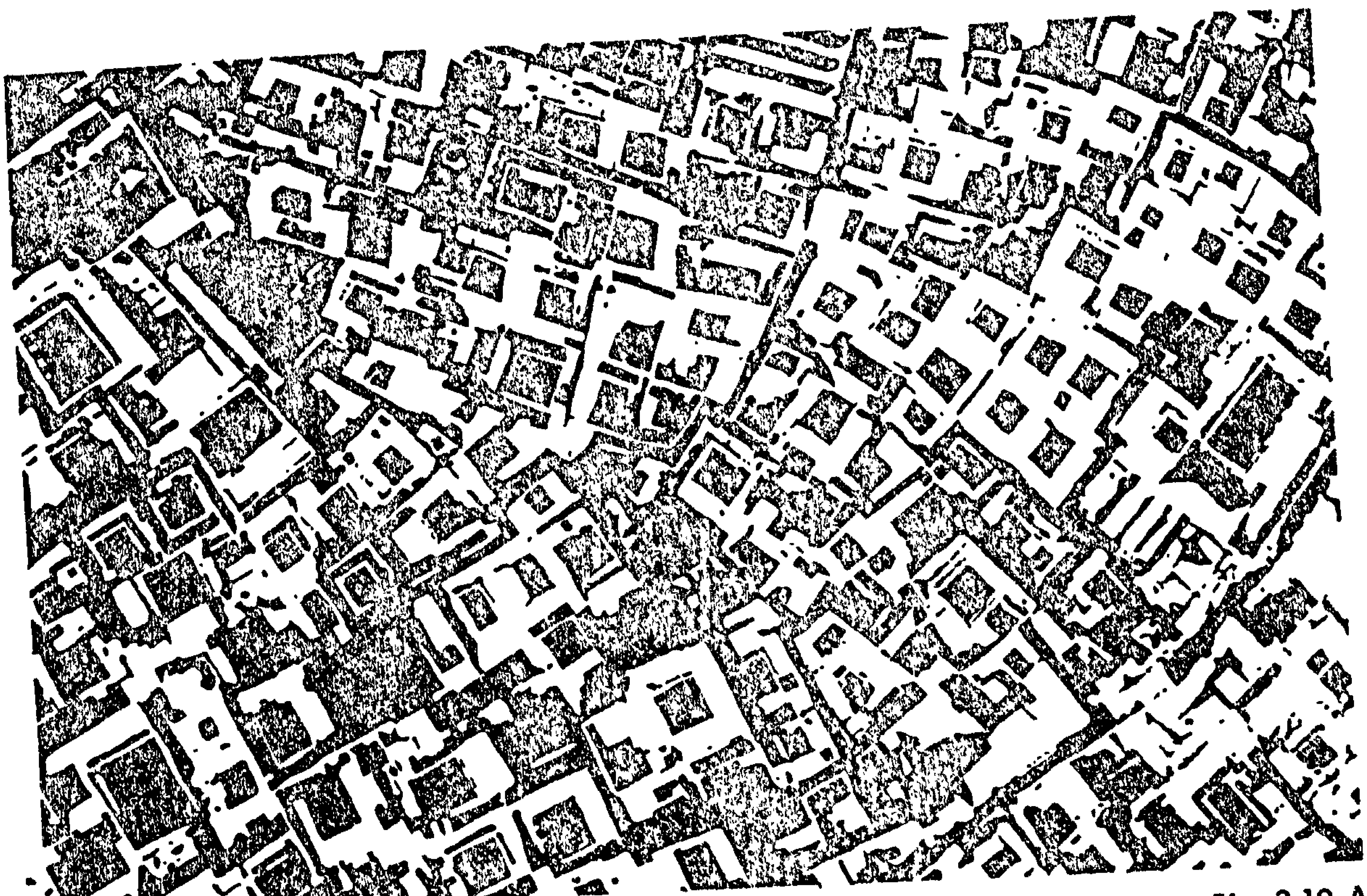
The term form as will be used here is to be understood mainly in the context of architecture's role and relations in society. In the Newtonian physics, force is recognized by its action in producing motion, changing motion, maintaining rest, or preventing change of motion. Unlike matter, force has no independent objective existence. So it is only when material is abstracted to form, or from the thing moved to its motions, that force is the appropriate term for the conception of the causes by which these forms and changes of form are brought about. Therefore, the term force is a symbol for the magnitude and direction in reference to the form of a material thing; it is a term as subjective and symbolic as form itself, and so is used appropriately in connection with it.

The form then, of any combination of materials, and the changes of form which are apparent in styles, movements, trends and morphologies may in all cases be described as due to the action of forces. Thus the form of a building is but a 'diagram of forces', and it may even be possible to deduce, by analysing this diagram of forces, the kind of forces that have acted upon it during its conformation.

3.10. DETERMINANTS of FORM

Forces act in an environment to produce certain architectural forms, some of these forces have been identified and defined as determinants of form. They may be listed as follows :

i. climatic conditions and need for shelter.
ii. materials, construction, and available technology.
iii. site and ecological factors.
iv. need for defence.
v. economic situation; scarcity or abundance.
vi. religion, rituals and symbols.



TYPICAL HOT-DRY REGION SETTLEMENT : MARAKESH

Fig. 3.10.A

i. Climatic Conditions and Need for Shelter

Climatic determinism has been widely accepted in architecture, "shelter is of supreme importance to man. It is the prime factor in his consistent struggle for survival. In his efforts to shelter himself against the extremes of weather and climate he has, over the ages, evolved many types of dwellings, one of which is the court house" (8). This and similar arguments may be criticized by the fact that the same area might develop the court house and other forms, also that so many forms of dwellings have been developed throughout history within a limited number of climatic zones. In fact anticlimatic solutions can be found in many parts of the world. However, vernacular architecture usually responds well to climatic conditions, so it is important variable in the matrix of form, but climatic conditions are not the sole determinants of architecture.

Fig.3.10.B TRADITIONAL MUD HOUSES IN NIGERIA

ii. Materials, construction methods and available technology

The structure of a natural form is nothing more than the stress diagram of the forces of tension and compression on that form, "the over-riding characteristic of any natural structure is a logical use of structural material, resulting in maximum strength and efficiency for a minimum expenditure of materials.....man's aesthetic appreciation of a minimal structure is closely associated with his appreciation of the natural structures to be found in his environment. The validity of the form is recognized subconsciously and intuitively" (9).

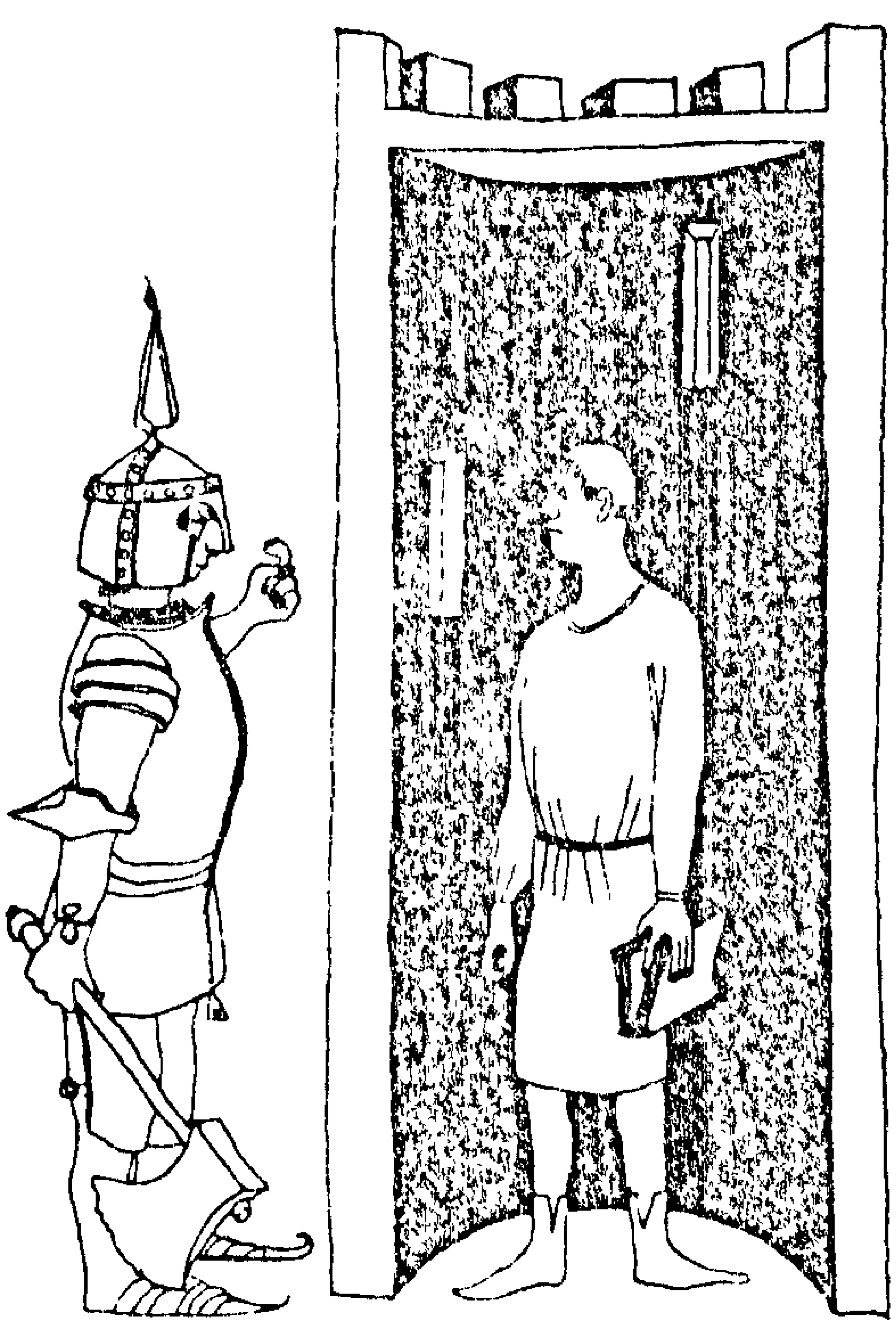
The argument that the procession of architectural forms, cave, circular hut, rectangular hut,....etc. are none but the resultants of the materials and techniques available at the time of their conception is very strong. However, the example of the Egyptians who knew the arch and the vault yet rarely used them, and then only where they could not be seen was given previously showing that the presence of technological knowledge does not necessarily mean that it will be used. Social or ideological values may take precedence over technological advances. Yet, it should be stressed that the availability of materials, construction methods and technological knowledge make possible or impossible certain decisions, but they are certainly not the sole determinants of form.

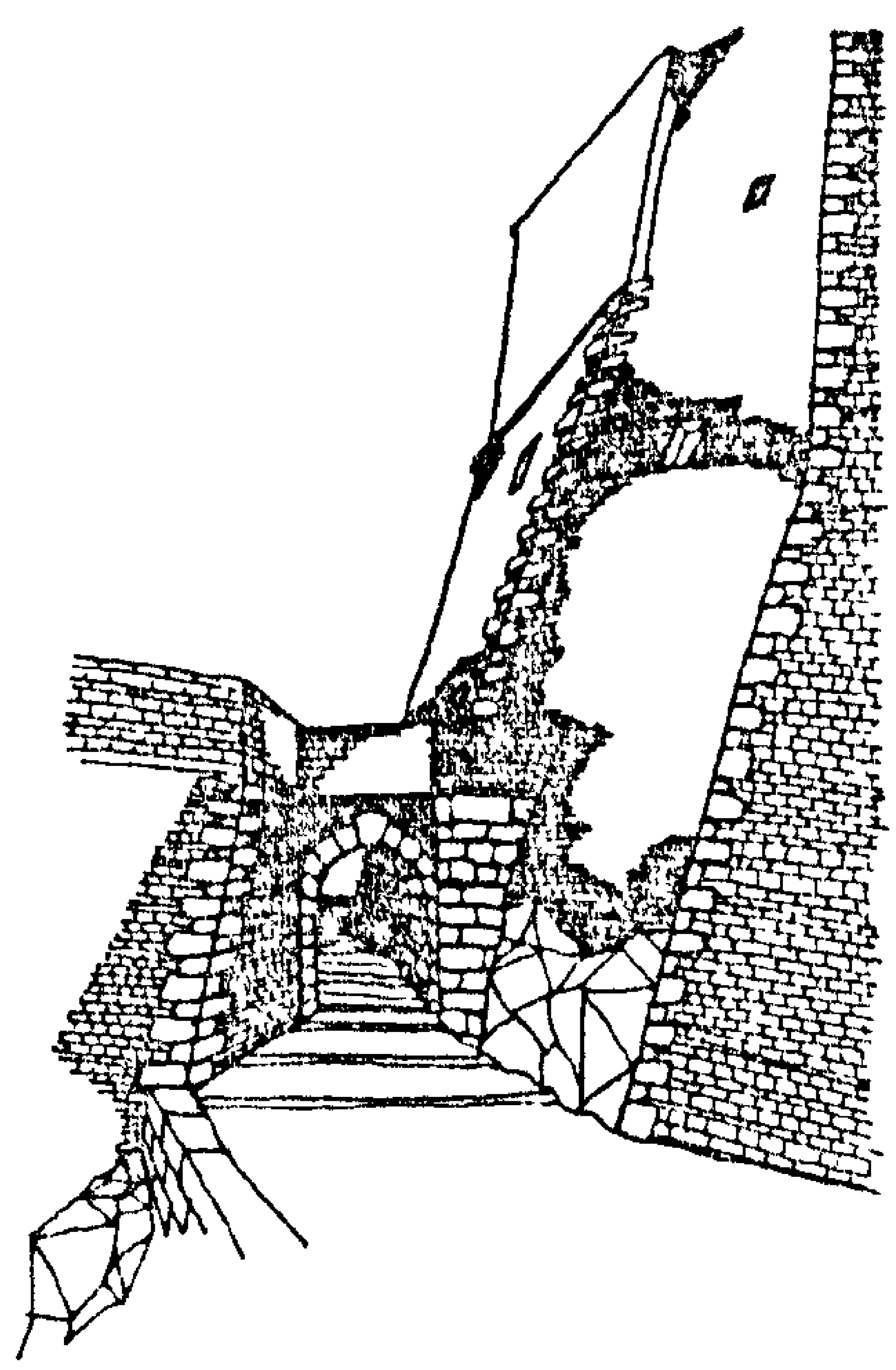
iii. Site and Ecological Factors

Site and ecological considerations are important in vernacular architecture, but their determinancy is questionable. Primitive and rural societies usually attibuted mysticism and sacredness to the land, and that may have influenced the placement and orientation of their built form. But surely, however forceful the site influence may be great variations in the built forms can usually be produced.

iv. Need for Defence

Defense certainly plays a role in deciding the architectural form. The use of fences, city walls, pilotis,....etc. have defensive origins and reasons. Still, defense can never account fully for all the implications of building form.





v. Economic Situation; Scarcity or Abundance

Probably when a sole determinant is to be chosen to explain architecture, the strongest and most widely used argument is for economics. However, it is possible to question its role as the sole determinant of built form. The argument for economics as determining forms becomes suspect when it is realized that even in economies of great scarcity there are examples where there are other factors than economics at work. The economical situation is a major force acting on the social structure and affecting the whole environment, and though it is one of the most important vectors in the diagram of forces, it is not acting on a singular basis.

vi. Religion, Rituals and Symbols

As a reaction to physical determinism in architecture, there appeared what was termed 'antiphysical determinism' which neglects and undermines the whole set of physical forces and attributes the built form to religious factors only (10). It may be demonstrated that a house is more than just a shelter, many examples can be found of the sacred function of the house, religion may affect the form, plan and spatial organization of the house. Still, it is just one of the forces that affect these aspects, one cannot neglect all the other variables.

3.11. FORM DETERMINISM and SOCIETY

Man was a symbol making animal long before he was a tool making animal. He reached specialization in myth, magic, ritual and religion before he specialized in the material aspects of culture. Therefore, even in those societies where there is a high criticality of choice due to strong physical constraints and limited material and technological resources, social and cultural forces never cease to operate. Rapoport writes, "form is the result of choice among existing possibilities, the greater the number of possibilities the greater the choice, but there is never any inevitability" (11).

In general the main argument against physical determinist theories is that :

i. most of those theories have been implicit rather than explicit.

ii. they tended generally to neglect social and cultural factors.

iii. usually they have been inclined towards the simplistic attitude of attributing form conformation to a single cause.

Socio-cultural determinism has the same problems as physical determinism. Form is not the result of one single factor, it is the resultant of a whole range of socio-cultural forces modified by climatic, economic and other physical conditions.

Thus, form configuration and its relation to a society may be stated as follows :

a- form should be considered as an 'event in space-time' and not merely a 'configuration in space'.

b- the choice of form is a function of growth in the society, a direct consequence of growth whose rate is variable.

c- constancy and change in the growth activity of a society tend to maintain a constant ratio to the output of architectural form in it.

d- the ratios of the strength of forces in action in a society are not absolutely constant, but tend to alter in course of time or to fluctuate in an orderly (or disorderly) way, and these progressive changes influence changes in the forms which accompany the development.

e- the rate of growth is affected, in acceleration or retardation, at certain periods of the life of a society, and these periods mark the durations of the domination of certain forms during those periods. When the growth of a society is negative, these periods are usually marked by a deterioration in the quality of the output of form.

3.12. ORDER as an ORGANIZING PRINCIPLE

Architecture is composed of both immediately visible forms and of an interrelationship between its elements, creating an integrated whole from a number of isolated parts. The sensitive eye can often instinctively sense when harmony has been achieved among all the parts of a building, its plan, spaces, elements and form. However, because the interplay of proportions and relationships is less visible than the immediate forms and shapes, the capacity to integrate parts into a comprehensible whole has always been a matter of concern for architects and designers.

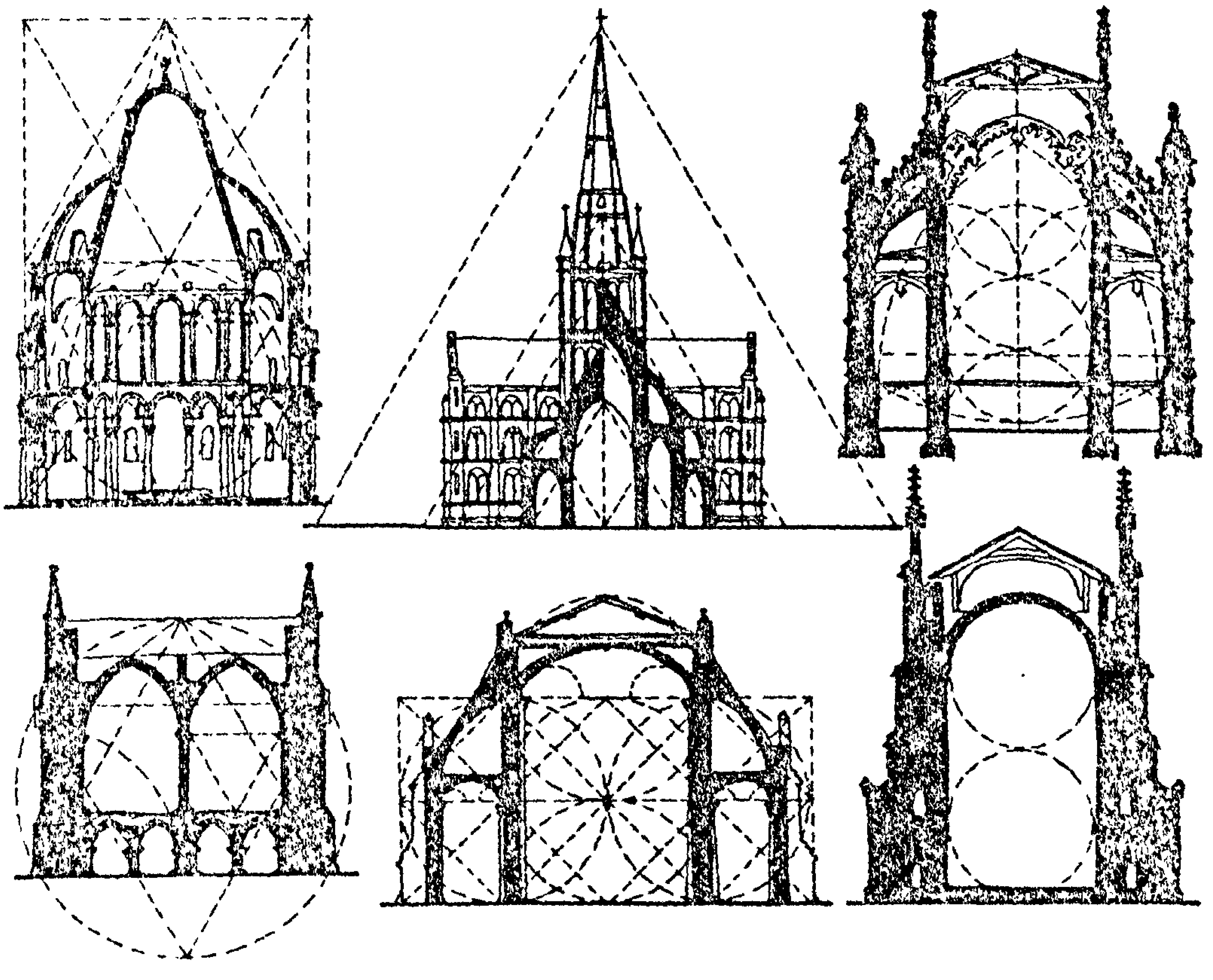


Fig. 3.12.A PRINCIPLES OF PROPORTION

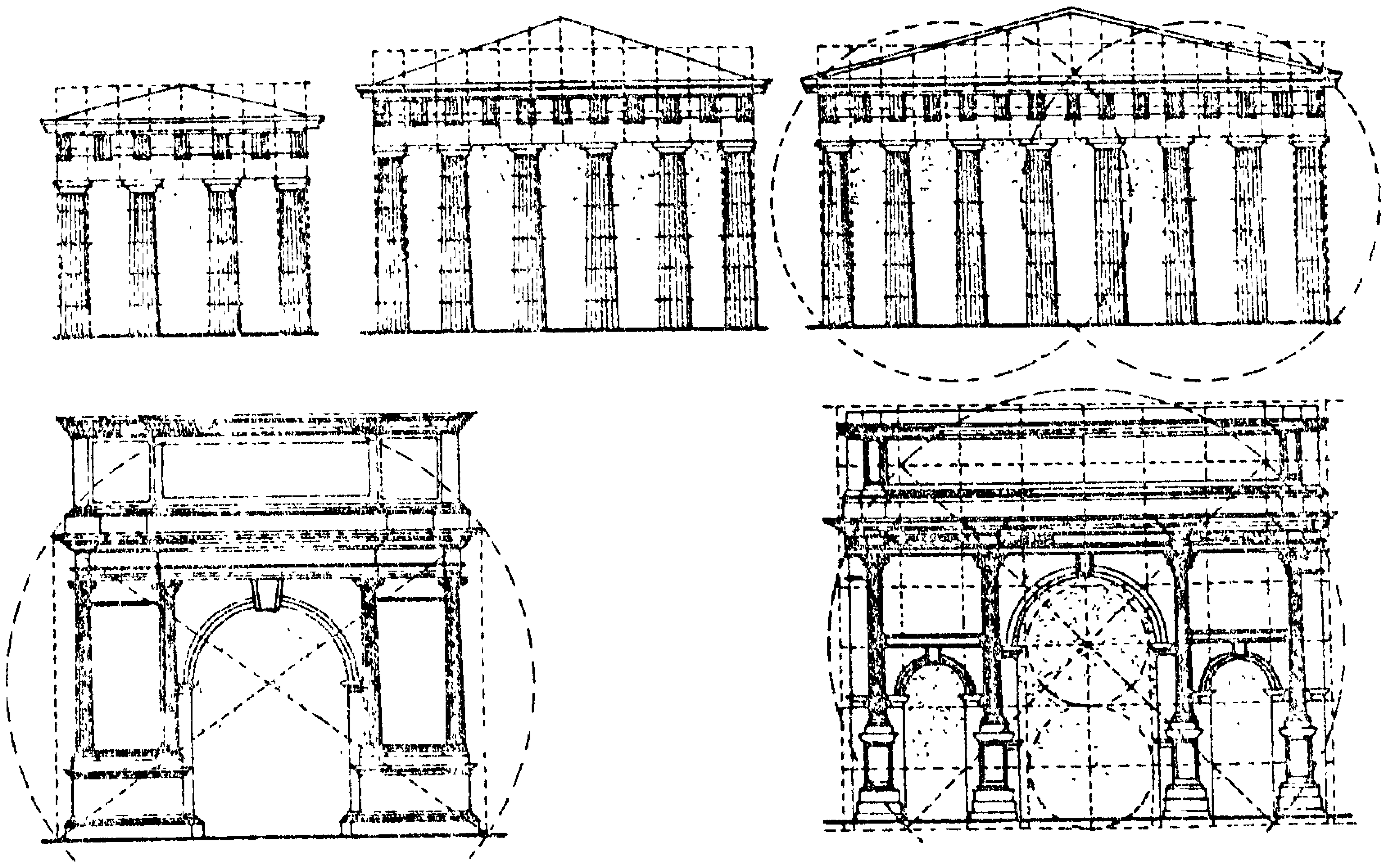


Fig. 3.12.B PRINCIPLES OF PROPORTION

Whatever earlier period is considered it will be found that all the architectural forms in all their formal aspects were subjected to the invisible interplay of a conscious canon of proportion. The need to impose this order on the environment is as old as man's need to build. However, in the early civilizations proportions were inseperably bound up with symbolic meanings, while it seems that in modern architecture, the relation between order and symbolism is less conspicuous, although the desire for order is still there. Much of the attention is now being given to imposing order on the design activity of producing architectural form rather than the interrelationships of the forms themselves.

REFERENCES

1. Sheridan, C.L.
   Fundamentals of Experimental Psychology
   New York, 1976

2. Segall, et al.
   The lnfuence of Culture on Visual Perception
   lndiannapolis, 1966

3. Scientific American
   Perception Mechanisms and Models
   San Francisco, 1972

4. phrase firt used by Hegel

5. Osgood, C.E., et al.
   The Measurement of Meaning
   Urbana, 1967

6. Hershberger, R.G.
   "Towards a set of Semantic Scales to measure the Meaning of Architectural Environments".
   Arizona, 1972

7. Fitch, J.M.
quoted from
Gutman, R. (edit.)
People and Buildings
New York, 1972

8. Schoenauer, N. and Seeman, S.
The Court Garden House
Montreal, 1962

9. Morcos-Asaad, F.N.
Unpublished paper

10. See Raglan, L.
The Temple and the House
New York, 1964

11. Rapoport, A.
House Form and Culture
New Jersey, 1969

Chapter Four

Architecture and Human Sciences

4.1. DESIGN and the HUMAN SCIENCES

For the last generation or two, there has been an enormous interest in relating behavioural sciences to the design priciples of architecture. There are several reasons for this interest.

a. The design professions are setting higher standards of social responsibility, this attitude started with the modern movement in the nineteen twenties and thirties, as an extremely idealistic and utopian approach. For that reason the designers could not help being dogmatic, and then believed they could change the world and the social order by simply manipulating the physical environment.

b. Simultanuously the designers became more self-conscious, as behavioural scientists, sociologists and psychologists developed a new concern for the practical applications of their research. Thus, a new field of inter-disciplinary cooperation was opened with the potential of more positive results.

c. The social disciplines also show an awareness of the effect and relevance of the environmental factors on human behaviour. Gutman states, "A body of coherent theory and research is now emerging that examines those needs of the human organism and of group functioning that are best satisfied through the provision of specific conditions in the physical, as distinguished from the social, environment" (1).

It is now accepted that the interaction between man, society, and architecture, follows a very complex pattern. Yet, little is known about many of the issues that this interaction raises. There are many theories attempting to explain the nature of this interaction, however, most of them are deterministic and hardly any gives a totally acceptable analysis. The argument for the need of the architect to cooperate with the human scientist usually takes one, or more, of the following forms :

a- guidance in understanding the purposes and objectives of the client and the user, also the need to decide on the validity of those objectives that are stated or implied.

b- advice on whether the present or proposed social organization represents a reasonable means for achieving the objectives that are implicit in the brief.

c- clearing the confusion about how to translate general abstract goals into particular objectives that can be attained through physical forms.

d- estimation of the space requirements of the activities of the users group according to their behavioural patterns in a certain social context.

e- evaluating the degree of influence of the physical form and space allocation on the existing and the proposed social transactions and interrelations; that is whether the physical form is likely to result in the intended consequence.

f- commenting on the validity of the social consequences that are anticipated by the design team, and reviewing and re-examining the original criteria and measuring the appropriateness of these new objectives in this particular social context.

The architect in the act of designing may display rational or empirical attitudes. The rational attitudes are concerned with what is known to be true as a result of reasoned thinking while the empirical attitudes are concerned with evidence as received by the senses. Often the architect combines both attitudes, though occasionally one meets an extreme. Most of the first and second generation of architects who founded the architecture of the twentieth century have been more inclined to the rationalist attitude. This is illustrated by the following quatations :-

"Form follows function"

L. Sullivan

"Internal space is the reality of the building"

F. L. Wright

"The plan is the generator"

Le Corbusier

"A standard is necessary for order in human effort"

Le Corbusier

"Sex life, sleeping habits, pets, gardening, personel hygiene, car maintemance, cooking, heating, insulation service, these are the only requirements to be considered when building a house"

H. Meyer

"We must conceive contemporary community features which would exert so stimulating an influence on the citizen who comes to live there that he will soon change from an onlooker into a participator"

W. Gropius

"We refuse to recognise problems of form"

Mies Van der Rohe

"The individual is losing significance; his destiny is no longer what interest us. The decisive achievement in all fields are impersonal and their authors are for the most part unknown. They are part of the trend of our time toward anonimity"

Mies Van der Rohe

It seemed necessary for those rationalists to look for their fundamental standards in the field of sociology, which had been a rational matter initially. Saint-Simon (1720-1825), Comte (1798 - 1857), Marx (1818-1883), and Engel (1820-1895) all had given much thought about the nature of society and set up models which were to explain its structure and functions and the mechanisms of social change. However, models are one thing and techniques are another, and sociology started to move away from rational speculation to become an empirical science because there were no scientific methods to prove or disprove the validity of their models.

Psychology and sociology are concerned, above all, with building up scales against which certain attitudes can be measured. There is usually little interest in problems of indeterminacy which result from the fact that the experiment itself adds to the subjects experience. Furthermore, by isolating single environmental variables, the effect of interactions between various sensory modes are inevitably distorted, and the information produced will unlikely be of direct use to designers.

The designer is now being faced increasingly with material from the human sciences which is based on the language of attitude measurement and factor analysis. The validity of this information for design purpose is not the same as its validity in the human scientists' sense. In fact, much of it may be of little if of any use to the design activity. Broadbent writes, "The designer may be well tempted to take psychologists's findings at face value,..... Yet they are true only in a limited, technical sense, using very specific definitions of the concepts in question. One has to be aware of precisely what the psychologists mean and how they have arrived at their conclusions, before acting on such statements in design" (2).

The attitude for deterministic behavioural designs has been extremely strong. There has been an attempt to force society into accepting certain trends which the architects favoured, by disguising them to make them appear inevitable. This attitude was summarized by Nikolaus Pevsner in his justification of the modern style in 1936, "However, the great creative brain will find its own way even in times of overpowering collective energy, even with the medium of this new style of the twentieth century, which, because it is a genuine style as opposed to a passing fashion, is totalitarian" (3). Although in his later editions, 'totalitarian' was changed to 'universal', it is significant, as it underlines the attitude of 'overpowering energy' which is often connected with technological and behavioural determinism. Also, the interchangeability of 'totalitarian' and 'universal' in this statement, is interesting as it signifies the degree of freedom of choice of values available in the case of any determinist approach to architecture.

One other feature of the human sciences is its capacity for predicting certain actions and reactions, though for a long time the idea that a prediction may have an influence upon the predicted event has been accepted, either positively, tending to bring about the predicted event, or negatively tending to prevent it. Clearly, there is an irreducible element of uncertainty in all social predictions caused by an unavoidable interaction between observer and observed, and the effect of predictions on the actual course of events is essential.

The building process may be divided into four stages :

a. the briefing stage, during which the demands of the client and user are presented and articulated to the architect and other members of the building team;
b. the design stage, during which the brief is translated into the design scheme;
c. the building stage, during which the design scheme is transformed into the object we call the building; and
d. the use stage, during which the building is inhabited.

The stages in which it is probable that the knowledge of the human scientist is of any value are :

i- the briefing stage, where he can act as a mediator between the user and the design team;

ii- the first phase of the design stage, where he can develop the analysis of the relevent information; and

iii- the use stage, where he can proceed with his attitude measurements to build up on his stock of knowledge for the 'feed-forward' process in the design activity.

4.2. SCALES of MEASUREMENT

With the vast number of human sciences; the inter-disciplinary relations in any system; and the complexity of terminology defining the properties of such a system; a need for scales of measurement is a necessity. Different types of scales are mentioned by many authors, and very briefly these may be summarized as follows :-

a- Nominal Scale : represents the simplest way in which objects may be put into order; each object or class of objects is assigned a numeral. This scale leads to complications in classification because of its interchangeability.

b- Ordinal Scale : is not just numbering things, but ranking them in a kind of order, however, although the order is known, the intervals between the objects are not, whether they are large or small they still look the same.

c- Interval Scale : maintains the order of the objects, and also defines the intervals between them; its only drawback is that the zero point is arbitrary, therefore different scales cannot be interrelated.

d- Ratio Scale : is an absolute scale of physics, and has a zero point. There are two types of ratio scales :

fundamental and derived. Fundamental scales are the result of direct physical measurement; and the derived scales are mathematical functions derived from the fundamental scales.

e- Psychometric Scales : involve measurement of psychological events that have no obvious physical counterparts. There are many methods of psychometric scaling, like :

i. pair comparisons, in which all stimuli are paired, with one of the pairs being chosen as above the other;

ii. pseudo-interval scales, which are derived from the frequencies of confusion;

iii. rating scales, which rate the extent of agreement or disagreement with a given item;

iv. ranking methods, which require that stimuli be placed in order of their values.

There are also other more direct methods for use in certain cases, such as magnitude estimation, social distance scaling and factorial scales. Usually, however, psychometric scales take one of the forms of the previously mentioned scales.

One of the major problems of human sciences is that they are rarely capable of being measured on a ratio scale. They are usually measured on an ordinal scale, and sometimes on a nominal scale which is then manipulated as if it were an interval or a ratio scale, resulting in questionable results.

In an assessment of design any individual arbiter has his own values, experiences and other built-in sources of unreliability. This has been recognized by theoreticians like Archer (4) who in setting up his system of rating scales asserts that if a number of arbiters were asked to rank a series of forms according to a certain merit, probably one will end up with a nominal scale if they do not agree, and given such an agreement one will still have an ordinal scale. Archer, therefore, proposes that the arbiters rate these forms on a 1 to 100 scale to achieve a kind of interval scale, which he terms rating scale. He then suggests that, "Within the context of a given design problem, rating scales can be perfectly adequately substituted for ratio scales, providing that the arbiters are correctly chosen and the conditions for judgement are adequately controlled".

Another problem facing human sciences is that in human experiences, like the perception of architectural form, perceived space and time are more important than physical 'real' space and time. Gestalt psychologists among other experimental psychologists have produced enough evidence in favour of the power, of the 'perceived space' in relation to the 'real space'. Optical illusions, in fact, are nothing but instances of the conflict between the perceived form and the physical stimulus.

Somewhat similar consideration applies to 'perceived time', the subjective present is not 'a point on the time line', corresponding to the physical 'now'. It is better illustrated by the model in figure (4.2.A), where a subjective 'now' has a certain maximum in B, but 'backwards' is 'mixed with memory', and 'forwards' is 'mixed with anticipation'.
At a certain point A, the component 'now' disappears completely, and only 'memory' remains in that direction. At C, the component 'now' is also lost, and only 'anticipation' exists if one continues in the same direction. The gap A-C represents a distance more or less filled with 'now'. This gap corresponds to physical time in a complicated way, and its stimulus varies usually between 0.001 seconds and 4 seconds.

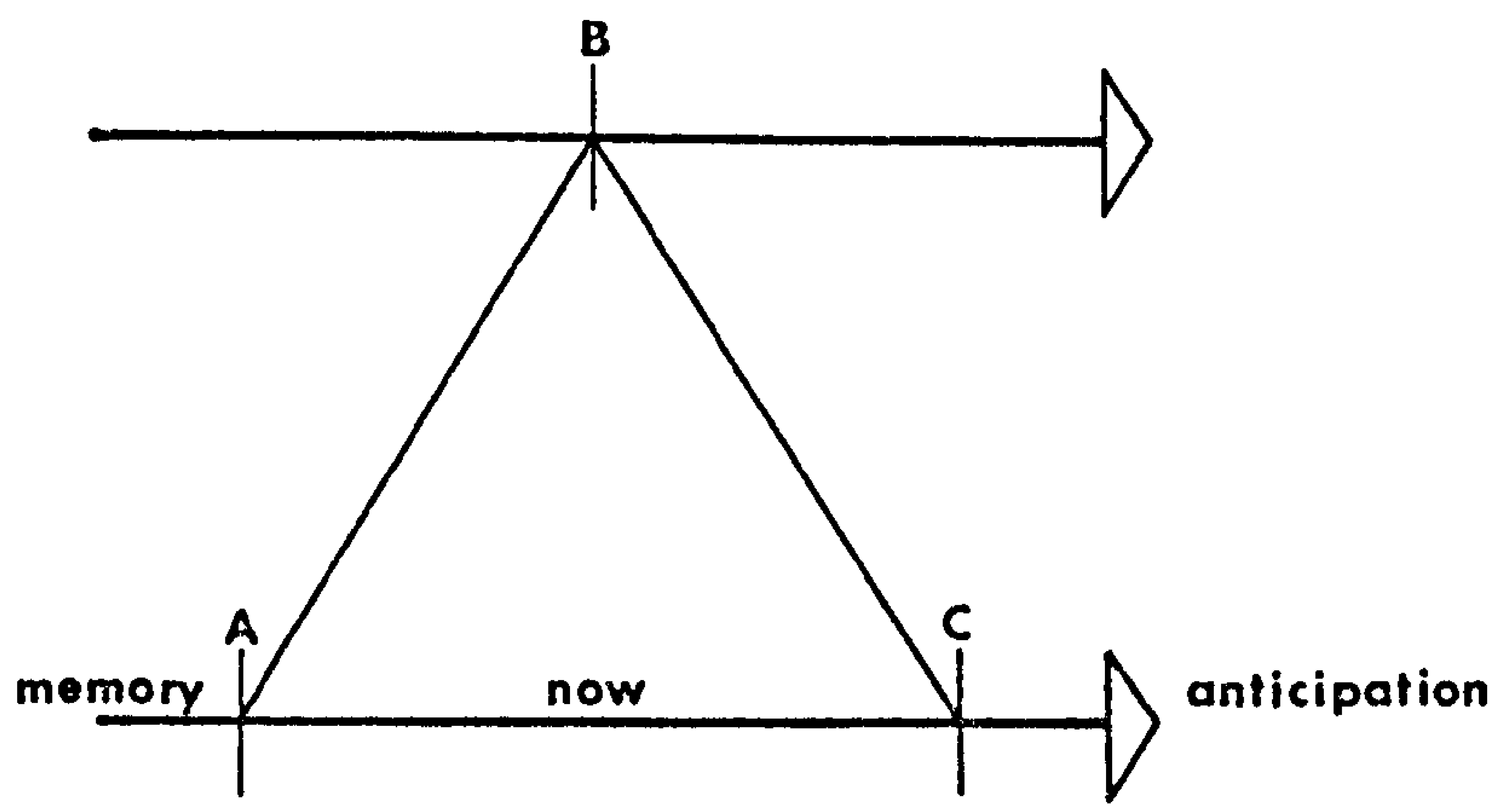


Fig 4.2.A MODEL OF PERCEIVED TIME

4.3. HUMAN DESIRES and NEEDS

In view of the increasing complexity of the problems involved in design, the need for a rational approach became a central issue intriguing designers. In their attempts to establish such a rational approach the designers turned to user requirements as a basis for the built form conformation. This led naturally to the need for hard data and in seeking that, the designers placed most of their attention to physical determinants such as anthropometrics, ergonomics, and comfort needs, rather than the more evasive and complex socio-cultural and psychological determinants.

However, at present this approach is being questioned by many theorists, and there is enough information to show that even those physical standards which might be regarded as 'hard' and quantifiable data, are themselves affected by cultural attitudes and social forces prevailing at the time and place of their collation and calculation. Dubos states that, "We respond actively and often creatively to environmental stimuli, we shut out some, modify others through symbolic and other socio-cultural mechanism, and our responses to these stimuli depend on the meaning which we attach to them, depending on our cultural background" (5).

Rapoport and Watson (6) make several valid points about the degree of the cultural variability in physical standards :

a. The situations for which it is deemed necessary to establish standards differ between societies; i.e. activities that are basic in a society may be missing in another.

b. Even in similar conditions, standards vary widely, and this applies not only to space standards which possess 'low criticality' but applies as well to standards of heat, light, noise...etc... which are considered biologically determinate and therefore assumed to have 'high criticality'.

c. Standards differ not only across cultures but within them, depending on the social context in which the facility is used.

Hans Meyer, one of the directors of the Bauhaus, was one of the rationalists who looked for fundamental standards on which architecture could be based, even at the risk of extreme generalization; "all life is an urge towards harmony. Growing means striving after the harmonious enjoyment of oxygen + carbon + sugar + starch + protein. Work means our search for the harmonious form of existence" (7). However, this level of generalization which leaves little to philosophy to help the designer make decisions when faced with real design problems, was not accepted by everyone.

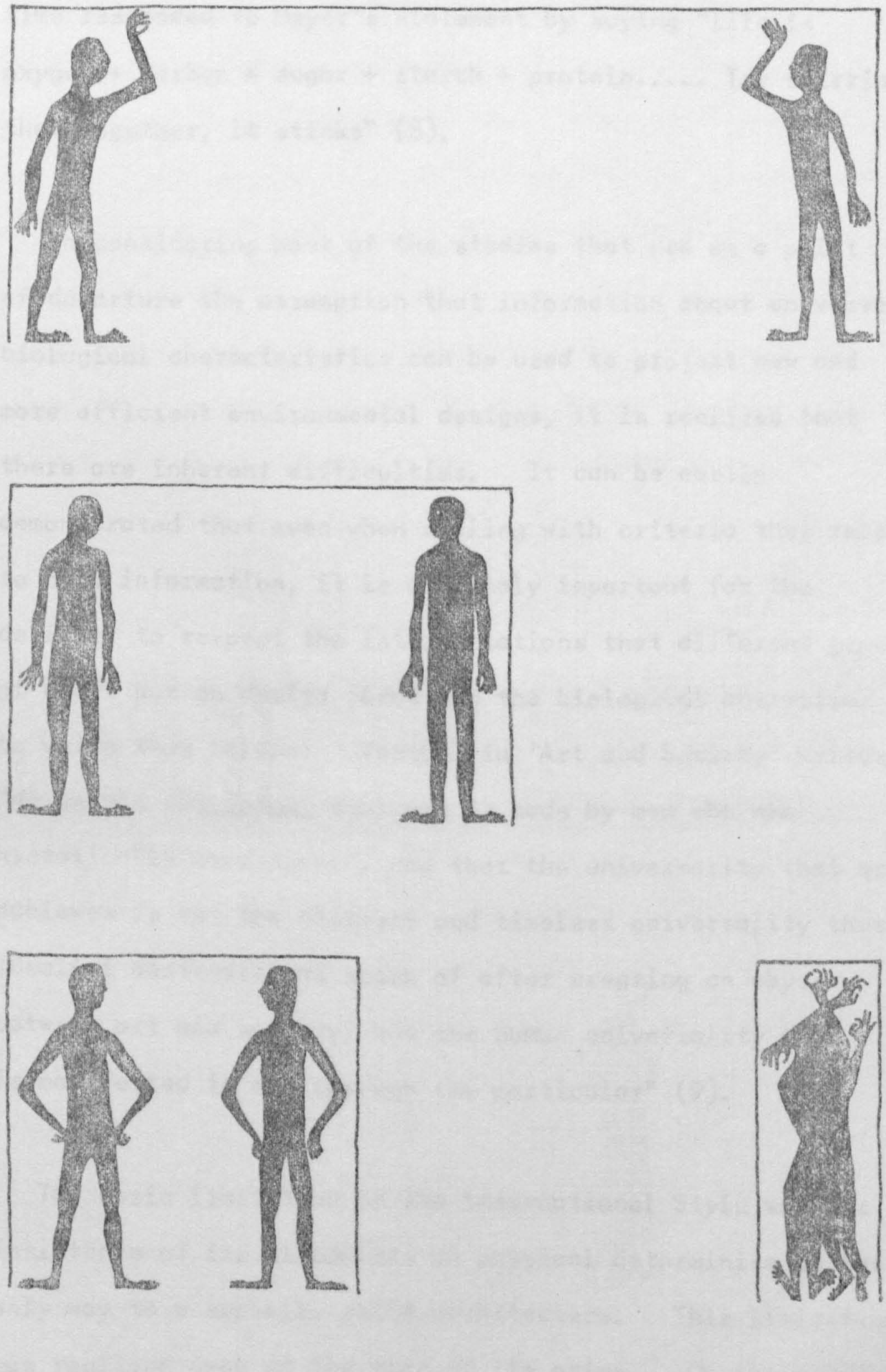


Fig. 4.3.A. Arrangement of people in space differ in various cultures and subcultures

Mies Van der Rohe who was Meyer's successor at the Bauhaus and also was one of the most rationalist architects of his time responded to Meyer's statement by saying "life is oxygen + carbon + sugar + starch + protein..... Try stirring that together, it stinks" (8).

In considering most of the studies that use as a point of departure the assumption that information about universal biological characteristics can be used to project new and more efficient environmental designs, it is realized that there are inherent difficulties. It can be easily demonstrated that even when dealing with criteria that relate to hard information, it is extremely important for the designer to respect the interpretations that different groups of users put on design forms and the biological activities to which they relate. Vasquez in 'Art and Society' writes, "We should not forget that art is made by men who are historically conditioned, and that the universality that art achieves is not the abstract and timeless universality that idealist aestheticians speak of after creating an abyss between art and society, but the human universality that is manifested in and through the particular" (9).

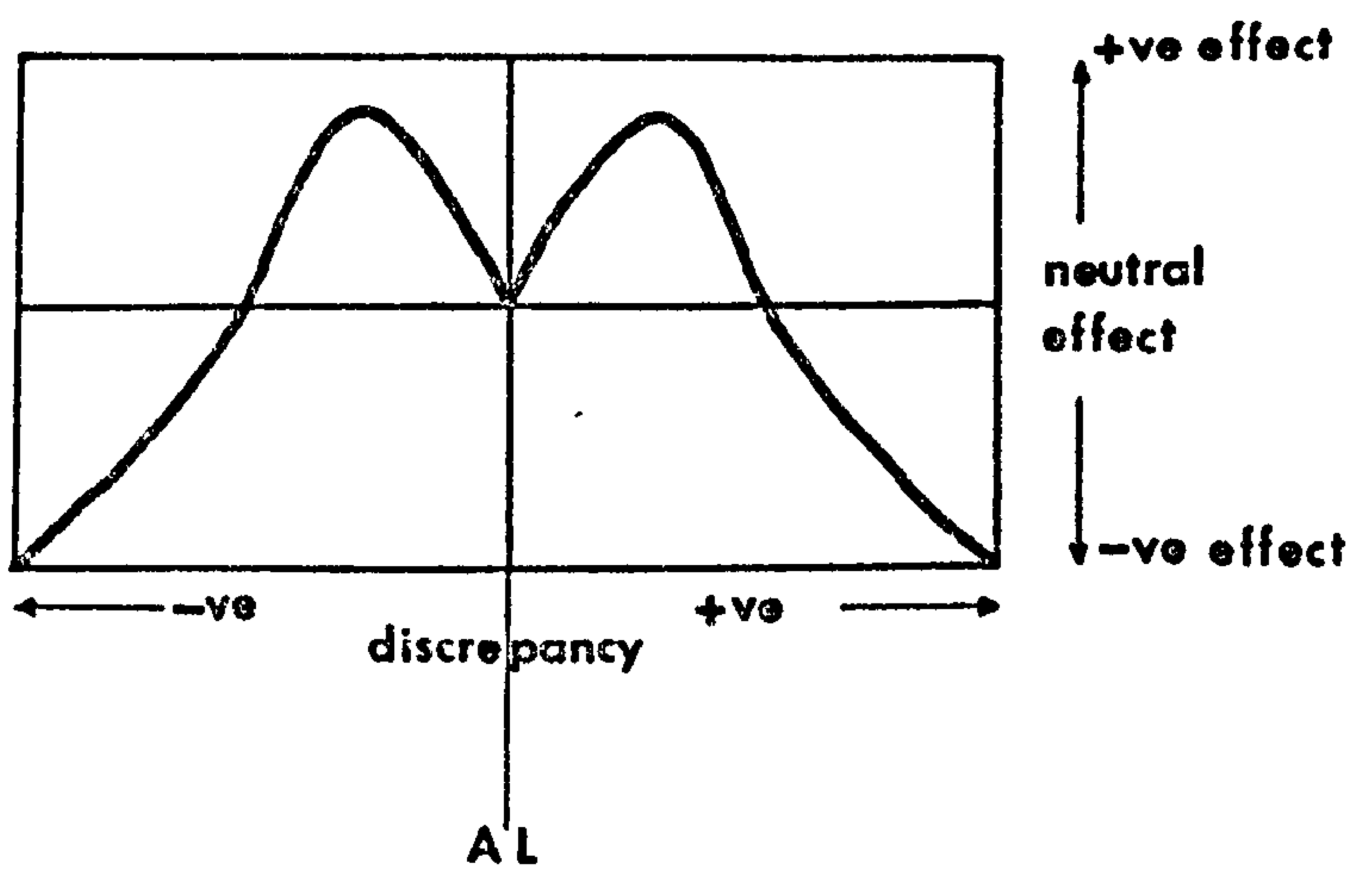
The basic limitation of the International Style was the insistence of its proponents on physical determinism as the only way to a socially valid architecture. This limitation was realized even at the time of its prime. On the trend of international style housing Hitchcock and Johnson say that it, "implies preparation not for a given family but for a typical family. This statistical monster, the typical family has no personal existence and cannot defend itself against the sociological theories of the architects. The European functionalists in their annual conferences set up standards for ideal minimal dwellings. These standards often have little relation to the actual way of living of those who are to inhabit them. The idealism of the functionalists too often demands that they provide what ought to be needed, even at the expense of what is actually needed. Instead of facing the difficulties of the present, they rush on to face the uncertain future" (10).

Human needs are more than just the sum total of their biological needs, and translating this into design factors means that design is more than economic and environmental factors. Another aspect of the problem of human needs, is the ongoing debate over the phenomenon of harmfulness or benefit of manipulating the stimulation level. There are several issues concerned with this aspect, and most of them have not been finally resolved. This is due to the lack of experimental work to verify them, and the complexity of the socio-cultural context in which they occur. Some of the issues concerning manipulating stimulation may be considered in the following questions :-

a. Which dimensions of stimulation are most important for arousing and maintaining the human interest?

b. For a particular group, is there an optimal level of stimulation? and if so, how can it be determined operationally?

c. What is the relation between short-run and long-run effects? and is there a possibility of a long-run damage even when the individual seems to have adjusted successfully to a certain level of stimulation?



CHANGES IN RESPONSE TO STIMULI

Fig. 4.3.B

Helson's Adaptation-level theory (11) represents man's response to stimulation encountered in the physical environment. This theory maintains that for any specified dimension of stimulus variation the individual establishes an adaptation-level (AL) which determines his judgemental or evaluative response to a given stimulus located on that dimension. Deviations from the AL in either direction are evaluated positively within a certain range, while beyond these boundaries they are experienced as unpleasant.

Surely if a comprehensive list of fundamental needs were possible to compile, then this would be a basic information input in a design situation, but then one would expect all buildings to be much more alike, in fact maybe even similar. However, by the same token of the bio-technical approach, that would also result in a sensory deprived and boring environment, and a degree of stimulation through change and choice will be needed. Vernon states, "I believe that the human being cannot long endure a completely homogenous situation no matter how good or how desirable it is. What is homogenous soon becomes boring and undesirable... If by his achievements man becomes bored with it all, even if that all is most desirable by ordinary standards, he will look for change even if he has to destroy his present circumstances; if he cannot build new and differently, in order to depart from the old, he will rid himself of it so that change is effected" (12).

This may well be the reason for the origins of decoration and ornamentation in buildings; for, at the beginning there must have been a 'high criticality' of form because of the material, technological and environmental limitations; so, the output of the built form would have been very similar, and the only way of creating variety and stimulation in the visual field, would have been through the addition of ornaments to the built form. Therefore, ornament and decoration had real meaning, and were not just additions to built form. Ornament resonated a human need for variety and change, among other symbolic and highly loaded cultural needs which, though less tangible than physical needs, are nevertheless very important in the welfare of the society.

4.4. The COUNTER CULTURE ATTITUDE

It is one of the characteristics of any society that there should be a set of conflicting and contradicting relations acting as forces on the canvas of that society to bring it to stability. Sometimes, a society, through the course of its development, becomes less able to justify the inevitability of its particular forms. The accepted notions of communication, especially between the artist and the layman, start to break up, and the established social relations themselves begin to disintegrate. Religion, authority, and tradition become questionable. At this point in a social developmental growth it becomes difficult to depend on accepted assumptions, hence responses to symbols and references cannot be estimated.

This situation usually resolves itself into a motionless academicism, in which the really important issues are left untouched because they involve controversy, thus, a convention in artistic representation dominates the scene. However, a convention is one thing and a style is another; convention is laid down beforehand, guiding reactions along a fixed path, while style has no independent existence and does not precede the actual response. This is the basic reason why strictly academic art form becomes dated as the conventions of a society change. Jencks writes, "Counter-action depends on our knowing that a trend is inexorable, that if we do not decide to do something rather emphatic about it, it will continue into the future. Thus we may say, contrary to

Marx and in accord with lslam, that the only social trends which are inevitable are those which we do not know about, and that the rest are inexorable and subject to our changing them. Fortunately, not all negative trends depend on our knowledge and desire for counter-action to disappear, but rather reach equilibrium because of an equal and opposite trend" (13).

It may then be said, that the consequence of academicism is the appearance of counter-culture attitudes which usually takes one of three forms; avant-garde, kitch and escapism :-

a. Avant-garde , detaches itself from society, and tries to find a path along which it would be possible to keep culture moving, usually by cutting itself from the public altogether in search for an absolute. Greenberg writes, "the absolute is absolute, and the artist, being what he is, cherishes certain relative values more than others. The very values in the name of which he invokes the absolute are relative values, the values of aesthetics" (14). Therefore, the avant-garde contains within itself some of the very academicism it seeks to overcome.

b. Kitch, on the other hand, is a term employed in describing the popular and commercial in art. Therefore, it is the most widespread counter-culture attitude, because the majority of the public can hardly distinguish it from the real art which is the product of their formal culture. In fact, the precondition for kitch to thrive is the availability close at hand of a fully matured cultural tradition, whose discoveries, acquisitions, and perfected self-consciousness, kitch can take advantage of for its own ends. Like avant-garde, kitch cannot free itself of its own academicism, it simply evades the more urgent and difficult problems of the society.

c. Escapism is a product of extremes in a society. As the society undergoes its evolutionary process of change, a number of the members of that society may develop a sense of alienation or vaulting ambition, and act in an adverse direction to the mainstream of that society or even completely drop out of the social system.

Avant-garde, Kitch and Escapism are all the result of the questioning of the credibility of the formal culture in a society. These counter-cultural attitudes are inherent in the fabric of a society that is mature enough to provide for both stability and change. The presence of such attitudes is a sign that the society is genuinely revolutionary, it is neither about to be revolutionized nor trying to retain its present structure.

Stability and change, thus, affect the artistic production in two aspects, one of these is realism doing its proper job of social criticism, the other is experimentalism in pure or abstract form. These tendencies and forces acting in a certain culture, without being suppressed, are a sign that it regards its social order as expendable and created for its convenience. The order being made for the sake of man and not man for the sake of order.

It is necessary, however, to point out that the product of counter-culture is 'formless' in comparison with formal cultural artistic creations. Aesthetic perception is replaced by mere recognition, which makes the perceptual activities faithful to the stereotyped expectations that are operating, rather than to the forms actually presented. Also, the aesthetic response is replaced by a mere reaction. The difference is that; while a reaction is solely determined by the initial stimulus which is usually judged through a preconception, a response follows a course that is not laid down beforehand and is shaped by a process of self-stimulation during the experience. This aesthetic response is usually guided by the unconscious store of past experiences. It is not a reaction to a signal but an engagement in a creative interpretation of a symbol.

4.5. The CONTENT of the HUMAN MIND

Freud discovered and drew attention to the fact that mind and behaviour are governed not so much by conscious as subconscious wishes and feelings. His major contribution was the finding of a way of bringing at least some of these subconscious wishes and feelings up to the level of consciousness.

Jung pointed out that there is a very large realm of subconsciousness that can never be made conscious, this being a consequence of its nature. He also said it was impossible to ascertain how large this realm of the subconscious is. He expresses the opinion that the realm of consciousness has a subconscious connection with an eternal, endless common subconsciousness. He speaks of 'the god in the unconsciousness'.

In Coghill's opinion, the total pattern in the organic sphere, has three constituents : structure, function and mentation. So, the psycho-organismal individual is an indissoluble trinity, and not as structure plus function plus mentation. These three components are in every plane and act in such a way that structure is organization; function is organization in action within the frame of space-time; and mentation is organization in action beyond the frame of space-time, where reality and truth lie (15).

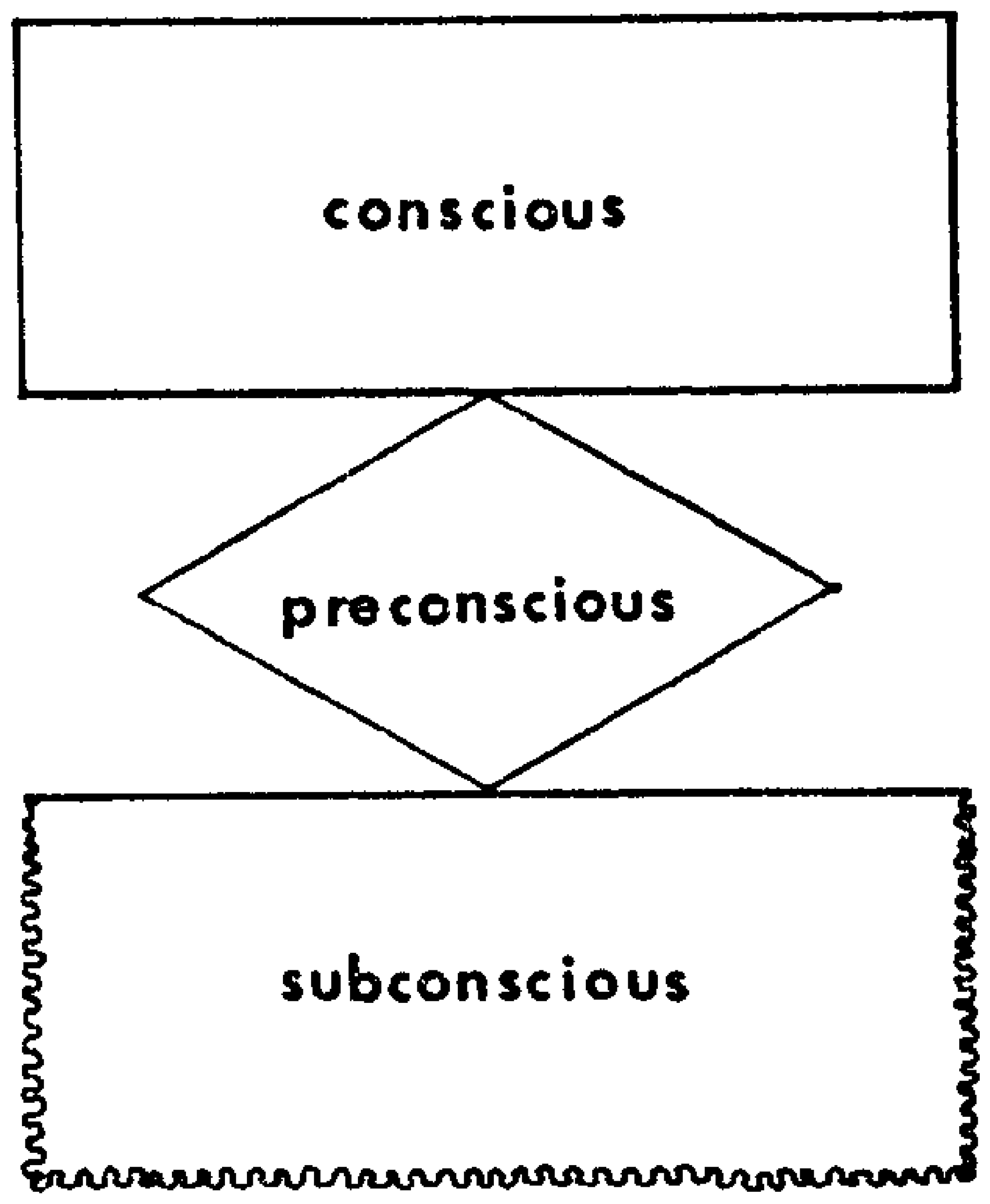


Fig.4.5.A.

The human intellect may be categorized at its simplest as presented in figure (4.5.A). The conscious mind contains all that one knows that is readily available. It is characterized by its rigid boundaries of logically organized and interconnected information. These characteristics of the conscious mind are invaluable for learning, ordering and hypothesis testing in a logical way. But, those same qualities that make the conscious mind so powerful, tend to inhibit it from utilizing the full potential of creative ability.

The preconscious is a problem solving oriented independent unit. Whenever a new problem is presented to the conscious mind, it is triggered to probe the subconscious for clues that may be relevant to the solution of that problem.

The subconscious is a storehouse of information of immense capacity. According to Freud, it contains all the experiences one has passed through since conception. Jung, on the other hand, believed that it contains the accumulated memories and experiences of the whole human race since time immemorial. Hypnosis and neurosurgery give strong evidence that the subconscious mind is a reservoir of information that is so vast and rich to an extent that is inconceivable by the conscious mind.

During the problem-solving process, the preconscious, when evoked by commitment and interest starts to search in the subconscious for relevant data. But because its criteria for relevance do not seem logical to the conscious mind, people start to built up a censor block between the conscious and the preconscious, figure (4.5.B). The build up of this censorship device starts at a very early age, usually at the start of formal education around the age of five (16).

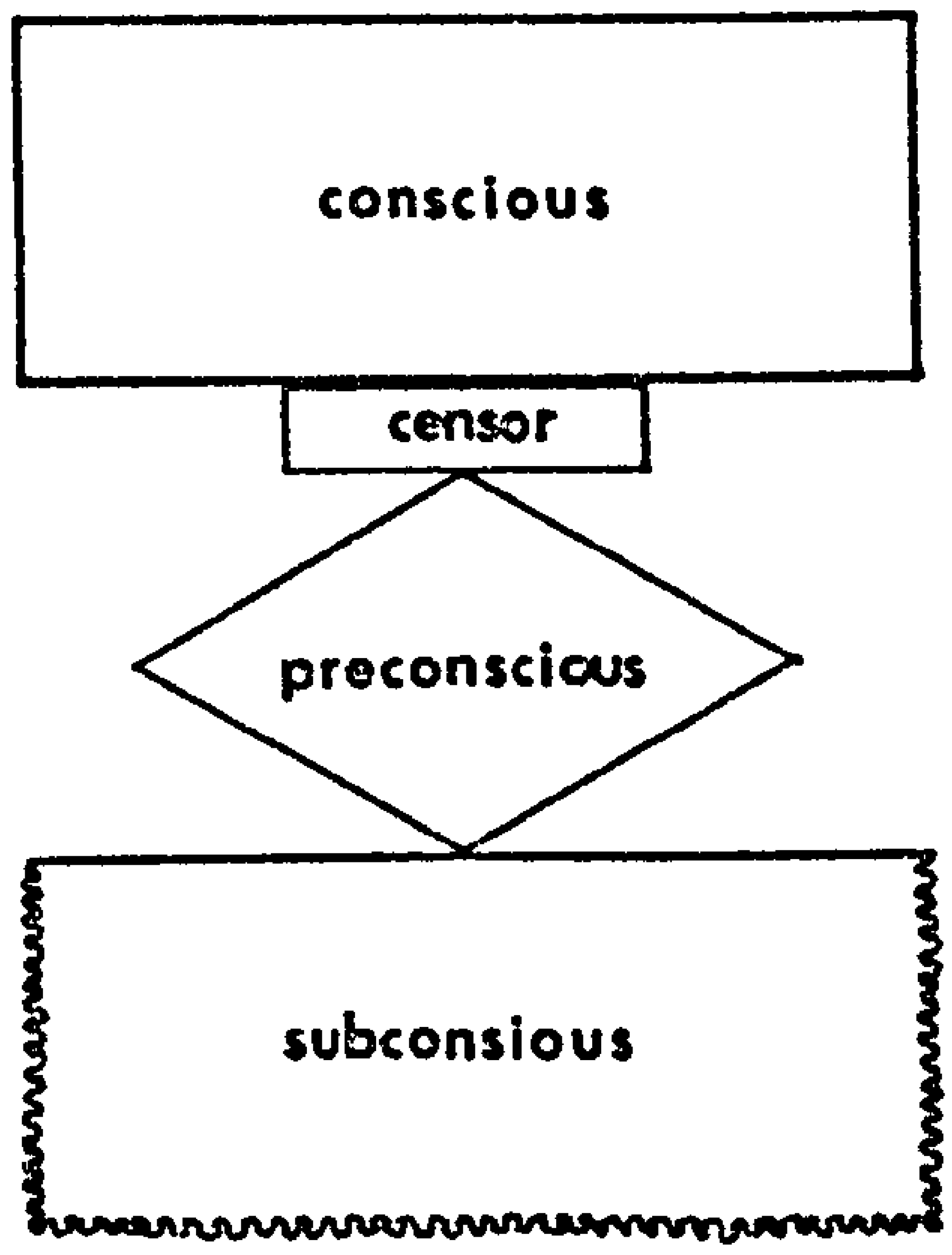


Fig. 4.5.B.

It should be noted that this censor is not infallible, and that messages can pass through depending on the degree of commitment, type of education and level of sensitivity and the receptivity of the person to his own impulses and intuition. It is those moments when this censor is bypassed which characterize the creativity of an individual. So it is necessary at this stage to try and understand the meaning of creativity and its importance to the designer at work.

4.6. CREATIVITY and IMAGINATION

> "Creativity : an arbitrary harmony, an expected astonishment, a habitual revelation, a familiar surprise, a generous selfishness, an unexpected certainty, a formable stubbornness, a vital triviality, a disciplined freedom, an intoxicating steadiness, a repeated initiation, a difficult delight, a predictable gamble, an ephemeral solidity, a unifying difference, a demanding satisfier, a miraculous expectation, an accustomed amazement".
>
> G.M.Prince (17)

Definitions of creativity vary and are often misleading, they may, however, provide a point of departure for more systematic investigation. The Oxford dictionary gives a straight forward meaning of 'create' as to bring into being, cause to exist, to form out of nothing. Yet Morgan (18) lists twenty five different definitions of creativity which he extracted from earlier literature. Spearman defined creativity as, "the power of the human mind to create new content -- by transferring relations and thereby generating new 'correlates' -- extends its sphere not only to representation in ideas, but also to fully sensuous presentations" (19).

Most of these definitions imply that creativity involves the development of something unique. However, approaches of investigation in creativity may be grouped into five main categories :

a- Psychoanalytic

Freud was one of the first to suggest a clear theory of the creative act. For him, creative production was seen as the result of conscious conflicts of drives and needs sublimated through the ego's effort into outcomes useful to both the creator and society. He also believed that "the manifest artistic formulation" (20) was a restructuring of archaic subconscious images after these had been accepted as conscious symbols and after the symbols had been reformulated within contemporary acceptable modalities. Thus the creative process originates within and not outside the person, and the "the creation mirrors unconscious imagery after it has been processed through the ego" (21).

Jung (22), emphasies the concept of the collective subconscious as a storehouse of racial memories handed down from the distant past. He states that the creator, in raising his image from the deepest subconscious, brings it into relation with conscious values, transforming it until it can be accepted by the minds of his contemporaries.

b- Humanistic

The humanistic position is that creativity requires flexibility between rational and emotional, objective and subjective experiences. Maslow (23) has been the leading proponent of self-actualization. Self-actualization is considered to be the motivating drive for creativity. The central view in the humanistic approach is that one should accept human sensuality, for with this acceptance one is brought to a state of awareness and readiness for creativity. The rejection of sensual orientation reduces the capacity to be alive and creative.

Thus for the creative designer two conditions should prevail, one internally and the other externally. The internal condition for creativity is self-actualization; openness to experience, internal scale of evaluation, and the ability to manipulate elements and concepts. The external conditions that facilitate creativity are the unconditional acceptance of the worth of the individual, the absence of critical evaluation in the environment, and the psychological freedom.

c- Trait-factorial

Statistical techniques of factor analysis are frequently used to identify traits, and factorial approaches are used to isolate seperate intellectual factors. The most notable proponent of the trait-factorial approach is Guilford (24). He envisaged a three dimensional theoretical model of intelligence called the "structure of the intellect" (SI).

These three dimensions of the SI model are :

i. contents; composed of information in the environment discriminated by the organism,

ii. operations; the intellectual processing that occurs in relation to that information,

iii. products; the forms that the information takes after processing.

However, this category of investigation into creativity is gaining popularity because of its mathematical nature, although the reliability of much of the methods used is questionable.

d- Holistic

Basically this is the Gestalt point of view, which describes creative thinking as occuring in a global situation. It is not a piecemeal operation but rather one in which each step is affected by the whole situation. A creative contribution, then, is made through simplification, preference for balanced, regular, symmetrical patterns, and intrinsic motivation of object structure.

e- Associationistic

For some investigators, the ability to think creatively is a matter of utilizing associations and analogies spontaneously. Koestler (25) suggests that creativity involves, the displacement of attention to something not previously noted, which was irrelevant in the old and is relevant in the new context; the discovery of hidden analogies as a result of the former; the bringing into consciousness of tacit axioms and habits of thought which were implied in the code and taken for granted; and the uncovering of what has always been there.

In conclusion, therefore, it appears that the theories concerned with creativity have more points of divergence than points of agreement. However, most of those theories agree on one item of great importance. The words, conflict, interaction, association and dissociation, which are used in most definitions indicate that the creative act is a multi-dimensional activity involving the interplay of more than two elements of the human intellect. Human responses are not governed by the Newtonian notions of reaction, but rather by the multi-dimensional behavioural entity.

4.7. CREATIVITY and DESIGN

To be able to conceive of the design activity as a creative process, one should transcend the usual view of behaviour as a linear stimulus response function. Thus, the creative problem solving ability may not be represented in one or two dimensions only since the stimuli act in a multi-dimensional reality. And the creative design activity in its totality, therefore, may not be externalized as a sequence of logical events even though it may possess several logical processes.

Taylor states that, "creativity is often not responsive to conscious efforts to initiate or control it since it is highly unpredictable and is resistant to scheduling" (26). At some point, however, some conscious discipline and control is beneficial and necessary.

While assessment of creativity involves important problems which have not yet been resolved, such as identifying measurement criteria, differentiating creativity from other mental processes and its isolation in a structured situation, the development of creativity invites more complex questions. Osborn (27) stimulated much thought concerning techniques for developing creativity. However, though some techniques are highly successful, they tend to have a limited area of application. The better approach could probably be the development of the creative ability in the earlier stages of education. This would result in human mental abilities that contribute to their potential for creative production in a more creative society.

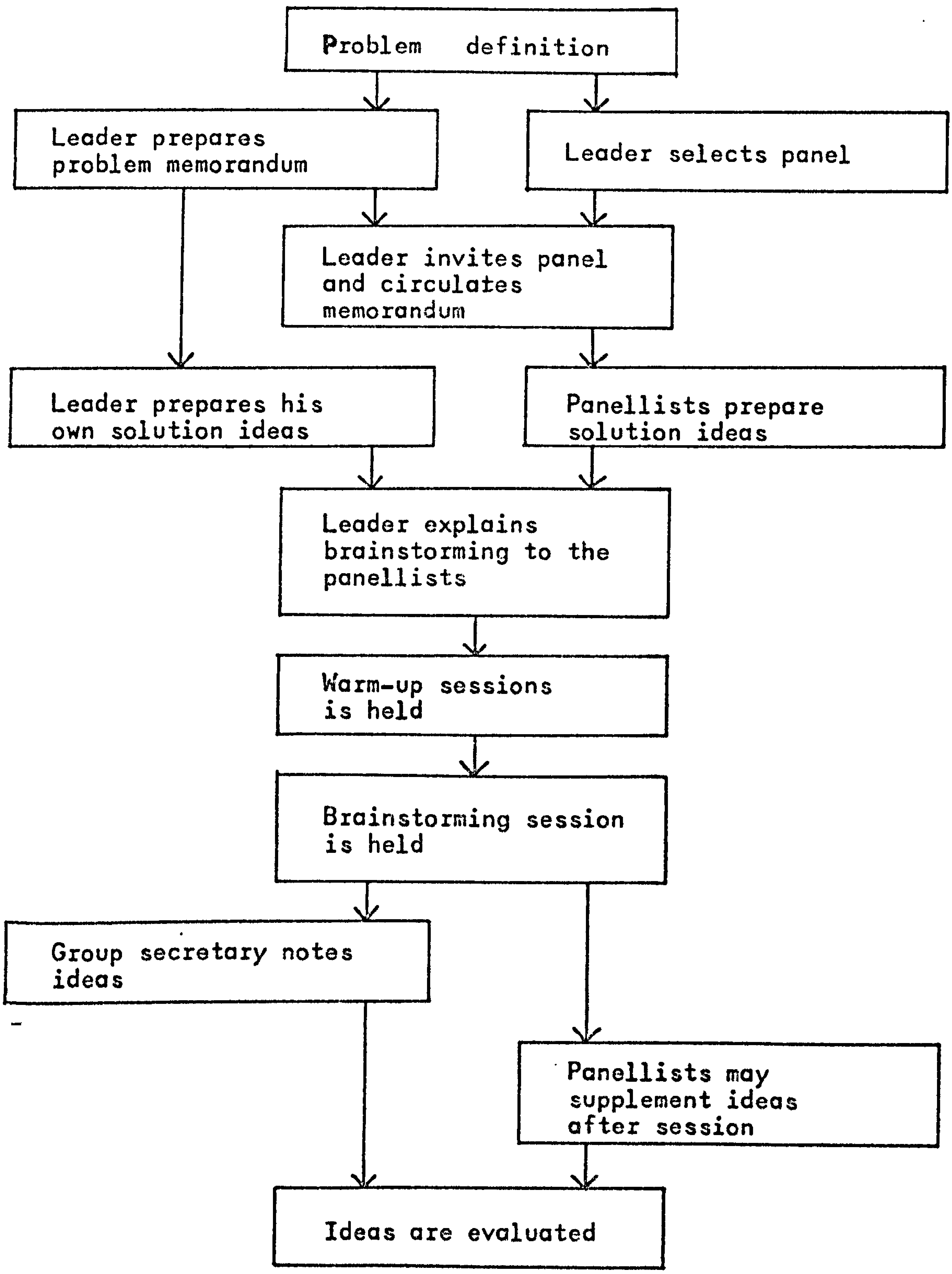


Fig. 4.7.A BRAINSTORMING BY ALEX OSBORNE 1963

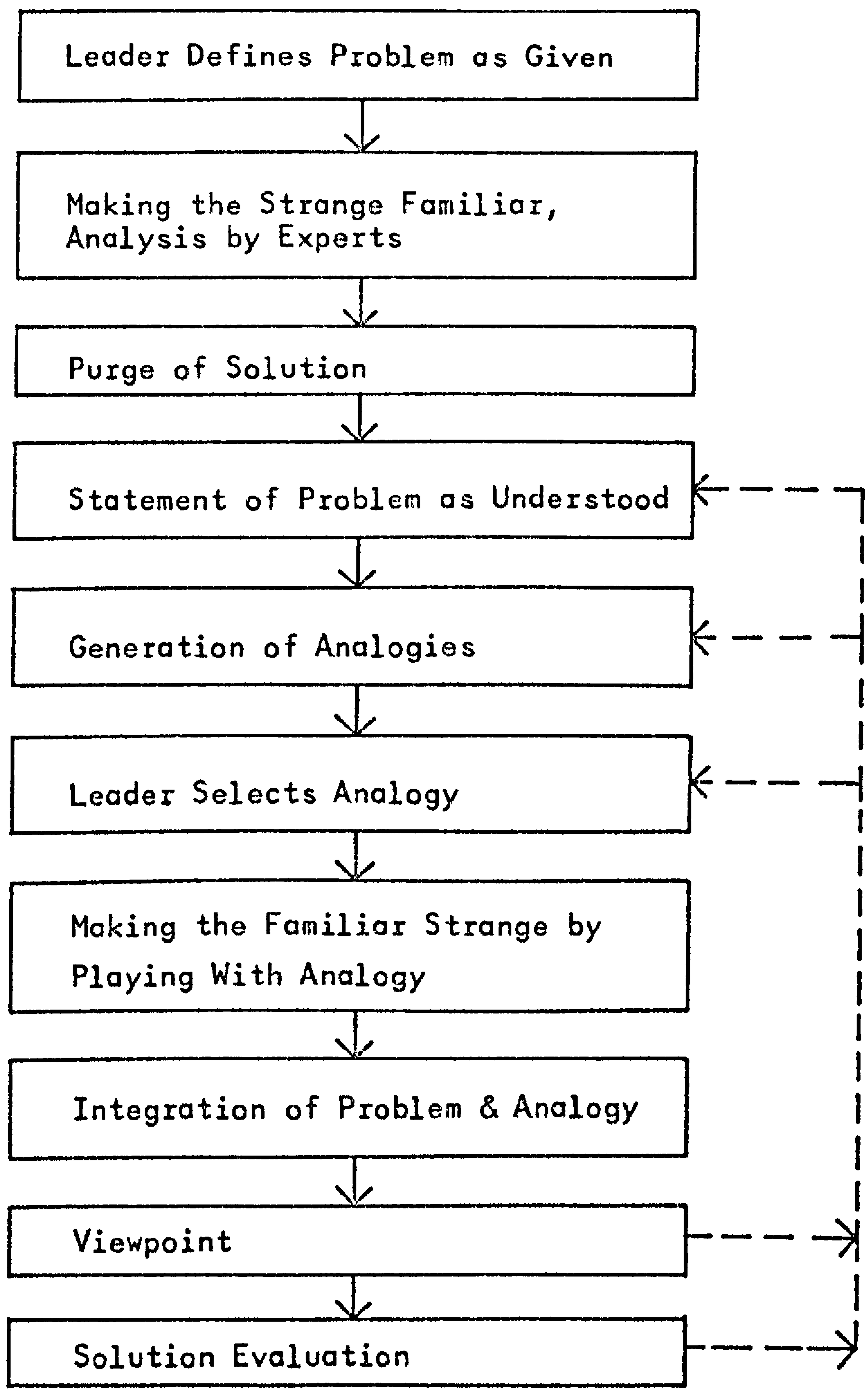


Fig. 4.7.B. SYNECTICS PROCEDURE after Gordon

It has been common to assume that a good way to train persons for creativity is to put them in an unstructured, permissive environment for a time. For example, brainstorming and synectics sessions are supposed to increase creative potential by freeing participants to think and say anything, no matter how ridiculous it might seem in more conventional circumstances. While there is certainly evidence that the volume and diversity of ideas can be temporarily increased in this fashion, it has not been definitely established that this effect persists long enough beyond the training sessions to shift the whole course of a life towards creative endeavor. In the psychological literature creative thinking designates a special class of activities with somewhat vague and indefinite boundaries. Problem solving is called creative if one or more of the following conditions are satisfied :

a- the product of the thinking has novelty and value,

b- the thinking is unconventional in the sense that it requires modification or rejection of previously accepted ideas,

c- the thinking requires high motivation and persistence,

d- the problem as initially posed was vague and ill-defined so that part of the task was to formulate the problem itself.

All of these characteristics can be exhibited to a greater or lesser degree in any architectural design process. So if it should be accepted that the design activity as a creative process is to develop a balance between the judgement and the imagination, as well as the open awareness of the environment through all of the senses and the deep self-searching into layer upon layer of data stored in the memory cells, between the logic and the emotion, between the deliberate creative effort and the incubation. Then surely that is the clue to the educational system. The education of the designer should strive to develop that balance so the design activity would flow in its cyclic process in a coherent and productive manner.

There are several factors that seem to dominate the creative activity in architectural design, especially from the point of view of form conformation.

a. A rejection of trends as well as rigid conventions, and an acceptance of the idea that only information that is derived from subjective experience can be considered valid and expressive.

b. The information which is gained from an appreciation of the physical capacities of the society and its social feelings is as important as the information restricted to the visible facts of nature.

c. Architectural form is dependent upon the expressive and constructive use of the visual phenomena as well as literary or other social associations.

d. The total personality is involved in making aesthetic decisions, and the personal preferences form the inescapable basis of a truly representative expression.

e. Architecture is not based on a number of static concepts but changes and extends its boundaries in response to the shifts of emphasis in the intellectual and emotional situation of each period in history.

The major consequence, therefore, is that the prevailing idea of fundamental training needs to develop personal enquiry on the basis of practice, as much as theory, seeking always the individual solution to each problem. It needs to place emphasis on intuitive and analytical work with materials and formative principles on the widest spectrum. There must also be a primary concern for visual and social response to what is taking place on which decisions will be dependent. Those decisions will inevitably be influenced by subjective preference arising out of the differences in the socio-psychological make-up of each and every individual designer.

REFERENCES

1. Gutman, R.

People and Buildings

New York, 1972

p.7

2. Broadbent, G.

Design in Architecture

London, 1973

p.135

3. Pevsner, N.

Pioneers of Modern Design

London, 1936

4. Archer, L.B.

Systematic Method for Designers

'Design', April 1963

pp. 46-49

5. Dubos, R.

Man Adapting

New Haven 1966

6. Rapoport, A. and Watson, N.
Cultural Variability in Physical Standards
Transactions of the Bartlett Society No.6
London, 1967, 1968
pp. 63-83

7. Meyer, H.
quoted in
Broadbent, G.
op.cit.
p.78

8. Mies Van der Rohe
quoted in
Broadbent, G.
op.cit.
p.78

9. Vasquez, A.S.
Art and Society
London, 1973
p.25

10. Hitchcock, H.R. and Johnson, P.
The International Style : Architecture Since 1922
New York, 1932

11. Helson, H.
Adaptation Level Theory
New York, 1964

12. Vernon, J.
Inside the Black Room
Harmondsworth, 1963

13. Jencks, C.
Architecture 2000
London, 1973
pp. 27-28

14. Greenberg, C.
quoted from
Hall, J.B. and Ulanov, B. (edit.)
Modern Culture and the Arts
New York, 1972
p.150

15. Herrick, C.J.
George Ellet Coghill
London, 1958

16. Papanek, V.J.
Solving Problems Creatively
London, 1964
pp. 169-196

17. Prince, G.M.
The Practice of Creativity
New York, 1970

18. Morgan, D.N.
Creativity Today
Journal of Aesthetics (12). 1953
pp.1-24

19. Spearman, C.
Creative Mind
New York. 1931
p.148

20. Freud, S.
Civilization and its Discontents
New York, 1933

21. Taylor, I.A.
Perspectives in Creativity
Chicago, 1975
p.5

22. Jung, C.G.
The Archetypes and the Collective Unconscious
New Jersey, 1959

23. Maslow, A.H.
Motivation and Personality
New York, 1954

24. Guilford, J.P.
Intelligence, Creativity and their Educational Implications
San Diego, 1968

25. Koestler, A.
The Art of Creation
London, 1969
pp.119-120

26. Taylor, I.A.
op.cit.
p.24

27. Osborn, A.F.
Applied Imagination
New York, 1963

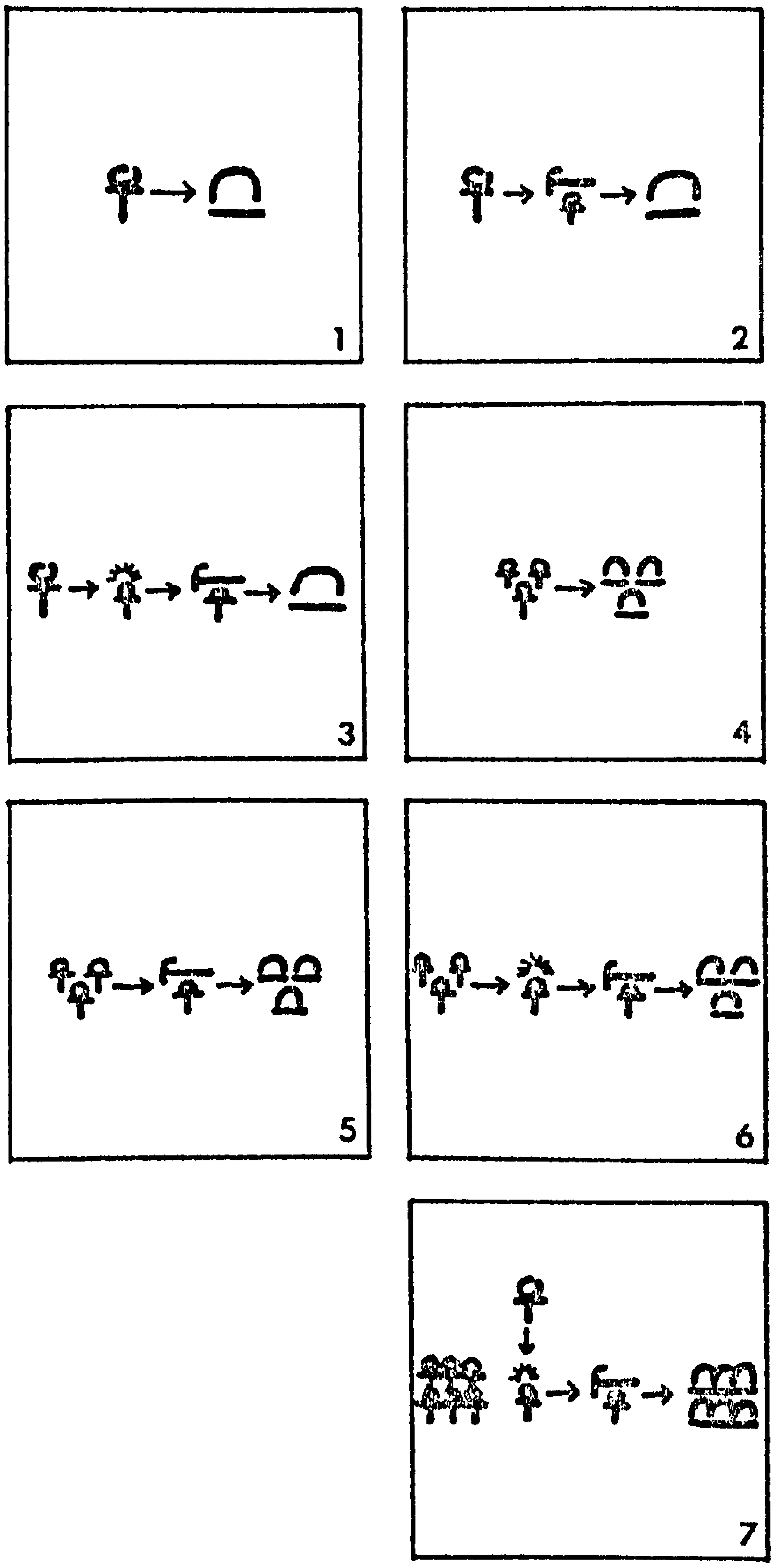
Chapter Five

Architecture and Design Methodology

5.1. The ROLE of the ARCHITECT and ARCHITECTURAL DETERMINISM

Despite the findings of social and behavioural science research, which indicate that physical design factors do not by themselves determine patterns of social interaction or produce desirable social relations, still many architects and planners continue to ignore the complexity of the relationship between man, society and spatial organization. They maintain their belief in the doctrine of architectural determinism, that the designer's decisions about the form of the building and its placement or setting will influence, and possibly change, the social relationships of the users.

The persistence of this doctrine could be attributed to the fact that a building cannot be conceived apart from the human activities it serves to facilitate and encourage. This fact led many architects to be critics of society, indeed architecture is now one of the few fields that keep alive the idealist traditions of human thought. Many architects hold to the vision of some future social organization that comes closer to achieving goals of justice and humaneness than those in the existing society. Thus, they regard every building as an opportunity to come closer to that dream of an ideal state of existence. And as long as architects hope that certain social outcomes will result from their designs they will tend to believe and expect that these outcomes will happen.



1 occupants build own house
2 craftsman offers services
3 architect intermediary bet. occupant & craftsman
4 community builds collectively
5 community delegates tasks to craftsman
6 architect intermediary bet. community & craftsman
7 nonrelation : occupants take no part in it

Fig. 5.1. A. RELATIONSHIP BETWEEN MAN & ENVIRONMENT

The basic problem however, is that designers are preoccupied in satisfying the physical needs, shelter, climatic control, economics and other physically measurable factors, in the hope that these will reciprocally change society to a better state. But the human society does not function like that, there are the needs of the 'soul' which should be satisfied alongside the needs of the body to keep in check the stability of the society. To satisfy these needs of the 'soul' recent research trends have been behaviouraly oriented into traditions and delving into nature. The aim is to find out the effect of the built environment physical manipulation on the behaviour of the individuals in a society. Consequently it is not the physical sciences which should arouse the apprehension of the anti-determinist, but psychology and the social sciences. Sufficient has already been achieved in these sciences to make the human scientists expect an ever increasing success in explaining and predicting human behaviour. And it is believed that success in explaining and predicting would eventually lead to success in manipulating and controlling.

The theory of architectural determinism asserts that architectural design has a direct and determinate effect on the way people behave. It implies a one-way process in which the physical environment is the independent factor, and human behaviour the dependent variable. Though physical and administrative measures cannot by themselves cause a social change, they may influence the promotion of certain social patterns and interactions. This occurs only if the seeds of those social ideals were originally present in the society. To achieve a more viable design theory, architectural training must begin to develop a more realistic understanding of the relations between architectural design and human behaviour. An understanding that reflects what actually happens rather than what is desirable or what hopefully might happen.

The first step to establish such understanding must be to introduce the distinction between "a potential and an effective environment" (1). The physical form is only a potential environment as it only provides settings or possibilities for social interaction. The effective or total environment is the sum total of the physical form plus the behaviour of its users, and this will vary in accordance with the social structure and culture within which the user operates.

The second fact to be recognised is that human beings are a good deal more autonomous and adaptable than a deterministic theory would lead one to believe. This is evidenced by people's adjustability which is more than often supposed. As human needs and desires are affected by social and cultural situations, their optimum levels fall within a wide range of alternatives. This leads to the assumption that the architect should still be free to design on the basis of a low criticality of choice, rather than be stifled and suppressed by a high criticality of constraints, because in the real life situation this degree of determinism is never achieved. It is worth noting that as Broady writes, "human behaviour is like runny jelly -- not formless, but wobbly and changeable; and since he cannot predict its changes, the designer also has to allow as best as he can for such new demands as may come to be made of his buildings" (2).

"Form harmony must rest only on the purposive vibration of the human soul" (3), this principle has been designated as the principle of inner necessity, which according to Kandinsky originates from three elements :

a. Every artist, as a creator, has something in him which demands expression (element of personality)
b. Every artist, as the child of his time, is impelled to express the spirit of his age, dictated by the period and particular country to which the artist belongs (element of cultural background)
c. Every artist, as a servant of art, has to help the cause of art (element of the purest manifestation of art, constant in all ages and among all nationalities)

These three necessities are the constituent elements of any work of art, and their interpenetrations forms the unity and the aesthetic appeal of the work.

The interaction between man and his environment is a complex one. Waddington states that, "Man in the world is like a caterpillar weaving its cocoon. The cocoon is made of threads extruded by the caterpillar itself, and is woven to a shape in which the caterpillar fits comfortably. But it also has to be fitted to the thorny twigs, the external world, which supports it" (4). The designers try with all their instruments, intellectual and applied, to come to grips with this complex relation between man and environment. In doing so, many methods and systems have been devised to facilitate the role of the designer.

5.2. REVIEW of DESIGN METHODS

By the early sixties, systems engineering, operational research, information theory, cybernetics, new mathematics and computing, were all available to the design theorist in highly developed forms, and it was from these sources that design methodology emerged as a discipline in its own right. Yet, there is no doubt that architectural theory and design methods are in a confused state. Architectural theory is the set of principles that guide the architect in making decisions about the complex problems that arise in translating the requirements of the brief into the design of a building. Design method is a series of mental procedural steps that architects may adopt in applying their principles to the design process.

Changes have been taking place in the arena of architecture due to; the break-down in established intellectual absolutes, the rise of pragmatic philosophy and the general emergence of a scientific ethos as the dominant ideology of Western culture. The necessity of a theory or theories for architectural practice is being argued. Few architects are willing to admit or defend their application of principles on the grounds of intuition alone and some wish to abandon intuition entirely as a basis for decision-making. Others feel there is no other method relevant to the architect's task while still other architects believe in intuition but would like a method to narrow down the range of decision in which intuition still is the most beneficial operator. Therefore, architects may be ranked along a continuum with the believer in intuition located at one end and the believer in a totally scientific approach to design at the other end. Most architects in fact do not fall at either of these two extremes but their beliefs lie somwhere in between; where design is considered as an achievement of the individual architect requiring the intervention of his creative talents in addition to scientific methods devised and used to evaluate the proposed design.

Architectural design philosophy in the twentieth century has been dominated by the concept of the machine. Everyone is familiar with Le Corbusier's nineteen twenties' expression, "a house is a machine for living in". Many will have heard of "the architecture machine" (5) of Negroponte in the seventies. Although the 'machine for living in' and the 'architecture machine' seem to crop from the same roots of philosophical thought, they actually represent very different philosophies concerning the role of the machine in architecture. For Le Corbusier the machine was a source of aesthetic inspiration, but he was primarily concerned with the architectural product. For Negroponte the 'architecture machine' was meant to relate to the process. The machine was to take over the role of designing, with or without a human partner.

This contrast between the machine as architecture and machine as architect marks a radical shift in architectural thought. The design process became a major research topic while the vast majority of architects continued to rely on the traditional design methods. Examples of, and proposals for, new design methods began to appear in the early sixties, often as developments from the operational research techniques that originated in the second World War, and hence often called 'systematic methods'. One approach to this methodology was described by Gugelot (6), who was a highly successful designer, as a design method of six stages :

a. information stage
b. research stage
c. design phase
d. decision stage
e. calculation
f. model-making

Asimow (7), on the other hand, describes design almost entirely in terms of information processes. His method is derived mainly from systems engineering. He describes two scales of operation :

A) The first he calls his strategy or design morphology and it comprises the following stages :

a- Feasibility study

b- preliminary design

c- detailed design

i. preparation for design

ii. overall design of subsystems

iii. overall design of components

iv. detailed design of parts

v. preparation of assembly drawings

vi. experimental construction

vii. product test programme

viii. analysis and prediction

ix. redesign

d- planning the production process

e- planning for distribution

f- planning for consumption

g- planning for retirement of the product

B) The second of the two scales which he calls design process, is a general problem solving procedure, and has the following stages :

a. analysis

b. synthesis

c. evaluation and decision

d. optimization

e. revision

f. implementation

Confusion can be seen in Asimow's methodology. He sees morphology as a vertical component and the process as the horizontal, which occurs in each step of the morphology. It would be more logical to consider the vertical as the design process which has horizontal decision sequences which consist of complete acts of thought. However, by the time Asimow published his book in 1962, design methodology had been established as a field of enquiry, and there was a consensus on the basic form of the sequence of design process. The terminology and the feedback loops may have not been settled then, but basically the design process was divided into :

1- analysis;

2- synthesis;

3- evaluation.

After this disintegration of the design process has been accepted and established, researchers started to develop and describe various techniques for each stage, like the interaction charts and the random connection diagrams for analysis; brainstorming and synectics for synthesis; and statistics computation and simulation for evaluation. Every effort was made to point out that systematic design was different from traditional design. It was not considered as complementary or a tool to increase the efficiency of the designer, but that it was a totally different type of activity.

ANALYSIS	SYNTHESIS	EVALUATION	SOURCE
Listing all design requirements and reducing these to a complete set of logically related performance specifications	Finding possible solutions for each individual performance and building up complete designs from these with least possible compromise	Evaluating the accuracy with which alternative designs fulfill performance requirements for operation, manufacture, and sales before the final design is selected	Jones (1963) "A method of systematic design" pp. 53-73 "conference on design methods"
Clarifying of goals; identifying problems, nature of difficulties; exploring relationships; producing order from random data	Creating part-solutions; combining part-solutions into consistent and feasible overall solutions; generating of ideas	(Appraisal) applying checks and tests; applying criteria, constraints, and limits; selecting of 'best' solution from a set; testing for consistency	Markus (1967) "AJ. 20 December" pp. 1567-1573
Collecting and classifying all information relevant to the design problem on hand	Formulating potential solutions to parts of the problem, which are feasible when judged against the information contained in the analysis stage	Attempting to judge by use of some criterion or criteria which of the feasible solutions most satisfactorily answers the problem	Luckman (1967) "O.R. Quarterly 18(4)" pp. 345-358
Breaking the problem into pieces	Putting the pieces together in a new way	Testing to discover the consequences of putting the new arrangements into practice	Jones (1970) "Design Methods"

TABLE (5.2.A) SOME OF THE DEFINITIONS GIVEN FOR THE THREE STAGES OF THE SYSTEMATIC DESIGN PROCESS

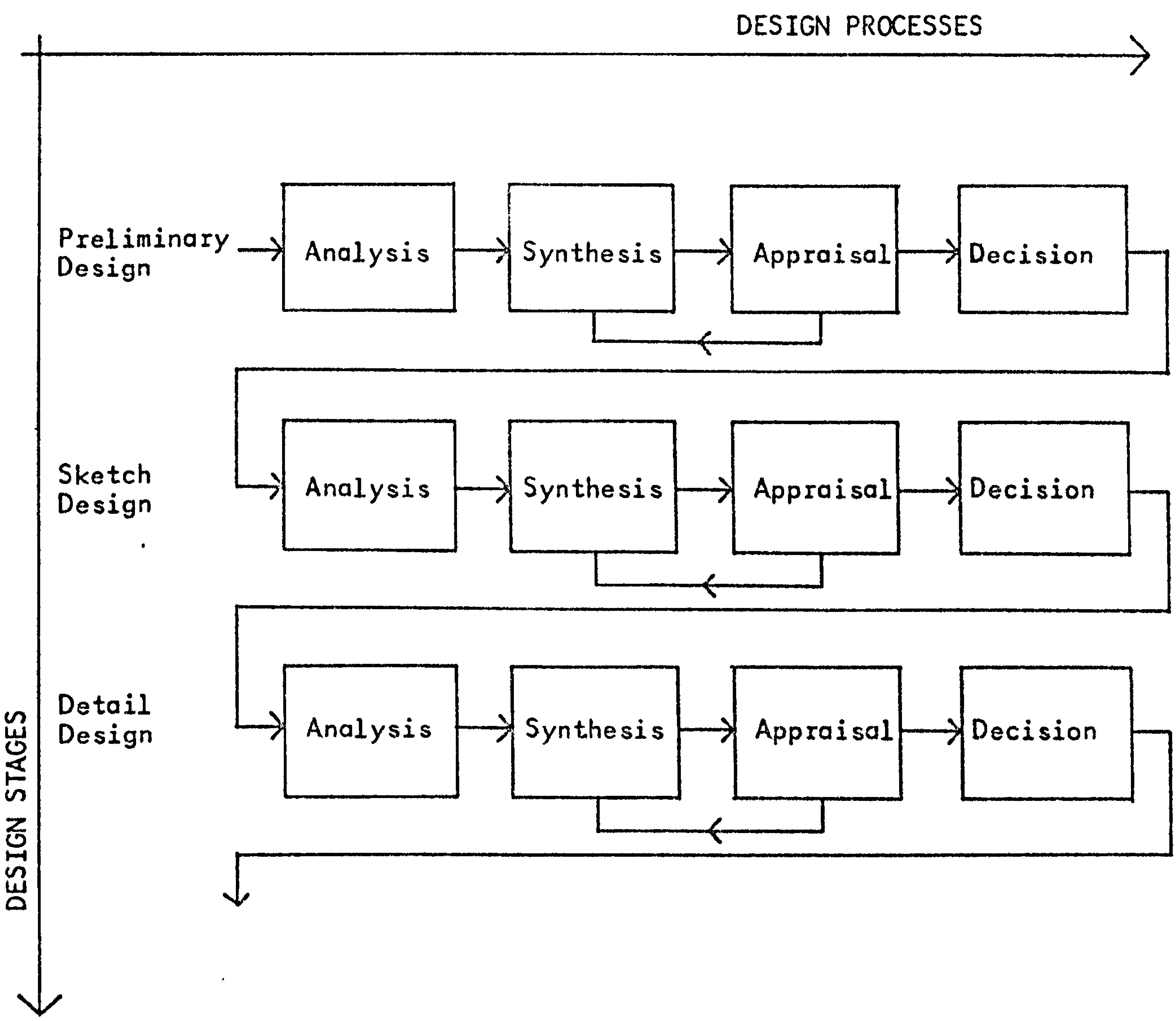


Fig. 5.2.B BASIC MODEL OF THE DESIGN ACTIVITY

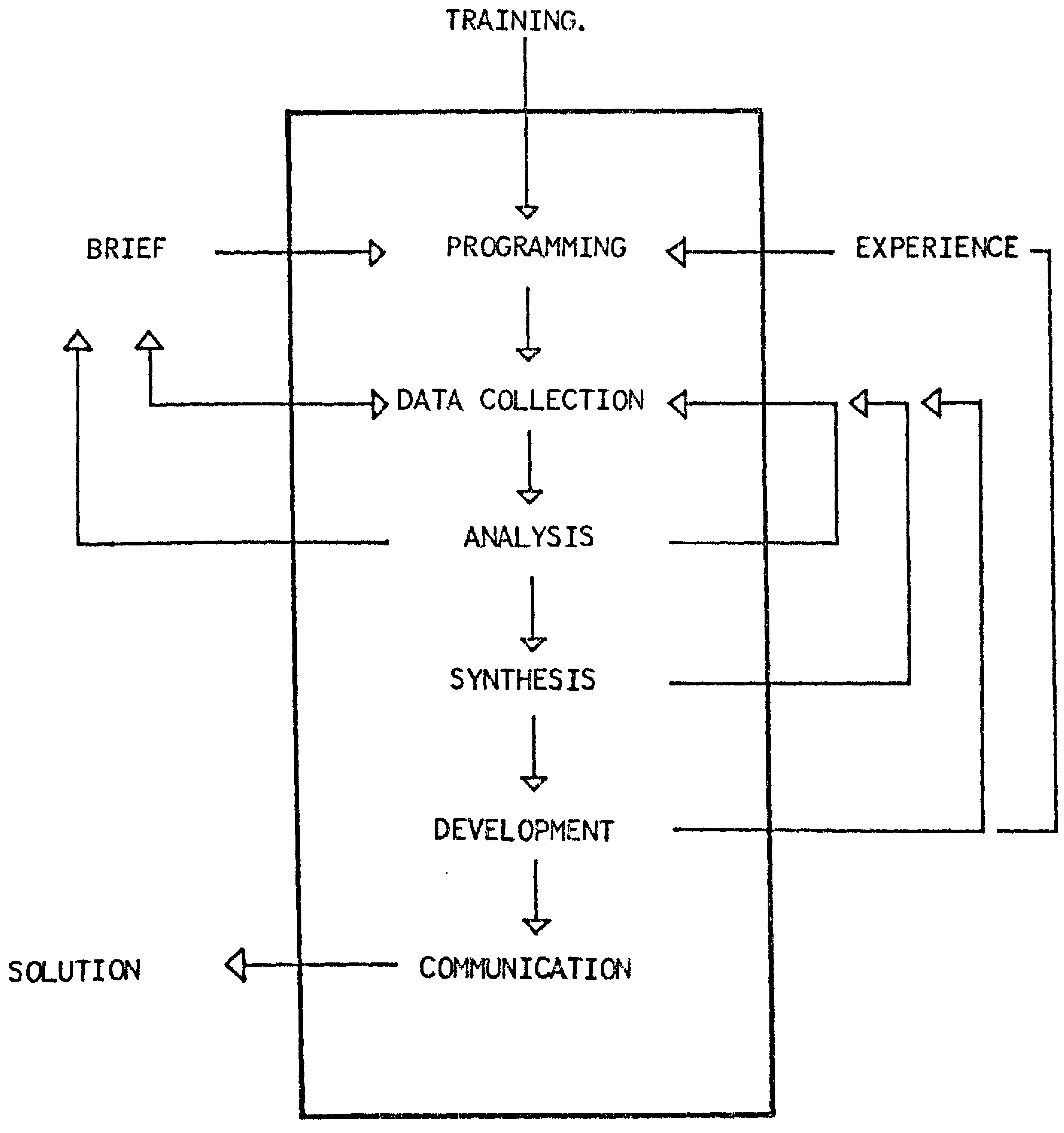


Fig. 5.2.C. ONE ATTEMPT TO PLOT THE SEQUENCE OF THE DESIGN PROCESS IN A FLOW CHART WITH FEED-BACK LOOPS.

after Archer.

Jones states that, "What we have at the moment are the confusing results of pulling the traditional design methods to pieces. The reintegration of these pieces into a coherent new process, that would operate effectively over all levels of generality and details, has yet to be achieved" (8).

The result of this was that the proponents of systematic design were detached from the real life situation, and instead of designing buildings; charts and diagrams became the substance and main goal of their design activity.

However, there were few theorists who studied the activity of the designer at work, and tried to formalise the design process on this basis. Thornley (9) established a design process based on what the designer actually does when he is designing something. He reached his conclusions on the basis of his own experiences. The method he proposed consisted of four stages summarised as follows :

A- The accumulation of data.

B- The isolation of a general concept or 'form'

a. the essential purpose of the building
b. the relationship of the building to the individual
c. the relationship of the building and its occupants to the surrounding social and commercial pattern
d. the relationship of the building to its physical surroundings

e. economics

f. preliminary consideration of spatial and formal organization

g. preliminary consideration of structural organization

h. the establishment of an appropriate 'Form' or generalized concept

C- The development of the 'Form' into the final scheme

a- detailed consideration of spatial and formal organization

b- detailed consideration of structure

c- the development of architectural values

D- The presentation of the final scheme.

Chermayeff and Alexander (10) went so far as to dismiss the possibility of any 'good' architecture as long as the architect is bound by traditional attitudes and approaches. They suggested that words such as 'yard', 'garden', 'kitchen' and 'bedroom' which are "firmly anchored in the culture of days gone by" could only be misleading in the search for 'better' solutions. Since these words are 'heavily loaded' they concluded that, "until one stops using popular or generalized words to describe specific objects and events, one will continue to be deceived by the associations with them to fail to arrive at the essential functional aspect of things and places that is the planner's actual concern in problem-analysis and design" (11). Of course, they missed the whole point. Naturally, these words carry associations and it is this loading of meanings and associations which makes communication possible. The relationship between a word and what it stands for, once formed, cannot be unilaterally changed. People will bring their expectations to the judgement of any building, whether the designer likes it or not, and if this building does not satisfy those expectations based, among other things, on past experience, then it has failed dramatically and people will not be capable of communicating with the concepts it carries.

The most significant feature of most of the approaches to systematic design is the number of studies on computer aided design. This became a major subject in its own right, and with the increased accessability and versatility of computers, and the adoption of system building techniques, like standardized and prefabricated building components, now systematic design is virtually synonymous with computer-aided design. However, it has been noticed by several theorists that most of the computer programs that have been successfully developed are concerned with space allocation and circulation. One may thus agree with Broadbent's statement; "and whilst these are important aspects of building design one cannot help feeling that they have attracted so much attention because they lend themselves fairly easily to programming" (12).

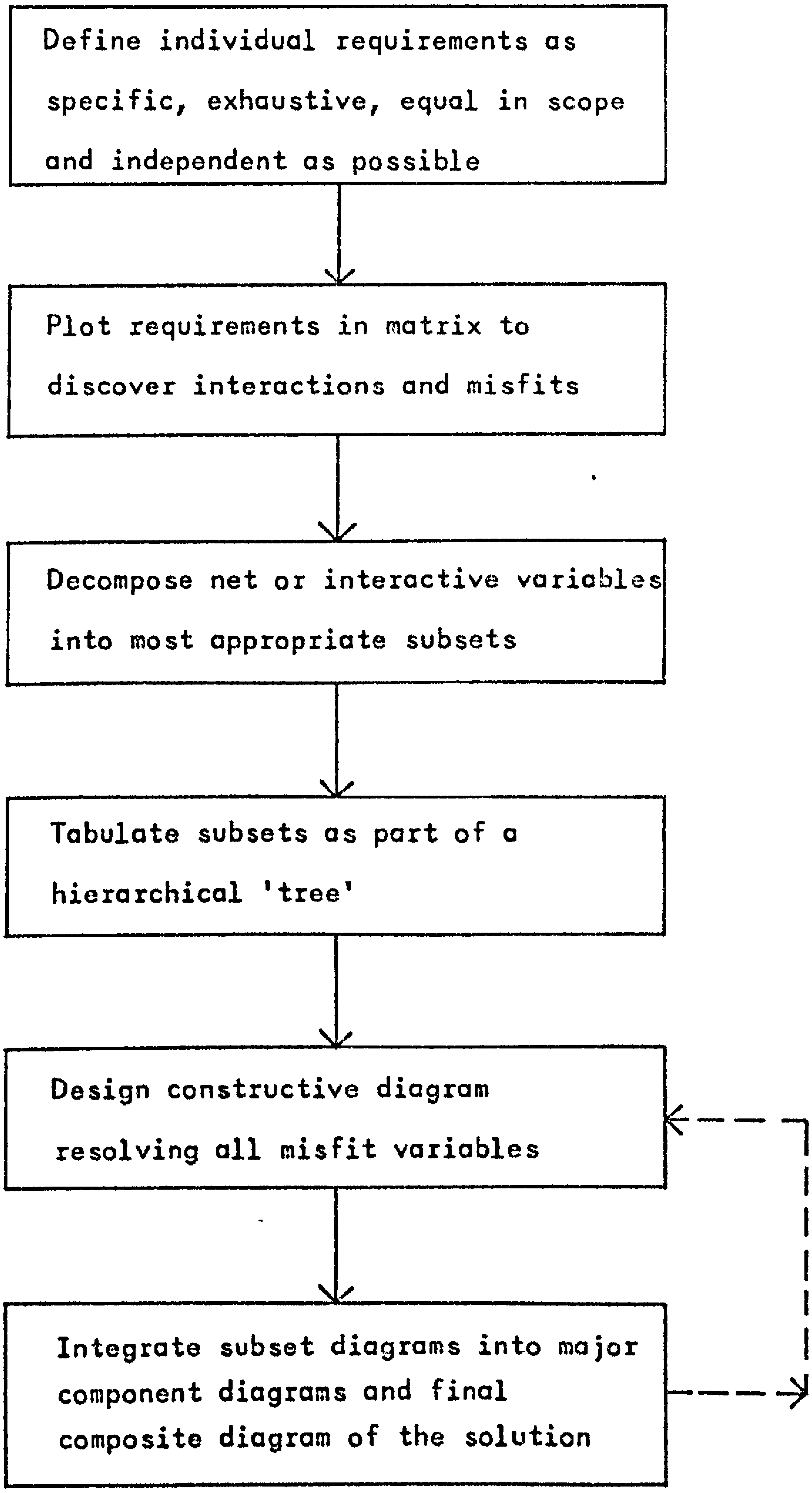


Fig. 5.2.D ALEXANDER'S APPROACH TO THE DESIGN PROCESS

Yet problems of space-allocation, which are considered easier, have several difficulties concerning the approach of the computer in solving them by the optimization of circulation routes. Broadbent states that, ".... such studies isolate one aspect of planning which itself is only part of architectural design.... They ignore the interactions between planning and environmental control, in terms of aspect, sun path, noise,.... economy of service runs, relationship of plan to structure. The concentric, irregular plans which adjacency programs produce are often impossible, and certainly expensive, to build. They ignore such considerations as the relationship of floor area and shape to length of perimeter wall, which will have critical effects, say, on the running costs of services" (13).

Christopher Alexander, despite his own earlier use of the computer in design, has criticized strongly certain applications of computer-aided design. He stated that "A digital computer is, essentially, the same as a huge army of clerks, equipped with rule books, pencil and paper, all stupid and entirely without initiative, but able to follow exactly millions of precisely defined operations.... In asking how the computer might be applied to architectural design, we must, therefore, ask ourselves what problems we know of in design that could be solved by such and army of clerks.... At the moment, there are very few such problems" (14).

Kahn, expressed rather more forcefully his feelings about the environments that are to be created by the 'architecture machine', "Its going to look like shit -- guaranteed -- and it will only produce environments that machines or machine-like people will want to inhabit" (15).

Despite these strong criticisms of the use of computers as an aid to design, one cannot at this stage dismiss them completely. The value of computer aids to problem solving is by no means a foregone conclusion, considerable further research is required both to justify and (if justified) to refine the application of computer aids. Future developments in computer-aided design, therefore, will only be fruitful if more attention was given to what the human being can do best and what the computer can do best. A search must be made for the possibility of a dialogue between them. This should not necessarily mean either an 'interactive graphic' system, or the intimate 'architecture machine' envisaged by Negroponte.

However, design methodology is not only computer-aided design methods. One of the important function of methodology is to organize and rephrase some of the design problems thus facilitating their solution. The total man environment relationship if analysed into its basic systems may yield itself to the application of logical methods of understanding and appraisal.

5.3. SYSTEMS in DESIGN

According to Levi-Strauss (16) the images and representations that develop in a society are not simply derived from objective facts. He argues that there is no discernible biological basis for explaining all the variety of social structures and systems that emerge in different societies, or the preferences people exhibit for particular forms of representation.. Instead, the choice of a social structure is an arbitrary procedure derived from the social interrelationships whose sources can be found in the histories and rule systems of particular cultures. Although these rules may exhibit certain regularities in some cases, these regularities exist at the level of culture and cannot be reduced to biological or technical principles.

There seems to be a close parallel between these anthropological statements and the way modern man still approaches the world. The need to represent the phenomenal world in such a way that it becomes a coherent logical system persists in all modern organizations. The contemporary man's sense of place and relationship in a built environment is not dependent only on measurable objective facts, it is basically phenomenal. Broadbent states, "architects generally have used four distinct ways of generating three-dimensional form.... pragmatic, iconic, analogic and canonic, in chronological order of application" (17). However, the purpose of the aesthetic organization of the environment is to capitalize on the subjective schematization, and make it socially available. The resulting form does not correspond in a one-to-one relationship to the objective logical systems, but is a construct which represents these systems in a socially recognizable way, and a process by which man tries to make a representation of the world of phenomena.

It follows that no system of representation, no meta-language, is totally independent of the facts which constitute the objective world. The modern movements in architecture attempted to modify the representational systems which had been inherited from the pre-industrial past and failed, or seemed to fail, to operate or to keep pace with the rapidly changing technology. At this moment a total belief in the ability of science to reveal the essence of nature's mode of operation, and scientific methods of design, classification and analysis affected the mode of thinking and drove out any other alternatives. Form became merely the result of a logical process by which biological needs and operational techniques were brought together. This bio-technical determinism was in total contradiction to any theory that would give reference to an intentional iconic or representational form. However, a very significant phenomenon happened. Those who were preaching pure technology and scientific objectivity in design started to attribute iconic power to the creations of technology. This was due to the fact that

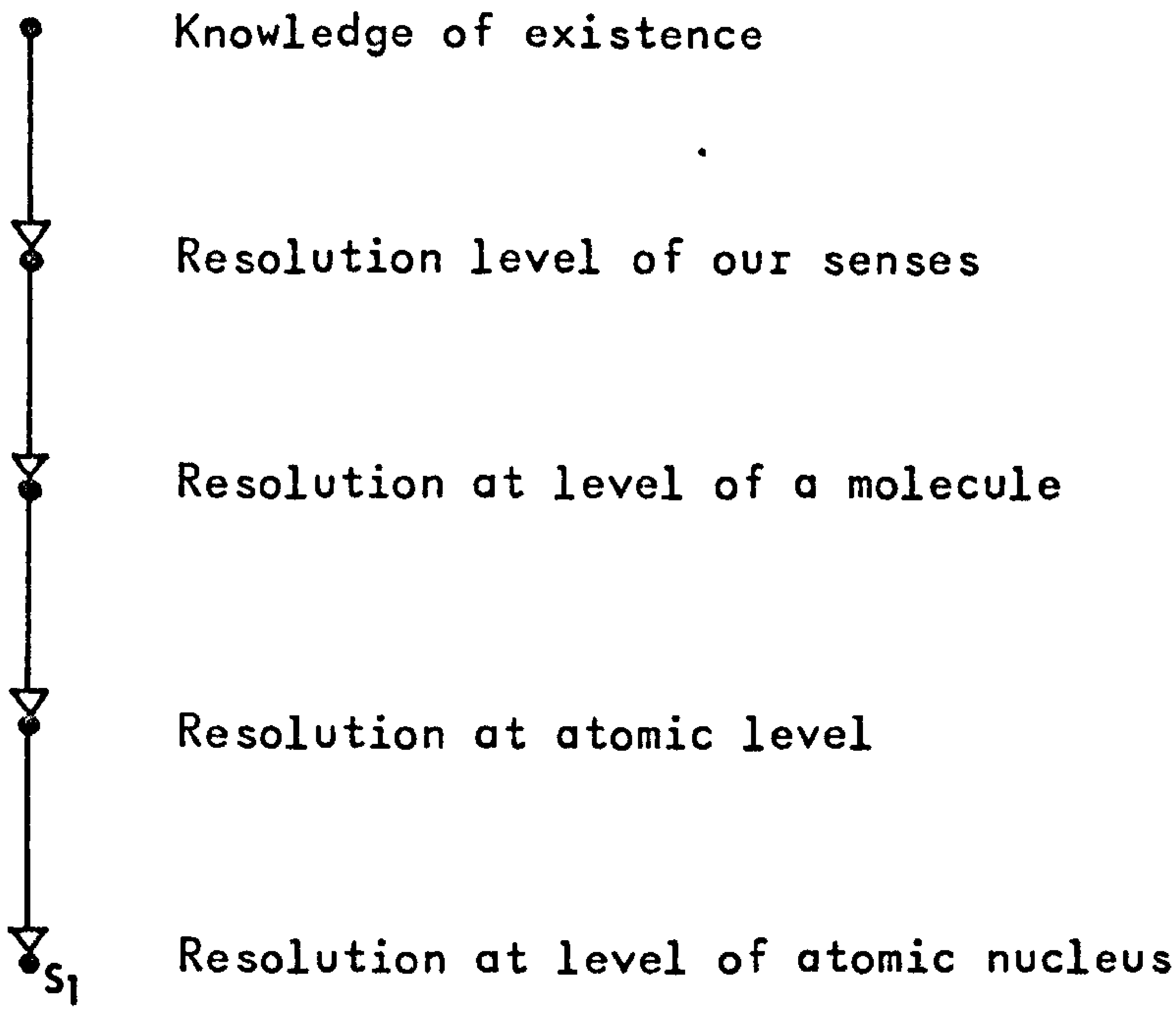


Fig. 5.3.A RESOLUTION GRAPH FOR THE ANALYSIS OF PHYSICAL SYSTEMS after Klir & Valach.

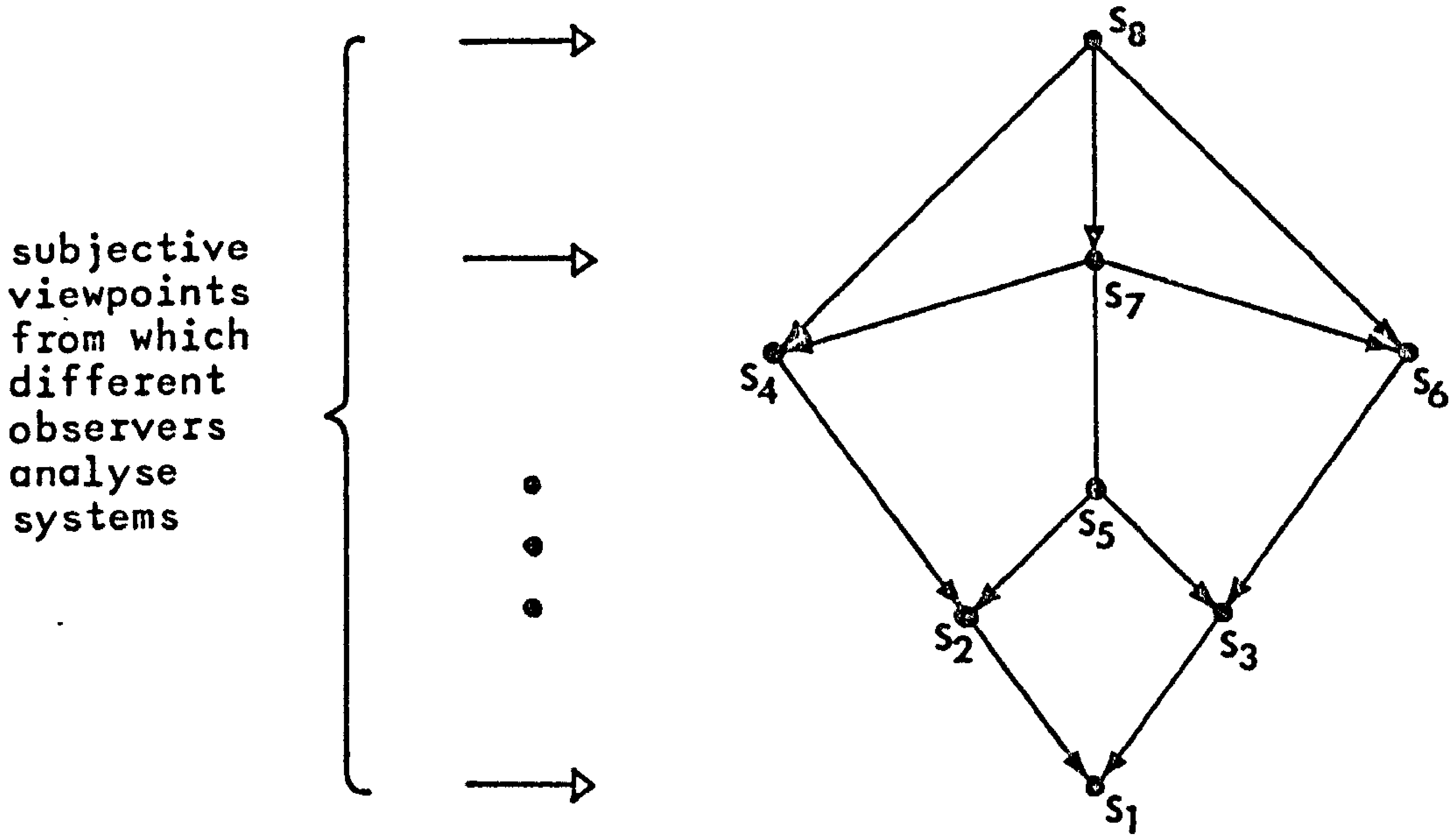
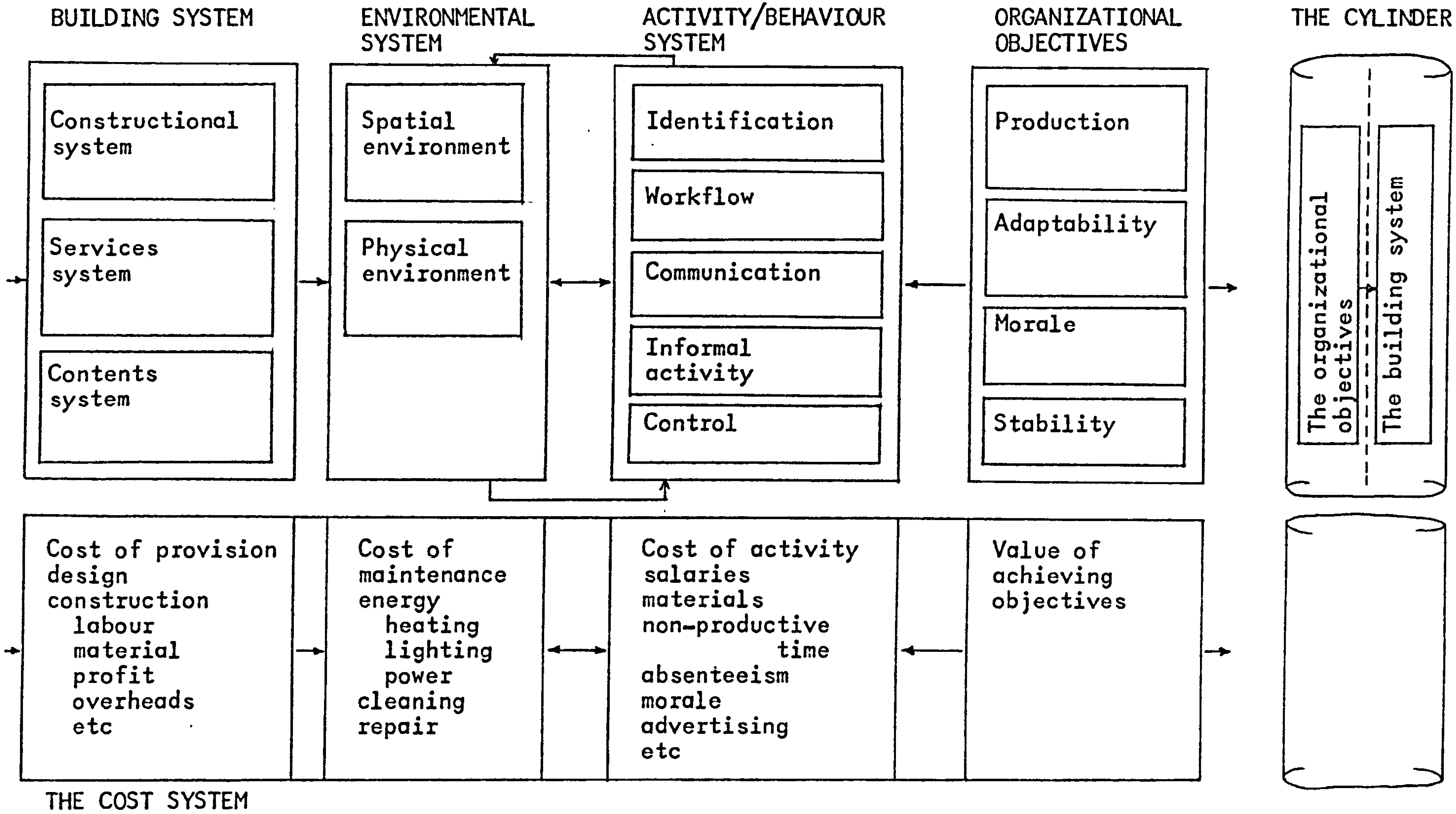


Fig. 5.3.B RESOLUTION GRAPH SHOWING THE WAY IN WHICH DIFFERENT OBSERVERS ANALYSE A GIVEN SYSTEM FROM DIFFERENT SUBJECTIVE VIEWPOINTS after Klir & Valach

it was in the power of objects to become icons, and that the aesthetic and iconic qualities of those forms were not due so much to an inherent property, but as Colquhoun suggests, "to a sort of availability or redundancy in them in relation to human feeling" (18).

Any system is formed of interrelated subsystems on different resolution levels. Moreover, what makes the analysis of any system quite complex is that different observers will analyse a given system each from his own different subjective viewpoint. The reduction in complexity as a first step in analysing highly complex systems seems a plausible attitude. To understand a certain system one can choose an appropriate level of resolution, and the relationships between the various levels can be represented on a 'resolution graph'. This will lead to building up a highly complex total decision by adding together a series of minor sub-decisions. However, most probably the final decision will lack consistency and cohesion.

An alternative process is one that recognizes from the start that one is dealing with an infinitely large number of integral and different alternatives, and one's aim is to select one of these. The decision process, therefore, would be of eliminating uncertainty rather than building variety. The direct applications of systems in architectural design is concerned mainly with the analysis of the total man/building environment system. The Building Performance Research Unit



THE BPRU'S CONCEPTUAL MODEL FOR APPRAISAL OF BUILDINGS IN USE

Fig. 5.3.C.

ENVIRONMENTAL SYSTEM		BUILDING SYSTEM		HUMAN SYSTEM	
CULTURAL CONTEXT	PHYSICAL CONTEXT	BUILDING TECHNOLOGY	INTERNAL AMBIENCE	USER REQUIREMENTS	CLIENT OBJECTIVES
	The site as given in terms of:	Modifications of external environment to provide suitable ambience for specified activities by means of:	Provision of physical conditions for performance of activities in terms of:	Provide for specified activities in terms of the following needs	Return for investment in terms of:
Social Political Economic Scientific Technological Historical Aesthetic Religious	Physical characteristics: climate geological topographical	Available resources in terms of: cash materials labour/equipment		Organic: hunger and thirst respiration elimination activity rest	Security Prestige Profit Expansion or other provision for change
	Other constraints: land use existing built forms traffic patterns legal	Structural systems: mass planar frame Space separating system mass planar frame	Structural mass: visible surfaces space enclosed	Spatial: functional (inc. fittings) territorial Locational: static dynamic	Housing of particular activities so as to encourage user well-being, motivation etc.
		Services system: environmental information transportation Fitting system: furnishing equipment	Sensory environment: lighting sound control heating/vent	Sensory: sight hearing heat and cold smell kinaesthetic equilibrium Social: privacy contact	

INTERRELATIONS IN BUILDING DESIGN : BROADBENT'S CONCEPTUAL MODEL

Fig. 5.3.D.

at the University of Strathclyde proposed a conceptual model for the appraisal of buildings in use (19). It plots the interactions between the four systems which it consists of -- the building, environmental, activity, and organizational systems -- there was also a cost/value system incorporated in the model.

Broadbent, critized this model on the basis that it is like most "rationally-elaborated structures, their self-consistency can mask the fact that they are incomplete" (20). He proposed his own conceptual model of the interrelations in building design in which three major systems are in operation; environment, building and human systems. The final model is very similar to the model of the BPRU. The main diffence was that he extended the concept of climate to include cultural, social, political, economic and aesthetic climates, in addition to the physical one. This extension of meaning led to the fact that the environment as a system became too complicated to help the designer. So, in an effort to make his model work, this aspect of the cultural climate had to be neglected in comparison to the more quantifiable physical climate. The check-list proposed for ranking various schemes consisted of the following factors :

a- structural practicability

b- capital cost

c- maintenance cost

d- servicing cost

e- heat loss

g- noise control

h- capacity to 'blend in'

Apart from the fact that there are some other physical factors which where overlooked, it seems that nearly all factors have been evaluated through their economic value (cost factor). In addition, there was hardly any mention of cultural or social factors apart from the 'capacity to blend in' which is an undefinable term, and could hardly have any cultural or social connotations.

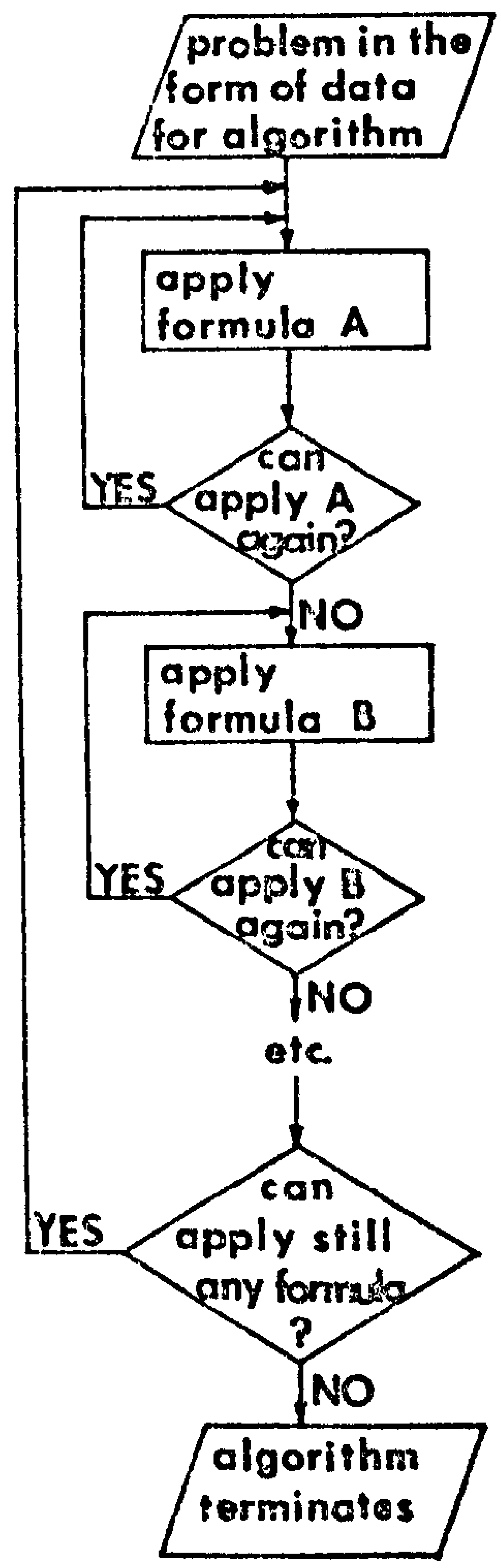
5.4. HEURISTIC and TYPOLOGICAL METHODS

From the indecision concerning the basic human needs, and the controversial statements by the proponents of design methodology, it seems clear that the designer is almost always faced with making voluntary decisions. These decisions are usually based on intentions and purposes that exist prior to the development of the program. Thus, the forms that the designer arrives at are a result of these intentions rather than merely the output of a deterministic process. With all the number of methods at hand, theorists refused to give credit to any method based on typology. Some may have accepted the idea that truly quantifiable criteria almost always leave a choice for the designer. However, in their theories this choice has been generally conceived of as based on intuition working in a cultural vacuum. It is suggested here that the area of pure intuition must be based on a knowledge of past solutions to related problems, and that creation is a process of adapting forms derived either from past needs or on past aesthetic ideologies to the needs of the present.

The application of general laws and procedures may be a necessary ingredient of a form; however, this ingredient is not a sufficient one for determining the actual conformation. Considering the comparatively simple environmental pressures that operate on a building, the determination of form through physical laws gives a very wide range of optional choices.

The exclusion of the idea of the modern architectural theory, may be explained by the more general theory of art that dominated the turn of the century. This theory can be seen most clearly in the work and ideals of certain painters like Kandinsky, both through his paintings and his book "Point and Time to Plane". To Kandinsky among other expressionists, all historical manifestations in art are an ossification of technical and cultural attitudes, whose raison d'être had ceased to exist. The expressionist's theory, accepts that shapes and forms have inherent expressive contents which they communicate directly to the human universal intellect.

These views were applauded by many, but were also subject to some criticism. One of the most convincing is E.H.Gombrich who in his book "Meditations on a Hobby Horse" demonstrated that arrangements of forms such as is found in a painting by Kandinsky are very low in content unless some system of conventional meaning not inherent in the forms themselves is attributed to them. Thus, forms can only be interpreted within a particular cultural context. Colquhoun writes, "We are not free from the forms of the past.... and if we assume we are free, we have lost control over a very active sector of our imagination, and of our power to communicate with others" (21). This dos not advocate a reversion to an architecture which accepts tradition without thinking or what may be termed 'vernacular revivalism'. This would imply that relations between forms and their meanings even



FLOW CHART FOR AN ALGORITHMIC PROCEDURE

Fig .5.4.A.

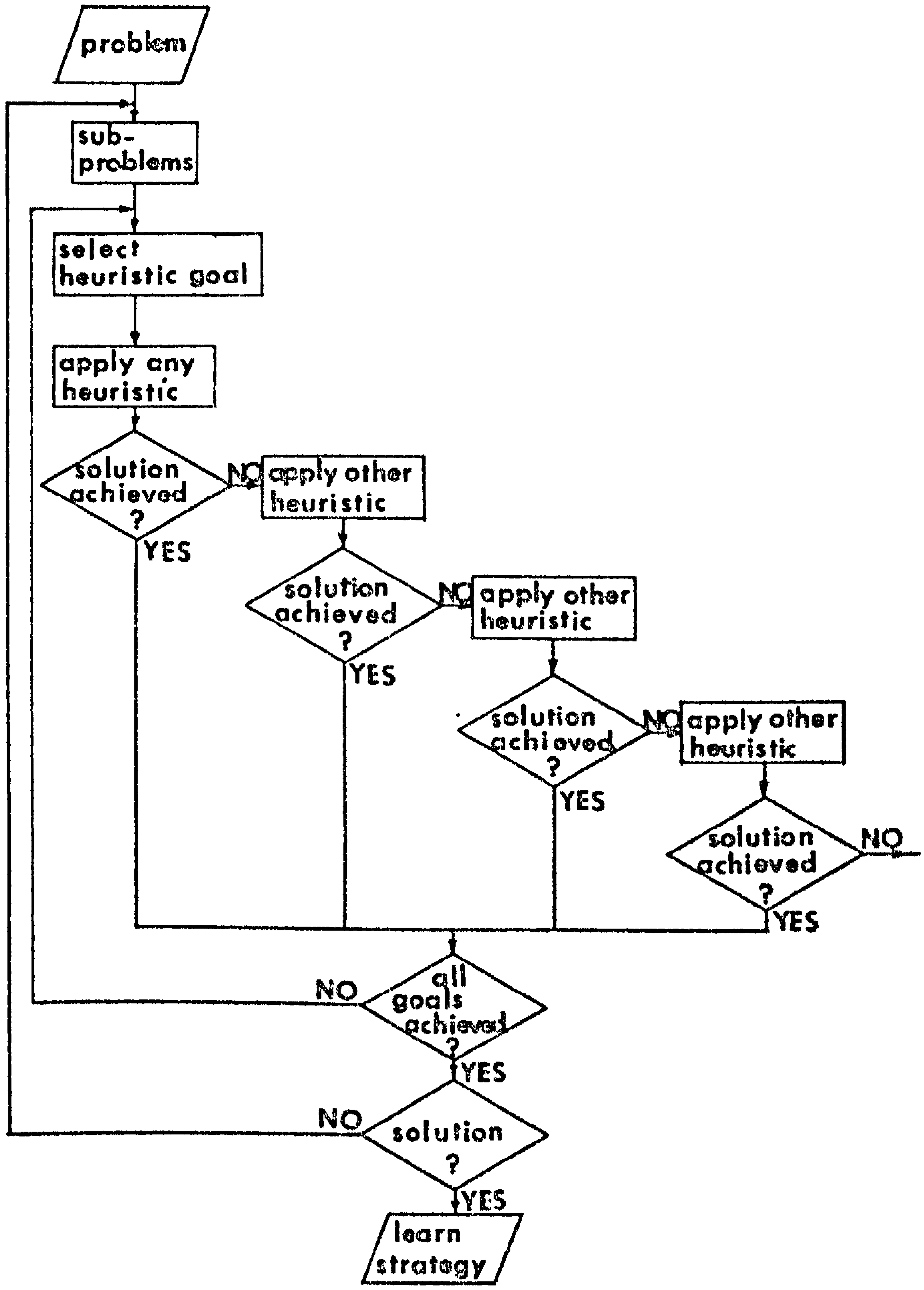


Fig.5.4.B. FLOW CHART FOR A HEURISTIC PROCEDURE

in a certain cultural ambiance is fixed and unchangeable. The fact is that one of the main characteristics of the human society is change, and it is precisely because this is so that a certain scientific detachment towards problems is essential. The application of scientific and mathematical tools will not give ready-made solutions, but should provide a framework within which operation is possible.

Since convention is a manifestation of academicism in artistic conformation, it may be argued that architects would become more effective in problem-solving and more creative in their designs if only they could be taught to be unconventional. Unconventionality may indeed be a necessary condition for creativity, but again it certaily is not a sufficient condition. If unconventionality simply means rejecting some of the heuristics that restrict search to a limited subspace, then the effect of unconventionality will generally be a return to relatively inefficient trial and error search in a very much larger space.

Unconventionality is likely to facilitate the solution of a problem only if the problem-solver has an appropriate new heuristic to replace the inappropriate heuristic that has been blinding him. Accordingly, to understand the success of effective and creative problem-solvers one must examine their motivational and attitudinal factors that enable them to change an initial set or to violate an accepted convention. One must also pay equal attention to the richness of their system of heuristics that make any particular heuristic dispensable, and to their learning processes that generate new heuristics to fill the vacuums created by the rejection of the ones previously used. Bruner argued that, "the twentieth century is peculiarly a century of formal heuristic, or creativity that pays attention to the internal demands of structure" (22). This is particularly more so in the nineteen seventies when the crises and criticisms of modern technology started to develop and cast technological change in a new light. Developments such as computer applications are no longer regarded as the inevitable march of progress from the path of which all obstacles must be removed and to which people must learn to adapt. The design activity should be viewed in a more human light, rather than considering the human being as a machine and postulating cybernetic models for his behavioural activities.

REFERENCES

1. Abrams, M.

The Social Effects of the Physical Environment

Journal of the American Institute of Planners

May 1961

p.122

2. Broady, M.

Social Theory in Architectural Design

in Gutman, R. (edit.)

People and Buildings

New York, 1972

p.183

3. Waddington, C.H.

Behind Appearance

Edinburgh, 1969

4. Waddington, C.H.

ibid.

5. Negroponte, N.

The Architecture Machine

Cambridge, Mass. 1970

6. Gugelot, H.
Industrial Design in Practice
Ulm, 1963
pp.3-5

7. Asimow, M.
Introduction to Design
New Jersey, 1962

8. Jones, C.
Design Methods
London, 1976
p.61

9. Thornley, D.J.
Design Methods in Architectural Education
in 'Conference on Design Methods'
1963

10. Chermayeff, S. and Alexander, C.
Community and Privacy
Harmondsworth, 1966

11. Chermayeff, S. and Alexander, C.
ibid.

12. Broadbent, G.
Design in Architecture
London, 1973
p.309

13. Broadbent, G.
ibid.
p.312

14. Alexander, C.
Notes on the Synthesis of Form
Cambridge, Mass. 1964
pp.6-8

15. Kahn, L.
Shelter
California, 1973
p.112

16. Levi-Strauss, C.
Structural Anthropology
New York, 1963

17. Broadbent, G.
op.cit.
p.25

18. Colquhoun, A.
Typology and Design Method
'Arena', June 1967
p.12

19. Markus, T.A., et al.
Building Performance
London, 1972

20. Broadbent, G.
op.cit.
p.384

21. Colquhoun, A.
op.cit.
p.14

22. Bruner, J.S.
The Process of Education
New York, 1960
p.9

6.1. LIMITATIONS of the CYBERNETIC MODEL

Christopher Jones in answer to the question,'what do the new methods have in common'? states that "it is that all the methods are attempts to make public the hitherto private thinking of designers to externalize the design process" (1). In some cases this is done in words, sometimes in mathematical symbols, and nearly always with a diagram representing parts of the design problem and the relations between them. Jones reviews the act of designing by symbolizing it in a cybernetic picture of the designer :

1- From the creative point of view the designer is a 'black box' out of which comes the creative leap.

2- From the rational point of view the designer is a 'glass box' inside which can be distinguished a rational process with the following characteristics :

a. objectives are fixed in advance

b. analysis is completed before solutions are sought

c. evalution is linguistic and logical

d. strategies are fixed in advance

3- From the control point of view the designer is a 'self-organizing system' capable of finding short cuts across unknown territory.

Chapter Six

Design Activity Model : A Proposal

6.1. LIMITATIONS of the CYBERNETIC MODEL

Christopher Jones in answer to the question, 'what do the new methods have in common'? states that "it is that all the methods are attempts to make public the hitherto private thinking of designers to externalize the design process" (1). In some cases this is done in words, sometimes in mathematical symbols, and nearly always with a diagram representing parts of the design problem and the relations between them.
Jones reviews the act of designing by symbolizing it in a cybernetic picture of the designer :

1- From the creative point of view the designer is a 'black box' out of which comes the creative leap.

2- From the rational point of view the designer is a 'glass box' inside which can be distinguished a rational process with the following characteristics :
   a. objectives are fixed in advance
   b. analysis is completed before solutions are sought
   c. evalution is linguistic and logical
   d. strategies are fixed in advance

3- From the control point of view the designer is a 'self-organizing system' capable of finding short cuts across unknown territory.

Most design methods have been crippled because of this limited view of the designer. The logical, systematic, analytic, behaviouristic and operational character of the methods devised on the assumption that the process of human thought could be disintegrated then reintegrated in a new order and organization, has already led to the accusation of methodology of being inhuman and unethical. (Marcuse 1964 (2), Daly 1969 (3)).

If we accept that it is advantageous to bring design thinking into the open so that other people, such as users, can see what is going on and contribute to it information and insights that are outside the designer's knowledge and experience. Then the problem is to devise a model of human behaviour that may simulate the act or event of designing to a closer degree of precision than the existing cybernetic representations. Mathematical models that explain events and govern the nature of their processes, are usually considered the most accurate means of describing those events.

For a long time the basic method of forming such models has been the differential calculus, which has an inherent limitation. It only deals with those phenomena where change is smooth and continuous. Yet, the design process is full of sudden transformations and unpredictable divergences, which call for functions which are not differentiable. Therefore, theoreticians have abstained from describing the design process in a mathematical model form. The concept to which the differential equation gives expression is given in Poincaré's statement, "on admét que l'état actuel du monde ne dépend que du passé le plus proche, sans être influencé pour ainsi dire par le souvenir d'un passé lointain" (4). However, to explain a certain phenomenon, especially relating to human behaviour, under the influence of such restrictions, is to rule out important and indispensable factors just because the state of the present physical knowledge is restricted. And this is the reason why differential calculus was unable to represent proper models of human behavioural activities.

6.2. The CATASTROPHE THEORY

Recently, René Thom (5) developed a mathematical method for dealing with those situations where gradually changing forces or motivations lead to abrupt changes of behaviour. For this reason the method has been named 'catastrophe theory' and is derived from topology, the branch of mathematics concerned with the properties of surfaces. Thom has shown that there are just seven elementary catastrophes in the case of process controlled by no more than four factor. Zeeman states that, "The proof of Thom's theorem is difficult one.....the elementary catastrophes themselves can be understood and applied to problems in the sciences without reference to the proof" (6). The nature of the models derived from 'catastrophe theory' are basically geometric and qualitive.

Although any attempt to explain phenomena qualitatively rather than quantitatively may be subject to scientific scepticism, it is a characteristic of the human being to give some interest and value to the qualitative analysis. This can be shown by the following illustration :

Assume that an experimental study of a phenomenon Φ is represented by graph

$$y = g \quad (x)$$

to explain Φ the theorist has two hypotheses θ_1 and θ_2, represented by graphs

$$y = g_1 \quad (x)$$

and $y = g_2 \quad (x)$ respectively

neither one of these two graphs fits

$$y = g \quad (x)$$

and although

$$y = g_1 \quad (x)$$

fits better quantitatively, since

$$\int | g - g_1 | \quad > \int | g - g_2 |$$

the graph $y = g_2\ (x)$ has the same shape and appearance as the $y = g\ (x)$ graph.

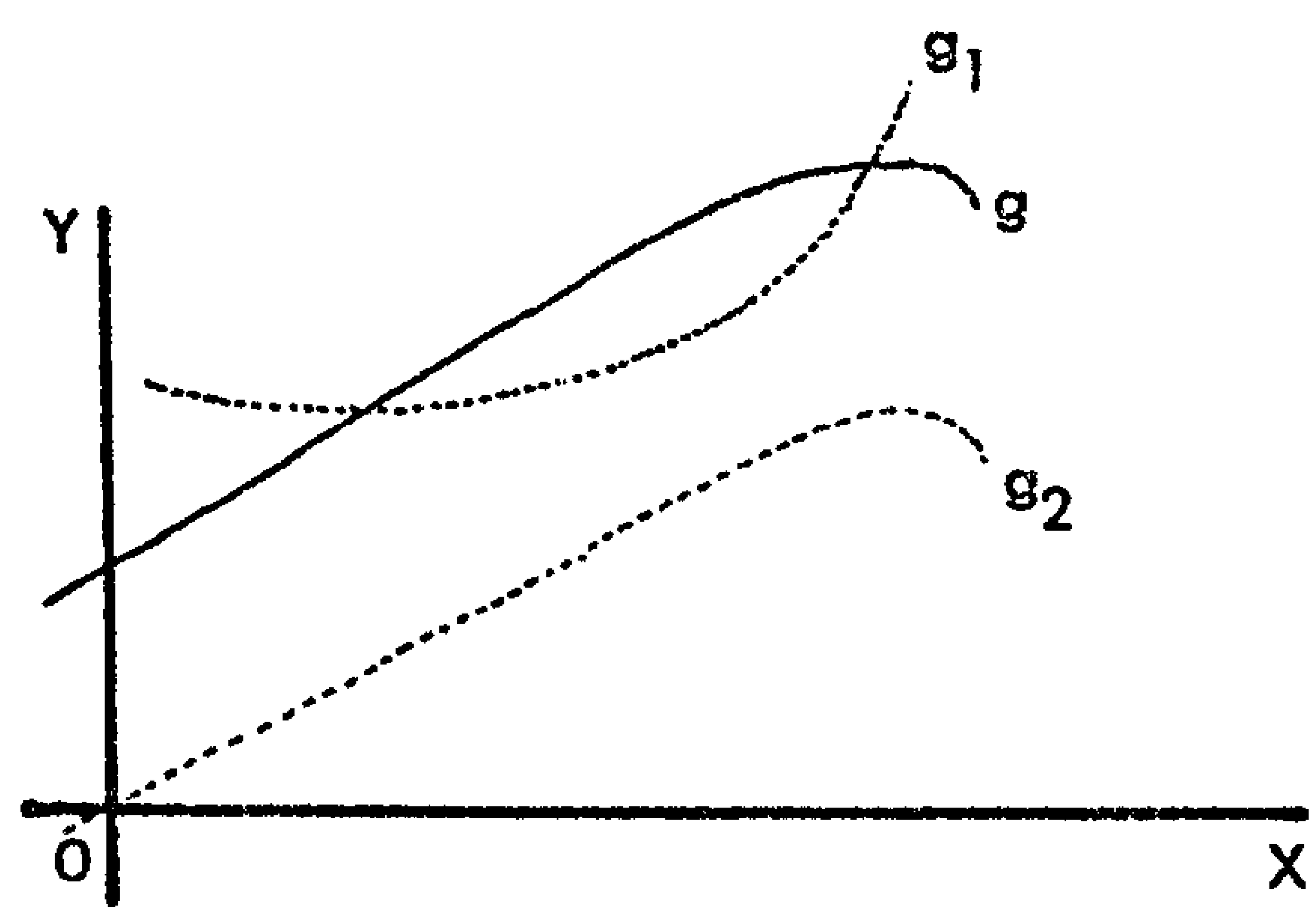


Fig. 6.2.A

In this situation it is more probable that the theorist will retain hypothesis θ_2, and discard θ_1. Naturally this is not a proof, but an illustration of the natural tendency of the human mind to give qualitative analysis some intrinsic value.

However, it is not the impossibility of giving quantitative results that condemn the old qualitative theories to modern eyes, for what matters most in everyday use is almost always a qualitative result and not the precise value of some real number. What condemns these speculative theories is not their qualitative character, but the lack of precision and often vagueness of the ideas they use. With the exception of a very few cases, almost all these theories rely on the experience of simple Platonic three-dimensional bodies in simple Euclidean three-dimensional space. Obviously, these intuitions are insufficient for an explanation of complicated multi-dimensional behavioural actions in a multi-dimensional space-time frame of reference, even on a macroscopic scale.

The models which Thom devised have five qualities, namely :

a. bimodality

b. sudden transitions

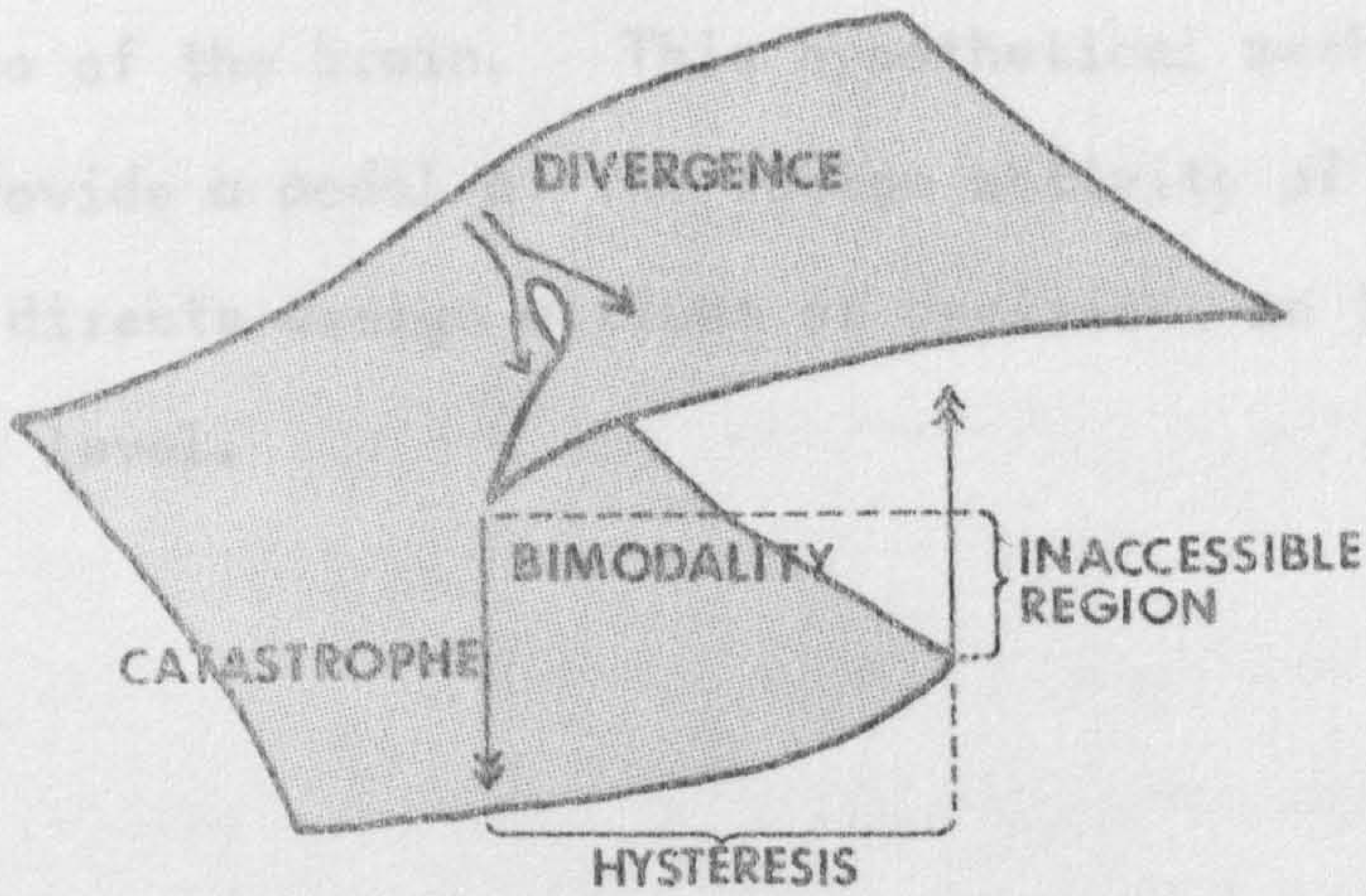
c. hysteresis

d. inaccessibility and

e. divergence.

These features are related to one another by the model itself. If these qualities are to be distinguished in a process then the event may be considered a candidate for description by the catastrophe theory. Thom did not attempt to design a model that would represent the totality of human behaviour, but only a probe to investigate particular areas of behaviour and hopefully explain them logically to fit in the total image of the Universe. Thom writes, "To each partial system, relatively independent of the environment, we assign a local model that accounts qualitatively and, in the best cases, quantitatively for its behaviour. But we cannot hope, a priori, to integrate all these local models into a global system. If it were possible to make such a synthesis, man could justifiably say that he knew the ultimate nature of reality, for there could exist no better global model. For myself, I think that this would be extravagant pretension; the era of grand cosmic synthesis ended, very probably, with general relativity, and it is most doubtful that anybody will restart it, nor would it seem to be useful to attempt to do so" (7).

The catastrophe model depends on the concept of the attractor as a stable state, its effect is like a magnet, everything within its range of influence is drawn towards it. Under the influence of the attractor the system assumes a state of static equilibrium. In human models, however, the attractor of a system that is in dynamic equilibrium consists of the entire stable cycles of state in which the system passes. The obvious place to seek attractors would be the neurons of the brain. As mentioned earlier, the brain is highly complicated and not very well understood, still, its million of neurons are known to be organized in interconnected networks that form the dynamic system. As each network, as a stable cycle of state, gives way to another to manifest itself as a new attractor, the stability of the system is



1. the behaviour is always bimodal in some part of its range.
2. sudden jumps are observed between one mode of behaviour and the other.
3. the jump from the top sheet of the behaviour surface to the bottom sheet does not take place at the same position as the jump from the bottom sheet to the top one, an effect called hysteresis.
4. between the top and the bottom sheets there is an inaccessible zone on the behaviour axis (representing the least likely behaviour).
5. the cusp catastrophe implies the possibility of divergent behaviour.

Fig. 6.2.B FIVE PROPERTIES CHARACTERIZE PHENOMENA THAT MAY BE DESCRIBED BY THE CATASTROPHE MODEL

preserved either smoothly or through catastrophic jumps in the state of the brain. This hypothetical mechanism may well provide a model of the design activity of the brain that directs design actions or decisions on the behavioural level.

6.3. The BEHAVIOURAL ACT of DESIGNING

One of the processes where the five qualities of Thom's models may be detected is the design activity. Therefore the author believes that it may be possible to construct a model of the design process on the basis of the catastrophe theory. The control parameters in this model are economical awareness, cultural stability and technological change. However, because the cost factor has become increasingly dominant in the recent years, the parameter of economical awareness will be considered in this model as having a continuous effect on the design activity, and thus will be a constant factor at the neutral point of the behaviour level of the graph.

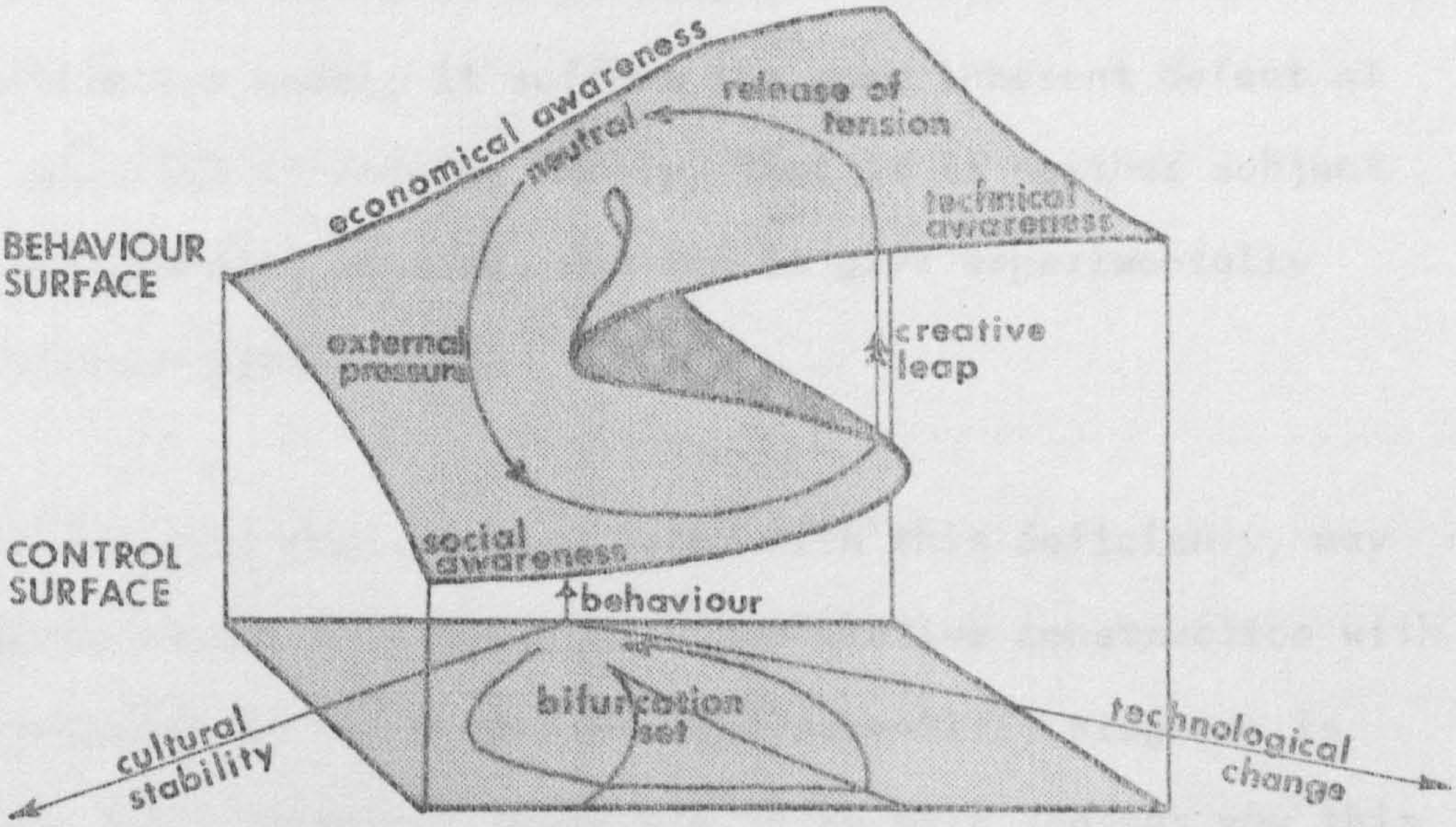
To construct the model the two control parameter, culture and technology, are first plotted as axes on a horizontal plane called the control surface. The design activity of the designer is then measured on a third axis, the behaviour axis, which is perpendicular to the first two. It is then assumed that there is a smooth continuum of possible modes of behaviour (design activity) ranging at one extreme from outright vernacular to the other end of the spectrum, that is, the revolutionary futuristic designs. Either one of the two extreme modes of behaviour will be assigned the highest value on the behaviour axis, the other the lowest value; for the sake of clarity, the technological change activity will be assigned the high value, and the social and cultural stability the low value. For each point on the control surface, (that is, for each combination of cultural and technological influence) there is at least one most probable action, which is represented as a point directly above the point on the control surface and at a height appropriate to the behaviour.

For most of the points on the control surface, where either social (cultural) stability or technological change is predominant, there will be just one behaviour point. Near the centre of the graph, however, where the effects of culture and technology are roughly equal, each point on the control surface has two behaviour points, one at a high value on the behaviour axis representing change action, the other at a low value representing stability action.

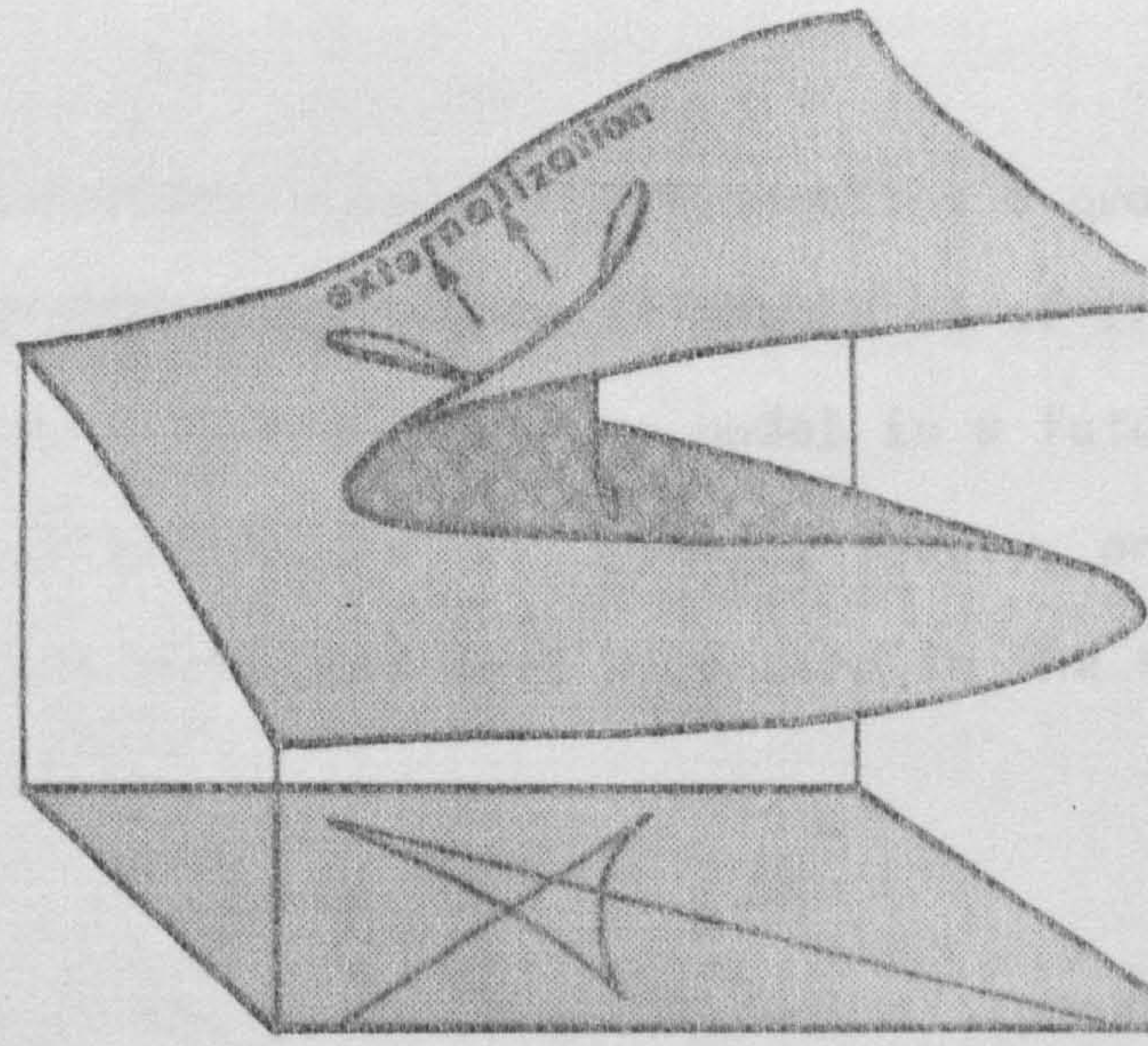
In addition there exists a third point that will always fall between these two, representing the least likely neutral behaviour, which is in fact inexplicable in design action terms. If the behaviour points for the entire control surface are plotted and then connected, a smooth surface with an overall slope will result. There would also be a double fold in its middle in accordance with Thom's 'Catastrophe theory'.

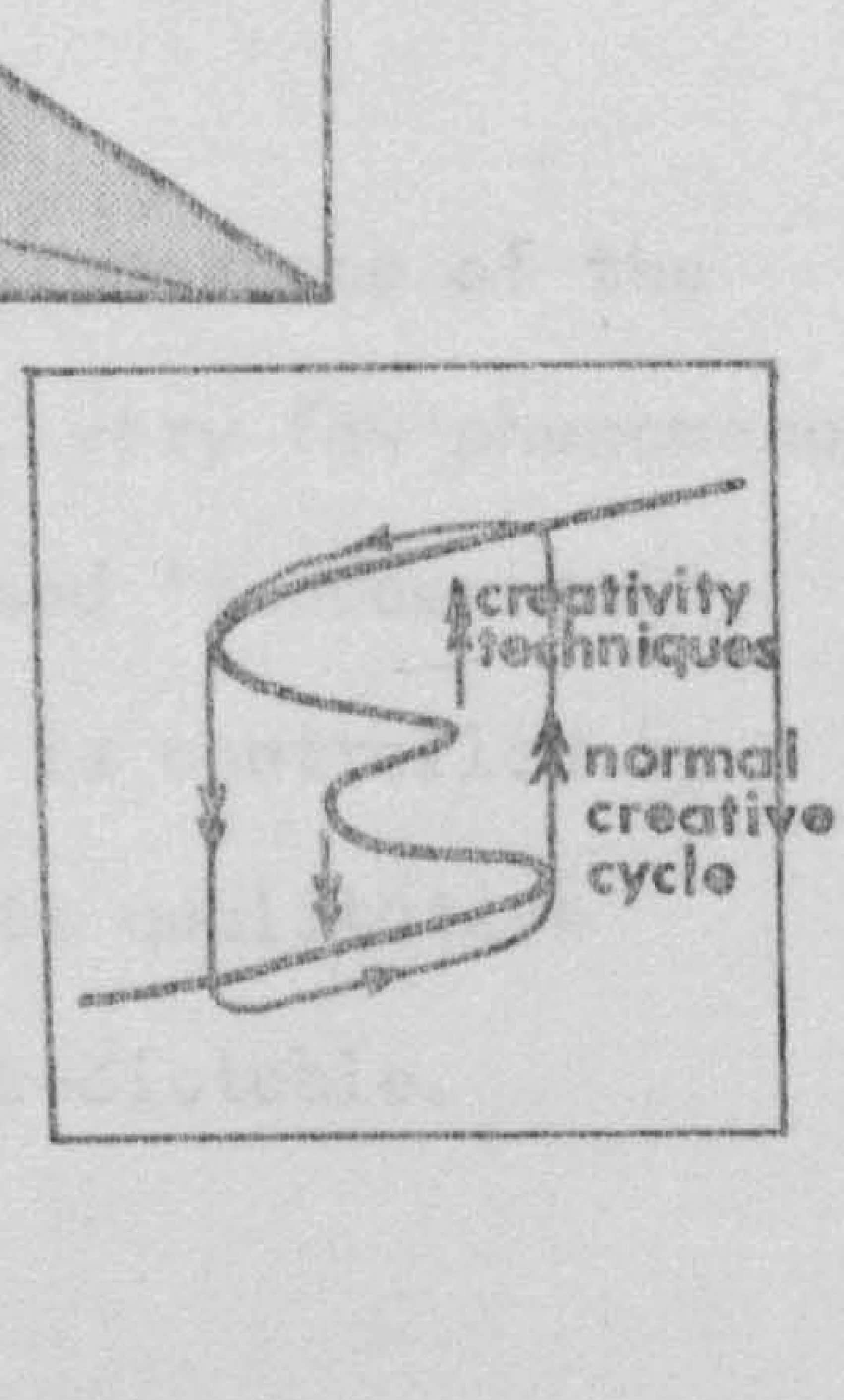
In order to understand how the model predicts the design activity, the designer's reaction to changing stimuli must be considered. Suppose that initially the designer's emotional state is neutral and can be represented by a point on the control surface; his behaviour, given by a point on the design activity surface is also neutral. If some stimulus then increases the designer's technological slant without affecting his cultural consciousness, the design activity changes smoothly, following the upward trend of the behaviour surface, reaching at its extreme design actions of total technological futuristic attitudes. If the designer's cultural and social awareness now begins to increase, while his feelings for change remain at an elevated level; the point representing his emotional state on the control surface will move across the graph towards the centre; the point representing design activity will follow till it reaches the edge of the fold. With any additional increase in social awareness the surface vanishes and the design activity state will fall to the lower level of the behavioural surface; this sudden change in the design activity explains the sudden creative insight. The graph also predicts the existence of the opposite pattern that leads to the creative leap, where originally the social stability is dominating the designer's framework of thought, but with a gradual increase in the stimuli awakening the desire for change, there is a sudden jump to the higher level of the behaviour surface, explaining the creative leap.

The design methods, as they exist at the moment, have relied on creating an intermediate mode of behaviour, namely externalization. The effect of this fourth parameter is to create a pocket in the bifurcation set and thus create an intermediate stage in the design activity behaviour surface. This leads to a series of catastrophic jumps from the intermediate level to the top and bottom levels. These are the manipulated creativity techniques -- brainstorming, synectics, pattern-making, changes of set, and guesswork. When the design method has been successful (by its own standard) the designer makes a smooth transition to the area of behaviour behind the pocket, where extreme effects are minimal and usually the strongest parameter is the economic evaluation.



PROPOSED MODEL OF DESIGN ACTIVITY





EFFECT OF USING DESIGN METHODOLOGY

6.4. EVALUATION of the MODEL

Since this model is a qualitative rather than a classical quantitative model, it suffers the same inherent defect of all qualitative models, namely, that it is neither subject to experimental control, nor can it give experimentally verifiable predictions.

The strict empiricists, faced with this deficiency, may tend to reject this model as a speculative construction with no interest as far as the present scientific progress is concerned. However, there are three main reasons why this model should be useful on a larger scale than its direct application :

1- every quantitative model first requires a qualitative isolation from reality, so it should be of interest to integrate this qualitative model in a future framework of a quantitative abstract general theory, and indeed this qualitative model may just be a step in the search for such a theory.

2- there is at the moment a great deal of ignorance of the limits of quantitative models, in fact, very few phenomena depend on mathematically simply expressed 'fundamental' laws; furthermore, even when a system is controlled by explicit laws, it often happens that its qualitative behaviour is still not computable or predictable.

3- on the philosophical plane, this model offers a monistic view of the human activity, which combines causality and finality in one geometric 'topological' continuum, of course this requires the abandonment of 'universal mechanism' and 'absolute determinism' theories, which in any case were never anything but wishful thinking.

So what is proposed here is not a once-and-for-all explicit standard model, but rather a description of a dynamical model compatible with empirical knowledge, so it is only a first step in the understanding of the phenomenon of design activity. It is hoped that theoreticians and future researchers will develop a quantitative model in the framework of the given substratum.

6.5. APPLICABILITY of the CONCEPTUAL MODEL

The predominantly analytical and dissective methods which have isolated component factors and elements of architectural form have assumed that the process of expressive creative synthesis would remain undiminished. This assumption is subject to much scrutiny, and in many cases has proved false; and according to the proposed design activity model, it is quite clear that the process of design is not an analysis/synthesis procedure, but rather a behavioural activity acting in the space time continuum and influenced by scientific, technological, social, cultural and environmental forces, implying that architectural design should be considered :

a. an attitude of mind, not a method.

b. primarily a form of enquiry, and not necessarily a new art form.

c. not only an enquiry about the structures which appear out of the materials used, and the functions to be fulfilled, but also an enquiry about the sources and terms of personal expression and reaction to the world and social forces in action in it.

d. concerned with form in a fundamental sense in every field, not only in abstract universals, but in the social and human context.

e. emphatically not an end in itself, but a means of making the society as individuals more acutely aware of the expressive resources at their command.

f. a 'feed-forward', where lessons of the past are transmitted to the future, not only in structural and technological aspects, but also in human and social fields.

g. a source to more knowledge in social and human sciences of man as much as it is an end, the stream of knowledge between the two disciplines must be reversible; there is as much to know about human reactions from built forms as there is to know about built form from human reactions.

The real need of modern time, that of integrating social stability with technological change, cannot be accomplished unless scope exists to explore the mutual transformation of both social organizations and man made systems. This two way flexibility is the essential condition for the evolution of humanity. The key figure in this relation is the designer who is capable of reacting according to the proposed design activity model. However, much of the architectural education at this moment is not geared to produce such a designer.

REFERENCES

1. Jones, C.
   Design Methods
   London, 1976
   p.25

2. Marcuse, H.
   One-Dimensional Man
   London, 1964

3. Daley, J.
   The Myth of Quantifiability
   Architects' Journal (148,34)
   21 August 1968
   pp.339-341

4. Poincare, H.
   quoted in
   Thom, R.
   Structural Stability and Morphogenesis
   Mass., 1975

5. Thom, R.
   op. cit.

6. Zeeman, E.C.

Catastrophe Theory

Scientific American, April 1976

p.65

7. Thom, R.

op. cit.

p.7

Chapter Seven

Architectural Education: A Proposal

7.1. TOWARD a PHILOSOPHY of EDUCATION

As a civilized human being, modern man is the inheritor, neither of an inquiry about himself and the world he lives in, nor of an accumulating body of information stored and piled simply neatly in a hierarchical composition; but of a conversation, begun in the primeval forests and extended and continuously made more articulate in the course of the centuries. It is a conversation which goes on both in public and within each individual. Naturally there is argument, inquiry and information, but wherever these are profitable they are to be recognized as passages in this conversation, and perhaps they are not the most captivating of the passages. This conversation is not an enterprise designed to yield an extrinsic profit, a context where a winner gets a prize, nor is it an activity of interpretation of theories, it is rather an unrehearsed intellectual adventure.

Education basically is an initiation into the skill and partnership of this conversation, in which each individual learns to recognize the voices, to distinguish the proper occasions of utterance, and in which he acquires the intellectual and moral habits appropriate to conversation in its proper social setting. And since it is this conversation which, in the end, gives place and character to every human utterance and activity, it is most important to give the utmost care and consideration to the period of initiation.

Education should therefore be concerned with the comprehensive development of the mind in acquiring knowledge, and aimed at achieving an understanding of experience in many different ways. This means the acquisition by critical training and discipline not only of facts but also of complex conceptual schemes and of the arts and techniques of different types of reasoning and judgement. Syllabuses and curricula cannot therefore be constructed simply in terms of information and isolated skills. They must be constructed so as to introduce students as far as possible into the interrelated aspects of each of the basic forms of knowledge, each of the several disciplines. And they must be constructed to cover at least in some measure the range of knowledge as a whole.

Educational theory has been for too long haunted by misleading models of what an educational situation is. On the one hand, there are those who regard it as one in which some high-minded operator 'shapes' students according to some specification, or 'tops them up' with knowledge; on the other hand, there are those who think that the teacher's function is to encourage the student to 'grow' or to 'follow his own interests', as if he were an organism unfolding some private form of life. Both accounts have their own specific defects; but they both share the common defect of ignoring the central fact that education consists essentially in the initiation of others into a public world picked out by the language and concepts of a people and structured by rules governing their purposes and interactions with each other. In relation to this, the teacher is not, as it were, an external operator who is trying to impose something of his from the outside on students, or trying to develop something within them which is their own peculiar possession. His function is rather to act as a guide in helping them to explore and share a public world whose contours have been marked out by generations which have preceded both of them.

An individual is not a solitary centre of consciousness, he is a social being from childhood, and the knowledge that he has to acquire, is equally socially determined in an important sense. For knowledge presupposes criteria of truth, and these presuppose the agreement in judgements of which Wittgenstein spoke (1). Hence learning on the part of an individual is basically his initiation into a framework over which there is wide agreement, even if there is also plenty of room for individual deviations from the norm.

7.2. DEFINING the PARAMETERS

It is essential to think more closely about the aims of the educational process and what it is capable of doing. There are basically three types of change which the educational process is capable of bringing about in those who are subjected to it :

a. It can develop or impregnate certain knowledge and skills which are specific to the subject or activity which is being studied.
b. It can develop or modify personal attitudes and values held by the individual.
c. It can develop or modify certain fundamental subjects under study

Education philosophers usually spend most of their time and arguments on the attributes that essentially consist of the knowledge and skills which are gained from studying a specific subject. They are measured carefully by traditional examinations. These attributes are undoubtedly important in an increasingly knowledge intensive world, but it is all too easy to become obsessed with them to the exclusion of all else.

The attributes that are concerned with attitudes, philosophies and values held by the individual : attitudes to life, other people, worldly success, social institutions, social change, leisure, religious and political ideas are markedly influenced by the educational process. However, education is a process in which the environment changes the learner, and the learner changes the environment. In other words, both are interactive, and through their interaction change may occur in the status quo of the society while stability will be maintained. Leonard writes, "No environment can strongly affect a person unless it is strongly interactive. To be interactive, the environment must be responsive, that is, must provide relevant feedback to the learner. For the feedback to be relevant, it must meet the learner where he is, then program (that is, change in appropriate steps at appropriate times) as he changes. The learner changes (that is, is educated) through his responses to the environment" (2).

The attributes concerning the qualities of intellect, social skills and the ability to communicate, though given the least attention, are of extreme importance as aims of education in general, and architectural design education in particular. These attributes may be defined as :

1- The ability to analyse situations and problems critically, objectively, logically and subsequently to postulate realistic solutions.

2- The ability to absorb new facts or hypotheses even when contrary to previously held ideas, and to modify these ideas accordingly.

3- Sensitivity to the emotions, attributes and ideas of others, 'the ability to see the other man's point of view'.

4- The ability to work with others in a superior, equal or subordinate role, to command respect and to inspire others to action as and when required.

5- The ability to communicate information and ideas clearly and succintly, and to influence the views of others through effective written, graphic, mathematical and oral communication.

6- The ability to think and to communicate in quantified terms, and to recognize the limits of error inherent in this approach.

7.3. INTEGRATIVE DESIGN EDUCATION

Vitruvius in his famous definition of the qualities of the architect , stated that he "should be a man of letters, a a skilful draughtsman, a mathematician, familiar with scientific enquiries, a diligent student of philosophy, acquainted with music, not ignorant of medicine, learned in the responses of jurisconsults, familiar with astronomy and astronomical calculations" (3). However, in modern times this reads like an account of another world, but is it? One can surely learn to begin to understand and appreciate the quality and attitude of a mind which has explored deeply enough into most branches of knowledge to realize that they spring from a common source. Such an attitude nowadays is usually difficult to understand because "the tendency today is to explore outwards, to discover the many complicated smaller branches which grow out of any main branch of knowledge, to master the twigs which grow out of these, and so on ad infinitum. This shows an essential difference in outlook irrespective of ways of life, science and technology. Whereas we today are looking out along the branches of the tree of knowledge into the infinite diversity of the intersecting smaller branches and twigs, the men of the past were looking inwards, into the tree of knowledge, towards the unity of its trunk" (4).

Unless this difference in attitude of the mind is understood and considered, the education of architecture will remain incapable of supplying designers who can integrate environmental, technological and social needs in a total design activity. However, that an architect needs all types of knowledge is misleading. An architect needs two basic categories of knowledge. The first is 'technical knowledge', which is concerned with the physical know-how of the act of building as an assemblage of physical components to form a physical structure. The second kind of knowledge an architect needs is 'socio-cultural knowledge' which is concerned with the symbolic loadings and the spatial arrangements in relation to the social and cultural requirements.

7.4. CONCEPTUAL REQUIREMENTS for a THEORY of ARCHITECTURAL EDUCATION

There is an urgent need for the development of a strong, theory-based approach to architectural research and practice.

In a paper presented to the Royal Institude of British Architects in January 1967, Sir Leslie Martin powerfully argued the case for this need, "the architect has a special task; in my view it is to study the potentialities of the built form in an increasingly rational manner and to extend this everywhere by speculative thought. The ultimate problem for the profession is that of setting out the possibilities and choices in building an environment. And in that field the crisis will not be solved by technical advance alone, or by picturesque images. At bottom it is a crisis of lack of understanding. Our task is to try make that understanding more complete" (5).

An examination of the problems of educational institutions leads one to consider several overlapping but distinguishable areas of conceptualization. Taken together, these areas constitute different but complementary perspectives from which educational theorists may analyse actual problems arising during the construction or reconstruction of the educational institution. These conceptual areas account for the presence, or absence, of a continuous constructive behaviour in the educational institution, which will then extend into the professional realm of the designer.

The conceptual areas of educational concern may be summarized as follows :

A. Concepts concerned with the human dimension : at the level of individual personality, of interpersonal relations, group behaviour, intergroup behaviour, and the social, economic, cultural and political system that constitute the environment in which the individual exists.

B. Concepts dealing with the objective reaching process, whereby : the mission of the educational institution is formulated and translated into socio-technical and performance objectives; the strategies for reaching these objectives are devised on the basis of alternatives that are socially viable and realistic in terms of an analysis of the consequences.

C. Concepts relating the educational institution to its environment, sponsoring institutions and special interest groups :

i. How could the educational institution influence the environment ?

ii. What does the environment in its political, economic, social and technological aspects seem to demand of the educational institution and its product ?

iii. How does the educational institution respond to changing environmental conditions, political instability, prosperity and economic depression ?

D. Concepts relating to the creation of essential formal or informal structures : work process systems, patterns of authority, reward, punishment, evaluation, communication and identification.

E. Concepts that concern the realization of positive values : respect for individual dignity, justice, freedom, technical excellence, social relationships and efficiency.

F. Concepts regarding changes of feeling, anxieties and emotions; channeling them into patterns of more creative and constructive emotions.

G. Concepts related to general systems models of the educational institution, in particular the transformation of inputs and resources into outputs and performances.

7.5. COMPONENTS and INTERACTIONS in the DESIGN EDUCATIONAL PROCESS

Chart (7.5.A) presents a simplified diagram showing some of the more important internal components of a design educational process. These components interact continuously as may be illustrated by the following examples :

Example A :

Assume that a decision is made to alter the system's aims or priorities in some fashion, like a political decision to branch out creating specializations in architectural education with a certain vocational bias. The implementation of this decision will inevitably require far-reaching changes in the system's academic structure, in the curriculum and teaching methods, in facilities and equipment, and in the distribution of teachers and the flow of students within the structure; in fact, virtually every component is substantially affected by such a change.

Example B :

Similarly, without any change of basic aims or priorities, a significant input of research innovation in the curriculum will result in substantial alterations in teaching and learning methods, which in turn may require changes in the deployment of time, in physical facilities and equipment, and in the number and kind of teachers required. This chain reaction will thus have considerable consequences for the system's input requirements and for the quantity and quality of its final outputs.

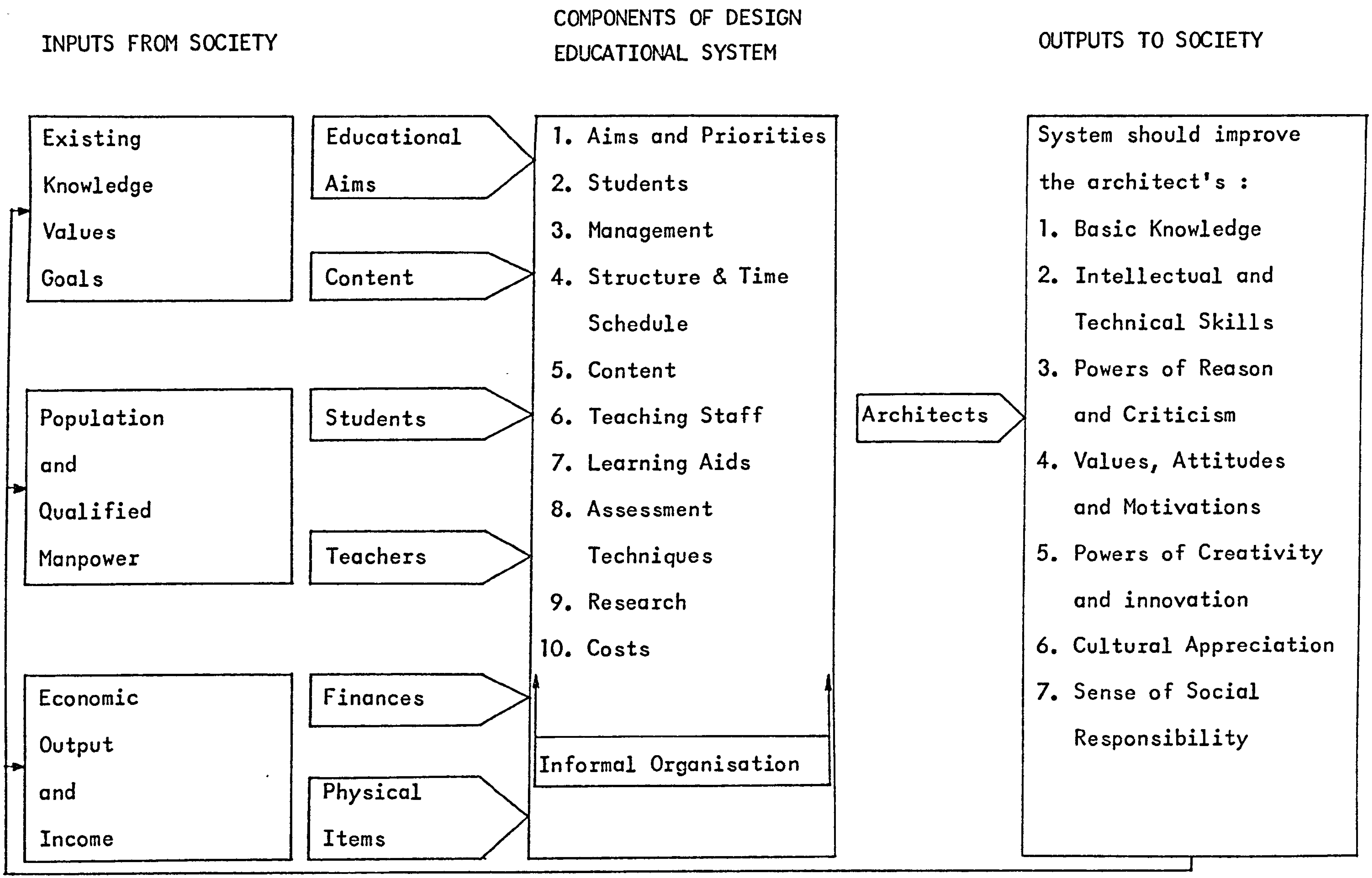


CHART (7.5.A) INTERRACTIONS BETWEEN A DESIGN EDUCATIONAL SYSTEM & ENVIRONMENT

However, the internal components of the system are not detached from the environment. And since it is society which supplies the educational system with the means of functioning, just as the educational system is expected, in its turn, to make vital contributions to society, architectural design education's inputs and outputs should be examined in their external relationships with society. These external relations reveal both the resource constraints that limit the system and the factors that ultimately determine its productivity to society. Hence the multiple components of the inputs from society into the design educational system, followed by the multiple outputs from that system which flow back into society, upon which they ultimately have many diverse impacts are also represented in the chart to give a complete representation of the design educational system and its interaction with the environment in which it is situated.

One also cannot afford to neglect the 'informal organization' of the educational process, the influence which students have upon each other in their social activities and day-to-day relationships. Academic pressures in some instances prevent the student from a full involvement in college or university life, such constraints influence the extent to which some important attributes can be developed. Successful involvement in non-academic activities is one of the few available indicators of important qualities which no academic examination has yet been designed to measure.

7.6. EDUCATION of ARCHITECTURAL DESIGNERS

Like nearly all education, education for designers is based on the learning of skills and the acquisition of a philosophy. The skills that are currently taught are too often related to processes and methods of an age that is coming to a close; and the philosophy is an equal mixture of individualism and profit-oriented commercialism. Moreover, the method of transmitting all this is becoming more and more questionable.

In 1929 the 'Albert Langen Verlag' of Munich published the book 'Von Material zu Architektur' by Laslo Moholy-Nagy as Volume 14 for the Bauhaus. Moholy-Nagy attempted to find new ways of involving young people with the interface between technology and design; when Moholy-Nagy started the 'New Bauhaus' (later the Institute of Design) in Chicago, the book was republished (by Norton in 1938) under the title 'The New Vision'. An expanded and lavishly illustrated re-hash of all this was brought out shortly after Moholy-Nagy's death under the title 'Vision in Motion' in 1947. And now, nearly a quarter of a century later, as Papanek states, "this 1947 re-hash of a 1938 translation of a 1929 book describing design experiments carried on in 1919 still forms the basic design curriculum at nearly all American and European schools.... Can we wonder that students are bored? can we wonder that our young people no longer consider the university and its courses relevant to living?" (6).

It is virtually impossible to teach anything in vacuum, least of all a subject as deeply involved with man's basic needs and aspirations as design. Therefore one of the main troubles with many design schools seems to be the imbalance between the amount of design tuition and knowledge concerning the social and cultural environment in which design takes place. Chomsky's important claim that the doctrine of innate ideas is an account of the act of learning (7), though initially was made in the context of language learning, may have a much wider application , possibly in the field of learning architectural design. This view has been adopted in his more recent writings. In 'Language and Mind' he asks whether there are other areas of human competence where one might hope to develop a fruitful theory analogous to 'generative grammar'. Chomsky suggests that "one might, for example, consider the problem of how a person comes to acquire a certain concept of three dimensional space, or an implicit theory of human action, in similar terms". His hypothesis is based on the idea that the possibility of learning X presupposes the existence of prior knowledge in terms of which X will make sense to the learner. In learning which involves a positive attempt to arrive at an answer to a question there must be prior knowledge of what sort of thing will count as an answer. This problem, however, has its philosophical roots in the doctrine of recollection in which Plato attempted to meet the paradox that one cannot carry on an inquiry since either one already knows that one seeks or one shall not recognize it when one reaches it.

However, architectural education should be concerned, not only with information gathering and information retrieval capacities which are naturally essential, but also with the information processing capability. Also the design of courses should develop the student across the whole spectrum of creative faculties and 'talent bands'.

The teacher's role is assumed to be as talent developers, they should guide the students to activate and develop the multiplicity of their talents. This approach breaks away from the standard one-talent-only type of teaching and opens the way for several more previously neglected talents.
In this way academic achievement is seen as a part of a whole new educational system. Table (7.6.A) illustrates the talent variation levels of six different students arranged from top to bottom on each of six talent bands.

academic	creative	planning	communication	forecasting	decision making
A	A	D	E	D	E
B	D	B	A	E	G
C	F	A	B	F	C
D	E	F	C	G	A
E	G	E	F	A	B
F	C	G	D	B	F
G	B	C	G	C	D

Fig. 7.6.A. TALENT VARIATION LEVELS OF SIX STUDENTS

Since it has been shown that the individual displays great complexity within his inner processes, products, characteristics and activities; it is worth considering the aim of education as training across such complexity, instead of the focused approach that aims at training directly and separately for each of the talents. The main goal in multiple talent teaching is to have the students use many more of those neglected talents -- more of their dormant mindpower -- than they do at present. Nearly all students can be above average in at least one of these many intellectual talents which can be functioning in a classroom.

Furthermore, through his particular high score talent, a student can process information across the whole spectrum of subject matter. In fact, through this system where knowledge is not an end but a means towards the end of cultivating several high level talents in students, they will acquire a more lasting, working knowledge instead of knowledge that they merely receive, store, retrieve, use during an exam and then forget. More knowledge will be acquired when the goal is a talent-focused rather than a knowledge-focused one.

Many architectural educationalists also believe it impossible to decide what students should be taught because no one knows exactly what job those students will be doing in a few years time. Prediction therefore, must be indeterminate, because the act of deciding what the future will be like, will itself provoke certain positive or negative attitudes. It has been suggested by Ozbekhan that prediction may have great difficulties because, "It calls for the ability to define goals and norms, to construct sets of concretely envisioned situations, to abstract different alternatives from them, and to choose among such alternatives. It depends upon one's capacity to distinguish what is constant and what is variable. Finally, there is the difficulty that to satisfy the above requirements, the resulting construct must be different from the present state of the system and that these differences must embody some good or virtue that the present system lacks" (8).

One cannot foresee exactly what knowledge will be needed a few years from now to meet the designer's problems. The designer should, however, be able to develop attitudes and abilities that will help him meet any future challenge creatively by finding better solutions to problems. The objective of any architectural design course at the moment should be to help the student to acquire and do just that. He learns to associate in new ways the knowledge and experience he possesses, as well as the new knowledge and experience he acquires throughout his education and his life. Thus he becomes better able to apply his learning to problems he meets as he progresses throughout school and into the future.

7.7. GENERAL VERSUS SPECIALIST EDUCATION

Universities cannot by their nature, be expected to change the character of their undergraduate courses so as to respond rapidly to changes in external demands, even if these could be accurately assessed. The reasons for this state of affairs are :

1- Universities try to reach decisions about courses and curricula in a democratic manner, which inevitably means that they are slow to initiate change

2- Teachers, scholars and research workers require a relatively stable educational environment in which to operate.

3- The 'information explosion' that is happening at the moment means that even specialized information possessed by a student on graduation is often inadequate and will almost certainly become insufficient or out of date within a few years.

The solution to this dilemma in the case of design education should be that architectural institutions should concentrate a major portion of their teaching resources into non-specialized interdisciplinary courses which would not only serve the traditional function of training the mind of the student but also ensure that he is aware of the broad cultural developments and values in the society in which the university is situated.

The argument about specialists and generalists should be seen in a new light. The terms in which it is usually conducted do not seem quite right, for the words should relate as much to the self-image and aspirations of the individual as to the course he has followed. It is individual behaviour as much as educational input which defines the differences.

However, this argument has its roots in the state of the architectural profession and is affected by the course design situation. Graduates of schools of architecture do not all work as designers, in fact they usually choose one of three mainstreams that can be identified as follows :

a. Architectural design activity.

b. Management tasks related to the architectural profession.

c. The building construction industry.

The kind of graduate needed for each of these areas is different, yet the educational system does not reflect this differentiation at the moment. Strategically one does not know enough about the precise pattern or kind of skills that will be needed in the architectural profession in a decade or so, and technological knowledge is undergoing a continuous revolution making it impossible to predict the technical state of architecture ten or twenty years in advance. Therefore mid-career upgrading of knowledge through postgraduate professional courses should become an essential aspect of architectural design education.

7.8. ARCHITECTURAL COURSE DESIGN

Two main trends of thought underlie most of what is said and done about course design. They may be termed discipline-oriented and problem-oriented respectively. By discussing them and their interactions, for they are not mutually exclusive, one can reach the conclusion that they need to be supplemented by a third, namely, balance-oriented.

A. Discipline-orientation :

Probably the most widely held view of the nature of university courses is that when an intellectual approach has succeeded in throwing the light of understanding on a subject area it should be taught academically. However, this led to many courses being put on without there being any pressing social need for them.

B. Problem-orientation :

It is for its non-vocational tendencies that discipline-orientation is much criticized, and problem-orientation is the alternative that is fashionable to prescribe, where professional requirements rather than intellectual values dominate course design. While academic ability is equated with a capacity for abstract thought, which allows relevance to be subordinate to rigour; a more practical, concrete approach is thought suitable for the less able, for whom the relevance has to be brought to the surface.

C. Balance-orientation :

The difficulty of this situation is in finding an alternative which escapes from the intellectual one-sidedness of discipline-bound study without getting tied down to specific and narrow vocational requirements. One may recognize breadth as desirable in itself, because flexibility of the mind is both job relevant and a highly regarded personal quality. But in addition there is a need for some guiding principle to rise above the haphazard preferences of unrestricted student choice. Such a guiding principle should be that of balance, a balance conceived not in terms of precise content but in term of skills.

Within this context the first degree curriculum for architectural education should be the academic and theoretical basis from which the student of architecture can proceed to more intensive and specialized studies. This general curriculum may be designed with reference to the following themes :

a- The process of learning : learning theory and logic

b- The bases of thought : conceptualization, mathematical models, problem analysis, and communication

c- The cultural matrix : influences of social, technological, theological, and political matrices of actions and intentions

d- Value systems : sources of motivation and effect of value systems on art and architecture e- Science as a mode of knowledge : the assumptions and limitations of science

f- Art as a mode of knowledge : analysis of emotional and intuitive attitudes

g- Technology and the physical world : technological choices and their social and economic implications

h- Social studies : people in society urban patterns and social activities

i- The experience of architecture : the interaction of individuals, society and buildings; perception and perceptual theories of architecture

j- Philosophy and architecture : changing ideals and the history of the philosophy of art and aesthetics

k- Design skill : a balance of conceptual and manipulative skills according to the design activity model

This general curriculum, however, should be integrated in a project educational situation, in which a concern for the environmental and social problems of the people will formalise the student's architectural intentions.

7.9. PROJECT ORIENTED DESIGN TEACHING

Most educationalists seem to agree on two points concerning the role of projects in teaching architecture :

a. that architectural education is traditionally project based

b. that they are such a familiar part of architecture courses that their role and merits are seldom questioned

Design projects are usually readily accepted as necessary and desirable in the education of architectural designers. This heavy commitment to the project mode in architectural schools stems out of the fact that a design project is a reflection of what happens in architectural practice, the project is a simulation of reality. However, the architectural project as it is applied at the moment, is a continuous part of the educational program, it is a means of teaching rather than applying architectural knowledge.

Usually three stages are identified during the process of the project, namely :

1- gathering and selection of information

2- design activity development

3- presentation of the final output

However, the assessment and appraisal of the student ability is usually measured only on the end product, although it has been noticed that "the final presentation of a proposal does not necessarily reflect the actual process the student has gone through to achieve it" (9). To improve the situation there have been many trials to subject the assessment and appraisal of design projects to more objective criteria, (refer to Module 2 at the University of Strathclyde in Appendix C), though there is not as yet any evidence that a method of appraisal of the design activity itself has been made to work.

It seem that the situation at the moment is that the project mode has two inherent basic aims, the educational aims and the task aims. And though both are recognized, only the task aims which are concerned with physical products are appraised, and a judgement based on that is applied to the educational aims which are concerned with the actual process the student has gone through to achieve the end product.

Claridge, after attending the York Seminar of 1977, proposes a differentiation between design project and design exercise; "The word project should be applied only to work directed towards learning about the design process" (10). But since the end product will play a far less significant part in the assessment of the achievement of the stated aims, and from the professional point of view inadequate products cannot be accepted, a series of design exercises to meet explicit briefs will form a balance between the concern for the individual intellectual development and the concern for the real world need for feasible and human solutions to architectural problems.

There are two main benefits of such a distinction, the more obvious benefit is that evaluation assessment and appraisal techniques will become more realistic and understandable when the aims and objectives are clear. The second less obvious benefit is concerned with the pattern of teaching architecture as an integral whole.

7.10. AN ARCHITECTURAL EDUCATION APPROACH

The current practice in most schools of architecture is that design work occupies about one half of the students' time, and is usually run as afternoon sessions concurrently with formal teaching in the mornings, or may be organized into blocks of formal and blocks of studio teaching. These two structures have the major defect of the disparity and difference of pace between basic formal knowledge and design project oriented knowledge. The result is the isolation of formal knowledge input from being considered in design. Most subjects are taught in an abstract form and examples are given on unreal situations that mean nothing to the student, yet when the time might come for its use in a design problem, it is rarely recalled.

However, if the project with its new definition becomes the core from which knowledge is generated, this can be done through an integration of the curriculum at each stage to fulfil certain educational aims. The time table will be directly related to the type of projects being undertaken, and these projects in their turn must generate the time table. Design exercises on the other hand will be more sparcely set, and their topics and timing will be chosen to invite the student to make some active use of knowledge that was gained through the preceding project period.

The relative merits of the heuristic and didactic approaches should be understood as fully as possible, making full use of case studies and group project work in which students experience the problems of working together in solving problems and achieving results in real social contexts. Tutorials and seminars in which ideas are criticized and defended as among equals, and the regular preparation and thorough criticism of written work derived from the projects discussed in those seminars, are important not just for instilling information and knowledge but also for developing effectiveness in communication.

The proposed architectural education approach is based on staging the educational process into several defined and interrelated periods, each having its own objectives and means of achieving them.

Stage 1 : Undergraduate

This stage should be a three year general education course having the basic aim of developing the intellectual abilities of the students. A wide range of cultural, social and human science subjects would be tackled in addition to the development of basic technical skills to provide for balance of choice in the next stage without constraining the freedom of that choice to allow for the maximum probabilities of vocational selection.

Education during this period will be multiple talent-focused system including extra curricular social activities and projects that are related to the prevailing physical and cultural environment. Clearly individual universities would desire to design their own schemes for the different combinations; however, topics will usually be an outcome of the organized development and discussion of the ongoing projects, which will also help in increasing the communication ability within and outside the institution.

At the end of this stage an interim degree will be awarded, this degree will be minimally vocational oriented thus giving the graduate maximum flexibility in job choice.

Stage 2 : Graduate

After at least one year of practical experience, an interim degree holder can start the two year graduate stage. The major aim of this stage is the development of professional and technical skills, the student after three years of general undergraduate study and at least one year in contact with the real life situation will be more capable of making his own choices, so an increase in extent and value of options will allow individual students to change the main emphasis of their course as they progress.

However, still this period will be a project based education but should contain much more exercises as direct application of technical information given in modules of lectures and formal education sessions.

Since the aim of this stage is vocational there will be a continuous interaction between education, research and practice. The demand for the output of a particular course might fluctuate. The actual demand for graduates with particular training should be ascertainable by effective monitoring and consultation with appropriate professional and social institutions. What is required, therefore, is some system of arranging graduate training courses which provides the maximum flexibility in the recruitment of staff and enables courses to be started, expanded or contracted and terminated with as little difficulty as possible.

Stage 3 : Postgraduate

This stage will usually be required after a variable period of professional and vocational experience, whether in a design office, management board or working on the site, the architect will come back to the educational institution for a mid-career postgraduate study, the most important objective of this stage is the upgrading of information and knowledge. The system of education will be basically lectures and applied exercises to develop certain skills and new techniques over a period of one year which may extend in special cases to two years. Communication will be three way as a direct contact will be brought about between practice and education and these will filter down the acquired knowledge to the graduate stage creating a dynamic interrelationship.

The proposed structure is not intended to be monolithic, and this was meant to be so, to allow for flexibility within this educational structure so that architecture continues to reflect the needs and aspirations of society both in its stability and its change. In general the considerable expansion of the general courses means that the bulk of the specialized teaching will be done in the graduate and postgraduate stages, however, knowledge and skills are relatively easily acquired if the right foundations have been laid by the educational process. Naturally this proposed structure will impose heavy demands on the staff, and will need extreme care on the administration level, since any loss of synchronization will result in the loss of the central purpose of the proposed educational structure.

REFERENCES

1. Wittgenstein, L.
   Philosophical Investigations
   Oxford, 1953
   I, 242

2. Leonard, G.B.
   Education and Ecstasy
   New York, 1968
   p.39

3. Author unknown
   Lectures on Architecture
   Royal College of Art
   1957

4. Author unknown
   ibid

5. Sir Martin, L.
   a paper presented to
   The Royal Institute of British Architects
   January 1967

6. Papanek, V.
   Design for the Real World
   London, 1972
   pp.244-245

7. Chomsky, N.
Language and Mind
New York, 1968
p.64

8. Ozbekhan, H.
The Future of an Ethical Concept
London, 1969

9. Rae, J.
The Architectural Design Project
Bartlett School of Architecture
January 1978

10. Claridge, B.
Design Projects in Architectural Courses
Univ. of Adelaide
January 1977

Conclusions & Recommendations

CONCLUSIONS and RECOMMENDATIONS

Through a historical survey of the cultural implications on architectural configuration and aesthetics this research reconfirms the fact that Architecture is the manifestation of social and cultural forces as well as the physical and economic factors that act on human society of any period and in any specific environment. The role of interaction between an individual and his environment is of great importance as it mediates between social and individual determinisms. The research also shows that the moral and aesthetic standards which an individual applies to his own conduct and preferences are always the reflection, more or less individualized, of the values prevailing in his social environment.

Arriving at a choice of values and investigating, validating or disqualifying the choice that was made, was identified as one of the major problems that face designers. The architect should arrive at a choice of values by applying the prevailing values of the society in which he is designing, as value judgements could only be the direct outcome of the cultural, religious, political and social context of the day.

Architectural design is the result of solving a problem in a context. It grows around an organizing priciple and takes form in a social, cultural, economic and physical space.

The architecture created has form but this form is the outcome of a design activity and will inevitably be unseccessful if sought for its own sake. Human needs, structural requirements, human purposes and the social awareness of the designer all act on the design process to create an architecture that will be positively evaluated.

This research demonstrates that whenever an individual is confronted with an external stimulus impinging on his sensory apparatus, the way in which that stimulus is perceived depends mainly on his experientially established perceptual dispositions. To be capable of realizing the meaning and symbolism of an architectural form, there should be a shift of attention from the object to the subjective experience. A cross-cultural study on the appreciation of architectural form was undertaken in an attempt to relate people's aesthetical and cultural evaluations to architectural form. This field survey established that :

a. different cultural groups evaluate built form differently and that their preferences for certain forms varied considerably with respect to their cultural background.

b. The matrices of communication used by different cultures showed distinctive variations, there were culturally different language implications of the meaning of the formal aspects of architectural form.

c. there are inherent limitations in the use of behavioural and psychological experimental situations which prevent any authoritative conclusions to be made of the results.

However, from the results and general evidence of this cross-cultural study it can be seen that architectural form in a design evaluation situation could be directly related to the social and cultural background of the subject and that it also reflects the frames of reference used to relate meanings within the social context prevailing.

Peoples of both the industrially developed countries and the developing countries, inhabit a world that is undergoing continuous change. However, the space/time dimensions of this world, when viewed from different cultural angles, are not the same. Not only are there some very natural differences, but also these differences are not seen in the same light from the differeing viewpoints. Therefore, the architecture of these 'social situations' should exhibit differences and should accordingly be designed to meet the needs of the differing conceptions of the human reality.

Architectural thought, from the point of view of the more conventional scientists and some rationalists 'lacks consistency' and facts are customarily charged with poetic overtones.

This occurs as the architect mixes various thought patterns which are derived from the natural sciences, the human sciences and the philosophy of art, all in a particular field of cultural forces. Therefore an explicit recognition of the intertwined character of architectural though makes for a better understanding of the architectural design activity.

Taking into consideration the real situation of the behavioural activity of the designer during the creative process, a design activity model is proposed by the author. This model was based on the qualitative mathematical model of the 'catastrophe theory'. It demonstrates that the creative design activity occurs due to a conflict between the cultural attitudes and the technological aspirations of the designer. The creative leap happens as a result of a moment of instability of the forces acting in the behavioural level.

The structure of the theory and practice of architectural design is the same in whatever self-conscious reality it is practised. But it assumes a distinctive dimensional balance according to the nature of the society within which it operates. Therefore, for architecture to be relevant, it will need to restructure the past in the space/time continuum, serve the present and offer clues to the future. It has to offer both locally and in the larger context of city and nation, information for a clear and comprehensive human environment, an environment to which people can respond while it is full of future potential. This architecture will be successful, practical and in accord with 'the spirit of the times'.

The architect's intellectual structure has its own distinctive field of fact and theory but is deeply penetrated and partly structured by fact and theory from many specialized fields of study. In order to move freely in his own field of decision the architect has to be able to handle competently the essential ideas and new developments in many associated disciplines. These disciplines encompass and include those of applied physics, engineering, sociology, anthropology, economics, law, management, aesthetics, site engineering and constructional assembly. Hence it is recommended that the educational system of the architect should have a base period of general study so he can grasp the concepts and basic ideas in such fields of knowledge. This in no way denies the fact that the architect has his own specialization namely the planning of space for human use. Yet, it is not a specialization in the narrow sense of the word, but rather the architect should still be considered a 'universal man' who exploits his own specialization and those of many others to meet the individual, social and cultural needs of his user clients.

Central to the study of architecture is therefore the study of the process of architectural design, of design objectives and of the whole structure of design thought in its cultural and social perspectives. It is this that should form the essential curriculum. Architectural knowledge is not an external object and the educational system must prepare the mind so that this knowledge may grow within. Obviously, some facts and skills must be absorbed, but from the beginning of study the most necessary aspects should be theories, concepts and ideas, and some of these must come from the student himself. Once his own ideas have started to link up with the mainstream of architectural thought, a period of vocational education could commence delivering the majority of the facts and information concerning the real experience of the external world. This second stage should be linked with research and mid-career postgraduate study, thus becoming more sensitive to the relevant skills and information needed in the prevailing social environment.

Finally, it is hoped that this research has succeeded in establishing the fact that qualitative models and analysis can perform as good as, if not better than quantitative analysis in the cases of multi-variable situations where most of the variables are virtually unknown as is the case with architecture. Therefore future research in architectural qualitative evaluation techniques is strongly recommended so that the architect may approach those elusive problems of human, social and cultural aspects with confidence, knowledge and creativity.

Bibliography

BIBLIOGRAPHY

Abdulak, S. and Pinon, P.
Maisons en Pays Islamiques
L'architecture d'aujourd'hui 167
May/June 1973

Abrams, M.
The Social Effects of the Physical Environment
Journal of the American Institute of Planners
May 1961

Alexander, C.
Notes on the Synthesis of Form
Harvard Univ. Press
Cambridge Mass. 1964

Alexander, C.
The Question of Computers in Design
Landscape (spring 1965)

Alger, J.R.M. and Hays, C.V.
Creative Synthesis in Design
Prentice Hall
New Jersey, 1964

Ames, D. (trans.)
Egyptian Mythology
Paul Hamlyn Ltd.
London 1965

Archer, L.B.
Systematic Method for Designers
Design
April 1963

Arnheim, R.
Visual Thinking
Faber
London 1970

Ashby, E.
Masters and Scholars
Oxford University Press
London 1970

Asimow, M.
Introduction to Design
Prentice-Hall
N.Jersey 1962

St. Augustine
Russel, R. (trans.)
De Ordine
Cosmopolitan Science & Art Service
New York 1942

Badawy,A.H.
The Harmonic System of Architectural Design in Ancient Egypt.
Deutsche Akademie der Wissenschaften
Berlin 1961

Baynes, K.
Art in Society
Lund Humphries
London 1975

Beloff, J.
Brain and Mind
British Journal of Psychology 47/1956

Benedict, R.
Patterns of Culture
Houghton Mifflin Company
Boston 1959

Berlyne, D.E.
Studies in the New Experimental Aesthetics
John Wiley & Sons
Washington 1974

Berofsky, B. (edit.)
Free Will and Determinism
Harper & Row
New York 1966

Blair, L.
Rythms of Vision
Granada Publishing Ltd.
St. Albans, Herts 1976

Bosanquet, B.
A History of Aesthetic
George Allen & Unwin Ltd.
London 1917

Brett, L.
Parameters & Images
Weidenfeld & Nicolson
London 1970

Broadbent, G.
Design in Architecture
John Wiley & Sons Ltd.
London 1973

Broadbent, G. & Ward, A. (edit.)
Design Methods in Architecture
Lund Humphries
London 1969

Brolin, B.C.
The Failure of Modern Architecture
Studio Vista
London 1976

Bronowski, J.
The Ascent of Man
British Broadcasting Corporation
London 1976

Brosan, G. et.al.
Patterns & Policies in higher Education
Perguin Books
Harmondsworth 1969

Brothwell, D. (edit.)
Beyond Aesthetics
Thames & Hudson
London 1976

Bruner, J.S.
The Process of Education
Vintage Books
New York 1960

Buckley, W.
Sociology and Modern Systems Theory
Prentice-Hall
New Jersey 1967

Cakin, S.
Evaluation and Participation in Design
University of Strathclyde
PhD. Thesis 1976

Canter, D.
The Study of Meaning in Architecture
Unpublished Paper
April 25,1968

Canter, D. & Tagg, S.
The Empirical Classification of Building Aspects & their Attributes
University of Surrey
paper 1974

Canter, D. & Lee, T.
Psychology & the Built Environment
The Architectural Press
England 1974

Canter, D. & Stringer P.
Environmental Interaction
University of Glasgow Press
1975

Canter, D.
Why Architecture is Necessary
RIBA Journal 6/1977

Cassirer, E.
Essay on Man
Yale University Press
New Haven 1944

Chermayeff, S. & Alexander, C.
Community and Privacy
Penguin Books
Harmondsworth 1966

Chomsky, N.
Language and Mind
Harcourt Brace
New York 1968

Claridge, B.
Design Projects in Architectural Courses
School of Architecture University of Adelaide
Australia January 1977/paper

Colquhoun, A.
Typology and Design Method
'Arena' The A.A. Journal
London June 1967

Conference
The Making of an Architect
University of Edinburgh Dep. of Arch.
May 9,1978

Conrads, U. & Sperlich H.
The Architecture of Fantasy
Frederick A. Praeger
New York 1962

Coombs,P. H.
The World Educational Crisis
Oxford University Press
New York 1968

Copplestone, T.
World Architecture
Hamlyn
London 1963/1971

Cotterill, H. B.
A History of Art (two volumes)
George Harrap
London 1922

Critchlow, K.
Islamic Patterns
Thames & Hudson
London 1976

Cross, N.
Impact of Computers on the Architectural Design Process
The Architect's Journal 623
March 22, 1972

Cross, N.
The Automated Architect
Pion Ltd.
London 1977

Daley, J.
The Myth of Quantifiability
Architect's Journal 148/34 pp.339-341
August 21, 1968

Daley, J.
A Philosophical Critique of Behaviourism in Architectural Design
Broadbent, G. & Ward, A. (edits) ' Design Methods in Architecture'
1969

Danford, S. & Willems, E.P.
Subjective Responses to Arch. Displays
Environment & Behavior, Vol 7. /4 pp. 486-515
1975

Department of the Environment
Housing the Family
MTP Construction
Lancaster 1974

Dewey, J.
Democracy and Education
Macmillan Co.
New York 1916

Dubos, R.
Humanistic Biology
American Scientist, 53 pp.4-19
1965

Dubos, R.
Man Adapting
Yale University Press
New Haven 1966

Eccles, J.C.
The Physiology of Imagination
Scientific American
September, 1958

Eddington, A.S.
The Nature of the Physical World
Cambridge University Press
Cambridge 1928

Edwards, A.T.
Towards Tomorrow's Architecture
Phoenix House
London 1968

Edwards, I.E.S.
The Pyramids of Egypt
Penguin Books
Harmondsworth 1961

El Ekiaby, M.A.
M. Arch. Thesis
Assiout Univ.
September 1975

Elton, W. (edit.)
Aesthetics and Language
Oxford 1954

Emery, W.B.
Old World Archeology
The Tombs of the First Pharoahs
Scientific American
July 1957

Emerey, W.B.
Archaic Egypt
Harmondsworth
Middlesex 1961

Daley, J.
The Myth of Quantifiability
Architects' Journal, 148, No.34
21 August 1968

Daley, J.
A Philosophical Critique of Behaviourism in Architectural Design
Broadbent, G. & Ward, A. (edit.) in 'Design Methods in Architecture'
1969

Danford, S. & Willems, E.P.
Subjective Responses to Arch. Displays
Environment & Behaviour, Vol7. No.4
December 1975

Lancaster
Housing the Family
MTP Construction
1974

Dewey, J.
Democracy and Education
Macmillan Co.
New York 1916

Dubos, R.
Humanistic Biology
American Scientist, 53,
1965

Dubos, R.
Man Adapting
Yale Univ. Press
New Haven 1966

Faulkner, T.
Design 1900-1960
Polytechnic
New Castle 1976

Festinger, L. et.al.
Social Pressures in Informal Groups
Tavistock Publications
London 1969

Fisher, K.
Living for Today
Thames & Hudson
London 1972

Fleming, C.K.
Notes on the Space Enclosures
Unpublished Paper
1975

Fletcher, B.
A History of Architecture on the Comparative Method
Oxford University Press
1970

Frankfort, H.
Ancient Egyptian Religion
New York 1961

Freud, S.
Civilization and its Discontents
Cope & Smith
New York 1933

Gardner, H.
Art Through the Ages
Harcourt Brace Jovanovich Inc.
New York 1975

Gardiner, S
Evolution of the House
Constable
London 1975

Gay, P.
Art and Act
Harper & Row
New York 1977

Giedion, S.
The Eternal Present
Oxford University Press
London 1964

Gilbert, K.E. & Kuhn, H.
A History of Esthetics
1939

Gombrich, E.H.
Art & Illusion
The Bollingen Foundation
New York 1960

Gombrich, E.H.
Meditation on a Hobby Horse
Phaidon Press
London 1963

Gombrich, E.H.
The Story of Art
Phaidon Press
London 1967

Goodenough, W.H.
Cultural Anthropology & Linguistics
Georgetown University Press
1957

Gordon, N.J.
Synectics
Harper
New York 1961

Grillo, P.J.
Form, Function and Design
Dover Publications Inc.
New York 1975

Gross, F.
Focus on Switzerland
Swiss Office for the Development of Trade
Lausanne 1975

Gruber, H.E. et.al.
Contemporary Approaches to Creative Thinking
Atherton Press
New York 1967

Gugelot, H.
Industrial Design in Practice
Zeitschrift der Hochschule fur Gestaltung
7 January 1963

Guilford, J.P.
The Nature of Human Intelligence
Mc Graw-Hill
New York 1967

Guilford, J.P.
Intelligence, Creativity and their Educational Implications
Knapp
San Diego 1968

Gutman, R.
People and Buildings
Basic Books Inc.
New York 1972

Hall, E.T.
The Hidden Dimension
Doubleday
New York 1966

Hall, J.B. & Ulanov, B. (edit.)
Modern Culture & the Arts
Mc Graw Hill
New York 1972

Handler, A.B.
Systems Approach to Architecture
American Elsevier
New York 1970

Hauser, A.
The Social History of Art (Two Volumes)
Routledge & Kegan Paul
London 1952

Hawkes, D.
Models and Systems in Architecture and Building
The Construction Press Ltd.
England 1975

Hegel, G.W.F. (trans. by Knox, T.M.)
Aesthetics (lectures on fine art)
Clarendon Press
Oxford 1975

Helson, H.
Adaptation Level Theory
Harper & Row
New York 1964

Hermeren, G.
Influence in Art and Literature
Princeton University Press
New Jersey 1975

Herrick, C.J.
George Ellet Coghill
Chicago University Press
Chicago 1949

Hershberger, R.G.
Toward a Set of Semantic Scales to Measure the Meaning
of Architectural Environments
Arizona State University
1972

Hesselgren, S.
The Language of Architecture
Student Litteratur
Lund Sweden 1967

Hinz, E.
Development of a Graphical Model for Spatial Layouts
MSc. University of Strathclyde
1977

Hitchcock, H.R. & Johnson, P.
The International Style: Architecture since 1922
W.W. Norton
New York 1932

Hoffmann, H.
One-Family Housing. Solutions to an Urban Dilemma
Thames & Hudson
London 1967

Hogben, L.
Mathematics for the Million
Pan Books Ltd.
London 1967

Honikman, B.
Construct Theory as an Approach to Architectural
and Environmental Design
1974

Ibrahim, T.A.
Socio-Psycho-Cultural Forces & Architectural Morphology
University of Strathclyde
Glasgow 1976

Insko, C.A.
Theories of Attitude Change
Appleton
London 1967

Isaac, A.R.G.
Approach to Architectural Design
Butterworth
London 1971

Jencks, C.
Architecture 2000
Studio Vista
London 1973

Jevons, F.R. & Turner, H.D. (edit.)
What Kinds of Graduates do we Need
Oxford University Press
London 1972

Jones, J.C.
Design Methods (seeds of human futures)
Wiley-Interscience
London 1976

Jones, J.C. & Thornley, D.
Conference on Design Methods
Pergamon Press
Oxford 1963

Jung. C.G.
The Archetypes and the Collective Uncouscious
Princeton University Press
New Jersey 1959

Kahn, L.
Shelter
Shelter Publications
California 1973

Kant, I.

Critique of Judgement

Trans. Meredith, J.C.

Oxford 1928

Kaplan, B. (edit.)

Studying Personality Cross Culturally

Harper & Row

London 1961

Kasmar, J.V.

The Development of a Usable Lexilon of Environmental Descriptors

Louisiana State University

1970

Kaufmann, A. (trans. by Audley, R.)

World University Library

London 1968

Kepes, G.

Sign, Image, Symbol

George Braziller

New York 1966

Kitson, M.

The Age of Baroque

Paul Hamlyn

London 1966

Klir, J. & Valach, M.
Cybernetic Modelling
trans. Dolan, P.
London 1967

Koenigsberger, O.H., et.al.
Manual of Tropical Housing & Building
Longman
London 1974

Koestler, A.
The Act of Creation
Hutchinson
London 1969

Kuhn, T.C.
The Structure of the Scientific Revolutions
University of Chicago Press
1962

Langer, S.K.
Feeling and Form
Routledge & Kegan Paul
1953

Larson, L.
Lighting and its Design
Whitney
New York 1964

Laszlo, E. & Wilbur, J.B. (edit.)
Value Theory in Philosophy & Social Science
Gordon & Breach
New York 1973

Lawton, D.
The ldea of an lntegrated Curriculum
University of London lnstituted of Education Bulletin
Autumn 1969

Leonard, G.B.
Education & Ecstasy
Delacorte Press
New York 1968

Lethaby, W.R.
Architecture Mysticism & Myth
The Architectural Press Ltd.
London 1974

Lethaby, W.R.
Architecture Nature & Magic
George Braziller lnc.
New York 1956

Levi-Strauss, C.
Structural Anthropology
Basic Books
New York 1963

El Lissitzky, trans. Dluhosch, E.
Russia : An Architecture for World Revolution
M.I.T. Press
Cambridge Mass 1970

Lloyd, B.B.
Perception and Cognition a Cross-Cultural Perspective
Penguin Books
London 1972

Luckman, J.
An Approach to the Management of Design
Operational Research Quarterly 18(4)
1967

Marc, O.
Psychology of the House
Thames & Hudson Ltd.
London 1977

March, L. & Steadman, P.
The Geometry of Environment
Riba
London 1971

Marcuse, H.
One-Dimensional Man
Routledge & Kegan Paul
London 1964

Markus, T.A.
The Role of Building Performance Measurement & Appraisal
in Design Method
The Architects' Journal 20 December
1967

Markus, T.A., et.al.
Building Performance
University of Strathclyde
London 1972

Martindale, A.
Man and the Renaissance
Paul Hamlyn
London 1966

Maslow, A.H.
Motivation and Personality
Harper
New York 1954

Maver, T.W.
A Theory of Architectural Design in which the Role of the
Computer is identified
Building Science 4
1970

Meadow, C.T.
Man-Machine Communication
Wiley
New York 1970

Menzies, M.R.
Complexity in Architecture
Unpublished paper
University of Birmingham 1976

Michelson, W.
Behavioural Research Methods in Environmental Design
Dawden Hutchinson & Ross Inc.
Pennylvania 1975

Montagu, M.F.
Culture, Man's Adaptive Dimension
Oxford University Press
1968

Morcos Asaad, F.N.
Architecture and Technology
Cairo University, Faculty of Engineering
1962

Morcos Asaad, F.N.
Building Technique of the Renaissance & Baroque
University of Strathclyde
Glasgow 1978

Morcos Asaad, F.N.
Building Theories in Renaissance Europe
University of Strathclyde
Glasgow 1978

Morcos Asaad, F.N.
Decisive Technology : A Parameter in Architecture
Dep. of Arch., University of Strathclyde

Morcos Asaad, F.N.
The Influence of Mid-Eastern and Arabic Culture
on Science, Art and Architecture

Morcos Asaad, F.N.
Lectures on Structures
University of Strathclyde
Glasgow

Morgan, D.N.
Creativity Today
Journal of Aesthetics (12)
1953

Morris, D.
The Naked Ape
Jonathan Cape
London 1967

Mumford, L.
Art and Technics
Columbia University Press
New York 1952

Mac Ewen, M.
Crisis in Architecture
Riba Publications Ltd.
London 1974

Mc Laughlin, T.P.
A House for the Future
Independent Television Books Ltd.
London 1976

Mc Mullen, R.
Art, Affluence and Alienation
Pall Mall Press
London 1968

Nahm, M.C.
Selections from Early Greek Philosophy
Appleton-Century-Crofts
New York 1964

Nahm, M.C.
Readings in Philosophy of Art and Aesthetics
Prentice-Hall Inc.
New Jersey 1975

Najder, Z.
Values and Evaluations
Clarendon Press
Oxford 1975

Negroponte, N.
The Architecture Machine
MIT Press,
Cambridge, Mass. 1970

Negroponte, N.
Soft Architecture Machines
MIT Press
Cambridge Mass. 1975

Norberg-Schulz, C.
Meaning in Western Architecture
Studio Vista
U.S.A. 1975

Oakeshott, M.
Rationalism in Politics and Other Essays
Methuen
London 1962

Oakley, D.
The Phenomenon of Architecture in Cultures in Change
Pergamon Press
Oxford 1970

Oliver, P. (edit.)
Shelter & Society
Barrie & Jenkins
London 1969

Opper, J.
Science & the Arts
Fairleigh Dickinson Univ. Press
New Jersey 1973

Osborn, A.F.
Applied Imagination
Charles Seribner's Sons
New York 1963

Osgood, C.E.
Methods & Theory in Experimental Psychology
Oxford University Press
London 1953

Osgood, C.E., et.al.
The Measurement of Meaning
University of Illinois Press
Urbana 1957

Osgood, C.E., et.al.
The Measurement of Meaning
Illinois University Press
Urbana 1967

Ozbekhan, H.
The Future of an Ethical Concept
Proceedings of the 6th General Assembly & Congress,
International Conference of Societies of Industrial Designers
London, September 1969

Papenek, V.
Design for the Real World
Thames & Hudson Ltd.
London 1972

Papenek, V.J.
Solving Problems Creatively
Management Views Vol.9
1964

Paterson, J.
Information Methods for Design & Construction
John Wiley & Sons
London 1977

Perlmutter, H.V.
Towards a Theory & Practice of Social Architecture
Tavistock Publications
London 1965

Perraton, J.
Models, Evaluation, and Information Systems for Planners
1974

Peters, R.S. (edit.)
The Philosophy of Education
Oxford University Press
London 1973

Pevsner, N.
Pioneers of Modern Design
Penguin
Harmondsworth 1960

Piage, J.
Sagesse et Illusions de la Philosophie
Focus on Switzerland

Piankoff, A.
Mythological Papyri
Bollingen Series
New York 1957

Platt, J.R.
How we See Straight Lines
Scientific American
January 1962

Postman, L. et.al.
Personal Values as Selective Factors in Perception
Journal of Abnormal Social Psychology
1948

Poston, T. & Stewart, I.N.
Taylor Expansions and Catastrophes
Pitman Publishing
London 1977

Prak, N.L.
The Language of Architecture
Mouton & Co.
Paris 1968

Prince, G.M.
The Practice of Creativity
Harper & Row
New York 1970

Rader, M., et.al.
Art & Human Values
Prentice-Hall lnc.
New Jersey 1976

Rae, J.
The Architectural Design Project
Bartlett School of Arch.
University College London 1978

Raglan, L.
The Temple and the House
W. Norton & Co.
New York 1964

Rapoport, A.
House Form and Culture
Prentice-Hall
New Jersey 1969

Rapoport, A. & Watson, N.
Cultural Variability in Physical Standards
Transactions of the Bartlett Society
University College London 1968

Rasch, H.
Some Roots of Modern Architecture
Alec Tiranti
London 1967

Rescher, N.
Introduction to Value Theory
Prentice-Hall Inc.
New Jersey 1969

Richards, J.M.
Architecture
David and Charles
Newton Abbot 1974

Rose, S.
The Conscious Brain
Penguin Books
England 1976

Rowland, K.
The Development of Shape
Ginn & Co. Ltd.
London 1963

Rowland, K.
Pattern and Shape
Ginn & Company Ltd.
London 1964

Rowland, K.
The Shapes we Need
Ginn & Company Ltd.
London 1965

Author unknown
Basic Course in Architecture
Royal College of Art
1957

Russell, S.P.
Art in the World
Rinehart Press
San Francisco 1975

Rykwert, J.
On Adam's House in Paradise
The Museum of Modern Art
New York 1972

Saleh, H.A.H. & Shalaby, M.
Determining a Public Image
Cairo University Library Press
1976

Santayana, G.
The Sense of Beauty
New York 1896

Schafer, H.
Principles of Egyptian Art
Clarendon Press
Oxford 1974

Schoenauer, N. & Seeman, S.
The Court Garden House
Mc. Gill University Press
Montreal 1962

Schulz, C.N.
Intentions in Architecture
Allen & Unwin
London 1963

Schuon, F.
Dimensions of Islam
London 1969

Freeman, W.H. & Company
Old World Archeology Foundations of Civilization
Scientific American
San Francisco 1972

Freeman, W.H. & Co.

Perception : Mechanisms and Models

Scientific American

San Francisco 1972

Freeman, W.H. & Co.

Image, Object, & Illusion

Scientific American

San Francisco 1974

Freeman W.H. & Co.

Recent Progress in Perception

Scientific American

San Francisco 1976

Scruton, R.

Art and Imagination

Methuen & Co. Ltd.

London 1974

Segall, et.al.

The lnfluence of Culture on Visual Perception

Bobbs Merill

lndiannapolis 1966

Serpell, R.

Culture's lnfluence on Behaviour

Methuen & Co. Ltd.

London 1976

Sheridan, C.L.
Fundamentals of Experimental Psychology
Holt, Rinehart & Winston
New York 1976

Simon, H.A.
Models of Man : Social and Rational
Wiley
New York 1957

Simon, H.A.
Representation and Meaning : Experiments with Information
Processing Systems
Prentice-Hall
Englewood Cliffs, New Jersey 1972

Soleri, P.
Theology of the Sun
Architecture d'Aujourdhui (167)
May-June 1973

Spearman, C.
Creative Mind
New York
Appleton 1931

Spencer, H.
The Image Maker
Charles Scribner's Sons
New York 1975

Stewart, I.

The Seven Elementary Catastrophes

The New Scientist, 20th November 1975, Vol.68 No.976

Stewart, I.

Concepts in Modern Mathematics

Penguin Books

Suedfeld, et.al. (edit.)

The Behavioural Basis of Design (Book 2)

Community Development Series, Dowden, Hutchinson & Ross lnc.

Pennsylvinia 1977

Swansen. V.

Architectural Space Representation in Two Dimensional Art Form

University of Strathclyde

March Thesis 1975

Tagg, S.K.

The Structure of Situations : Psychological Models

for Room Differentiation

PhD. University of Strathclyde

1976

Taylor, I.A. & Getzels, J.W. (edit.)

Perspectives in Creativity

Aldine Publishing Company

Chicago 1975

Th'ng, R.
A Caad Approach to Secondary School Design
PhD University of Strathclyde
1976

Thom, R.
Structural Stability & Morphogenesis
Benjamin, W.A. Inc.
Massachusetts 1975

Thompson, A.W.
Growth and Form
Cambridge University Press
1952

Thornley, D.G.
Design Methods in Architectural Education
Pergamon
Oxford 1963

The Arts and Man
"A World View of the Role and Functions of the Arts in Society"
UNESCO publication
1969

Vasquez, A.S.
Art and Society
Merlin Press
London 1973

Venturi, R.
Complexity and Contradiction in Architecture
The Museum of Modern Art
New York 1966

Vernon, J.
Inside the Black Room
Penguin Books
Harmondsworth 1963

Vernon, M.D.
The Psychology of Perception
Penguin Books
England 1973

Vernon, P.E. (edit.)
Creativity
Penguin
England 1975

Vesey, G.N.A. (edit.)
Body & Mind
George Allen & Unwin
1964

Waddington, C.H.
Behind Appearance
Edinburgh University Press
1969

Walker, F.A.
John Ruskin: Rekindling the Seven Lamps
AA Quarterly Vol.9 No.1
1977

Wallace, A.
The Psychic Unity of Human Groups
Harper & Row
1961

Wertheimer, M.
Productive Thinking
Tavistock Publications
London 1961

Wiener, N.
Cybernetics
MIT Press
Cambridge, Mass. 1961

Wiener, P.P.
Readings in Philosophy of Science
London
1958

Wilson, F.
Structure, the Essence of Architecture
Studio Vista
London 1971

Wilson, R.N.
The Arts in Society
Prentice Hall
New Jersey 1964

Wittgenstein, L. (trans. by Pears, D.F. & McGuiness, B.F.)
Tractacus Logico-Philosophicus
Routledge
London 1961

Wittgenstein, L.
Philosophical Investigations
Blackwell
Oxford 1953

Wittrock, M.C. (et. al.)
The Human Brain
Prentice Hall
New Jersey 1977

Woldering, I.
Gods, Men & Pharaohs
Harry N. Abrams, Inc.
New York 1967

Wood, D.G.
Space Enclosure & Systems
E.E.S. Bulletin 203
Ohio State University 1973

Woodcock & Poston

A Geometrical Study of the Elementary Catastrophes

Lecture Notes in Mathematics - Vol.373

Springer

London 1974

Zeeman. E.C.

Catastrophe Theory

Scientific American

April 1976

Appendix A

A CROSS-CULTURAL STUDY on the APPRECIATION of ARCHITECTURAL FORM

Until man can fully comprehend the complex interdependencies between himself and his physical environment, very little can be accomplished in any systematic manner toward facilitating desired relationships between the two. This study examines one aspect of this man/environment interface, namely, different cultural cognitive responses to architectural form. Specifically, this study explores the cross-cultural differences in the appraisal and appreciation of a simulation technique of colour photographic prints of specific architectural forms as measured by a series of adjective rating scales.

When architecture researchers use the methodology and measurement techniques of the social sciences, they should be ready to accept the accompanying liabilities in the form of invalidities peculiar to the use of any one method. However, this study sought to assess the responses of the subjects with an attention towards practical as well as statistical significance.

DESIGN of the STUDY

A. The Stimulus Elements

Three characteristics were important in the selection of the architectural forms for this study :

a- They should have no cultural overtones and difficult to place in a definite cultural environment context.

b- They should be relatively isolated, to prevent distraction by other surrounding facilities.

c- They should be of relatively unfamiliar buildings to prevent the effect of prejudgement.

Ten colour photographic prints 125x90mm. of different built forms were presented to the selected subjects for evaluation. The stimulus material was shown to all subjects in the same order, thus controlling the influence of a certain form on the judgement of another.

B. Response Instrument

Subject's responses were recorded by having them rate each form on bipolar adjective scales for the degree to which each adjective described the architectural form or represented the observer's emotional subjective feelings about that form.
The present study selected 42 descriptive adjectives from the lists published by Canter (1968), Vielhauer (1970), Hershberger (1972), and Canter & Tagg (1974); the selection of adjectives was based on the following criteria :

a- They have to be generally applicable or relevant to the description of exterior architectural form.

b- The highest scores achieved in those previous studies.

c- The ease by which the meanings will be understood by the Egyptian subjects according to the judgement of the author.

d- The elimination of irrelevant adjectives to keep the list at a manageable size, so that the whole session with each subject does not exceed 30 minutes.

The total list of 42 adjectives was then organized into a set of bipolar adjective, seven point rating scale (Fig.A.A.1). Each form was evaluated on a seperate page of a response booklet.

pleasant	unpleasant
gloomy	cheerful
organized	disorganized
characterless	characterful
beautiful	ugly
friendly	unfriendly
chaotic	orderly
boring	interesting
unattractive	attractive
repelling	inviting
tidy	untidy
stylish	unstylish
appealing	unappealing
welcoming	unwelcoming
complex	simple
tasteless	tasteful
unimpressive	impressive
dull	lively
ornate	plain
distinctive	ordinary
like	dislike

FIG. A.A.1 THE LIST OF BIPOLAR ADJECTIVES USED IN THE STUDY

C. Selection of Subjects and Procedure

Male and female volunteers with an age range of 20 to 40 years, with the majority between 20 and 32 years of age were assigned to each of three groups participating in this study. Most of the subjects were university graduates and undergraduates, while a few were occupied in postgraduate research. Each group included 12 subjects and could be identified as follows :

Group 1 : British subjects (Bs), subjects in this group were British by birth and education; they lived all their lives in Britain except for short period of holiday.

Group 2 : Egyptian subjects (Es), subjects in this group were Egyptians by birth and education; they lived all their lives in Egypt except for short period of holiday.

Group 3 : Egyptian subjects (EBs), subjects in this group were also Egyptians by birth and basic formal education; but they lived for at least one year previous to the study in Britain.

Each subject was tested individually in the presence of the author. The subject was handed the response booklet and was asked to appraise the stimulus material on the given bipolar adjective seven point rating scale after being informed that there were no right or wrong answers, and encouraged to evaluate the forms subjectively disregarding the function and location of the building in question. The exact sequence of the stimulus material was controlled, but the duration of exposure was left to the respondent. The average time to complete the booklet was between twenty and thirty minutes.

D. Data Analysis

The semantic differential was chosen because of its simplicity in data analysis (Osgood et al., 1957). The GAP INGRID computer program of the University of Strathclyde was used to compare the response structures of the three groups. The options in the program gave the correlations and angular distances between the constructs, and between the elements, also it gave the components as per cent. The result of the Bartlett test was used to measure the significance of differences between the distribution of the components. The rest of the output was concerned with the relation between constructs and elements expressed as cosines and as degrees, also the inter-element relations expressed in degrees.

RESULTS

The data from the bipolar adjective rating scales of the three groups were compiled and represented in three matrices (figs. A.A.2, A.A.3, A.A.4). These matrices were analysed for the significant components for each group of subjects, the results of this analysis (figs. A.A.5, A.A.6, A.A.7) demonstrate that the spread of variance for each of the three groups of respondents was such that about 90 per cent was accounted for by the first two principal components. Accordingly the construct space diagrams were represented two-dimensionally, and the two principal components were used as the two major axes of these graphs (figs. A.A.8, A.A.9, A.A.10), and the constructs and elements were plotted according to their loadings to each component.

Fig. A.A.2 MATRIX OF THE RESULTS OF THE BRITISH SUBJECTS (Bs)

pleasant	unpleasant	3.75	3.58	6.50	3.00	5.08	5.33	2.33	3.83	2.83	4.17
organized	disorganized	3.42	4.00	2.92	1.75	4.42	2.42	2.58	3.92	3.33	3.75
beautiful	ugly	4.42	4.08	6.50	2.92	5.00	5.92	3.25	4.67	3.42	4.92
friendly	unfriendly	4.83	3.83	6.17	4.42	5.08	6.00	4.08	4.42	3.50	5.17
tidy	untidy	3.33	4.25	3.33	1.75	4.50	1.58	2.33	4.50	2.83	4.50
stylish	unstylish	3.08	4.08	5.92	2.42	4.67	4.67	2.75	3.25	2.92	4.67
appealing	unappealing	4.25	3.75	6.42	2.92	5.75	5.75	2.83	3.83	3.00	5.08
welcoming	unwelcoming	4.42	4.00	6.42	3.92	5.33	6.00	3.42	4.42	3.67	5.33
ornate	plain	4.17	3.00	6.42	3.75	4.17	6.08	3.42	2.67	3.08	3.25
distinctive	ordinary	2.92	3.33	6.25	2.67	3.83	5.17	2.33	2.00	2.50	4.25
like	dislike	4.17	3.67	6.58	2.58	5.50	5.75	2.83	3.83	3.08	5.17
cheerful	gloomy	3.08	2.92	6.08	3.08	5.33	5.08	3.17	4.00	3.17	4.50
characterful	characterless	3.25	3.00	6.58	3.50	4.25	6.33	2.50	2.50	3.25	4.42
orderly	chaotic	3.33	4.33	2.17	1.50	4.92	1.92	2.83	3.83	2.75	3.83
interesting	boring	3.33	2.75	6.25	3.17	4.25	6.00	2.75	2.58	3.08	4.25
attractive	unattractive	4.08	3.75	6.42	2.83	4.83	5.42	5.58	4.00	3.17	4.92
inviting	repelling	4.33	3.83	6.08	3.25	5.08	5.33	3.08	3.92	3.17	5.00
simple	complex	5.17	5.75	2.50	3.75	4.67	2.58	4.58	5.25	4.67	4.67
tasteful	tasteless	3.58	3.50	6.17	2.92	5.00	4.92	2.92	4.17	3.33	4.75
impressive	unimpressive	2.92	3.42	5.50	2.42	4.75	3.75	2.42	2.50	3.50	4.00
lively	dull	3.25	2.83	6.25	3.00	4.50	5.50	3.42	3.42	3.17	4.58

Fig. A.A.3 MATRIX OF THE RESULTS OF THE EGYPTIAN SUBJECTS (Es)

pleasant	unpleasant	4.92	2.58	5.17	2.83	5.50	3.75	2.00	4.00	1.75	3.67
organized	disorganized	4.67	1.83	2.75	1.50	5.67	1.58	1.75	4.25	1.75	3.50
beautiful	ugly	5.00	3.08	4.83	2.83	5.50	4.25	2.75	4.00	1.92	4.00
friendly	unfriendly	5.92	2.67	5.25	4.00	5.42	4.92	1.92	4.50	2.08	3.92
tidy	untidy	3.17	1.75	3.17	1.50	4.67	1.25	2.17	3.92	1.67	3.33
stylish	unstylish	4.67	2.25	5.00	2.75	5.00	3.83	2.33	2.83	2.25	3.83
appealing	unappealing	5.33	2.83	5.42	3.42	4.92	4.75	2.33	4.17	2.42	4.25
welcoming	unwelcoming	3.75	2.42	5.67	3.42	5.67	5.42	2.08	4.33	1.83	4.58
ornate	plain	5.42	4.00	6.08	5.83	3.00	6.50	4.42	3.17	4.67	3.58
distinctive	ordinary	4.00	3.00	5.83	3.67	2.92	5.75	3.42	2.08	2.58	3.33
like	dislike	5.92	2.50	5.50	3.33	5.83	4.67	2.17	4.83	1.83	4.50
cheerful	gloomy	4.17	3.58	4.75	3.42	4.33	4.42	2.42	4.00	2.33	3.00
characterful	characterless	3.33	2.83	4.92	3.08	3.25	4.67	2.00	2.17	1.83	3.25
orderly	chaotic	3.75	2.75	3.17	2.33	5.67	2.42	2.17	3.75	2.08	3.67
interesting	boring	4.17	2.67	5.33	3.67	4.75	5.58	2.67	3.00	2.08	4.00
attractive	unattractive	5.33	2.75	5.33	3.33	4.92	5.08	2.33	3.17	2.00	4.00
inviting	repelling	3.92	2.92	5.33	3.42	4.50	5.42	2.42	4.00	2.17	4.58
simple	complex	4.75	4.50	3.00	1.58	6.00	2.75	3.17	6.08	3.67	5.33
tasteful	tasteless	5.25	2.42	5.25	2.58	5.50	5.00	2.17	3.42	2.00	4.50
impressive	unimpressive	4.17	2.42	5.42	2.83	4.67	4.92	2.58	3.17	2.33	4.17
lively	dull	4.50	2.67	5.83	3.08	4.83	4.67	2.33	3.92	1.83	4.17

Fig. A.A.4 MATRIX OF THE RESULTS OF THE EGYPTIAN SUBJECTS (EBs)

pleasant	unpleasant	4.50	1.75	3.75	1.67	4.67	4.58	2.25	3.17	2.25	3.58
organized	disorganized	3.08	1.83	2.08	1.25	4.50	2.00	1.75	2.67	2.67	2.92
beautiful	ugly	4.75	2.83	4.83	1.75	4.67	4.33	2.42	3.42	3.17	4.17
friendly	unfriendly	5.08	1.75	4.83	2.92	4.67	4.25	2.33	3.83	3.50	4.42
tidy	untidy	3.00	2.83	2.92	2.50	4.33	1.92	2.00	3.58	3.08	4.17
stylish	unstylish	2.67	3.00	3.25	1.33	3.58	2.25	1.83	2.17	2.33	3.83
appealing	unappealing	4.67	2.00	3.67	1.42	4.58	4.33	2.58	2.58	2.75	3.42
welcoming	unwelcoming	4.75	2.17	4.17	2.42	4.92	4.17	2.08	2.67	3.17	3.92
ornate	plain	4.42	2.42	5.17	5.58	2.33	6.50	4.58	2.67	3.33	2.83
distinctive	ordinary	2.25	2.75	4.92	2.17	2.17	4.58	2.33	1.33	2.92	2.25
like	dislike	5.00	1.67	4.67	1.75	5.17	4.75	2.25	3.17	3.25	4.00
cheerful	gloomy	4.50	2.17	5.00	3.17	3.92	4.67	1.92	3.08	2.92	3.92
characterful	characterless	4.17	2.75	4.08	2.33	3.42	4.83	2.92	1.75	2.58	3.25
orderly	chaotic	4.42	3.25	2.67	2.58	5.08	1.92	2.42	4.58	3.17	4.50
interesting	boring	4.42	3.00	5.42	2.42	3.83	5.33	2.17	2.58	3.17	3.75
attractive	unattractive	4.58	2.83	5.42	2.42	3.75	4.50	2.25	2.00	2.92	4.00
inviting	repelling	4.42	2.33	4.17	2.08	4.75	4.50	2.33	2.83	2.92	3.58
simple	complex	5.75	5.00	3.08	3.00	5.75	2.42	4.08	6.00	4.25	6.17
tasteful	tasteless	4.92	2.83	5.17	2.33	4.50	4.42	2.50	3.00	3.08	4.25
impressive	unimpressive	3.67	3.67	3.92	2.08	4.75	4.50	2.50	2.42	3.25	3.75
lively	dull	5.17	2.67	5.08	1.75	4.58	5.00	2.58	3.00	3.17	4.08

COMPONENT	ROOT	AS PER CENT
1	196.9740	76.45
2	42.3605	16.44
3	6.2114	2.41
4	4.2640	1.66
5	3.0345	1.18
6	1.9570	0.76
7	1.3921	0.54
8	0.8987	0.35
9	0.5463	0.21

Fig. A.A.5, Bs RESULT OF BARTLETT TEST, CHI SQUARE.

2 COMPONENTS SIGNIFICANT

COMPONENT	ROOT	AS PER CENT
1	211.9814	70.28
2	69.5842	23.07
3	8.0375	2.66
4	4.3082	1.43
5	3.3639	1.12
6	2.0180	0.67
7	1.1777	0.39
8	0.6600	0.22
9	0.5002	0.17

Fig. A.A.6, Es RESULT OF BARTLETT TEST, CHI SQUARE,

3 COMPONENTS SIGNIFICANT

COMPONENT	ROOT	AS PER CENT
1	144.7038	62.34
2	62.9642	27.13
3	11.1979	4.82
4	5.7335	2.47
5	3.6302	1.56
6	1.8141	0.78
7	1.2758	0.55
8	0.5640	0.24
9	0.2390	0.10

Fig. A.A.7, EBs RESULT OF BARTLETT TEST, CHI SQUARE,
5 COMPONENTS SIGNIFICANT

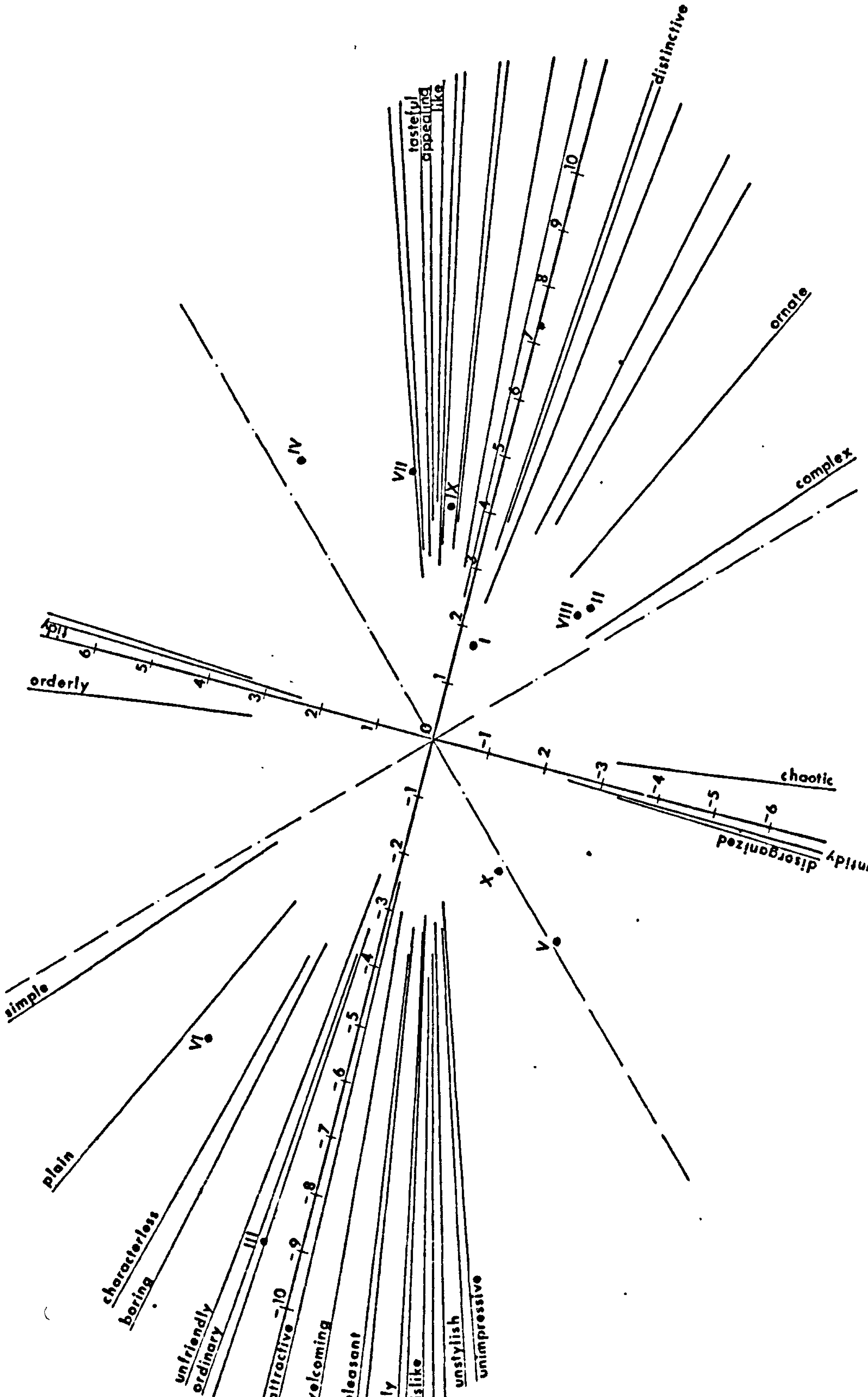

distinctive
tasteful
appealing
like
ornate
complex
tidy
orderly
chaotic
untidy
disorganized
simple
plain
characterless
boring
unfriendly
ordinary
dull
unattractive
unwelcoming
unpleasant
gloomy
ugly
repelling
dislike
unappealing
tasteless
unstylish
unimpressive
I
II
III
IV
V
VI
VII
VIII
IX
X

Fig. A.A.8. (Bs)

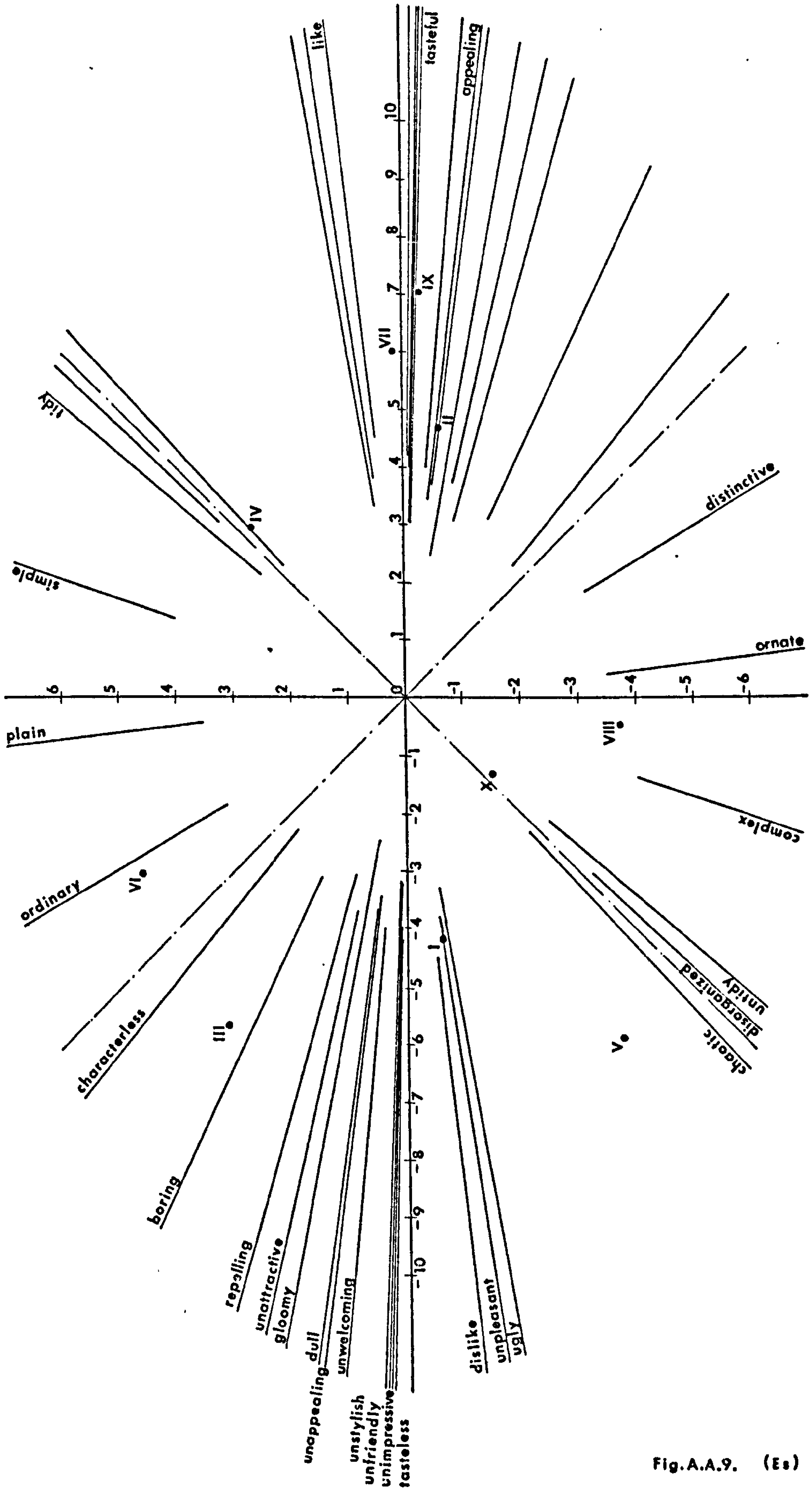

like
tasteful
appealing
tidy
simple
distinctive
ornate
plain
complex
ordinary
characterless
untidy
disorganized
chaotic
boring
repelling
unattractive
gloomy
dull
unappealing
unwelcoming
unstylish
unfriendly
unimpressive
tasteless
dislike
unpleasant
ugly
I
II
III
IV
V
VI
VII
VIII
IX
X

Fig.A.A.9. (Es)

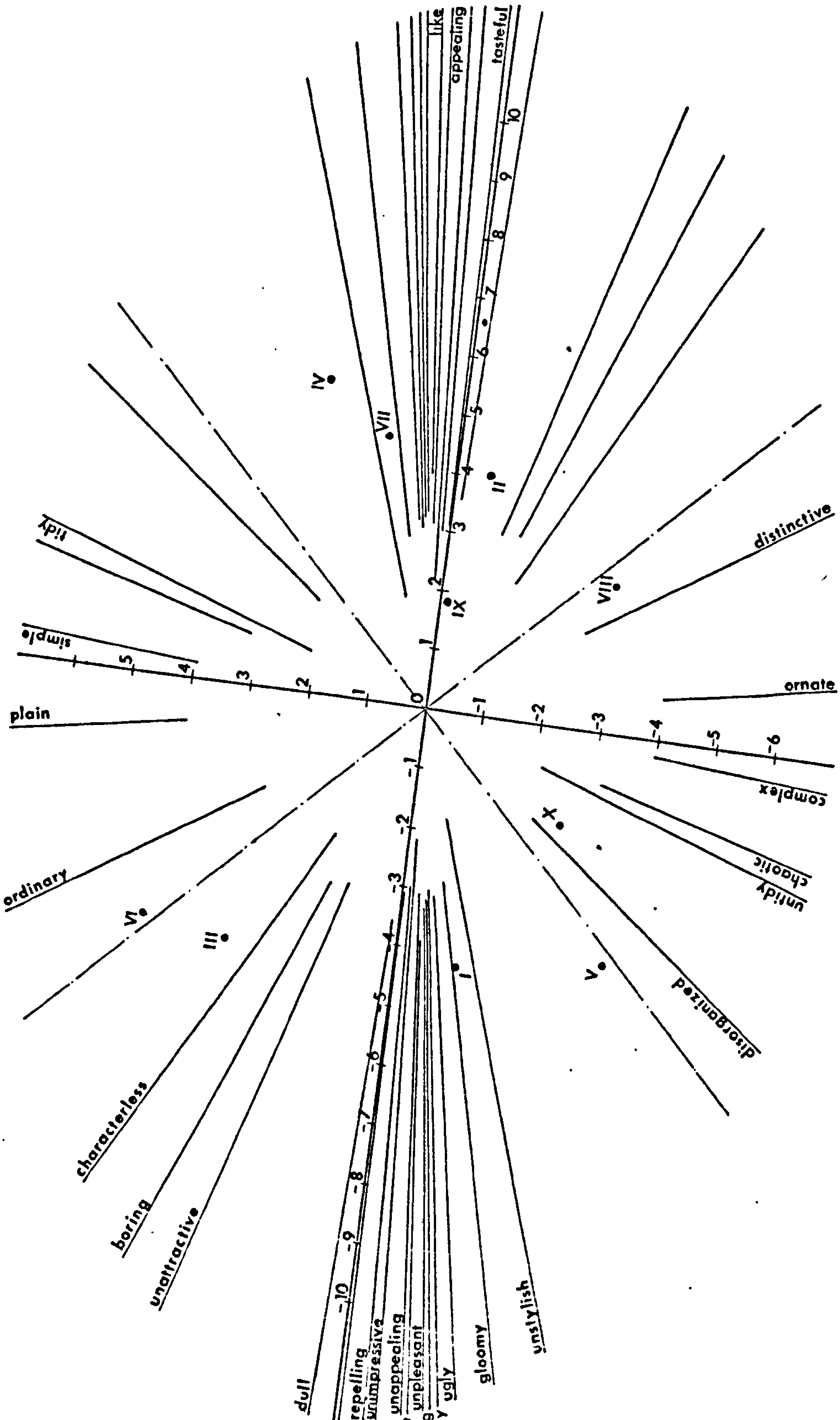

like
appealing
tasteful
distinctive
ornate
complex
chaotic
untidy
disorganized
unstylish
gloomy
ugly
unfriendly
unpleasant
unwelcoming
unappealing
dislike
unimpressive
repelling
tasteless
dull
unattractive
boring
characterless
ordinary
plain
simple
tidy
I
II
III
IV
V
VI
VII
VIII
IX
X

Fig. A.A.10. (EBs)

DISCUSSION

1- There were two significant components in the case of Bs,

a. evaluative

b. complexity

In the case of Es, three significant components appeared,

a. evaluative

b. complexity

c. friendliness

In the case of EBs, five significant components appeared, which implies that this group of respondents was undergoing a process of acquiring new values and re-evaluating their own value systems.

2- Form 1 was evaluated positively by the Bs, on the other hand, it was evaluated negatively by the EBs and Es who in fact considered it the most disliked architectural form of the 10 elements.

3- Form VIII also was evaluated positively by the Bs, and negatively by the Es. However it was evaluated positively by EBs.

4- It is notable that most of the other Forms fell in nearly the same zones of the graphs, however it is important to point out that the constructs themselves were evaluated differently by the three groups, for although the two main components were the same, the angles of the construct vectors were different;

case a. 'simple' and 'plain' were considered by the Bs as having a negative evaluative dimension, while the Es and EBs did not consider them as qualities with any evaluative loading.

case b. 'ordinary' was considered as a totally negative evaluative dimension by the Bs, on the other hand, it was considered rather as a complexity dimension related to the simplicity of the form by the Es and EBs.

case c. 'chaotic', 'disorganized' and 'untidy' were considered by the Es as having a negative evaluative dimension, while the Bs considered them neutral on the evaluative dimension.

case 4. 'complex' was considered as a positive evaluative quality by the Bs, and as a negative evaluative quality by the Es; while the EBs did not attribute to it any evaluative implications.

5- From a formal point of view the buildings most liked and those most disliked by each of the three groups according to the pair of global evaluative responses 'like' and 'dislike', (fig. A.A.11) related to totally different types of architectural form.

GROUP	FORM MOST LIKED	FORM MOST DISLIKED
British (Bs)	IV	III
Egyptian (Es)	IX	I
Egyptian (EBs)	II	V

Fig. A.A.11 Forms most liked/disliked by Bs,Es,EBs.

CONCLUSIONS

In any such attempt to understand the ways in which man comprehends his physical environment, and experiences architectural forms, the researcher is immediately faced with the important problem of how to display the environment in such a way as to enable a valid appraisal. Given the complexity of even the simplest form researchers often turn to simulation techniques to allow a controlled study. The use of colour photographic prints in this study demonstrated the limitation of the use of simulation techniques in architectural displays as they do not represent adequately the totality of the experiential reality which is very important in understanding and appreciating architecture.

This study also demonstrated the limitations of the cross-cultural studies because of the linguistic overtones, that the study was undertaken in the English language for the three cultural groups had the following consequences :-

a. the choice of the Egyptian subjects was limited to those who understand and speak English, and these probably have been a least slightly influenced by the British culture during the course of their learning the English language.

b. the Egyptian subjects were handicapped in comparison to the British subjects, as the former were using a second language in expressing their feelings, while the latter were using their mother tongue.

However, this study was successful in giving evidence of the fact that different cultural groups show different meaning associations to architectural forms.

I.

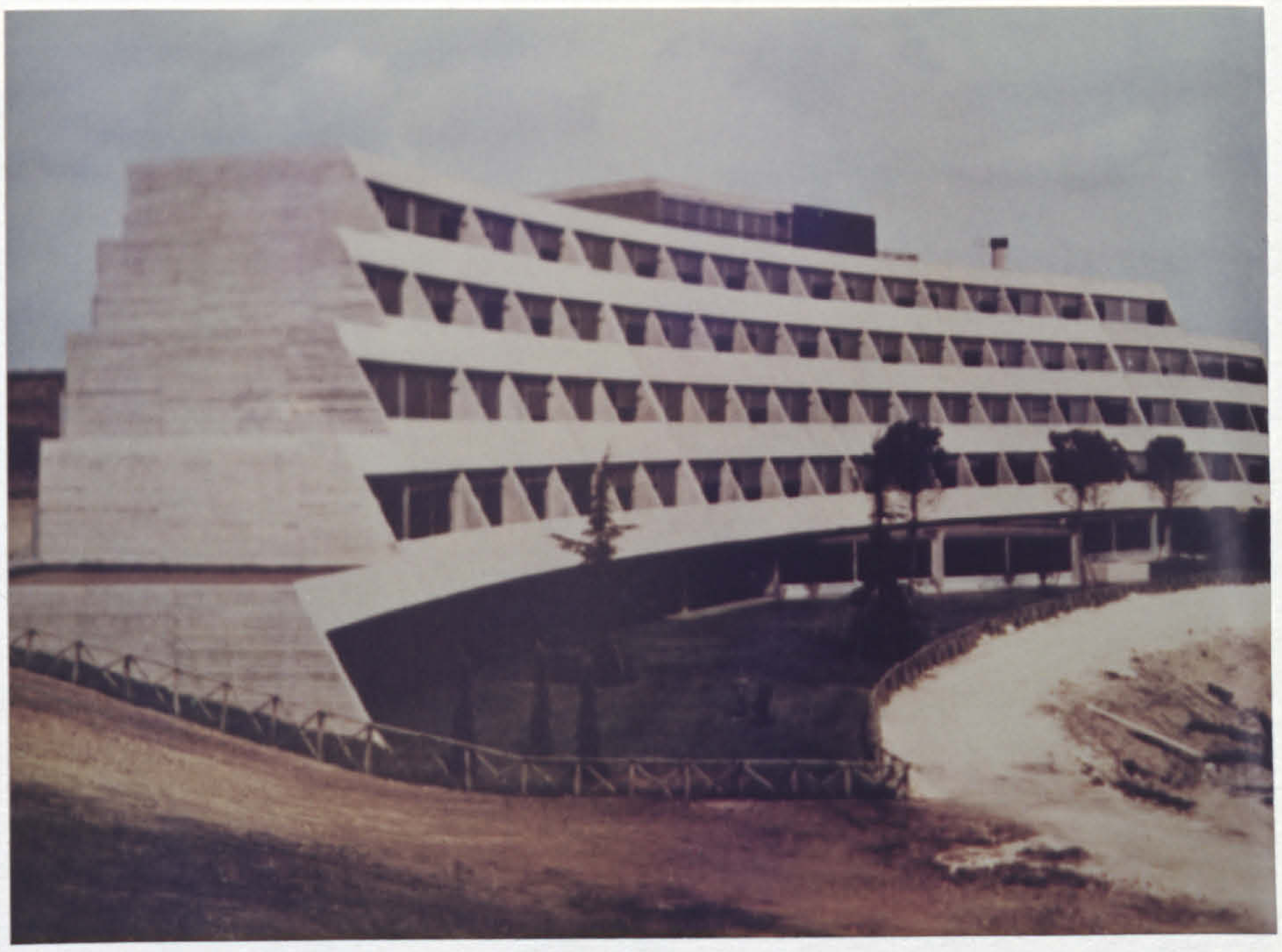
II.

III.

IV.

V.

VI.



VII.

VIII.

IX.

X.

Appendix B

THE CATASTROPHE THEORY

This appendix is a compilation of quotes from the following.

René Thom
Structural Stability and Morphogenesis
D.H. Fowler (trans.)
W.A. Benjamin, Inc. Massachusetts 1975

Dr. Ian Stewart
The Seven Elementary Catastrophes
New Scientist 20 November 1975

E.C. Zeeman
Catastrophe Theory
Scientific American April 1976

"The calculus of Leibniz and Newton takes pride of place in the mathematical description of physical phenomena, from the motions of the planets to the structure of the atom. However, its application is limited to those phenomena exhibiting 'smooth' behaviour. When faced with systems having sudden discontinuities the calculus offers little of value".

I. Stewart

"A mathematical method for dealing with discontinuous and divergent phenomena has only recently been developed..... Catastrophe theory is the invention of René Thom of the institut des Hautes Études Scientifique at Bures-sur-Yvette in France. He presented his ideas in a book published in 1972, 'Stabilité Structurelle et Morphogénèse'...... The theory is derived from topology, the branch of mathematics concerned with the properties of surfaces in many dimensions. Topology is involved because the underlying forces in nature can be described by smooth surfaces of equilibrium; it is when the equilibrium breaks down that catastrophes occur. The problem for catastrophe theory is therefore to describe the shapes of all possible equilibrium surfaces. Thom has solved this problem in terms of a few archetypal forms, which he calls the elementary catastrophes. For processes controlled by no more than four factors Thom has shown that there are just seven elementary catastrophes".

E. Zeeman

"The concept of structural stability seems to me to be a key idea in the interpretation of phenomena of all branches of science (except perhaps quantum mechanics)..... forms that are subjectively identifiable and are represented in our language by a substantive, are necessarily structurally stable forms; any given object is always under the disturbing influence of its environment, and these influences, however slight, will have some effect on its form".

R. Thom

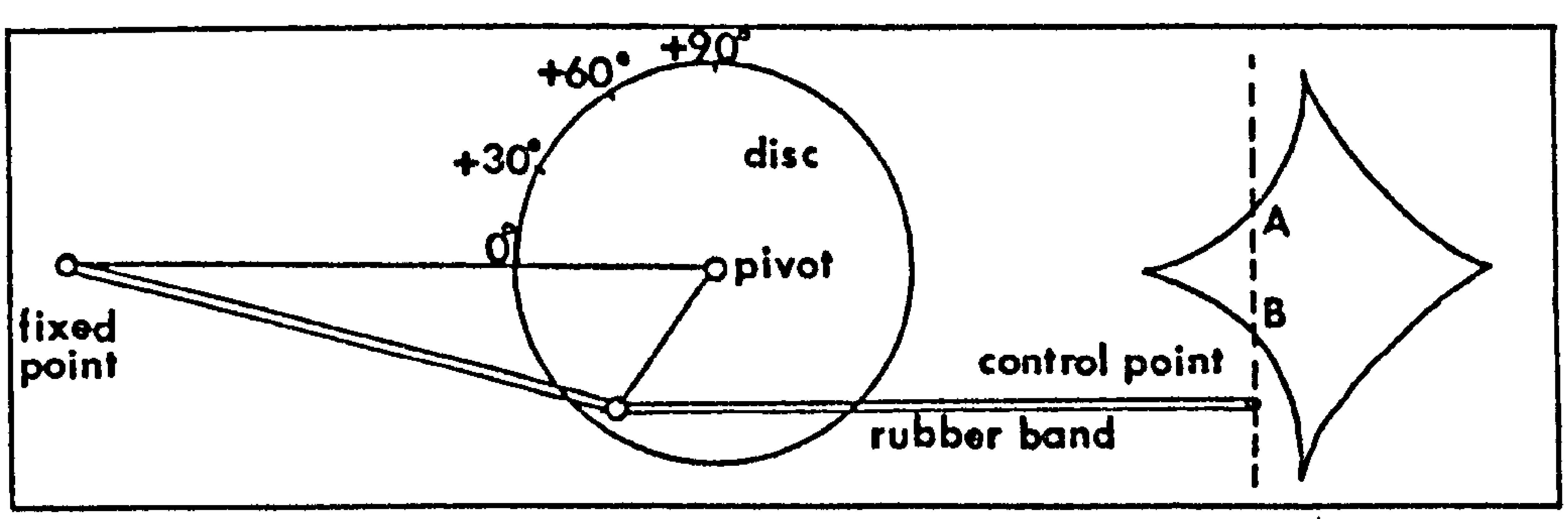
"Formal models, whose kinematic is a formal system, have the following advantages : their description is simple, being axiomatic or combinational, and deduction within these models is formalized and theoretically could be mechanized; also the formal model is compatible with some indeterminacy of phenomena since deduction is an indeterminate operation. But they do have defects : some questions may be undecidable within the system (e.g., to know whether a proposition is or is not the consequence of a set of propositions); moreover, no dynamic is possible for them.

Continuous models, on the other hand, admit a dynamic; moreover, the use of differential models provides strict determinism; and even qualitatively indeterminate phenomena may be described by structurally unstable dynamical systems. However, these models too have inconveniences : they are difficult to describe, and if explicit differential equations are required, only a small number of sufficiently simple geometrical or algebraic objects can be used, conflicting in general with the a priori need for structural stability when dealing with a process that is empirically stable. Imposing this condition strictly leads not to a unique dynamical system, but to an open set of topologically equivalent dynamics, and we then reintroduce into the model a discrete factor making it analogous to a formal system.

We might be tempted to conclude from the foregoing that formal systems are superior, being the only ones that can be conveniently described, but this would be going foo far. If, as Paul Valèry said, 'Il n'y a pas de géometrie sans langage', it is no less true that there is no intelligible language without a geometry, an underlying dynamic whose structurally stable states are formalized by the language. As soon as a formal model is intelligible, it admits a semantic realization, that is, the mind can attach a meaning to each of the symbols of the system".

R. Thom

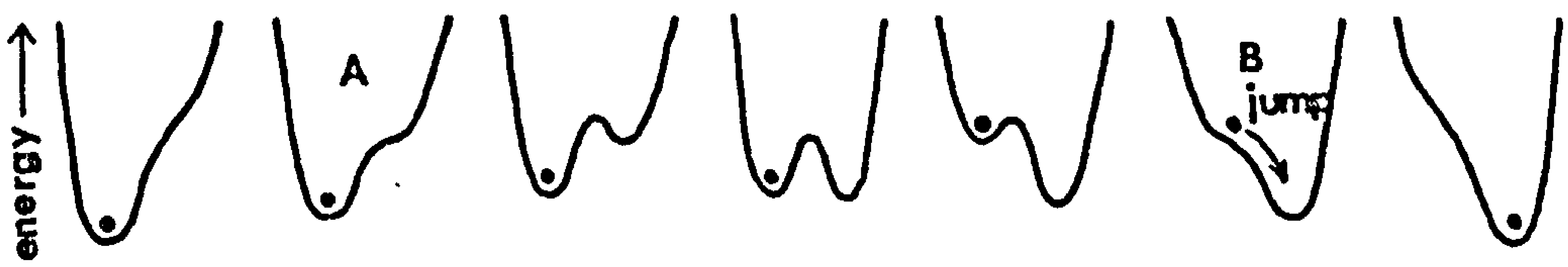
"Catastrophe machine, invented by the author (E.C. Zeeman) exhibits discontinuous behaviour that can be described by a cusp catastrophe. The machine consists of a cardboard disc pivoted at its centre, with two rubber bands attached at a point near the perimeter. The unstretched length of each rubber band is approximately equal to the diameter of the disc. The free end of one rubber band is fixed to the mounting board and the machine is operated by moving the



CATASTROPHE MACHINE

other rubber band, the free end of which is designated the control point. The behaviour measured is the angle formed by the fixed point, the pivot and the point at which the two rubber bands are attached to the disc. Many movements of the control point cause only smooth rotation of the disc, but in some cases the disc swings suddenly from one side to the other. If all the positions of the control point at which such sudden movements take place are marked, a diamond shaped curve is generated. The curve is made up of four cusps, each forming the bifurcation set of a cusp catastrophe. Moving the control point along the trajectory (shown as a dotted line), there is no movement at point A, but the disc turns suddenly at B. If the path of the control point is reversed, it passes B uneventfully, but the disc moves when the control point reaches A. Inside the cusp there are two stable positions of the disc".

E.C. Zeeman



ENERGY FUNCTION

"Energy function, governs the behaviour of the catastrophe machine. The machine tends always to assume a position of minimum energy, that is, the disc rotates to minimize the tension on the rubber bands. When the control point is outside the bifurcation set, there is only one position of minimum energy, corresponding to the one stable position of the disc. As the control point is moved across the bifurcation set a second local minimum develops at A, and eventually it becomes deeper than the original one. The machine cannot shift to the new local minimum, however, because it is seperated from it by a local maximum. Only when the control point crosses the second line of the cusp at B is the local maximum eliminated; the equilibrium then breaks down and the machine moves suddenly to the new minimum".

E.C. Zeeman

"Thom studied a more general situation : those systems in which behaviour can be described by a finite set of variables x,y,z,..... and controlled by a second finite set of variables a,b,c,.....; under an energy function E which varies with a,b,c,..... and x,y,z,..... which is completely general except for mild conditions allowing the operations of calculus. For fixed a,b,c,.... the system takes up equilibrium values of x,y,z,.... corresponding to stationary values of E.
The question is : if we now vary a,b,c,...., what kinds of jump behaviour in the equilibrium positions can the system exhibit?".

I. Stewart

	CATASTROPHE	CONTROL DIMENSIONS	BEHAVIOUR DIMENSIONS	FUNCTION	FIRST DERIVATIVE
CUSPOIDS	FOLD	1	1	$\frac{1}{3}x^3 - ax$	$x^2 - a$
	CUSP	2	1	$\frac{1}{4}x^4 - ax - \frac{1}{2}bx^2$	$x^3 - a - bx$
	SWALLOWTAIL	3	1	$\frac{1}{5}x^5 - ax - \frac{1}{2}bx^2 - \frac{1}{3}cx^3$	$x^4 - a - bx - cx^2$
	BUTTERFLY	4	1	$\frac{1}{6}x^6 - ax - \frac{1}{2}bx^2 - \frac{1}{3}cx^3 - \frac{1}{4}dx^4$	$x^5 - a - bx - cx^2 - dx^3$
UMBILICS	HYPERBOLIC	3	2	$x^3 + y^3 + ax + by + cxy$	$3x^2 + a + cy$ $3y^2 + b + cx$
	ELLIPTIC	3	2	$x^3 + xy^2 + ax + by + cx^2 + cy^2$	$3x^2 - y^2 + a + 2cx$ $-2xy + b + 2cy$
	PARABOLIC	4	2	$x^2y + y^4 + ax + by + cx^2 + dy^2$	$2xy + a + 2cx$ $x^2 + 4y^3 + b + 2dy$

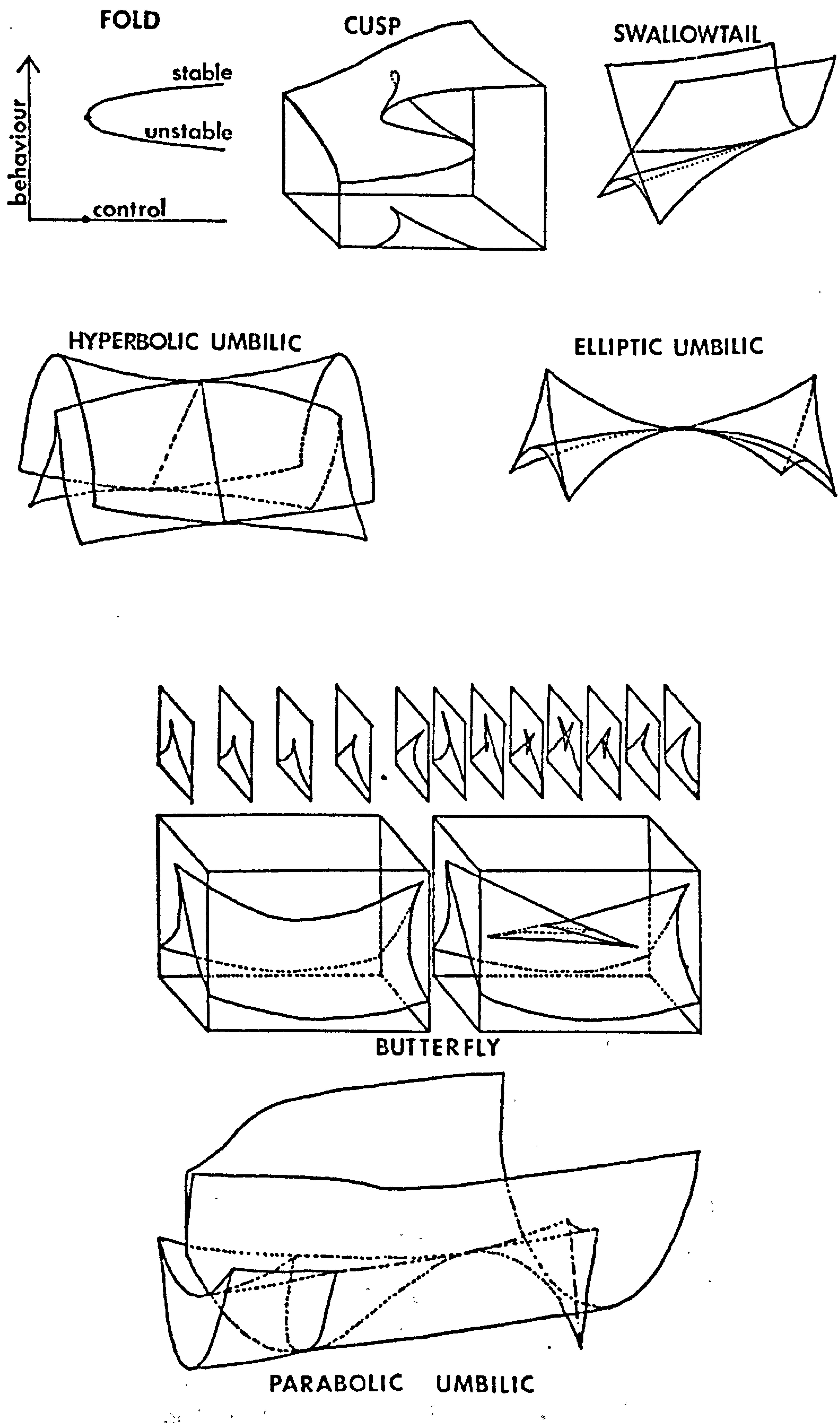
THE SEVEN ELEMENTARY CATASTROPHES : describe all possible discontinuities in phenomena controlled by no more than four factors. Each of the catastrophes is associated with a potential function in which the control parameters are represented as coefficients (a,b,c,d) and the behaviour of the system is determined by the variables (x,y)

"The power of Thom's theory lies in its generality and its completeness. It states that if a process is determined by minimizing or maximizing some function, and if it is controlled by mo more than four factors, then any singularity of the resulting behaviour surface must be similar to one of the seven catastrophes".

E.C. Zeeman

"There is no doubt it is on the philosophical plane that these models have the most immediate interest. They give the first rigorously monistic model of the living being, and they reduce the paradox of the soul and the body to a single geometrical object. Our models attribute all morphogenesis to conflict, a struggle between two or more attractors. This is the 2,500 year old idea of the first pre-Socratic philosophers, Anaximander and Heraclitus. They have been accused of primitive confusionism, because they used a vocabulary with human and social origins (conflict, injustice, etc.) to explain the appearance of the physical world, but 1 think that they were far from wrong because they had the following fundamentally valid intuition : 'the dynamical situations governing the evolution of natural phenomena are basically the same as those governing the evolution of man and societies', profoundly justifying the use of anthropomorphic words in physics".

R. Thom



THE SEVEN ELEMENTARY CATASTROPHES OF R. THOM

Appendix C

A1 General constraints
(valid for all projects)

1.1 Building related regulations

- distances to neighbour buildings, sites (Reg. D17)
- total height of building; number of storeys (Reg. D3, T4)
- shadow diagrams
- total gross area or volume
- safety regulations (fire escape, fire warning and protection, fire fighting, explosion protection etc.) (Reg. D5, T6; E4, T10; Reg. E7; Reg. E8; Guide to fire precaution act ...)
- production control (GMP etc.) and space standard (air quality)
- other building related regulations, e.g. max. travel distance (Reg. E5).
-

1.2 Environment related regulations

- emission control (smoke, dust, fumes, smells, noise etc.
- historic aspects, listed or protected buildings or building parts in neighbourhood
- protected landscape, trees in neighbourhood
- outlook and skyline
- other environment related regulations (e.g. protection of ground water etc.)
-

A2 Project constraints
(valid for particular projects only and mentioned in the brief)

2.1 Spatial constraints

- max. gross floor area (m^2)
- max. gross floor area of individual functions (m^2)
- max. % of circulation area on total gross floor area (m^2)
- max. building volume (m^3)
- min. or max. floor to floor height (m)
- min. or max. clear room height (m)
- number of carparks (% of occupants etc.)
- min. or max. size of rooms
- other spatial constraints

2.2 Economic constraints

- min. or max. investment (capital cost)
- min. profit / return on investment
- max. running cost
- other economic constraints (e.g. occupancy, tariff, costs etc.)

2.3 Functional constraints

- functional interrelationship, functions
- degree of flexibility, expansion
- other functional constraints

2.5 Presentation of process and product

- required information (content)
- required form of presentation (plans, sections, elevations, details, diagrams, graphs, model, perspective, photomontage etc.)

- 1·1 Building System
  - 1·11 Adequacy building/use
    - 1·111 Adequacy of building type/space type for use
      - floor areas (coherent), space sizes
      - number of floors
      - organisation system (access, distribution)...
      - others
    - 1·112 Adequacy of building system for use (constrict)
      - free span both directions (construction system)
      - space depth (℄ to facade)
      - layout organisation
      - others
    - 1·113 Compatibility structure-services/installations
      - vertical distribution, ducts
      - horizontal distribution
      - stairs, lifts, hoists, elevators
      - others
  - 1·12 Degree of flexibility
    - 1·121 Degree of adaptability of building to changing use
      - change of layout
      - change of service distribution, installation
      - practicability of changes
      - others
    - 1·122 Building expansion
      - type of expansion / disturbance factor / interdependence
      - degree of expansion (% of gross floor area)
      - surplus capacity / expansion service centres
      - others
  - 1·13 Adequacy installation/security
    - 1·131 Adequacy of central installations
      - power supply
      - heating, ventilation plant
      - central services and installations
      - others
    - 1·132 Degree of building security
      - fire warning & fighting systems
      - emergency measures (light, power..)
      - safety measures (showers ...)
      - others
  - 1·14 Adequacy external organisation
    - 1·141 Access / carpark
      - access cars, delivery, pedestrians
      - carpark guests, staff
    - 1·142 Building-environment
      - interaction building-environment (attraction ...)
      - orientation (sun, view, noise, privacy)
      - levelling (cut + fill) ...

① FUNCTIONAL QUALITY

- 1·2 Environmental System (performance quality)
  - 1·21 'Optical' Quality
    - 1·211 Natural light
      - · glazing
      - · orientation (quality of light)
      - · sun protection, blackout
      - · others
    - 1·212 Artificial light, electricity
      - · intensity
      - · variability
      - · quality (colour)
      - · others
  - 1·22 Climatic quality
    - 1·221 Heating, Ventilation
      - · temperature control
      - · humidity control
      - · air quality (filtration)
      - · others
    - 1·222 Thermal insulation
      - · surface temperatures boundaries
      - · heatgain facade
      - · heat loss boundaries
      - · others
  - 1·23 Acoustic quality
    - 1·231 Sound quality space
      - · reverberation time
      - · sound quality (hard, soft ..)
      - · others
    - 1·232 Sound insulation
      - · airborne sound insulation
      - · structure borne sound insulation
      - · others
  - 1·24 Service quality
    - 1·241 liquids, drains
      - · water, pressurised water, chilled water, destilled water ...
      - · drainage, sewer
      - · laboratory drainage
      - · others
    - 1·242 gas
      - · gas, special gas
      - · compressed air
      - · vacuum
      - · others
  - 1·25 Security, resistance
    - 1·251 Resistance of boundaries
      - · boundary resistance to fire (time)
      - · surface resistance to acids, alkalis, solvents, grease, oil ...
      - · others
    - 1·252 Security means
      - · security / warning systems
      - · emergency measures (showers, light, power ..)
      - · escape ways
      - · others

- 1·3 Activity system
  - 1·31 Operational functions
    - 1·311 Location and association
      - disturbance-free layout organisation
      - distance between functions
      - workflow
      - number of visits
      - location of central functions (vertical traffic toilets...) – centre of gravity
      - others
    - 1·312 Compatibility of adjacent functions
      - with regard to acoustics
      - visual connection / separation
      - security (fire, explosion risk etc.)
      - others
    - 1·313 Environment – activity
      - compatibility activity – environmental properties
      - range of possible activities (neutrality)
      - others
  - 1·32 Social functions
    - 1·321 User identification
      - psychotopic character of system / subsystems
      - contact to external environment
      - internal contact to people
      - compatibility of system with social interactions
      - others
    - 1·322 User participation
      - layout organisation
      - finishes, decoration
      - external visual form
      - realization
      - adaptability of system
      - others

2· VISUAL QUALITY

- 2·1 Building volume
  - 2·11 Form and appearance
    - 2·111 Form
      - building form, proportions
      - rhythm of volumes
      - links of building parts
      - openings, enclosed surfaces
    - 2·112 Appearance
      - number & type of materials, combinations
      - colour and texture combinations
      - plants, their integration
      - others
  - 2·12 Compatibility with environment
    - 2·121 Building dimensions
      - height over ground
      - total volume to site / density
      - total length of building
      - others
    - 2·122 Formal aspects of building
      - articulation of building within built environment
      - interaction with landscape
      - colour to landscape and built environment
      - facades, openings
      - others
- 2·2 Building space
  - 2·21 Internal space
    - 2·211 Individual spaces
      - form to function
      - proportions, shape
      - materia, colour, texture surface
      - others
    - 2·212 Space combinations
      - flow of spaces, rhythm
      - change of proportions, dimensions
      - combination materials, colours, texture of surfaces
      - others
  - 2·22 Internal - external space
    - 2·221 Spatial links from inside
      - integration external spaces, gardens
      - visual connection, views (to roofs, landscape...)
      - visual privacy of functions (from outside)
      - others
    - 2·222 Accessibility, attraction, privacy from outside
      - separation/integration of buildings from/in environment
      - clear articulation entrances
      - visual attractivity of functions for user
      - articulation of surfaces (facades, gardens, roofs, terrasses)
      - others

③ ECONOMIC FEASIBILITY

- 3.1 optimal investment
  - 3.11 optimal schedule of accomodations
    - 3.111 number of individual functions
    - 3.112 size of individual functions
    - 3.113 occupancy/rates/tariffs
    - project dependent
  - 3.12 optimal layout + construction
    - 3.121 optimal layout (compactness)
      - ratio usable area/gross floor area
      - ratio circulation area/gross floor area
      - ratio ancillary area/gross floor area
      - others
    - 3.122 optimal building type
      - internal divisions (m^2)/gross floor area
      - external wall/floor ratio
      - span loadbearing construction/function
      - number of floors/height/lifts
      - others
- 3.2 optimal cost in use
  - 3.21 running cost
    - 3.211 lighting, heating, ventilation
      - ratio window/external wall
      - ratio external wall/floor
      - ratio roof area/floor area
      - orientation n, s, e, w
      - U-values windows, roof, external walls
      - number of air changes per hour/air quality
      - others
    - 3.212 administration
      - ......
    - 3.213 maintenance
      - ......
  - 3.22 adaptation
    - 3.221 internal change (flexibility
      - number of changes/year
      - types of partitions
      - disturbance factor (space use)
      - others
    - 3.222 expansion, contraction
      - type of expansion, contraction/pre-investment
      - degree of expansion, contraction
      - disturbance factor (building use)

(A1) General constraints
(valid for all projects)

1.1 Building related regulations
- distances to neighbour buildings, sites (Reg. D17)
- total height of building; number of storeys (Reg. D3, T4)
- shadow diagrams
- total gross area or volume
- safety regulations (fire escape, fire warning and protection, fire fighting, explosion protection etc.) (Reg. D5, T6; E4, T10; Reg. E7. Reg. E9; Guide to fire precaution act ...)
- production control (GMP etc.) and space standard (air quality)
- other building related regulations, e.g. max. travel distance (Reg. E5).
-

1.2 Environment related regulations
- emission control (smoke, dust, fumes, smells, noise etc.
- historic aspects, listed or protected buildings or building parts in neighbourhood
- protected landscape, trees in neighbourhood
- outlook and skyline
- other environment related regulations (e.g. protection of ground water etc.)
-

(A2) Project constraints
(valid for particular projects only and mentioned in the brief)

2.1 Spatial constraints
- max. gross floor area (m^2)
- max. gross floor area of individual functions (m^2)
- max. % of circulation area on total gross floor area (m^2)
- max. building volume (m^3)
- min. or max. floor to floor height (m)
- min. or max. clear room height (m)
- number of carparks (% of occupants etc.)
- min. or max. size of rooms
- other spatial constraints

2.2 Economic constraints
- min. or max. investment (capital cost)
- min. profit / return on investment
- max. running cost
- other economic constraints (e.g. occupancy, tariff, costs etc.)

2.3 Functional constraints
- functional interrelationship, functions
- degree of flexibility, expansion
- other functional constraints

2.5 Presentation of process and product
- required information (content)
- required forms of presentation (plans, sections, elevations, details, diagrams, graphs, model, perspective, photomontage etc.)

(B1) FUNCTIONAL QUALITY

- 1.1 Building System
  - 1.11 Adequacy building/use
    - 1.111 Adequacy of building type/space type for use
      - floor areas (coherent), space sizes
      - number of floors
      - organisation system (access, distribution)...
      - others
    - 1.112 Adequacy of building system for use (construction)
      - free span both directions (construction system)
      - space depth (℄ to facade)
      - layout organisation
      - others
    - 1.113 Compatibility structure-services/installations
      - vertical distribution, ducts
      - horizontal distribution
      - stairs, lifts, hoists, elevators
      - others
  - 1.12 Degree of flexibility
    - 1.121 Degree of adaptability of building to changing use
      - change of layout
      - change of service distribution, installation
      - practicability of changes
      - others
    - 1.122 Building expansion
      - type of expansion / disturbance factor / interdependence
      - degree of expansion (% of gross floor area)
      - surplus capacity / expansion service centres
      - others
  - 1.13 Adequacy installation/security
    - 1.131 Adequacy of central installations
      - power supply
      - heating, ventilation plant
      - central services and installations
      - others
    - 1.132 Degree of building security
      - fire warning & fighting systems
      - emergency measures (light, power..)
      - safety measures (showers...)
      - others
  - 1.14 Adequacy external organisation
    - 1.141 Access / carpark
      - access cars, delivery, pedestrians
      - carpark guests, staff
    - 1.142 building-environ-
      - interaction building-environment (attraction ...)
      - orientation (sun, view, noise, privacy)

(B1) FUNCTIONAL QUALITY

FUNCTIONAL QUALITY

- 1·2 Environmental System (performance quality)
  - 1·21 'Optical' Quality
    - 1·211 Natural light
      - glazing
      - orientation (quality of light)
      - sun protection, blackout
      - others
    - 1·212 Artificial light, electricity
      - intensity
      - variability
      - quality (colour)
      - others
  - 1·22 Climatic quality
    - 1·221 Heating, Ventilation
      - temperature control
      - humidity control
      - air quality (filtration)
      - others
    - 1·222 Thermal insulation
      - surface temperatures boundaries
      - heatgain facade
      - heat loss boundaries
      - others
  - 1·23 Acoustic quality
    - 1·231 Sound quality space
      - reverberation time
      - sound quality (hard, soft ...)
      - others
    - 1·232 Sound insulation
      - airborne sound insulation
      - structure borne sound insulation
      - others
  - 1·24 Service quality
    - 1·241 liquids, drains
      - water, pressurised water, chilled water, destilled water ...
      - drainage, sewer
      - laboratory drainage
      - others
    - 1·242 gas
      - gas, special gas
      - compressed air
      - vacuum
      - others
  - 1·25 Security, resistance
    - 1·251 Resistance of boundaries
      - boundary resistance to fire (time)
      - surface resistance to acids, alkalis, solvents, grease, oil ...
      - others
    - 1·252 Security means
      - security / warning systems
      - emergency measures (showers, light, power ..)
      - escape ways
      - others

MODULE 2 GENERAL BUILDING APPRAISAL CHECKLIST — PART C: EXAMPLE HOTEL PROJECT YEAR 4 — 04/78
R 05/78

(B1) FUNCTIONAL QUALITY

- 1·3 Activity system
  - 1·31 Operational functions
    - 1·311 Location and association
      - disturbance-free layout organisation
      - distance between functions
      - workflow
      - number of visits
      - location of central functions (vertical traffic, toilets ...) – centre of gravity
      - others
    - 1·312 Compatibility of adjacent functions
      - with regard to acoustics
      - visual connection / separation
      - security (fire, explosion risk etc.)
      - others
    - 1·313 Environment - activity
      - compatibility activity - environmental properties
      - range of possible activities (neutrality)
      - others
  - 1·32 Social functions
    - 1·321 User identification
      - psychotopic character of system / subsystems
      - contact to external environment
      - internal contact to people
      - compatibility of system with social interactions
      - others
    - 1·322 User participation
      - layout organisation
      - finishes, decoration
      - external visual form
      - realisation
      - adaptability of system
      - others

(B2) VISUAL QUALITY

R 05/78

2 VISUAL QUALITY

- 2·1 Building volume
  - 2·11 Form and appearance
    - 2·111 form
      - building form, proportions
      - rhythm of volumes
      - links of building parts
      - openings, enclosed surfaces
    - 2·112 Appearance
      - number + type of materials, combinations
      - colour and texture combinations
      - plants, their integration
      - others
  - 2·12 Compatibility with environment
    - 2·121 Building dimensions
      - height over ground
      - total volume to site / density
      - total length of building
      - others
    - 2·122 Formal aspects of building
      - articulation of building within built environment
      - interaction with landscape
      - colour to landscape and built environment
      - facades, openings
      - others
- 2·2 Building space
  - 2·21 Internal space
    - 2·211 Individual spaces
      - form to function
      - proportions, shape
      - material, colour, texture surface
      - others
    - 2·212 Space combinations
      - flow of spaces, rhythm
      - change of proportions, dimensions
      - combination materials, colours, texture of surfaces
      - others
  - 2·22 Internal - external space
    - 2·221 Spatial links from inside
      - integration external spaces, gardens
      - visual connection, views (to roofs, landscape...)
      - visual privacy of functions (from outside)
      - others
    - 2·222 Accessibility, attraction, privacy from outside
      - separation/integration of buildings from/in environment
      - clear articulation entrances
      - visual attractivity of functions for user
      - articulation of surfaces (facades, gardens, roofs, terrasses)
      - others

(B3) ECONOMIC FEASIBILITY

R 05/78

3 ECONOMIC FEASIBILITY

- 3·1 optimal investment
  - 3·11 optimal schedule of accomodations
    - 3·111 number of individual functions
    - 3·112 size of individual functions
    - 3·113 occupancy / rates / tariffs
    - project dependent
  - 3·12 optimal layout + construction
    - 3·121 optimal layout (compactness)
      - ratio usable area / gross floor area
      - ratio circulation area / gross floor area
      - ratio auxiliary area / gross floor area
      - others
    - 3·122 optimal building type
      - internal divisions (m²) / gross floor area
      - external wall / floor ratio
      - span loadbearing construction / function
      - number of floors / height / lifts
      - others
- 3·2 optimal cost in use
  - 3·21 running cost
    - 3·211 lighting, heating, ventilation
      - ratio window / external wall
      - ratio external wall / floor
      - ratio roof area / floor area
      - orientation n, s, e, w
      - U-values windows, roof, external walls
      - number of air changes per hour / air quality
      - others
    - 3·212 administration
      - ......
    - 3·213 maintenance
      - ......
  - 3·22 adaptation
    - 3·221 internal change (flexibility)
      - number of changes / year
      - types of partitions
      - disturbance factor (space use)
      - others
    - 3·222 expansion, contraction
      - type of expansion, contraction / pre-investment
      - degree of expansion, contraction
      - disturbance factor (building use)