THE PORTRAIT OF ARCHITECTURE :
A SEARCH FOR COMPREHENSIVE DESIGN METHODOLOGY

A DISSERTATION

submitted in partial fulfilment of the
requirements for the award of the degree
of
MASTER OF ARCHITECTURE

By

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CANDIDATE'S DECLARATION

I hereby certify that the dissertation entitled,' **THE PORTRAIT OF ARCHITECTURE: A SEARCH FOR COMPREHENSIVE DESIGN METHODOLOGY'** which is being submitted in partial fulfilment of the requirement for the award of the degree of Master of Architecture of the University of Roorkee is an authentic record of my own work carried out during a period from August 1997 to January 1998 under the supervision of Mr. S.Y.Kulkarni.

The matter embodied in this dissertation has not been submitted by me for the award of any other degree.

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This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

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CHAPTER-1

INTRODUCTION

1.1 Overall review

Like that of various other human disciplines such as literature, industrial design, or fashion, the current panorama of architecture presents us with a degree of interwoven complexity in which the architecture learners and practitioners do not always manage to comprehend the clear, meaningful criteria, in an integrated profile, that help to elucidate the complicated framework and to proceed with the design activity. In the study of the architectural merit of buildings, built environments, and the entire architectural scenario at large, the concern given to the study to suggest certain design guidelines to objectify the design progress, when compared with the other areas of building science and regulations, is very less. Most written books and publications in light of architecture at present are dominated, more frequently than not, by studies on relatively the simplest practical common senses in proceeding with the design of buildings, as construction details, material analysis, etc. The most difficult and yet the primary concern of the subject, architecture, which is in the sphere of the state of mind, i.e., the response for the quest how to assemble and organize those independently studied elements of the subject in the most delightful form and the preferred efficient state in their utility is paradoxically put aside. Truth to tell, in the absence of certain approach to the integrated nature of architectural design, and most importantly to a comprehensive understanding of the nature and employment of enclosing structure forms which are the concrete meanses an architect uses in proceeding with the design activity, a non-experienced designer is pron to aimless wanderings and frustrations while coping with the complexities of designing. As such, " THE PORTRAIT OF ARCHITECTURE: a search for comprehensive design methodology" is an attempt sought to avert the tendency of those learners and beginner practitioners from either specializing the clipped portion of the subject just like 'atomists'; as the subject, unlike other industrial artifact designs, is far more than the mere assemblage of independently designed parts; or to somehow lessen the chaotic conception of the subject. It is to urge the need for circumventing such strive of specializing a clipped portion of it as most 'architect- designers' do not stay reserved only in their specialization domain when design competitions and invitations are open to them. With this also to suggest if there is any possibility of doing little more than the mere compilation through impressive photographs of many times advertised buildings; and drawing devoid list of theories,

proposals and other strives as widely being done today. The topic choice, thus, is made in response that as portraiture is the representation in art of a person, suggesting his or her character and personality so is architecture in the highest form of humane art. The portrait artist's major concern is deciding how to combine his or her vision with the subjects ideas and actual appearance so as to create an effective work of art. Likewise, the architect with his/her vision of artistic genius and learned convictions about architecture that grows out of a thorough, artisanal consideration of the ambience and from a very strong sense of his subject- people, portrays in his/her works their desire of carefully tailored environment which reflects their personality and idiosyncrasies or the cultural milieus they choose to inhabit. The portrait painter knows that it is often the relationship of the figure to the surrounding shapes that gives the figure its essential meaning, and so it is with buildings and their surrounding features and the entire environment at large, and man as the center. The facial features of a portrait project a different message with each unique combination of traits. Similarly, each architecture revealing certain ethnic domain, has a unique visual statement and inherited characters derived from its combination of traits as embodied human values, like way of life and emotional aspects, and the environmental manifestations to be coordinated into a cultural synthesis. Hence, what true architecture has to take as its inherited character by which to serve its purpose, embodying in it typical laws, usually governing good architecture will then be portrayed. Quite simply the approach is to suggest the necessity that the passage of knowledge to architecture learners should be in an integrated profile to effectuate holistic comprehending of the subject in the universal scheme of things. Although it may not be possible to discuss in-depth the fundamentals of architectural design in a volume of such dissertations, it can be started by at least indicating the nodes of the architectural design network as the primary consideration and disclosing the symbiotic evolution of overall building forms to harmoniously suit their environment site.

1.2 Objectives and goal

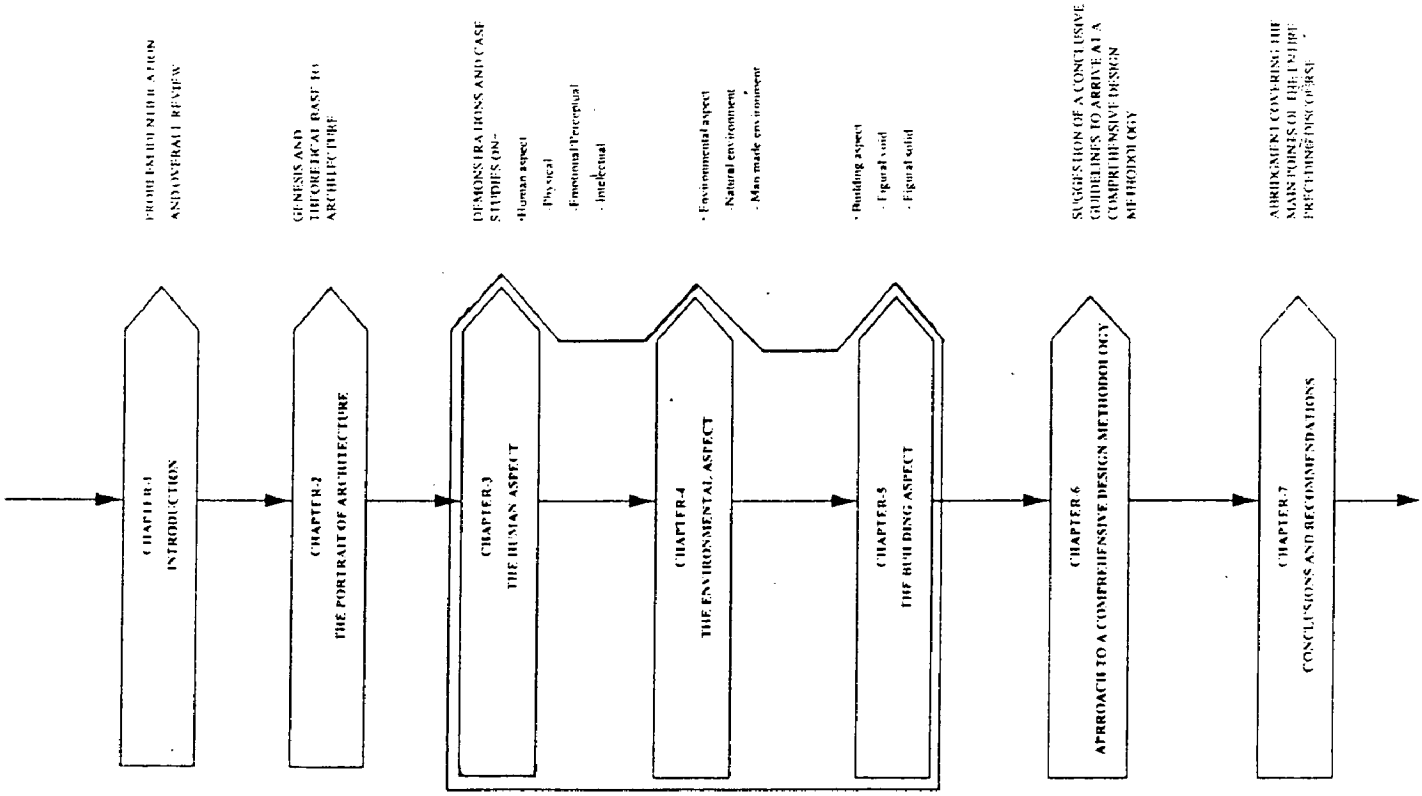
This dissertation in its entirity focuses to study the principal factors of the human aspect i.e., to relate the physical structure of man to his environment and to have a fresh look to the perception criteria how it can dictate a given design theme. And how this together with the environmental aspect decides the entegrity of the entire architectural buildings to go in context with their site. And ultimately to reach at a comprehensive design guidelines conception by which to portray the domain of the architectural space form and enclosure structure which an architect uses as the concrete means in proceeding with the design activity.

1.3 Scope and limitation

It is being a time bound problem, the study is limited to reveal, in a nutshell, the frame work of the basic design considerations; as the human, the environmental and the building aspects. To show how these components which constitute fundamentally the architectural design dictate the architectural design merit as an integrated living entity.

1.4 Methodology

The first chapter briefs the overall review to the approach of the dissertation; and chapter two provides an introduction and a theoretical base to the broadest spectrum of the subject architecture. The next three chapters give demonstration of the theory by case studies and own suggestions from observations with special focus on the three constituents of architecture i.e., the human, the environmental and the building aspects. And chapter-6 suggests a comprehensive approach to design methodology for architecture which is based on an interrelated summary of the entire guidelines proposed in the previous chapters. Further more the last chapter stresses upon the main points presented so far in effect of the overall concept and projection of the dissertation.



CHAPTER-2

THE PORTRAIT OF ARCHITECTURE

2-1 Nature of Architecture

Our world, a minor planet, moves on a ceaseless journey round the sun in limitless space as an infinitesimal speck of matter in the order of the universe. Its scope, from the ice-sheathed poles to the blazing equator, varies endlessly. On it is water divided into spacious oceans and narrow seas, and land in large masses which we call continents. This land is uneven, with high mountains and deep valleys, level plains where things grow fast and deserts where almost nothing grows. Starting from their probable birth place in East Africa 3 of 4 million years ago and, some what later, from South East Asia, on the land live human beings, creatures who walk about on the surface of the earth, and wandering over it for something close to such million years, have learned first to survive and later to thrive though a process of adaptation and leading nomadic-life like.

Nature, grateful to it, in its haphazard state provides innumerable instances of natural spaces that have served these wandering and nomadic-life like leading peoples. Later, about 10,000 years ago when they gave up this life style as they become more sedentary, they turned the nature of their shelter from such fortuitous spatial occurrences, as valleys, caves, group of trees and other kinds of shades to a permanent kind of modified caves, tents made of animal skins, adobe huts, or lean to shelters using existing natural materials of their localities featured by geoclimatic variations.

The gradual search for a better cave and other manners of construction give rise to the development of an advanced shelter concept; the subtle event indicative of entering the portals of architecture.

Then, these aboriginal earth-dwellers, in the course of the centuries, have become divided up and different from one another in many respects. There are interesting differences of height and build and face; of hair, color and speech; of ways of life and thought. Each of as belongs to some one of the worlds peoples-each forms a tiny part of a nation of identified culture.

With the manifestation of such cultural diversities, emerging from way of life in response to nature, architecture with its nobility has been changing the face of the earth from the little hut, the primitive architectural solution of a basic human problem and as an enduring symbol for a continuing necessity to the most complex metropolitan cityscape buildings of today. Hence, the scope architecture has broadened itself to include much more than the individual building; it now

encompasses planning of neighborhood, the city and even the region. This noble discipline, which participates in the eternal revolutionary agenda for man's role in rebuilding the universe, harmonizes the building to the garden, the garden to the landscape, this later to the ecosystem, the ecosystems to the earth, the earth to the solar system, etc. It has such a wide range of encompassing from the microclimate level to the word beyond

2-2 Elements of Architecture

Architecture, can thus be defined as:

.....the art and science which so disposes and adorns the edifices raised by humanbeings, for whatsoever uses, that the site of them may contribute to their mental health power, and pleasure; and operates in harmony with nature. (Modified from Ruskin)

And as categorization is the foundation of a rational thought, the following scheme of structuring the broad spectrum of architecture is made to set a reference for identifying the elements of architecture, as purpose structure and beauty, i.e., 'beauty for purpose in utility structures of humane habitats'. It also help to understand each requirement of a category in matters of architectural concern as:

- user requirements from architecture
- design requirements for architecture, and
- design constraints architecture.

2-3 On History of Architecture

The phenomenon of architecture is a development of the phenomenon of man. As life changes so does architecture, and as life varies from one district and country to another, so is architecture infinitely variable. The history of architecture is a history of the changing lives of nations, a history more accurate than the normal history book which often lays too much stress upon the doings of warriors and kings, and too little upon the day-to-day lives of the peoples themselves.

Memory plays an important part in architecture because people do not wish to work the things out for themselves if they can remember how someone else did it, or if they have an actual example before their eyes. It is therefore interesting in looking at architecture to know something of the long history of its development through the ages and how one type of style of it led to another, as the history of architecture is a record of experimental experience. These experimental evidences some as *styles*, which are the end products of extensive building experience, within a definable society., subject to physical restraints of climate, technique and

materials and in accordance with the culture and value systems of the people, have a lot to fetch from timeless wisdom of eternal relevance. And this later fact can evidently be used to organize a profound guidelines for design methodology.

2-4 On Anthropology for Architecture

As architecture is a phenomenon of man and reflects his condition, some fundamental laws derived from regularities observable in man's natural interaction with the environment to best suit to the fullest development of him is of a pivotal issue.

'Anthropology', as part of natural science and a study to understand man and his culture asserts that 'man' as part of nature can be studied scientifically and natural laws can be derived concerning his behavior, just as in the case for any other material objects. Anthropologists are supposed to discuss things like the place of human kind in nature, the origins of our species, as well as its subdivisions, and perhaps, most importantly the nature of the social bond.

As it happens, architects have long believed that together with the fear of the unknown and with language, building is one of the three constituents of the primal social bond.

Anthropologists can set out the condition of the building: they can tell us what people expected from them in the past; how they interpreted what they saw and experienced, even about the most obvious pieces of a building- doors and windows, walls, roofs and floors; how the experience of each part related to the whole- as the building, the district, the city were walked through, penetrated, integrated by use, their fragments compacted into a body. Quite simply, anthropology can supply self-evident facts about man's nature and his culture with respect to experimental experiences in architecture. Obviously, man is part of nature. His culture, however, is apart from nature,. Whatever man does or produces is at once cultural. Culture consists of all man's activities and products. Worth noting, here we can observe two presidential constituents of the human aspect in his existence. The first attribute is the natural/instinct/aspect and the second attribute is the man-made/cultural or learned/aspect. With respect to which we can set a marvelous reference of profound intent to base design guide lines in architecture.

To survive in the environment of earth, as a natural phenomenon, man like the rest of animals must act:

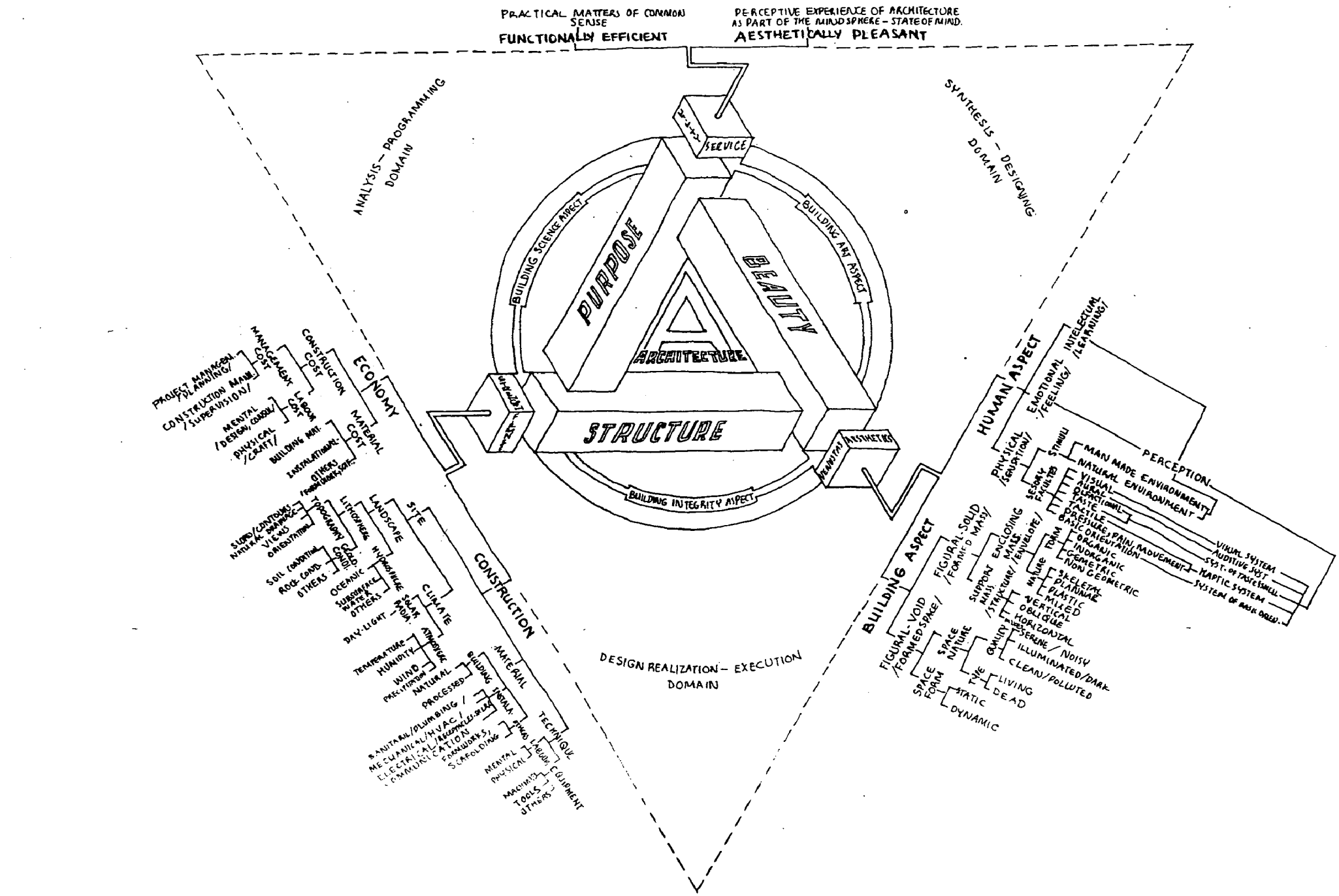
1. to protect himself- like by skin and hair as protective covering
2. to nourish himself- like by regulatory mechanisms which stimulates the search for food and water
3. to reproduce himself- like by sexual activity, regulated internally

These are axioms/self-evident truth/,essential to the preservation of the individuals and the species, prone to the first attribute.

But man is also a different animal of the mammalian class of the primate order, and of the genus and the species Homo-Sapiens, or rational man.

Hence, the second attribute, culture, a dichotomizing aspect of him from non-human primates, and which modifies the pattern of interaction with nature unlike other mammals, this is why his act of protecting himself takes the present format as changed to architecture together with the rest of his culture.

THE PORTRAIT OF ARCHITECTURE



CHAPTER - 3

THE HUMAN ASPECT

A person perceives and appreciates space form and its envelops structure from distinctly different but interrelated attitudes - from the *physical*, from the *emotional*, and from the *intellectual*. The architecture experience evoked a response which fulfills physical, emotional, and intellectual needs, effecting enjoyable interaction between the person and the well-designed building which like a beautiful painting, a fine piece of sculpture, or a magnificent musical composition, can be a source of enjoyment; and inspiration.'(Modified and rephrased)

See the following classification of the human aspect which has a direct bearing on the perception of architecture.

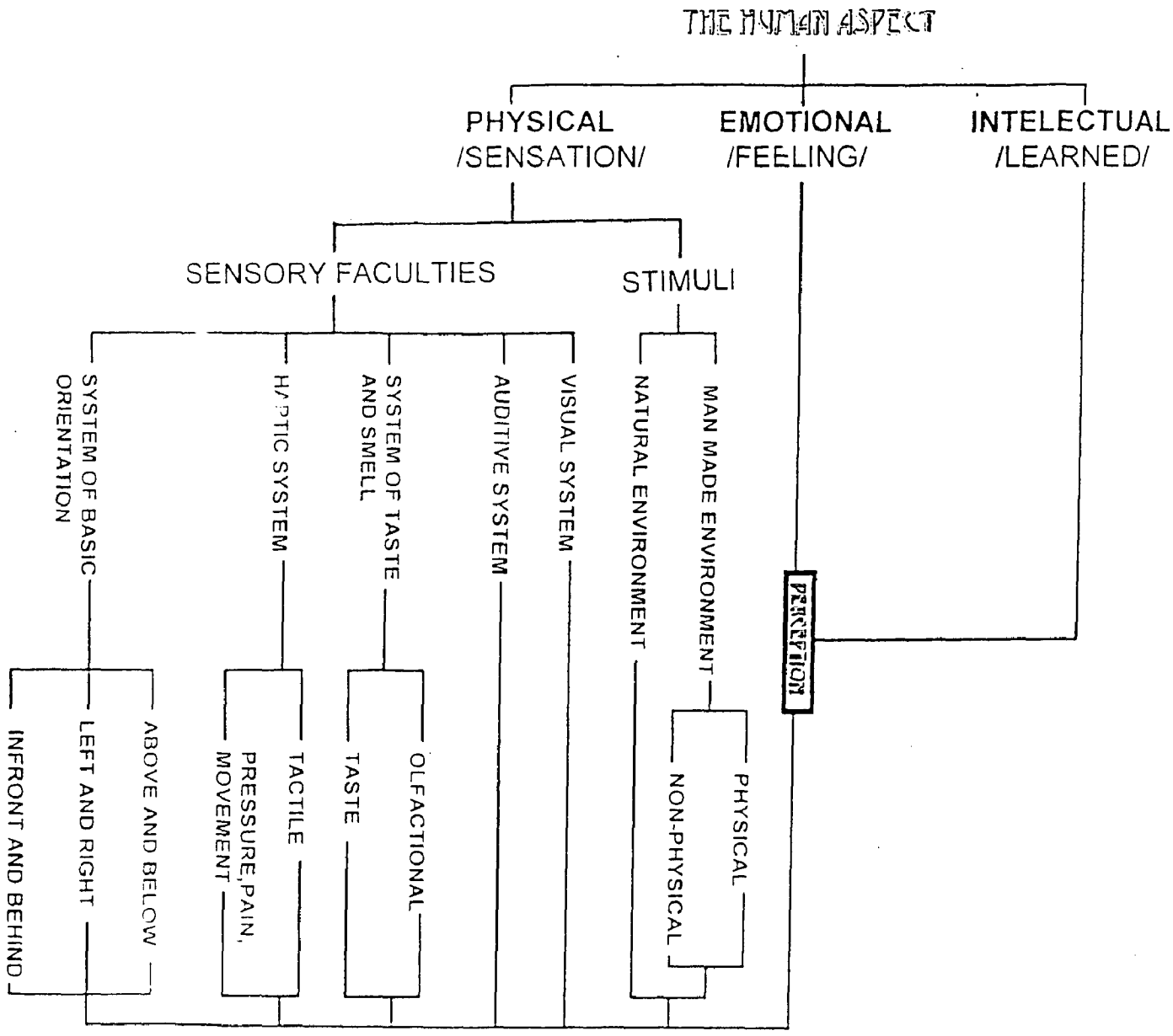


Table-2

3.1 The Physical

3-1-1 Biological Structure of Man

Of the broader range of criteria, relating to aesthetic analysis to judge the architectural merit of buildings, the quality which most concerns us is that of *form*. Objects of the external physical world are understood by an individual primarily interns of its form. In architecture too judgment is made regarding the formal aspects of buildings by their compatibility with a created order out of visual phenomena; and assisted by the balanced use of the other senses. This visual phenomena intern is based on the physical characteristics of the human form and the function of the brain. In other worlds, the human being evaluates objects in relation to himself. Any examination of 'form' in general must, therefore, be preceded by an examination of the human form in particular.

Upright Stance :

The most typical characteristic of man is his 'uprightness'. The upright man has an imaginary axis running through the center of his body which is at right angles to the surface of the ground. It is this upright axial stance which gives rise to the concept of *verticalness*. Every object which has a similar stance is conceived as being vertical.

Position of the eyes

The two eyes are situated infront at the top of the upright body/head/roughly 170 cm above ground/floor level, and along an imaginary axis which runs parallel to this ground or the horizon plane. This axis is at right angle to the previous vertical axis, and it is this which gives rise to the concept of horizontalness. We thus find that the two principal qualities of seeing, verticalness and *horizontalness*, arise in a quite natural way from the biological structure of Man. This right angled axiality is thus the framework in which all external form are seen and it is this framework that produces the qualities of *height* and *width*. Objects and their parts, however, can be situated at varying distances from an observer. An this gives rise to depth .

Anthropometrical form

Man seen frontally appears broad; seen laterally appears narrow. While the vertical dimension/height/remains constant, the horizontal dimension has two components : width and depth. These three principal *dimensions* make up the overall visual impression of the human form, and it is this same three components that define the primary visual character of all external forms. Now it is possible to see clearly how the Anthropometrical form of man has determined his visual concept. When this again is modified by the patterns of movement and working, the ergonomic of his surrounding will then be justified.

Studies were made on this anthropometries to relate the physical form of man and the pattern of his activities both to the objects he is using and more importantly to his spatial requirements. For example, Leonard davinici and other renaissance theorists have found that the man's naval marks the center of a circle; and the outstretched hands can reach this circle's periphery./*fig.* 3 /

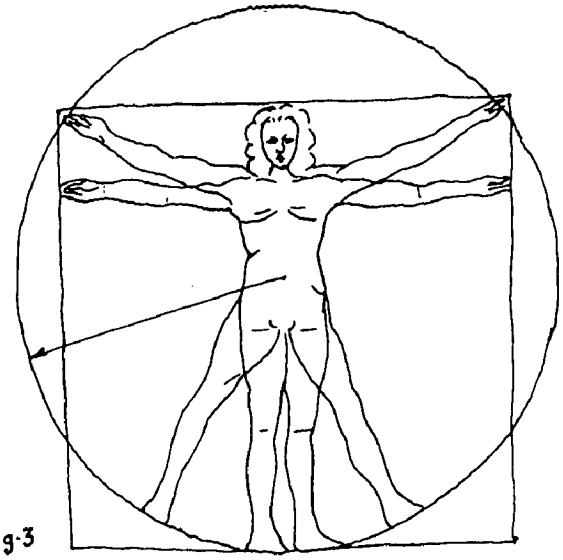
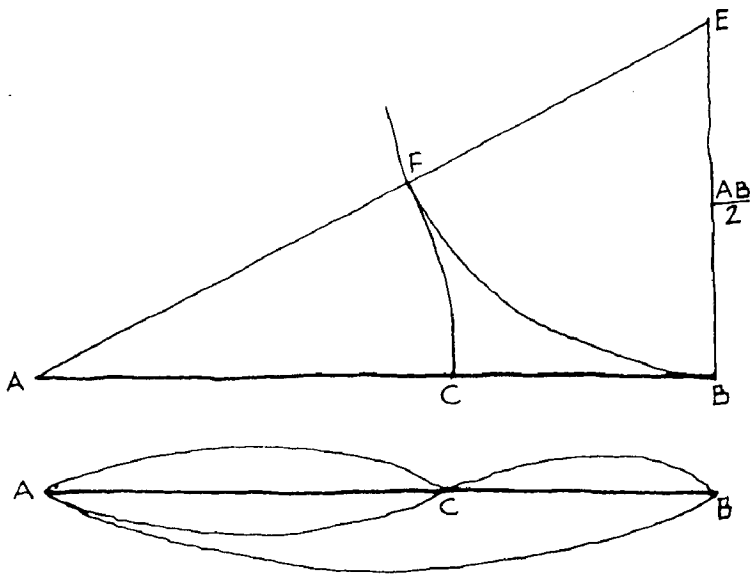


Fig-3

Also, Le Corbusier, basing his theory on the series of the eleventhcentury mathematician Fibonacci, takes the credit for reducing the Golden Number/very close to a ratio of 5=8/ to rational numbers applicable to architecture. Le Corbusier's contribution lies in his success in combining a fundamental, geometric principle with rational numbers and dimensions of significance for the body and movements of man. And this is automatically to be applied in the design of man's spatial requirement and its compositional proportion. / *fig.* 4 /



CONSTRUCTION OF THE GOLDEN SECTION

AC : CB = AB : AC

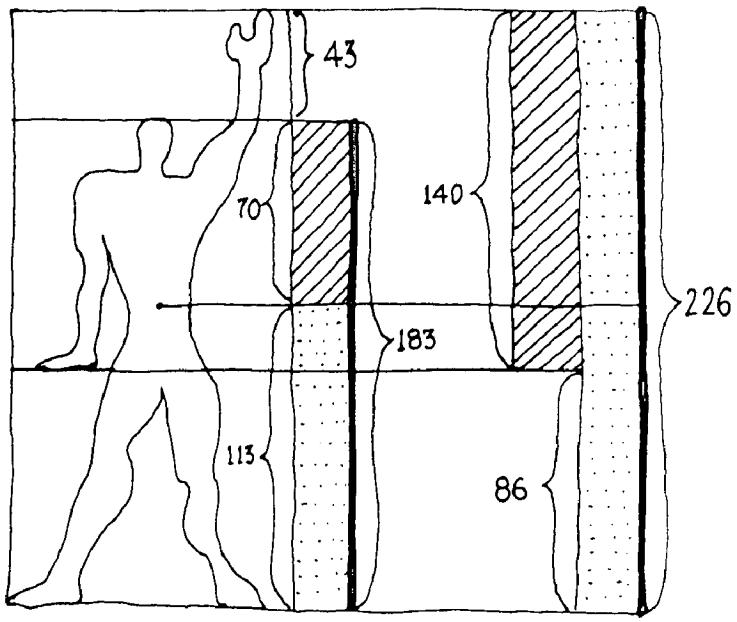


Fig-4 Le Modulor, Le Corbusier

Perception :

Perception is the process and experience of gaining sensory information about the physical world.

Although architecture is beyond mere perception which clicks some kind of impulse in the mind to stirrup our feelings/emotions/and brings mood of pleasure, it is worth while to discuss some of the major factors that will be of immediate concern and value to the architect to study the elements governing spatial perception. Those facets of it which have a direct bearing on the practice of design.

Human perception is based on a total assimilation through the senses not merely as passive receivers of stimulating sensations, but as actively searching systems, either singularly or collectively, depending on the given situation. Thus, to use for advantage, the designer must be aware of the interrelationships between the senses and their effect on perception. Recent theories proceed on the assumption of five, i.e. with eye-visual, nose-olfactional, ear- additive, tongue-taste, and skin-tactile; but makes a different classification. Gibbon, for example, differentiates as given in the previous classification of the human aspect under the sensory faculties part. / *fig.2*/

What is new and of importance for the perception of space is the system of basic orientation, which includes the sense of above and below, infront and behind, or left and right. The following are some of the processes that involve imagery and the classification of objects and sites, accomplished by some, or all of the senses like :

Visual-View : the eyes accommodate both to lower levels of light and too intense colored light from stained glass windows and others. With the aid of this we perceive the depth of space, the nature of spatial limitation, things close to us appear more clearly defined than those farther away.

Additive-Sound : the ears pick up the echoes of isolated sounds against the concentrated stillness of a vast, cavernous space based on familiarity of voices, music or sounds in nature, etc.

Olfactional-Smell : the nose detects musty and sometimes mysterious odors, images of scent, places processing certain smells, and certain foods, etc.

Taste : images of food, and others to be associated with certain sites.

Tactile-touch : the skin registers a reduction in temperature objects may seem smooth, rough, hot, cold, velvety, sticky.

Hepatic-pressure, pain and sensations of movement : the later involves in imagery made in skilled activities, such as dancing, etc.

Orientation : the sense of above and below, infront and behind, or left and right.

Hence, although it should be beyond dispute that perception of objects or space doesn't occur via the eyes alone, it is essentially sound practice to base a particular design theme on the dominance of one of the senses which, obviously, is *Vision*. Of all the senses, vision provides the most detailed and extensive information about the environment although assisted through the balanced use of the secondary senses.

Visual Perception :

Visual perception is the sense of sight which perceives the *form, shape, size color, distance, orientation* and *movement* of objects.

The process of seeing begins when light, comprising the visible spectrum in the range 380-720 nanometer in wave length, passes through the eye and is absorbed by the photosensitive cells (receptors) of the retina. Then impulse, emerge from the eye in the form of repetitive discharges in the fibers of the optic nerve. The optic nerves from the two eyes traverse the optic chiasma./*fig* - 5a/

The visual cortex included a project area in the occipital lobe of each hemisphere. Here there appear to be a point - to - point correspondence between the retina of each eye and the cortex. Thus the cortex contains a "map" or projection area, each point which represents a point on the retina and therefore a point in visual space as seen by each eye. However, the map is much too simple a model for cortical function. Vision tells much more than the location at which an object is seen. Visual tests show that other important attributes of the world, such as, the relative brightness of an object its color, motion, orientation, distance, size, shape or form are simultaneously perceived.

Space and time perception :

Spatial and temporal effects are clearly apparent in the sense of sight. These two effects enable the individual to become oriented with regard to space and time in the external environment, specially in the perception of motion and distance.

Man is able to relate himself to the surrounding both spatially and temporally, as is given below :

Visual	:	Spatial phenomenon (imageability becomes temporal)
Auditory	:	Spatio-temporal phenomenon
Taste	:	Temporal (momentary) phenomena
Olfactory	:	Spatio-temporal phenomenon
Tactility	:	Spatial phenomenon

Visual depth perception :

Depth perception is the experience of the third dimension of visual spaces. It includes perception of the distance of an object from the observer (absolute distance) and perception of the distance of objects from one another (relative distance). Depth cues are suggested to explain depth perception to the stationary eye by Leonardo deviance, such as *Linear perspective, occlusion of a far object by a near one,* and *aerial perspective* or *increasing haze.* Classical perceptual theory assumed that depth perception was learned from such cues, perceived distance would result from the visual color and shade sensations associated with memory images of previous muscle-stretch and touch sensations. However, Edward L. Thorndike Showed in 1899 that some animals can respond appropriately to visual depth cues even though they have had no prior visual experience, suggesting that some depth perception is innate rather than learned.

Elementary forms of space perception are *Vernier* and *Stereoscopic* discrimination. Here, the eye is required to judge the relative position of object in relation to another. */fig. 7 /*

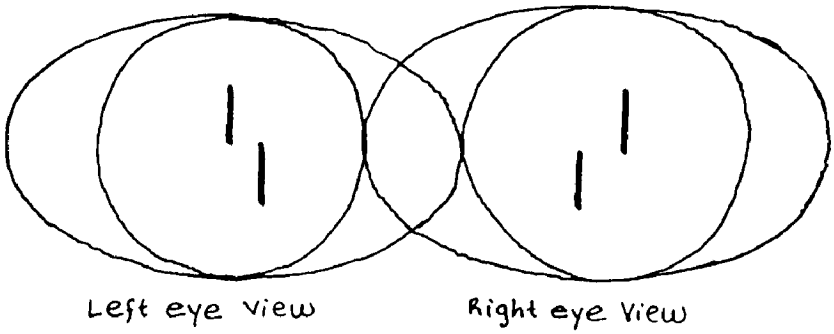
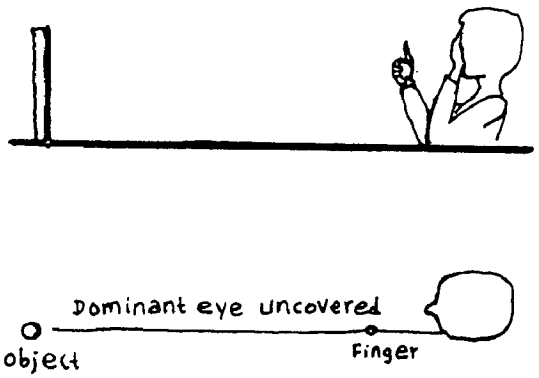


Fig-7



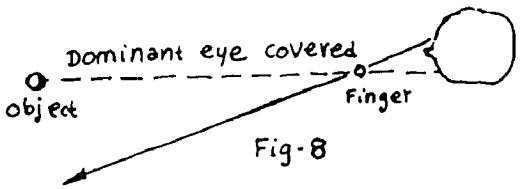


Fig-8

The left eye, for example, sees the lowerline as displaced slightly to the right of the upper. This is known as vernier discrimination. This suggests identification of dominate eye. See fig. 8 .If the right eye is presented with similar lines that are oppositely displaced, then the image for the two eyes appear fused into one and the subject sees the lower line as nearer than the upper. This is the principle of stereoscope. This effect is explained better as follows.

3-1-.2 Human Brain and Perception

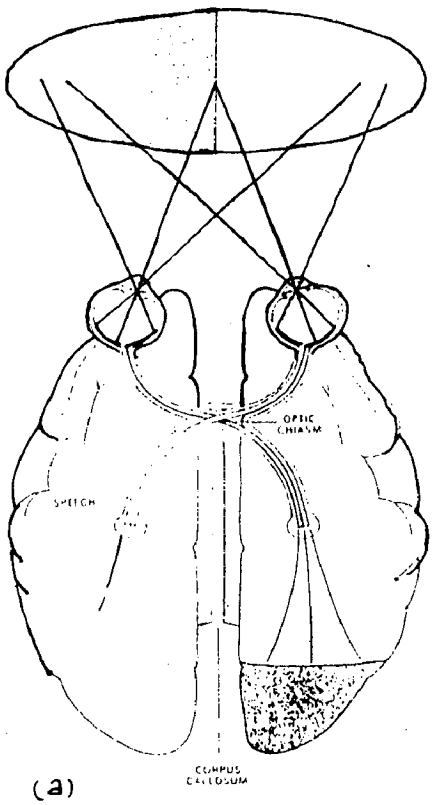
Human brain :

Man, unlike other mammalians possesses an asymmetric brain. It has two distinct hemispheres with different functions and modes of thought. The hemispheres are joined by a thick cable of white matter known as the Corpus Callosum. And as to the result of experiments, speaking/reading, the performance of tasks requiring judgment or interpretation based on language are all done by the left hemisphere of the brain. The right hemisphere is superior to the left in spatial abilities. Although this later half is illiterate and mute, it is apparently the source of most of what we consider the higher and distinctive attributes of human beings : *intuition, wisdom*, and *artistic creation*. It is precisely such right hemisphere functions that machine intelligence will never be able to simulate.

The following illustrations show the experimental approaches to know how the brain functions. /fig-6/

Below: visual input to the bisected brain was limited to one hemisphere by presenting information in only one field of vision. The right and left fields of view are projected via the optic chiasm, to the left and right hemispheres of the brain respectively. If a person fixes his gaze on a point, therefore, information to the left of the point goes only to the right hemisphere and vice versa. Stimuli in the left visual field cannot be described by a split-brain patient because of the disconnection between the right hemisphere and the speech center, which is located in the left hemisphere.

Below, right: visual-tactile association performed by a split-brain patient. A picture of a spoon is flashed to the right hemisphere; with the left hand he retrieves a spoon from behind the screen. The touch information from the left hand projects mainly to the right hemisphere, which means the patient is unable to say (using the left hemisphere speech center) what it is he has picked up.



(a)

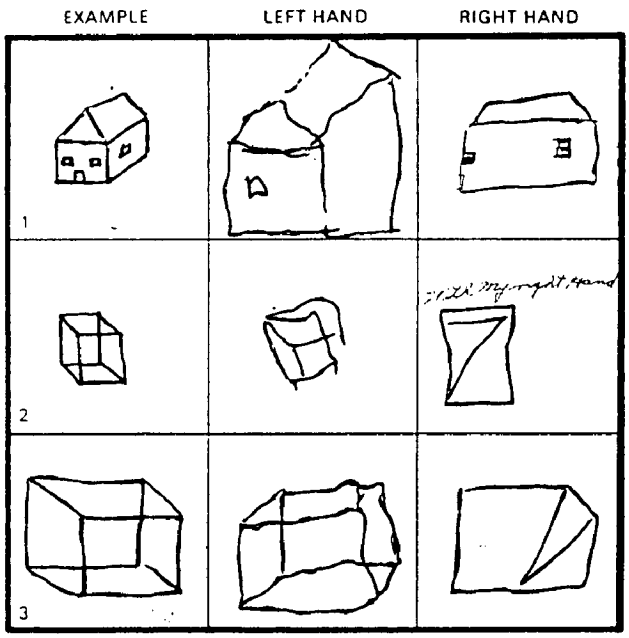
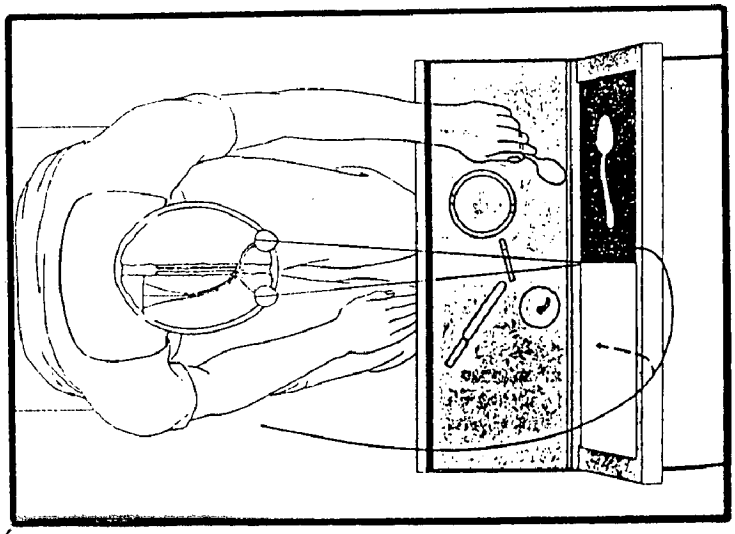


Fig-6 (b) Sketchs by a person whose brain is disected



(c)

Perception :

Perception is the process and experience of gaining sensory information about the physical world.

Although architecture is beyond mere perception which clicks some kind of impulse in the mind to stirrup our feelings/emotions/and brings mood of pleasure, it is worth while to discuss some of the major factors that will be of immediate concern and value to the architect to study the elements governing spatial perception. Those facets of it which have a direct bearing on the practice of design.

Human perception is based on a total assimilation through the senses not merely as passive receivers of stimulating sensations, but as actively searching systems, either singularly or collectively, depending on the given situation. Thus, to use for advantage, the designer must be aware of the interrelationships between the senses and their effect on perception. Recent theories proceed on the assumption of five, i.e. with eye-visual, nose-olfactional, ear- additive, tongue-taste, and skin-tactile; but makes a different classification. Gibbon, for example, differentiates as given in the previous classification of the human aspect under the sensory faculties part. / *fig.2*/

What is new and of importance for the perception of space is the system of basic orientation, which includes the sense of above and below, infront and behind, or left and right. The following are some of the processes that involve imagery and the classification of objects and sites, accomplished by some, or all of the senses like :

Visual-View : the eyes accommodate both to lower levels of light and too intense colored light from stained glass windows and others. With the aid of this we perceive the depth of space, the nature of spatial limitation, things close to us appear more clearly defined than those farther away.

Additive-Sound : the ears pick up the echoes of isolated sounds against the concentrated stillness of a vast, cavernous space based on familiarity of voices, music or sounds in nature, etc.

Olfactional-Smell : the nose detects musty and sometimes mysterious odors, images of scent, places processing certain smells, and certain foods, etc.

Taste : images of food, and others to be associated with certain sites.

Tactile-touch : the skin registers a reduction in temperature objects may seem smooth, rough, hot, cold, velvety, sticky.

Hepatic-pressure, pain and sensations of movement : the later involves in imagery made in skilled activities, such as dancing, etc.

Orientation : the sense of above and below, infront and behind, or left and right.

Hence, although it should be beyond dispute that perception of objects or space doesn't occur via the eyes alone, it is essentially sound practice to base a particular design theme on the dominance of one of the senses which, obviously, is *Vision*. Of all the senses, vision provides the most detailed and extensive information about the environment although assisted through the balanced use of the secondary senses.

Visual Perception :

Visual perception is the sense of sight which perceives the *form, shape, size color, distance, orientation* and *movement* of objects.

The process of seeing begins when light, comprising the visible spectrum in the range 380-720 nanometer in wave length, passes through the eye and is absorbed by the photosensitive cells (receptors) of the retina. Then impulse, emerge from the eye in the form of repetitive discharges in the fibers of the optic nerve. The optic nerves from the two eyes traverse the optic chiasma./*fig* - 5a/

The visual cortex included a project area in the occipital lobe of each hemisphere. Here there appear to be a point - to - point correspondence between the retina of each eye and the cortex. Thus the cortex contains a "map" or projection area, each point which represents a point on the retina and therefore a point in visual space as seen by each eye. However, the map is much too simple a model for cortical function. Vision tells much more than the location at which an object is seen. Visual tests show that other important attributes of the world, such as, the relative brightness of an object its color, motion, orientation, distance, size, shape or form are simultaneously perceived.

Space and time perception :

Spatial and temporal effects are clearly apparent in the sense of sight. These two effects enable the individual to become oriented with regard to space and time in the external environment, specially in the perception of motion and distance.

Man is able to relate himself to the surrounding both spatially and temporally, as is given below :

Visual	:	Spatial phenomenon (imageability becomes temporal)
Auditory	:	Spatio-temporal phenomenon
Taste	:	Temporal (momentary) phenomena
Olfactory	:	Spatio-temporal phenomenon
Tactility	:	Spatial phenomenon

Visual depth perception :

Depth perception is the experience of the third dimension of visual spaces. It includes perception of the distance of an object from the observer (absolute distance) and perception of the distance of objects from one another (relative distance). Depth cues are suggested to explain depth perception to the stationary eye by Leonardo deviance, such as *Linear perspective, occlusion of a far object by a near one,* and *aerial perspective* or *increasing haze.* Classical perceptual theory assumed that depth perception was learned from such cues, perceived distance would result from the visual color and shade sensations associated with memory images of previous muscle-stretch and touch sensations. However, Edward L. Thorndike Showed in 1899 that some animals can respond appropriately to visual depth cues even though they have had no prior visual experience, suggesting that some depth perception is innate rather than learned.

Elementary forms of space perception are *Vernier* and *Stereoscopic* discrimination. Here, the eye is required to judge the relative position of object in relation to another. */fig. 7 /*

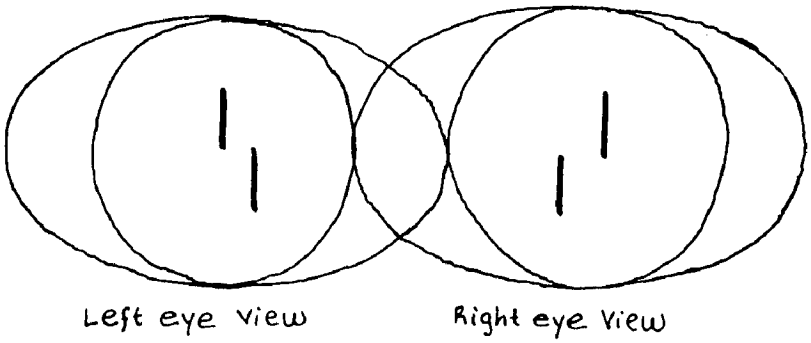
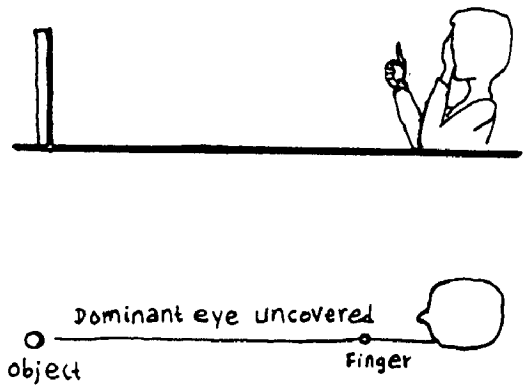


Fig-7



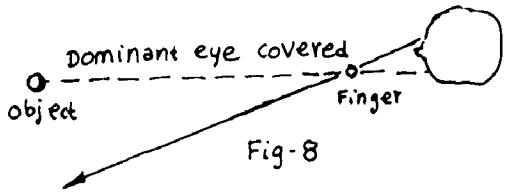


Fig-8

The left eye, for example, sees the lowerline as displaced slightly to the right of the upper. This is known as vernier discrimination. This suggests identification of dominate eye. See fig. 8 .If the right eye is presented with similar lines that are oppositely displaced, then the image for the two eyes appear fused into one and the subject sees the lower line as nearer than the upper. This is the principle of stereoscope. This effect is explained better as follows.

The primary visual signals or cues which aid our perception of depth are binocular vision and motion parallax.

Binocular vision can be divided into three component but related parts : *accommodation, convergence* and *disparity*. Accommodation is the ability to focus the eyes on only one point at a time. Convergence is the angle subtended by the two eyes on the object in focus-a nearer object subtending a larger angle, a more distant object a smaller angle. Disparity describes the fact that each eye receives a slightly different image from a perceived stimulus. These cues are signaled independently to the brain where they are integrated with all other sensory phenomena to compound a total perception.

Our eyes give overlapping fields of view and stereoscopic depth vision; motions of the head and eyes give motion parallax; so movement at right-angles to a line of vision alters the relative positions of two unequally distant objects, for example the relative movements of nearer trees and distant hills seen from a speeding train. Motion parallax depth information can also be perceived by a one-eyed person who, in panning like a cine camera, would make extra use of compensatory head movements. Apart from motion pictures and stereoscopic images, all two dimensional forms of spatial representation equate to the one-eyed person's view of space but from fixed points-monocular vision lacking the vital head movements which preude any use of the primary cues to depth. The pictorial images created by graphic displays have to rely totally upon the secondary cues.

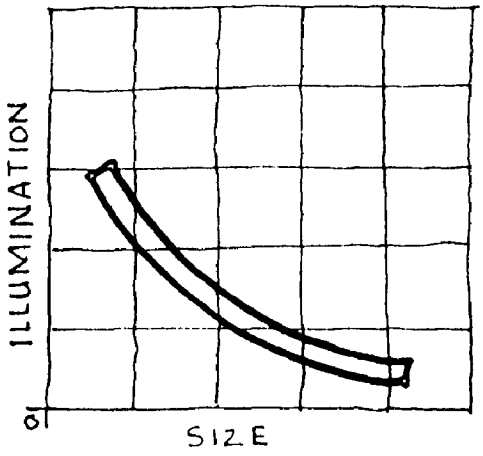
The fineness of verniere and stereoscopic discrimination transcends that of the retinal mosaic and suggest that some averaging mechanism must be operating in space or time or both.

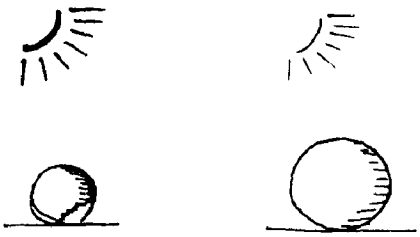
Some facts on perception :

A variety of factors affect the way in which things are perceived. So, in the design practice the designer shall take into account impacts of these facts.

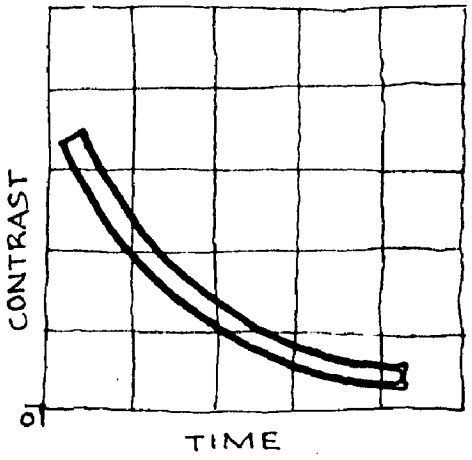
1. ***Seeing the task :*** Visibility, the state of being perceivable by the eye, is often thought to depend upon the amount of light on the object or task to be seen, and that more light on the object or task will make it more visible. To some degree this is true, but visibility also depends upon *visual acuity/* the ability to distinguish fine details/, and *contrast sensitivity* / the ability to detect the presence of luminous or brightness/which is determined by the amount of incident light, where the incident light comes from, and the reflectivity of the task.

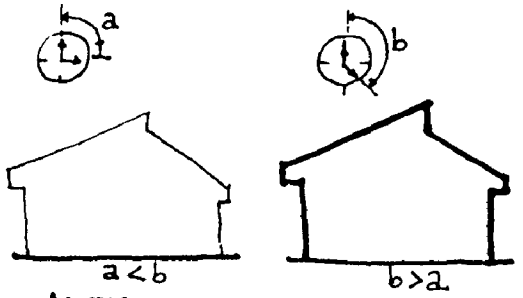
A 1% loss in contrast may require as much as 15% increase in illumination to achieve equal visibility. /see the following illustrations./*fig.* 9 /



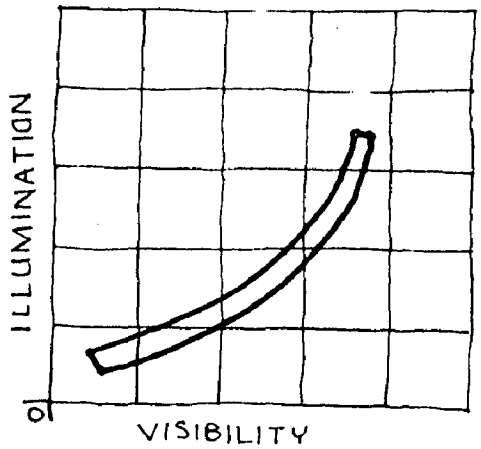


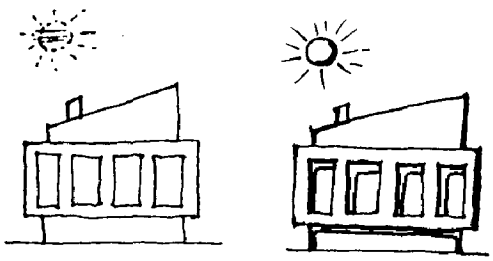
AS THE TASK SIZE INCREASES, THE REQUIRED ILLUMINATION DECREASES



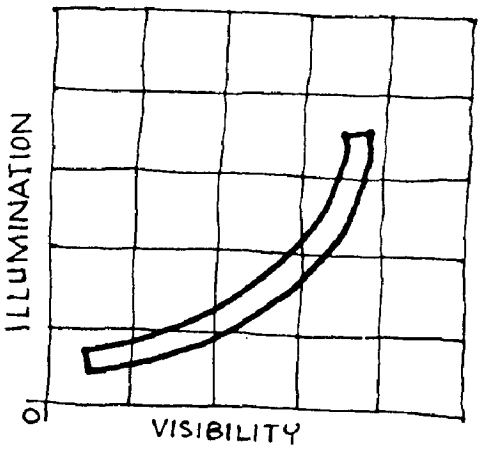


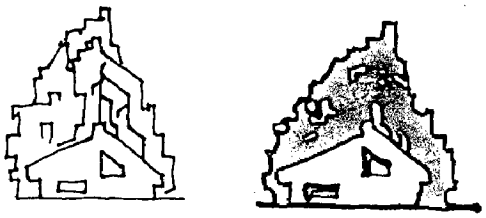
AS THE TIME AVAILABLE FOR SEEING INCREASES THE REQUIRE ILLUMINATION DECREASES





AS ILLUMINATION INCREASES, VISIBILITY ALSO INCREASES





AS THE CONTRAST INCREASES VISIBILITY ALSO INCREASES

Fig-9

2. ***The effect of constancy's, illusion, and organizational phenomena*** :

- *Constanties :* perception accord more often with objects properties than the sensory stimulation; for example a man's perceived height remains constant even though his retinal image size changes as he approaches an observer. /fig. 10/
- *Illusions :* are cases in which perception accords neither with how the receptors are stimulated, nor with the characteristics of the objects themselves. For example, in brightness contrast, an object's reflectance, in fact constant, appears to change when its surroundings change. There are many examples of such optical illusions-which is the deception of the eye by the tricked brain by the things we see./fig. 11/
- *The organizational phenomenal :* rests on the perceptual distinction between figure and ground. When a contour gives shape to one area/figure/, the region bounded by the other side of the contour/ground/usually has no recognizable shape or vice versa, but not simultaneously .Some other formulation about this is Gestaltists' "*Law of good Continuation*"/fig-12/.

Also on the constancy's and illusions, since Helmholtz the following idea is supported; a persons visual system acquires associations that reflect the normal structure of the physical world. For example the perceptual system learns to take distances into account when estimating the sizes of objects. Such sophisticated inferences are surely not conscious, so this theory is phrased as "*unconscious inferences based on unnoticed sensations*"

3. ***Perceivers tendency to what they :***

- *Expect :* we tend to see what we expect to see. For example, many people, unless they are put on guard, find it difficult to perceive the unexpected. /fig.13/An extreme case of this is the parched traveler lost in the desert who `sees' the hallucination of an oasis.
- *Give attention :* this may always be dominated by sheer intensity, size or speed - as with a loud noise or flash of lightening. For example, infants a few week old pay more attention to brightly colored, patterned, or moving objects than to drab or stationary ones.
- *Are emotional at :* emotional distortion, for example, can include the person who has faced grief in a certain site and may see aspects of that in other similar sites.
- *May be motivated :* when based on sensory or bodily deprivatiory such as when one needs a lofty site for wander or horse riding may get a flat for living too congesting.
- *Are familiar at or experienced:* For example most people in urban areas live in a world dominated by squares and rectangles. The figure below, as a result, is usually interpreted as an

oblique view of a rectangular frame, rather than as a face- on of an irregular four-sided figure. /*fig*-15 /

- *Are told/ effect of labels/:* two people were shown the figures on the extreme left below and were given different labels describing what they were supposed to be. When new drawings, made from memory, were examined, they were found to have been greatly influenced by the original descriptions.

The following figure was shown to one person as spectacle, to another as dumb- bells./ *fig*-16 / Also the next figure; one person was told to be a beehive; another that it was a hat./ *fig*- 17 / There may also be more other factors which can affect the propriety of our perception of the physical world in particular inside our living environment regarding optical aspects. Thus designers are bound to come across all such impactive elements to safeguard their artifacts from such chaotic jumble to sort out or make a decision; what is genuine and what is illusional.

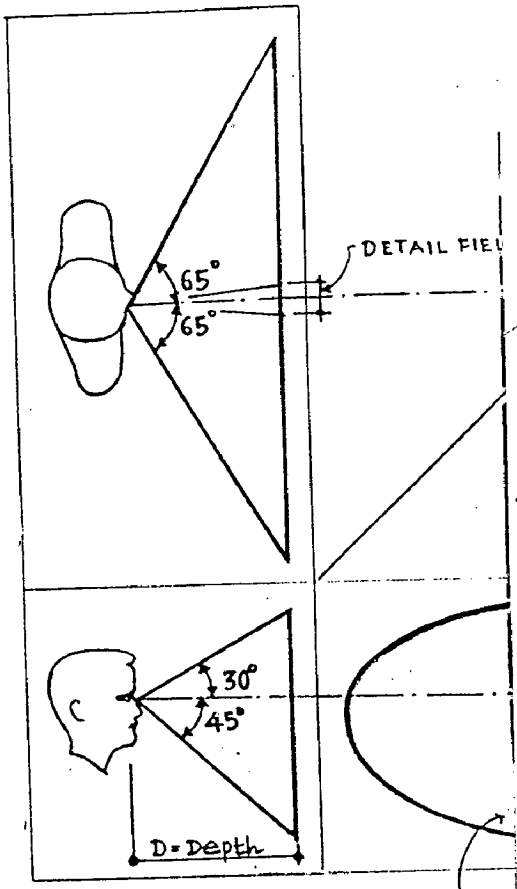
Quantification of framed field of visions Visual and depths:

Human eyes have a general and detail field of view, the former sees general shapes/ profiles/ and the later details of object bodies. The general field of view has an irregular conical shape, measuring about 30 up, 45 down, and 65 to each side. This is due to the shape of our faces. The detailed field of vision is a narrow cone within this large cone. It measures a very minute angle, approximately equal to a thumbnail held at arm's length. Because our eyes have overlapping cones of view horizontally, that is, due to the convergence effect of the two eyes to focus on an object and almost the two cone of visions merge as a single elliptical framing, we can "see around" verticals placed in our view. An important limitation of our vision is we cannot see an object farther from us than about 3,500 times its size.

Based on the above information's and by supposing the average horizontal distance of the two eyes' axis of vision, at normal state to be 6.5. cm , we can quantify the size of an area framed by an intercepted field of vision at any given depth 'd' from the observers' eye./ *fig*- 18 /

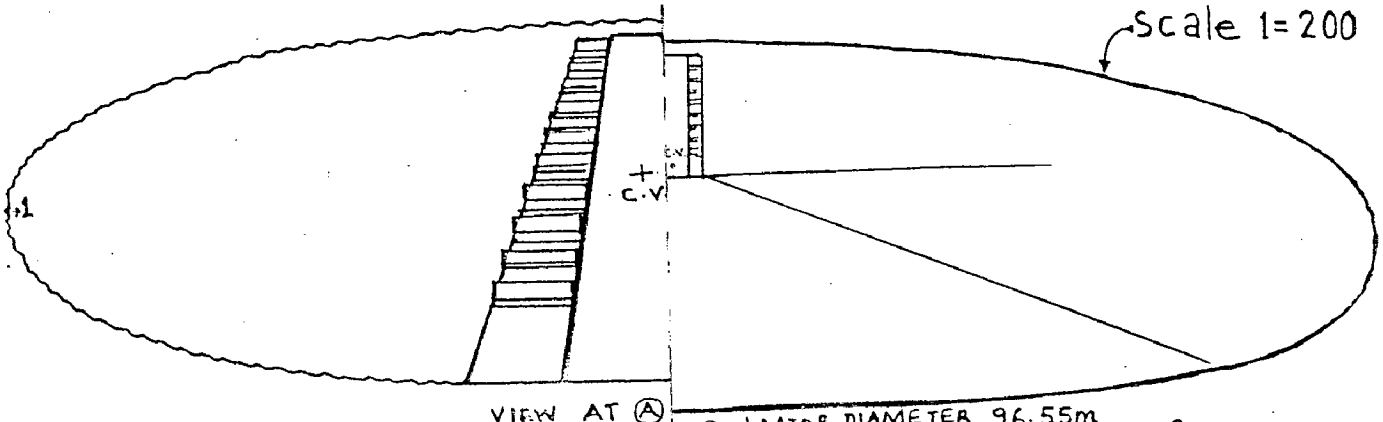
The importance of this is to set a frame of reference for the perception of the complete profile of a given scene/ or object/ than depending on the successive rapid, aimed movements of the eye called *Saccades* ,which is the unproved possibility of perceiving complete object or scene using the sequence of partial glimpses.

As to he classical perception theory, in the later, with each eye movement, the image of the scene shifts on the retinal. The shifting retinal images are normally not noticed, a form of constancy that is often explained as a compensation for the eye movement. Rather, this fact,



'D' DEPTH OF THE SCENE FROM THE VIEWER

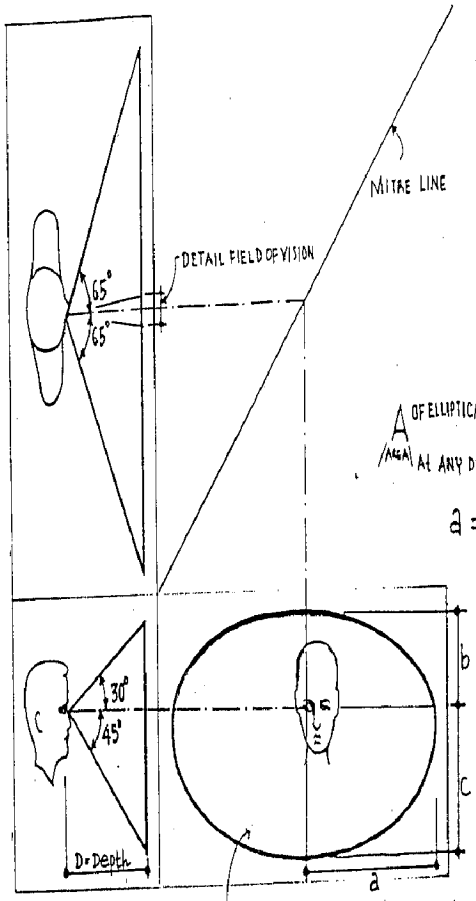
Fig-1B



VIEW AT Ⓐ

Ⓒ MAJOR DIAMETER 96.55m
AREA OF TERMINUS = 10766.93m²

QUANTIFICATION OF THE INTERCEPTED FIELD OF VISION



'D' DEPTH OF THE SCENE FROM THE VIEWER

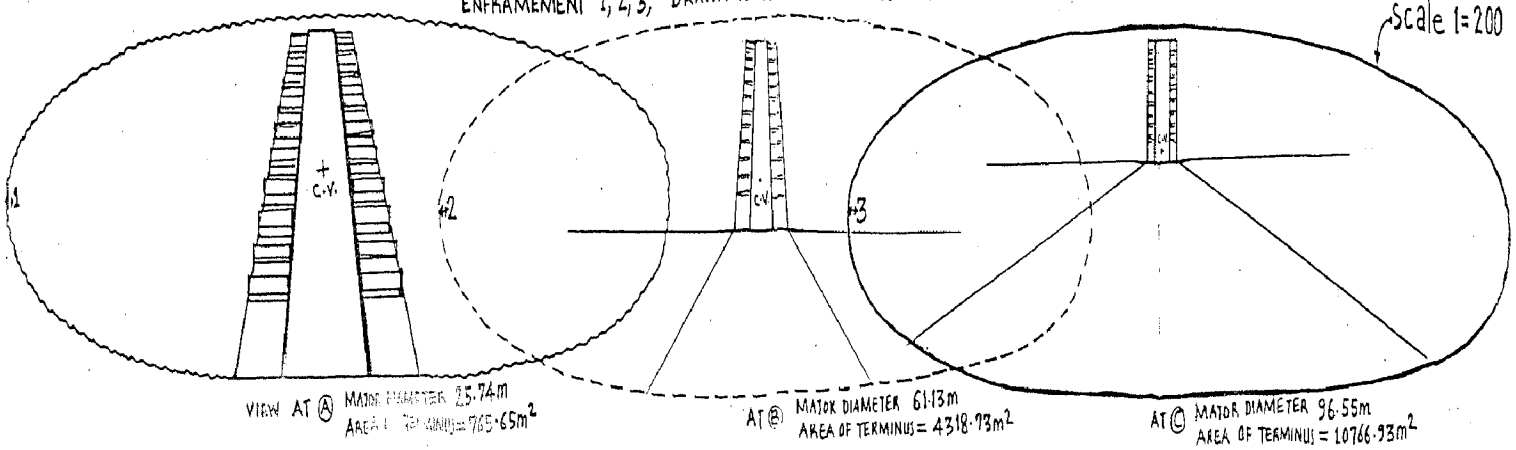
ENFRAMED TERMINUS / FOR VISTA / INTERCEPTED FIELD OF VISION /

Fig-18

$A_{(AREA)}$ OF ELLIPTICAL TERMINUS $= 5.317\ D^2$
AT ANY DEPTH 'D'

$a = 2.145D$

ENFRAMEMENT 1, 2, 3, DRAWN TO SAME TERMINUS SIZE



VIEW AT Ⓐ MAJOR DIAMETER 25.74m
AREA OF TERMINUS = 765.65m²

AT Ⓑ MAJOR DIAMETER 61.13m
AREA OF TERMINUS = 4318.93m²

AT © MAJOR DIAMETER 96.55m
AREA OF TERMINUS = 10766.93m²

SOME FACTS ON VISUAL PERCEPTION

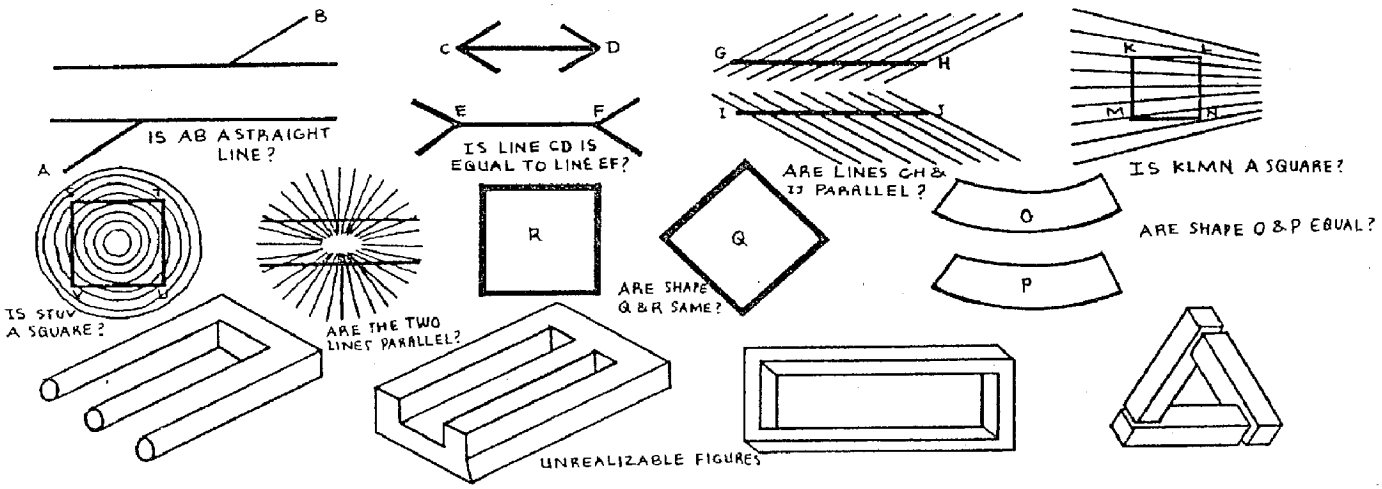


Fig-11 ILLUSIONS

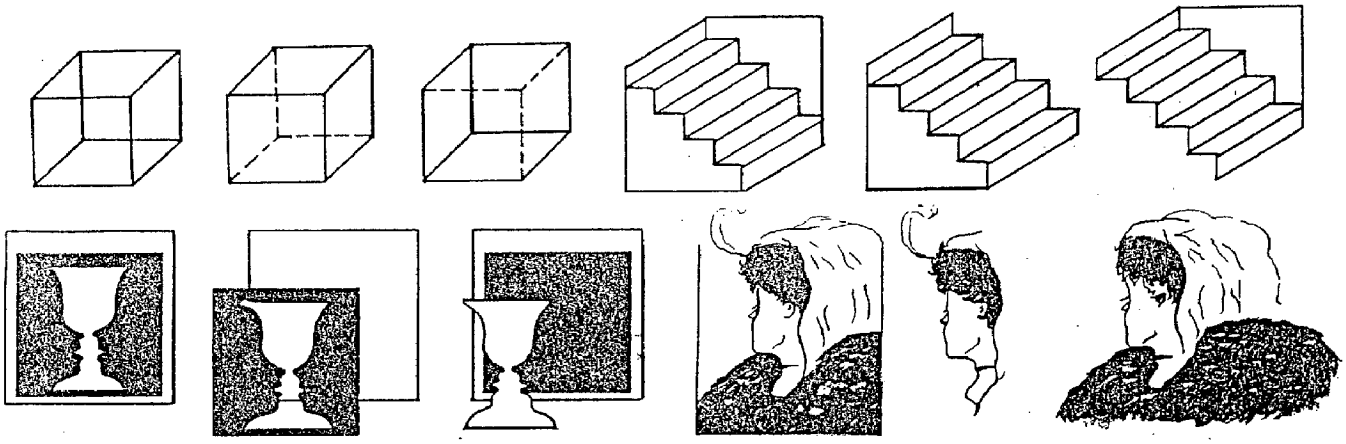
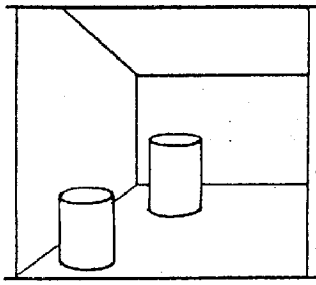


Fig-12 ORGANIZATIONAL PHENOMENA



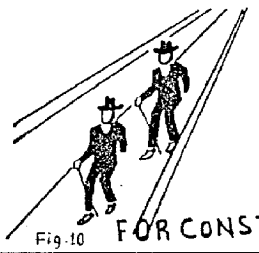


Fig-10 FOR CONSTANCY

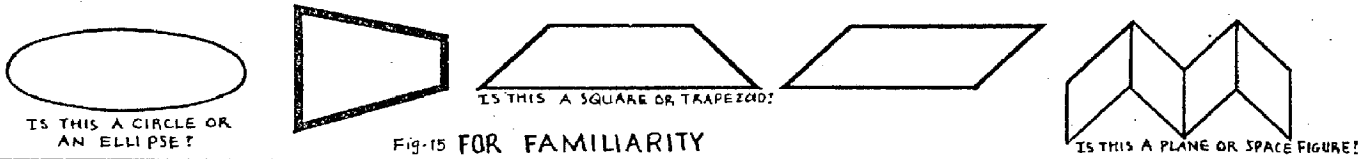


Fig-15 FOR FAMILIARITY

Fig-16 FOR EFFECT OF LABLES

Fig-17

Fig-13 FOR EXPECTATION

the incapability of our eye movement to consist the memories of a shape perception, is taken for advantage in the production of 'moving pictures', suggesting that it is not possible to perceive and truly comprehend, without tricks of the brain or illusions, the overall profile of a scene or object's configuration for the appreciation of be it its beauty or other aspects of the physical world.

When you look at a picture or a framed scene, the brain retains the image for about *one-tenth* of a second after it has gone. This is called persistence of vision. So, forexample, if you are shown 10 still pictures a second, your brain will join the separate images into a series of moving pictures. Movie films use 24 still picture a second. / *fig*-19 /

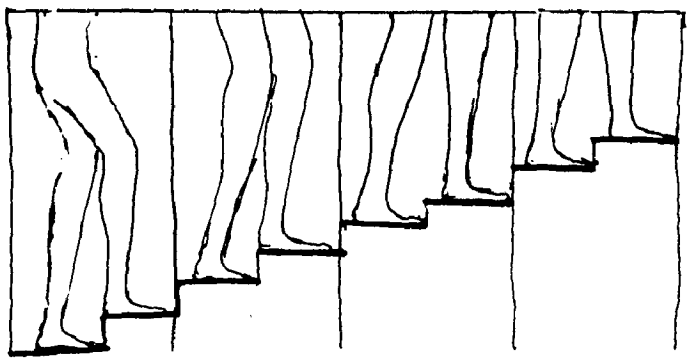


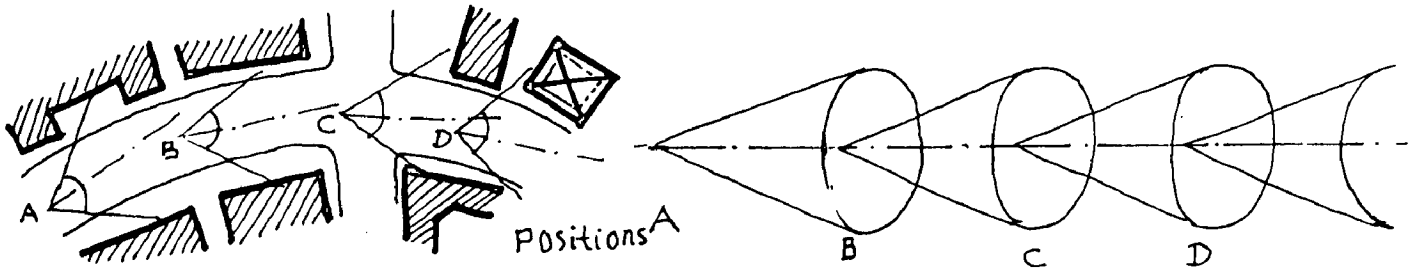
Fig -19

However, unlike this, buildings and scenes in architecture are not physically moving, in actual sense, to respond to a stationary eye. Instead the observers will shift their visual cone alongwith their movements through space and adds a new experience with each movement; */fig.20 a/* or else, if the terminus is kept constant and the observers change position, different size of enframement with encroachement vistas will be created / fig .20b/.

Further more, if movement is permitted or induced into the background in a visual exercise, then interesting possibilities become apparent. The size of the field of vision, the coupling of light, sound production, and smell inducement are important in the creation of illusion, which of course, is based fundamentally upon upsetting or reversing the expected and the familiar.

The application of the framed field of visions and Visual depths:

Hence, from such understanding, it will be worth while to employ such framing of a given site for each distance of the observers position and to configure the buildings or scene segments within that frame. This helps to fully perceive their emages at a single shot of glimpse and view appreciation will be undisturbed. The detail cone of vision can also help to locate important details of scenes or buildings with respect to a stationary eye.



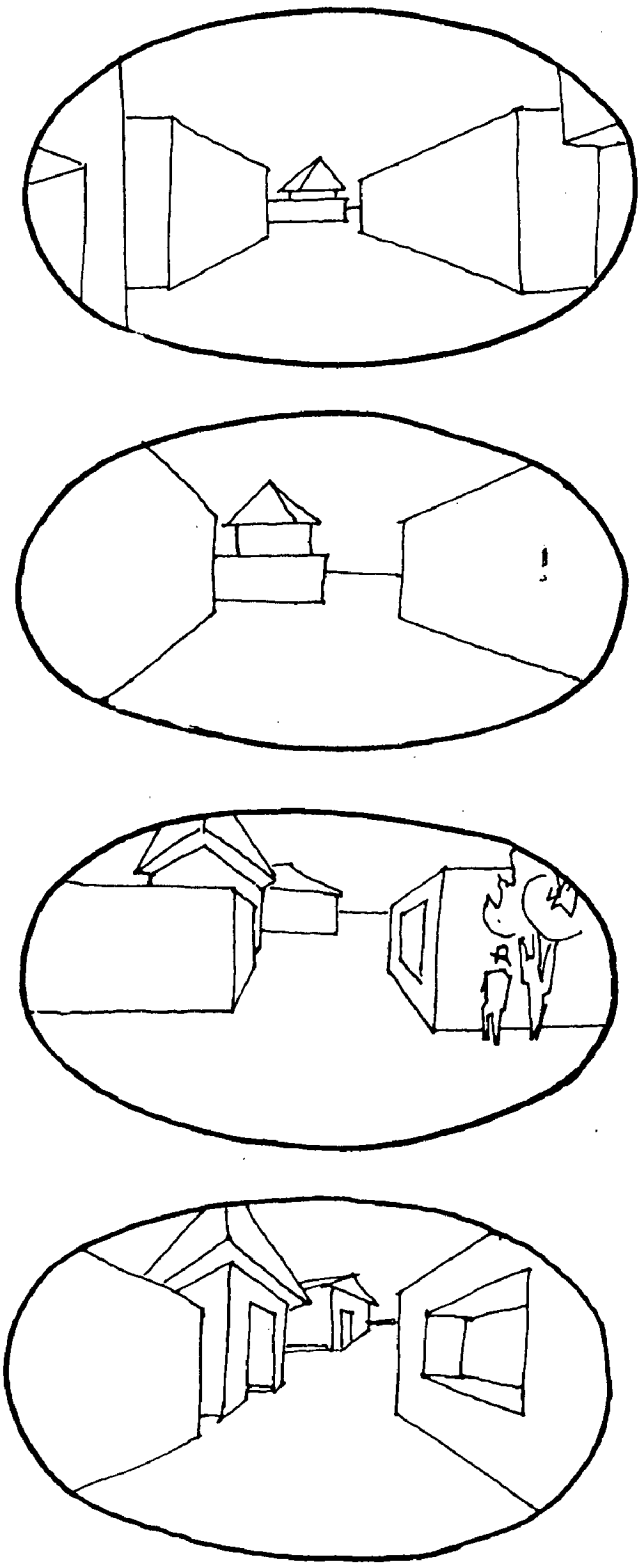
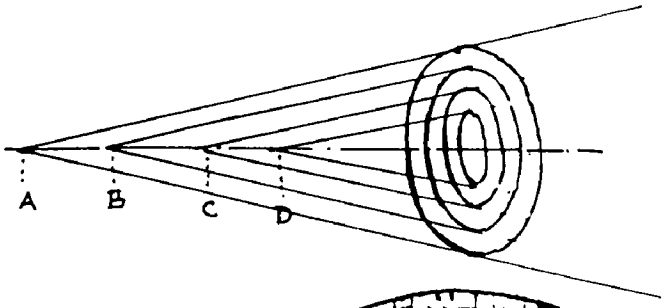
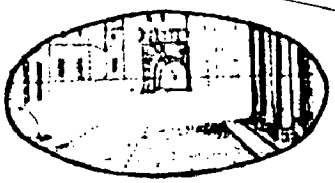
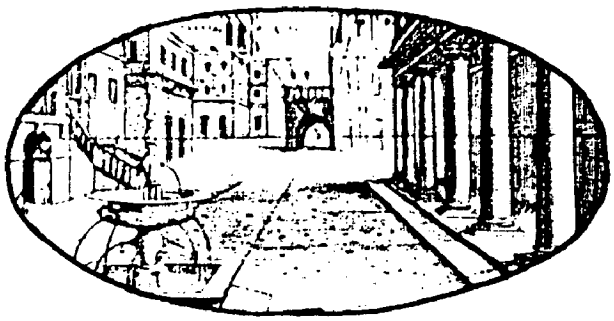


Fig. 20 a Visual Sequence
/Modified from LYNCH KEVIN / 'SITE PLANNING'

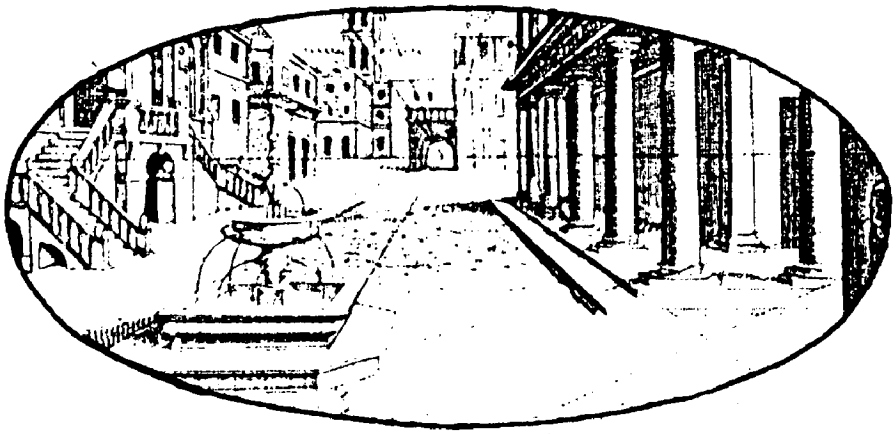




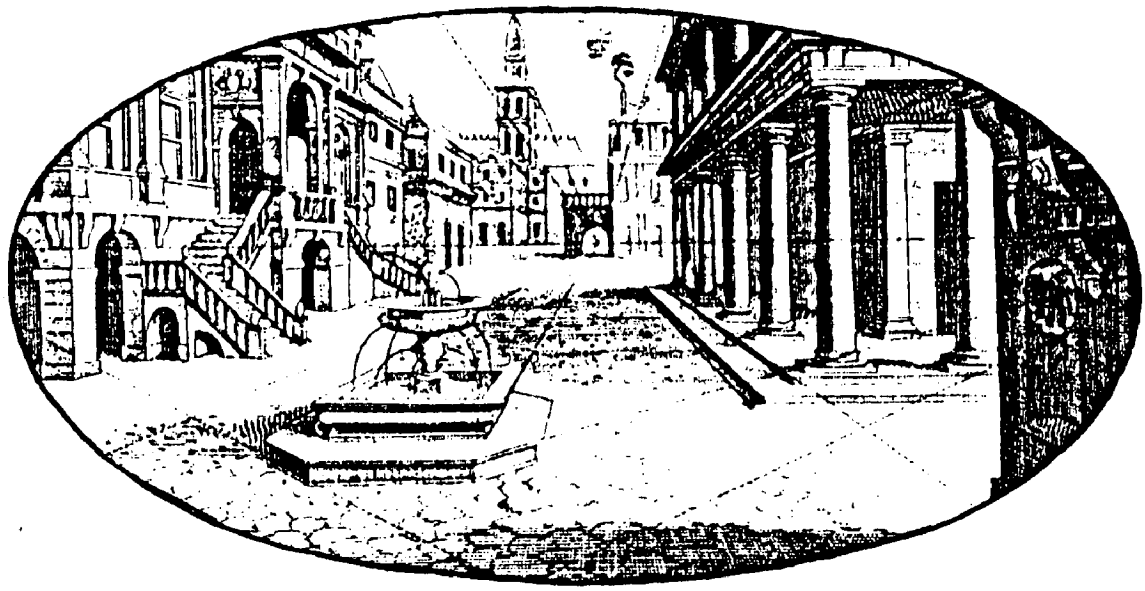
AT POSITION 'D'



AT POSITION 'C'



AT POSITION 'B'



AT POSITION 'A'

Fig 20b Visual depths for a stationary terminus

Further more this can be related to the capacity of an eye to look at objects and establish their identities over space. Which intern helps to decide for what type of objects/ details/ and events to give place at certain depths from the appropriate site of observers, like pedestrian to the side by buildings along street, to choose the height, type and other features of a landscape elements, etc.

For example in a normal comfortable sense, an eye is able to do the following. */fig-21/*

A- Observe/ Contact/

B- Conversational distance/ proximity/

C- Discerns facial expressions/ detail/

D- Recognize face/ identification/

E- Discerns action/ Movement/

F- See people or objects.

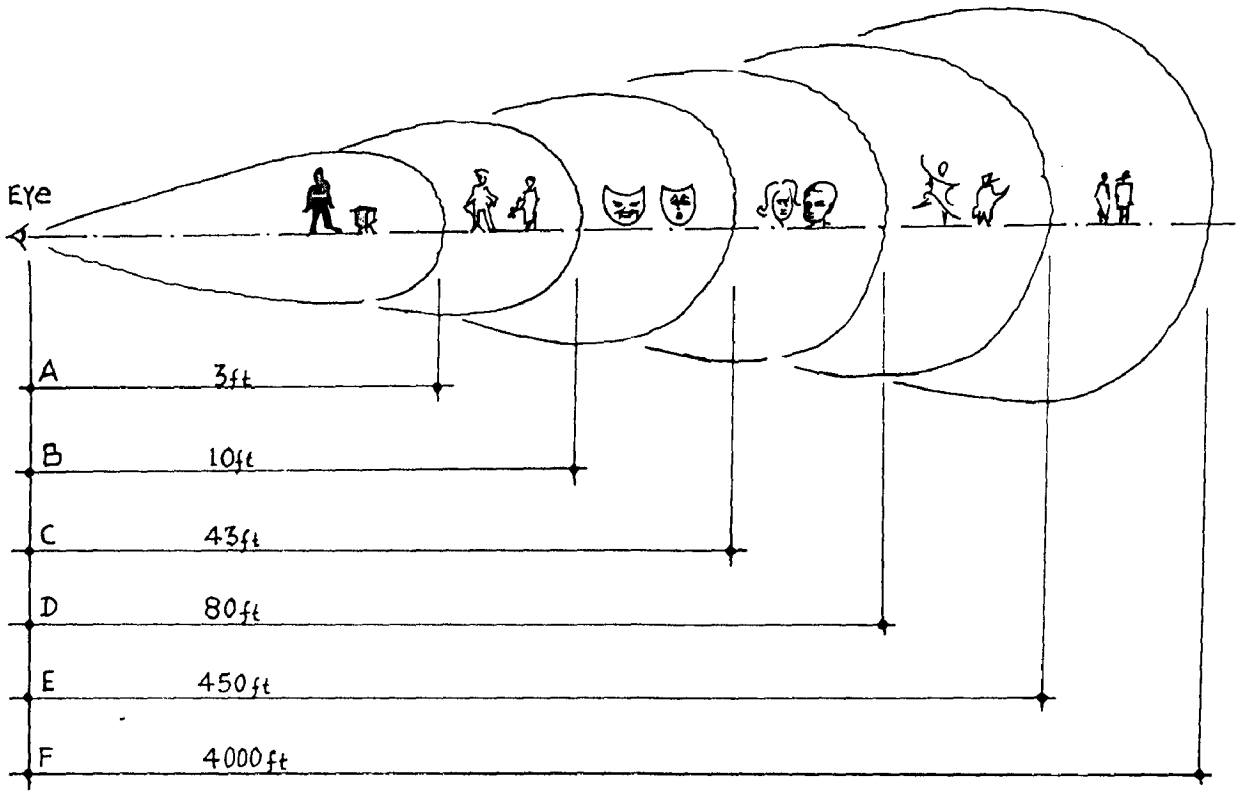


Fig-21
Modified from SPREIREGEN, PAUL D.

All built environment expressions fall within the range from 1 to 6 and the responses and emotions evoked depend on this range and the experience will show a definite variation from a high intensity emotion to a generalized emotion.

Because the neck is capable of turning in all directions, and so are the eyes, the vertical cones can tend to be a complex combination of various angles. For example, where the neck is moved around in a horizontal plane, the *Panoramic* views are formed instead of a linear view, and obviously the *skyramic* view are formed when it moves in a vertical plane. / *fig*- 22 /

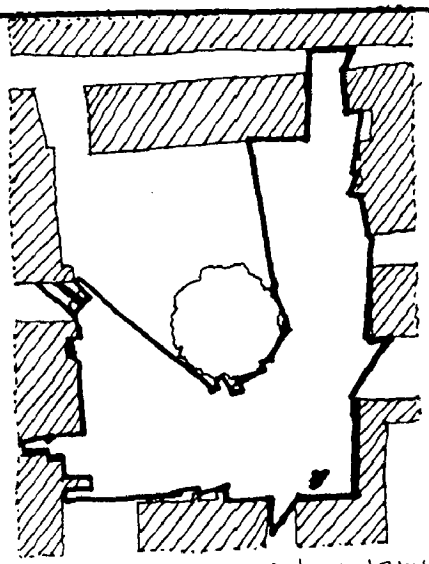
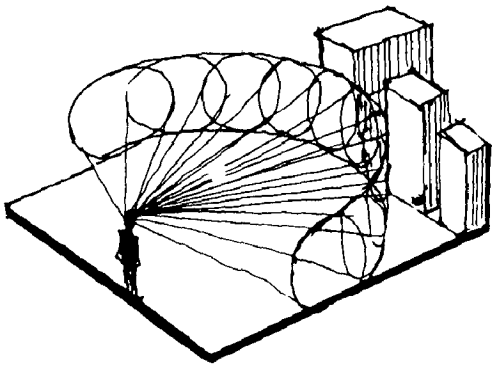
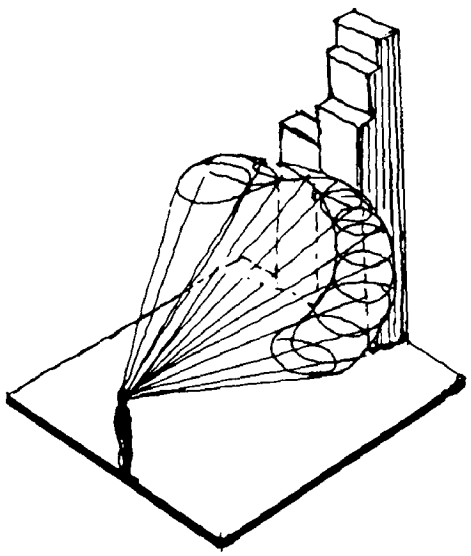


Fig-22 Diagram of a spatial boundary made at eye-level by a rotating observer.
/ After Tom porter, from 'How architects Visualize'/



Panoramic View



Skyramic View

naturally responds to the needs of the body and mind for a change of stimuli or mood. And when we are feeling pleased and happy we usually run and jump about, laugh and generally "feel good"' and this is in part because the various organs in our bodies are working smoothly from such a stimulus. This obviously suggests, for example, the tendency of a spectator to follow the least line of resistance/ to lessen possible strains in his biological mechanism/. Evidently, thus, in terms of *Shape/form* perception- from the large and simple to the small and detailed, in terms of *Color* - from the gay to the subdued, and interms of l*ighting* - from the bright to the dimly illuminated. The associations established in the field of vision are governed by this principle, but perception may follow more than one course and differing association arise.
In the following some of the emotional aspects that dictate man in his interaction with his environment are listed;as given by J.O.Simonds:

Impelling factors: Man tends to move.
In logical sequences of progression
In lines of least resistance
Along easiest grades
In lines suggested by directional forms, signs, or symbols
Towards that which pleases
Toward that which is fitting
Toward things wanted
Toward things that have use
Toward change — from cold to warm from sum to shade, from shade to sun.
Toward that which has interest
Toward that which exits his curiosity
Toward points of entry
Toward the receptive
Toward points of highest contrast
Toward points of richest texture of color
To attain a goal
By pride of height attained, distance traveled, friction overcome
In haste, via the direct; with leisure, via the indirect
In harmony with circulation patterns
In harmony with abstract design forms
Toward the beautiful, the picturesque

For the pleasurable sensation of motion

For the experience of space modulation

Toward exposure, if adventurous

Towards and through pleasant areas and spaces

Toward order, if tired of confusion

Toward confusion, if bored with order

Toward objects, areas, and spaces that suit his mood or need.

Repelling factors : Man is repelled by:

Obstacles	The uninspiring
Steep grades	The forbidding
The unpleasant	The demanding
The monotonous	Danger
The uninteresting	Friction
The dull	Disorder
The obvious	The ugly
The undesirable	The unsuitable

Motion directors : Man is directed or guided by:

Arrangement of natural or structural forms

Implied patterns of circulation

Baffles, screens, space dividers

Dynamic plan lines

Signs

Symbols

Mechanical controls, such as gates, curbs, barriers

Spatial shapes

Suggested progressions, such as violet to red, Hole No.I to Hole No.2

Repose induces: Man is induced to repose by:

Conditions of comfort, enjoyment, or rest

Opportunity for privacy

Opportunity for fuller appreciation of view, object, or detail

Opportunity for concentration

Restriction of movement

Inability to proceed

Imposed indecision

Pleasant arrangements of forms and space

Functions related to rest and repose

Plan elements suggesting or requiring repose

Attainment of optimum position.

Horizontal motion: Man is affected by horizontal motion in the following ways:

Movement is easier, freer, and more efficient in horizontal planes

Movement is safer

Change of direction is easier

Choice of direction is greater

Most functions are better suited to horizontal surfaces

Movement is more stable, in equilibrium with gravitational force

Movement is easier to control

Vision of moving object is easier to control

Vision from moving object is easier to control

Monotony results

Visual interest is in the vertical planes.

Downward motion, or *decline:* Man is affected by downward motion in the following ways:

Effort is minimized, but elevation must be regained

Safety depends on checks and on texture

Gives sense of refugee, hiding, "digging in"

Regression, return to the primitive

A coasting, swooping sense of being in harmony with the forces of gravity

Sense of increased confinement, protection, and privacy

The coal pit, the swamp, the fertile valley connotation

The rathskeller concept

The bargain basement concept

Downward movement and depth accentuated by deep earthy colors, solidity and simplicity of form, natural materials, and falling or quiet water

Vision is oriented to the base plane

Interest increased in things of the earth—in plants, water, and minerals

3.2 The Emotional

Having briefly considered nature of human perception, it would seem that the architectural design analysis must begin with the study, in a nut shell, of the emotional response derived from the purpose of a project and expressed interms of Space form organization and the modalities of its enclosing structure. And this intern shall highlight certain patterns that can lead to the art of erecting a structure in creating useable spaces in the most delightful form. To compute architecture with respect to the basic emotional responses and the abstract design qualities associated with them.

3-2-1 Causes of emotions:

Emotion, the affective aspect of consciousness- a state of feeling or a psychic and physical reaction when experienced subjectively can be caused in the following may.

As to hypothesis, the interruption or blocking of ongoing experience or cognitive activity can lead to physiological arousal and emotional response, which is central to the conception of, such as, the aesthetic response. This later being our ultimate interest since the whole of our strive is to get a pleasant living environment.

'It is being argued that the aesthetic experience is an emotional response to particular types of environmental stimute. These environmental stimuli are represented in a memory by *Schemes*, that these control our ongoing experience of the environment through a matching between stored prototypes and attributes of the relevant parts of the incoming information and that the conditions for aesthetic experiences are established whenever there is interruption or blocking of ongoing processing resulting from a mismatch.' Should events occur, in which objects perform contrary to the normal expected pattern, then the feeling of stability and permanence/ derived from the normal situation/ is destroyed, and incongruity may occurs in the extreme cases. And, as such, architecture shall deal with the creation of a subject/ as built environment/ which has such self renewal 'contrary' to an expected usuality and be suggestive of consistent orginality.

In the concept of schema, the degree of recognition, compensation and acceptance is directly related to the familiarity of the object and its setting, computed with respect to the schema-frame works in which successive glances and sensory information is stored; and is central to optical perception.

3-2-2 Emotions and their expressions.

The human organism is not adapted to stedy stimuli or to the complete lack of stimuli to remain sensitive and alert. For example the constantly changing nature of daylight automatically and

naturally responds to the needs of the body and mind for a change of stimuli or mood. And when we are feeling pleased and happy we usually run and jump about, laugh and generally "feel good"' and this is in part because the various organs in our bodies are working smoothly from such a stimulus. This obviously suggests, for example, the tendency of a spectator to follow the least line of resistance/ to lessen possible strains in his biological mechanism/. Evidently, thus, in terms of *Shape/form* perception- from the large and simple to the small and detailed, in terms of *Color* - from the gay to the subdued, and interms of *lighting* - from the bright to the dimly illuminated. The associations established in the field of vision are governed by this principle, but perception may follow more than one course and differing association arise.
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Downward movement and depth accentuated by deep earthy colors, solidity and simplicity of form, natural materials, and falling or quiet water

Vision is oriented to the base plane

Interest increased in things of the earth—in plants, water, and minerals

Relatively effortless movement, most welcome in the "home stretch" when energies flag.

Upward motion, rise, or climb: Man is affected by upward motion in the following ways:

Upward motion requires force of lift to overcome gravity

Adds a new dimension to motion

Is exhilarating

Gives sense of built-up potential

Gives sense of "Going up in life"

Detachment from things of the earth

Imparts a moral implication of exaltation, of being closer to God

Gives sense of being closer to sum, rarefied

Detachment from the crowd, supremacy, command

Implication of military advantage

Attainment of the pinnacle

Expanding views and vistas

Concept of man against the sky

Increased concern for safety and stability, and for texture of the base plane to provide necessary traction and grip

Visual interest in overhead planes and the sky; using sun and sky to full effect

All the above are increased in proportion to angle of inclination

Induced response Man responds by:

Relaxing in the familiar, becoming aroused or excited by the unfamiliar

Finding pleasure in unity, variety, and that which is fitting

Finding security in order

Finding amusement and divertissement in the strange, the lively, and in change

Ossifying and decaying physically, mentally, and spiritually amidst the rigid and the fixed.

On the street, in crowded shopping districts and perhaps even more particularly in exhibition areas men(and women, teenagers, kids, dogs, and cats) are cajoled, badgered, seduced, preached to, begged, teased, blasted at, or otherwise attracted by an overwhelming and constantly evolving, rolling barrage of visual persuaders. Sometimes flatteringly, sometimes surely, but almost inevitably they (the men, women, teenagers, kiddies, dogs, and cats) follow their eye-mind impellers toward that which is:

Meaningful	Dominant	Abstract
Animated	Spectacular	Select

Contrasting	Subtle	Successful
Unusual	Associative	Sophisticated
Beautiful	New in concept	Comprehensible
Varied	Inspiring	Superlative
Near pix, or eye level	Strange, amidst the familiar	Supreme
Decorative	New	Impressive
Necessary	Pleasing In pattern	Surprising
Desirable	Pleasing in form	Ingenious
Colorful	Pleasing in scale	Useful
Gay	Pleasing in texture	Logical
Lively	Pleasing in color	Sequential
Shocking	Safe	Progressive
Bright	Stable	Human
Familiar, amidst much that is strange	Suitable	Appealing
In motion against a fixed back ground	Convenient	Educational
Charming	On course	Curious
Subdued, when one is weary of the bright	Dramatic	Exotic
Restful, when one is weary of the tumult	Simple	Startling
Startling	Clean	Appropriate
Vigorous	Natural	Stimulating
Bold	Weird	Admirable
Interesting	Plansible	True
Exciting	Distinguished	Diverting
Amusing	Suggestive	Satisfying
Awesome	Symbolic	Fresh
Excellent		

It is then necessary to begin design dealings with the classification of such emotional responses derived from expression of design elements, which helps to decide the emotional level of a certain theme.

Lines, shapes/ forms, contour, texture, color, pattern of sounds, smells, all have in the abstract certain predictable impacts on the human intellectual- emotional response. If for example a certain from *Says* things, or *does* things to the observer, this might be reason enough to employ such forms in the shaping of those structures or objects or spaces that should ideally have for the observer this same message. Surely, if the abstract expression of a given line violates the planned expression of a structure, object, or space, it should be used only with studied interest and care. This modified phrasing and the following classification of abstract line expression is based on J.O.Simounds from his book of *Landscape Architecture. / fig-22a/*

Emotional or psychological responses and their abstract dosing qualities or spatial characteristics, as in a series of varying volumes, each specifically designed to induce a predetermined response is given below.

Tension: Unstable forms, Split composition. Illogical complexities. Wide range of values. Clash of colors. Intense colors without relief. Visual imbalance about a line or point. No point at which the eye can rest. Hard, rough or jagged surfaces, Unfamiliar elements, Harsh, blinding or quavering light, Uncomfortable temperatures in any range, Piercing, jangling, jittery sound.

Relaxation: Simplicity, Volume mayvery in size from the intimate to the infinite, Fitness, Familiar objects and materials, Flowing Horizontality. Agreeable textures. Pleasant and comfortable shapes, Soft light, Soothing sound, Volume infused with quiet colors- whites, grays, blues, greens, "*Think round thoughts*,"

Fright: Sensed confinement, A quality of compression and bearing. An apparent trap. No points of orientation, No means by which to judge position or scale, Hidden areas and spaces, Possibilities for surprise, Sloping, twisted or broken plane. Illogical, unstable forms. Slippery hazardous base plane, Danger. Unprotected voids. Sharp, intruding elements, Contorted spaces. The unfamiliar, The shocking. The startling. The weird. The uncanny. Symbols connoting horror, pain, torture, or applied force. The dim, the dark, the eerie, Pale and quavering or, conversely, blinding garish light. Cold blues, cold greens. Abnormal monochromatic color.

*Gaiety:*Free spaces. Smooth, flowing forms and patterns. Looping, tumbling, swirling motion accommodated. Movement and rhythm expressed in structure. Lack of restrictions. Forms, colors and symbols that appeal to the emotions rather than the intellect. Temporal. Casttal, Lack of restraint. Pretense is acceptable. The fanciful is applauded,. Often the light, bright, and spontaneous in contrast to the ponderous, dark, and timeless,. Warm bright colors. Wafting sparkling ,shimmering, shooting, or glowing light. Exuberant or lilting sound.

Contemplation: Scale is not important since the subject will withdraw into his own sensed well of consciousness. The total space may be mild and unpretentious or immense and richly ornate— so long as the structural forms are not insistent. No insinuating elements. No distractions of sharp contrast, Symbols, if used, must rerelate to subject of contemplation. Space must provide a sense of isolation, privacy, detachment, security, and peace, Soft diffused light. Tranquil and recessive colors. If sound, a low muted stream of sound to be perceived subeonseiously.

Dynamic action: Bold forms. Heavy structural cadence. Angular planes, Diagonals, Solid materials as stone, concrete, wood or steel. Bough natural textures. The pitched vertical. Directional compositional focus. Concentration of interest on focal point of action — as to rostrum, rallying point, or exit gate through which the entire volume impels one. Motion induced by sweeping lines, shooting lights, and by climactic sequences of form, pattern, and sound. Strong primitive colors — crimson, scarlet, and yellow - orange. Waving flags. Burnished standards. Martial music. Rush of sound. Ringing rescendos. Crash of brass. Roll and boom of drums.

Sensuous love: Complete privacy. Inward orientation of room. Subject the focal point. Intimate scale. Low ceiling. Horizontal planes. Fluid lines. Soft rounded forms. Juxtaposition of angles and curves. Delicate fabrics. Voluptuous and yielding surfaces. Exotic elements and scent. Soft rosy pink to golden light. Pulsating, titillating music.

Sublime spiritual awe:Overwhelming scale that transcends normal human experience and submerges one in a vast well of space. Soaring forms in contrast with low horizontal forms. A volume so contrived s to hold man transfixed on a broad base plane and lift his eye and mind high along the vertical. Orientation upward to or beyond some symbol of the infinite. Complete compositional order — often symmetry. Highly developed sequences. Use of costly and

permanent materials. Connotation of the eternal. Use of chaste white. If color is used, the cool detached colors, such as blue, greens, greens, and violet. Diffused glow with shafts of light. Deep, full, swelling music with lofting passages.

*Displeasure** Frustrating sequences of possible movement or revelation. Areas and spaces unsuitable to anticipated use. Obstacles. Excesses. Undue friction. Discomfort. Annoying textures. Improper use of materials. The illogical. The false. The insecure. The tedious. The blatant. The dull. The disorderly, Clashing colors. Discordant sounds. Disagreeable temperature or humidity. Unpleasant light quality. That which is ugly.

*Pleasure** Spaces, forms, textures, colors, symbols, sounds, light quality, and odors all manifestly suitable to the use of the space — whatever it may be. Satisfaction of anticipation, requirements, or desires. Sequences developed and fulfilled. Harmonious relationships. Unity with variety. A resultant quality of beauty.

If we were to list the requisites of the ideal space for each of a series of varying uses, we might be amazed at the variety of suggested spatial characteristics. A child's play lot, for example, would be designed .

* It is to be noted that "displeasure" and "pleasure" are general categories whereas "tension," "relaxation," "fright," and the other mentioned are more specific. With these more specific responses we can list in more specific detail the characteristics of the volumes designed to induce them. The degree of "pleasure" or its opposite, "displeasure" would seem to depend on the degree of sensed fitness of the volume for its use, and a unified and harmonious development of the plan elements to serve this function. It can be seen that one could therefore experience pleasure and right simultaneously (as in a fun holes) or pleasure and sublime spiritual awe simultaneously (as in a cathedral), and so forth.

3-3 The Intellectual

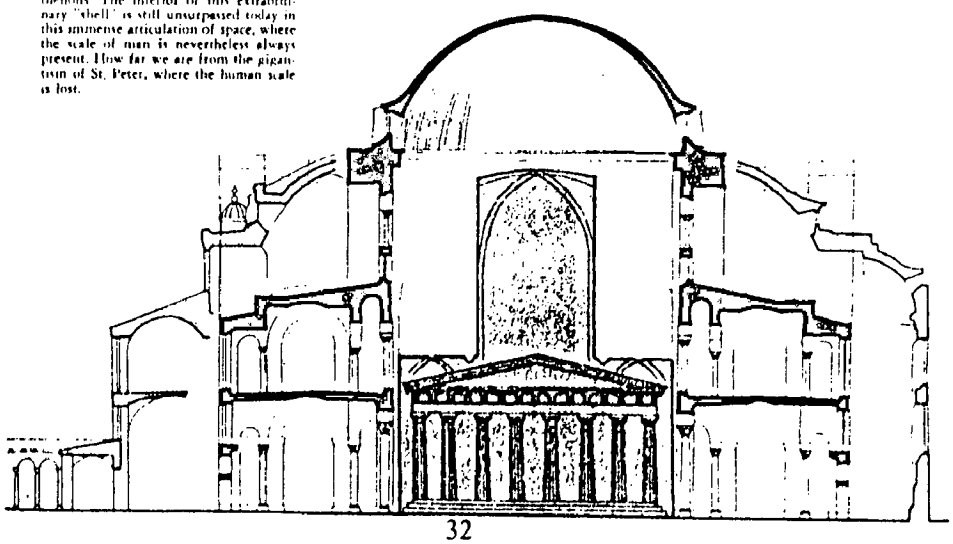
A work of architecture is a product of creation and interpretation/ *art* /, and discovery/ *science* / of an edifice to assure a soul charged humane environment/ habitat. It accomplishes this through an imaginative dealing, intuition, and render it flesh by exploring self evident facts that suit the created subject- the edifice and its site.

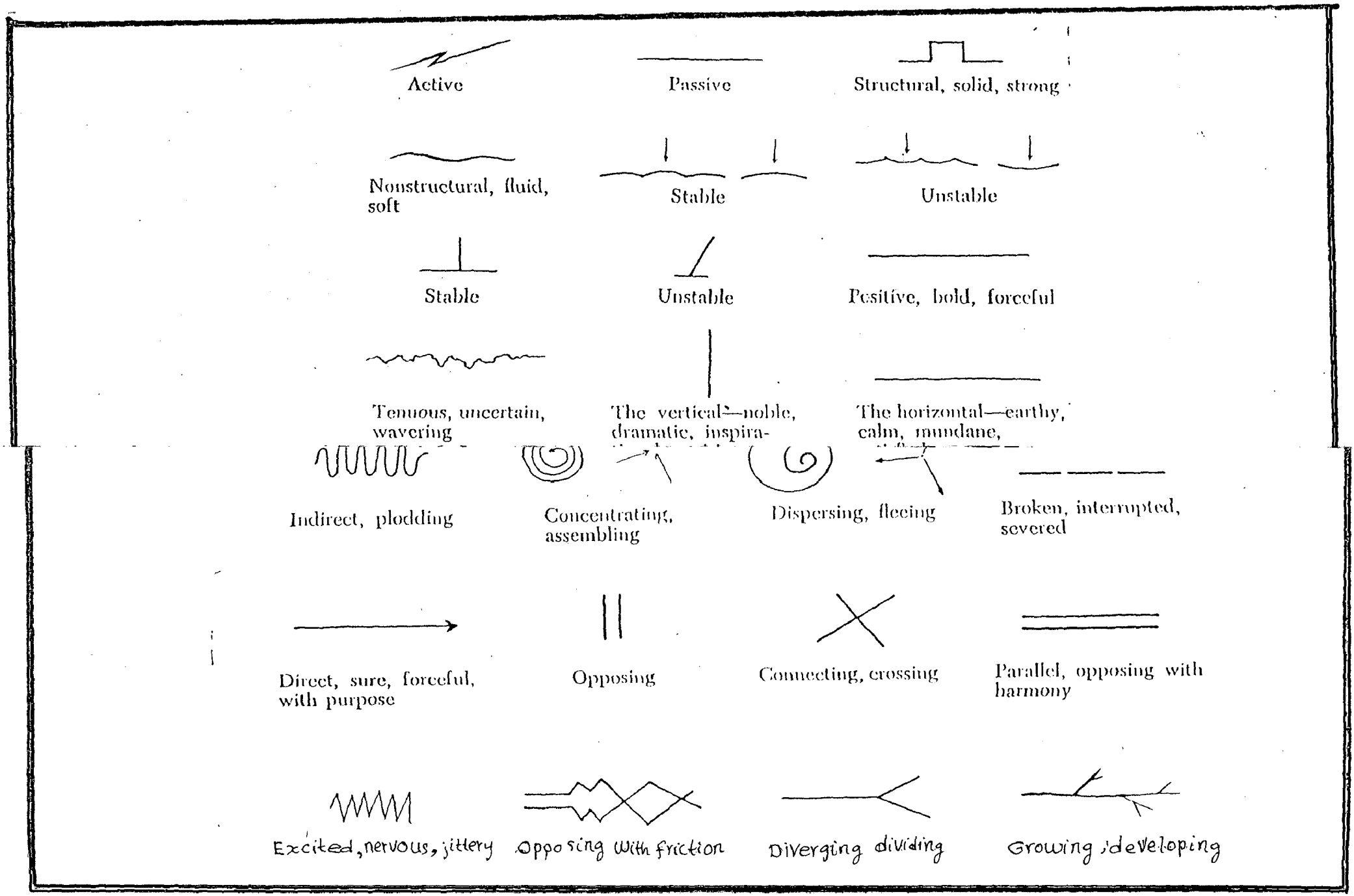
A consistent generation of impulse for an apparent 'contrary' to the usual perception of built scene, for originality and to evoke emotions of pleasure, is central to it.

The creative aspect operates with the most complex and challenging domain, the state of mind, in which an art blending is evaluated based on the convincing design quality 'gauge formats'/innate or learned/ be it composition of elements within certain design theme, or principles of space organization, or others; applied by the creator/ designer/. The discovery aspect on the other hand is a matter of practical common sense in proceeding with the design of a human habitat, like the knowledge of materials and manner of construction for a predetermined purpose. Thus, while the power of the mind to intuit can be cultivated, the second aspect his objective idea of the physical world can appreciably be sharpened through learning and practicing. Experience has been a teacher for the humans and give them experimental knowledge/cumulative wisdom/ as a product of the symbiotic interaction between their anatomical, physiological and behavioral nature and the environment in which they exist. The experience, study and creative contemplation of all architecture too is the discipline of architecture education.

Thus, in the conception of architectural buildings aesthetic value, judgment can be affected by the educated test of an individual. One's appreciation of a built environment by considering all influencing parameters of it, in the possibility of its realization; and computing it, through speculation, in a complex interactive matrix can eventually enhance or degrade, depends, our evaluation of its architectural merit. Together with the physical comfort and the emotional response, the appreciation of its beauty, by an observer, can be modified to an acute sort, by analyzing how certain aspects of the building are constructed, the possibility of spanning so wide, the choice of the material with its texture and color, etc., and the design decisions made to accord site specific conditions and others. For interest, if we see the following scale comparison/ as given by P.J.Grillo in his book of *Form, Function & Design/* of nave of St. Sophia and the parthenon and Ameins Catuedral, our conception of it can be astonishing for we know how gigantic the parthenon itself but then too small compared to this St. Sofia./ *fig*-23 /

Fig-23 The whole width of Amiens cathedral could easily be contained within the nave of St. Sophia, and three superposed Parthenons. The interior of this extraordinary "shell" is still unsurpassed today in this immense articulation of space, where the scale of man is nevertheless always present. How far we are from the gigantism of St. Peter, where the human scale is lost.




Active
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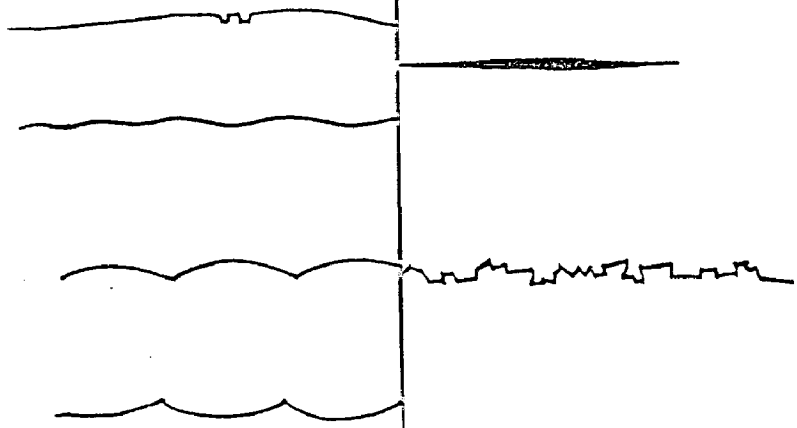
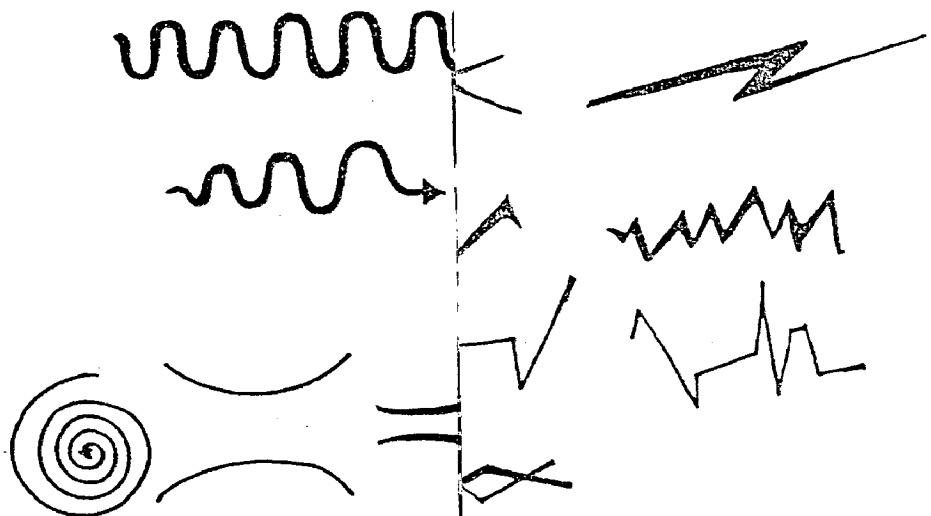
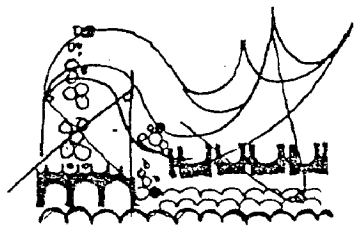
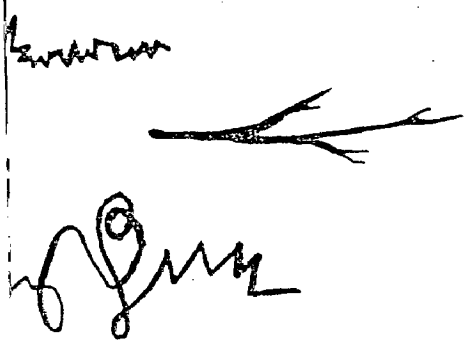
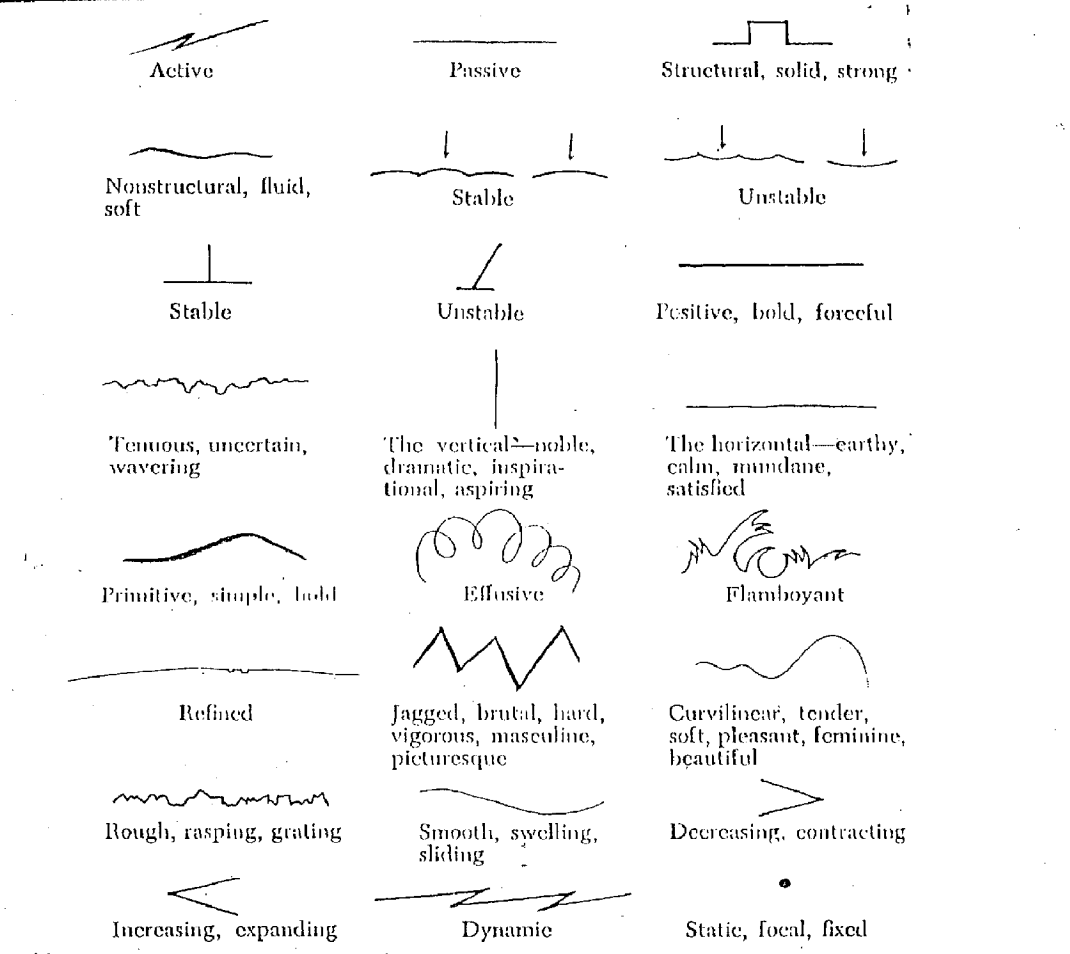
Structural, solid, strong
Nonstructural, fluid, soft
Stable
Unstable
Stable
Unstable
Positive, bold, forceful
Tenuous, uncertain, wavering
The vertical—noble, dramatic, inspira-
The horizontal—earthy, calm, mundane,
Indirect, plodding
Concentrating, assembling
Dispersing, fleeing
Broken, interrupted, severed
Direct, sure, forceful, with purpose
Opposing
Connecting, crossing
Parallel, opposing with harmony
Excited, nervous, jittery
Opposing with friction
Diverging dividing
Growing developing

		ORGAN	
		GEOMETRIC	N-GEOMETRIC
LINES	LINEAR		
	PLANAR		
	SPATIAL		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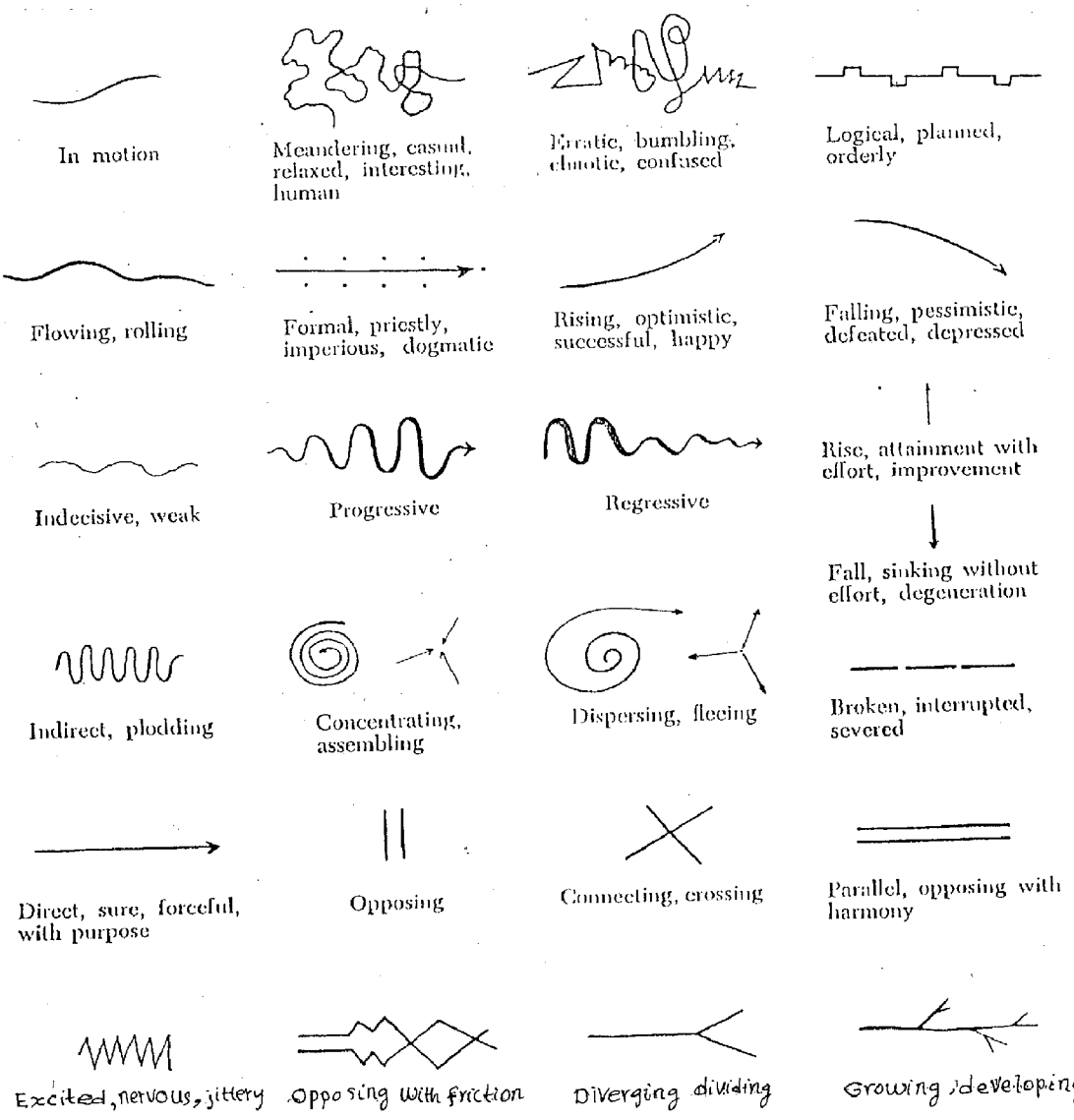
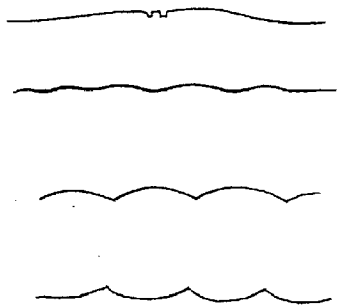
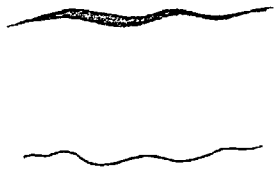
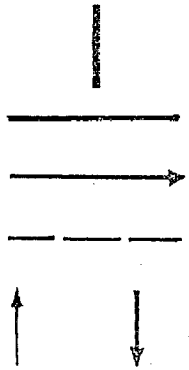
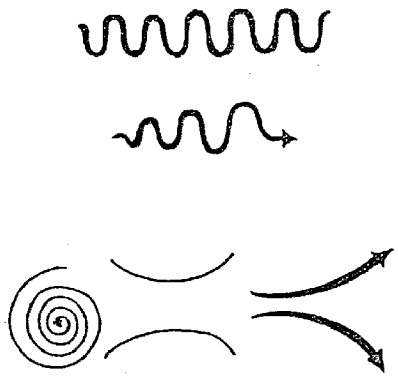
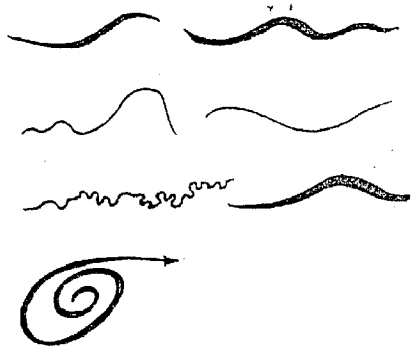
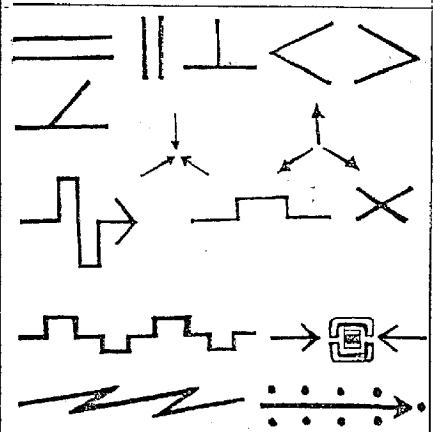
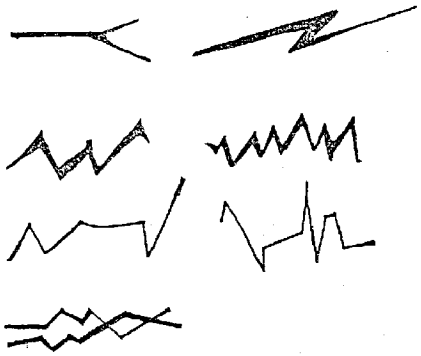
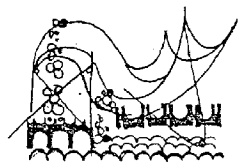
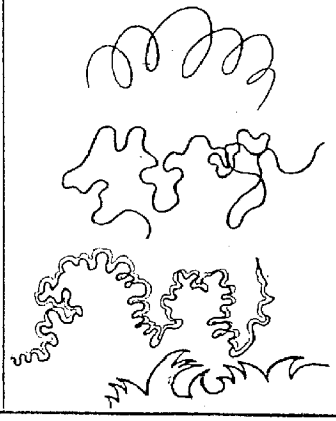
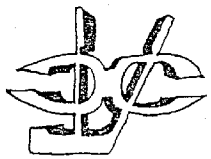
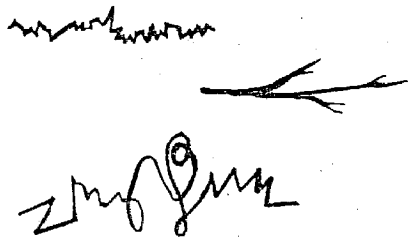
The vertical—noble, dramatic, inspirational, aspiring
The horizontal—earthy, calm, mundane, satisfied
Primitive, simple, bold
Effusive
Flamboyant
Refined
Jagged, brutal, hard, vigorous, masculine, picturesque
Curvilinear, tender, soft, pleasant, feminine, beautiful
Rough, rasping, grating
Smooth, swelling, sliding
Decreasing, contracting
Increasing, expanding
Dynamic
Static, focal, fixed


In motion
Meandering, casual, relaxed, interesting, human
Erratic, bumbling, chaotic, confused
Logical, planned, orderly
Flowing, rolling
Formal, priestly, imperious, dogmatic
Rising, optimistic, successful, happy
Falling, pessimistic, defeated, depressed
Indecisive, weak
Progressive
Regressive
Rise, attainment with effort, improvement
Fall, sinking without effort, degeneration
Indirect, plodding
Concentrating, assembling
Dispersing, fleeing
Broken, interrupted, severed
Direct, sure, forceful, with purpose
Opposing
Connecting, crossing
Parallel, opposing with harmony
Excited, nervous, jittery
Opposing with friction
Diverging dividing
Growing developing

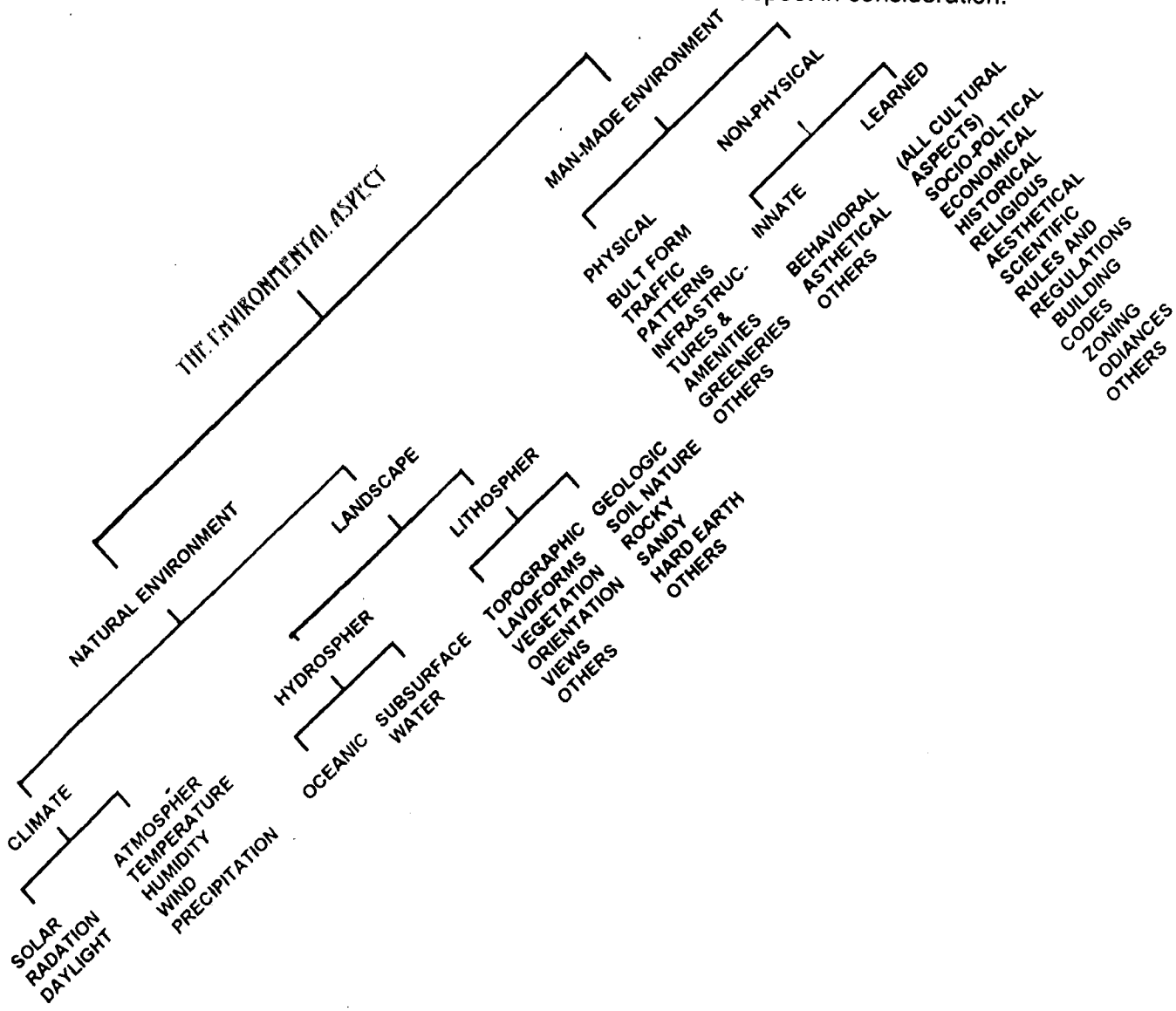
CLASSIFICATION OF LINES BASED ON THEIR GRAPHIC GEOMETRY

LINES	ORGANIC – / SOFT /		INORGANIC – / HARD /	
	GEOMETRIC	NON-GEOMETRIC	GEOMETRIC	NON-GEOMETRIC
LINEAR				
PLANAR				
SPATIAL				

THE ENVIRONMENTAL ASPECT

'Environment is that piece of reality which gets through to us; which passes the highly selective screen that sifts the world into comprehensible experiences, a screen lodged partly in each person's brain and partly in the specific spinning of circumstances',Rephrased.

To a greater extent than anything else, architectural buildings must be viewed not only as products in their own right, but as integral part of the larger environment. That is to say such buildings are not deemed to be single units, but their functional relationship with man-made environment, with the natural environment, the surrounding, is solved in a unified fashion.
The following is the classification of the entire environmental aspect in consideration.



4-1 Natural Environment

Nature is, in the broad sense, the entire world all its process and contents, including man and culture. Man although developed his tailored environment as the proper subset of nature, he is to a great extent the product of this environment, revealing symbiotic, interdependence between them. This strong bondage is best demonstrated through one of the primal necessities, shelter, the building/human habitat/, as the filtering interface defining a distinct existential space/ place/. And the form and nature of this space is determined by the impacts of features and events in the natural environment, such as: landscape climatic conditions and others together with the man-made environment. Using ecological reasoning as a frame work, buildings are judged not only interms of their individual design and utility, but also on the basis of whether or not they are good neighborus.

4-1-1 Climate

From Greek: Klima) is:' an integration in time of the physical states of the atmospheric environment, characteristic of a certain geographical location.' As *weather* is the momentary state of the atmospheric environment at a certain location, climate could be defined as 'the integration in time of weather conditions'.' Climate is entirely a function of the solar radiation impact.

The principal climatic elements are the following:

- Solar radiation
- Long wave radiation to the sky
- Air temperature
- Humidity
- wind
- precipitation

4-1-2 The influence of climate on building form

A building's thermal behavior can be affected by the *orientation, form* and *material nature* of its enclosure in reation to the heating or cooling agent.

Orientation: two forces of nature influence the orientation of a building: the Sun and the prevailing wind.

The Sun: *Sun* emits *Solar radiation/* an electromagnetic wave/ which is to be transformed into the form of *heat* and *light* . upon coming in contact with any surface. This transformation occurs simultaneously, but not in the same proportion. This original source of heat and light/ solar radiation/ having a wave length that extends form 290nm to 2300 nm; 1nm = 10 m; is tolerably bearable by the human body. And from this the visible light/ violet, Indigo, Blue, Green, Yellow, Orange and Red, by human perception, ranges form 380 nm/Violet/ to 700mn/Red/. But the secondary source of heat ,i.e., heated-up materials emit long-wave radiation to which the body has little resistance and which therefore causes greater discomfort./ NB Some aspects of Light is already seen in the previous section.

The rotation of the earth on its own axis and its revolution about the sun constituents an apparent movement of the sun relative to the horizone, which intern to affect the orientation of built forms and lots in control of gained radiation. See the following sun-path diagram/*fig-25*/ and shade line of model building./ *fig*- 26 /

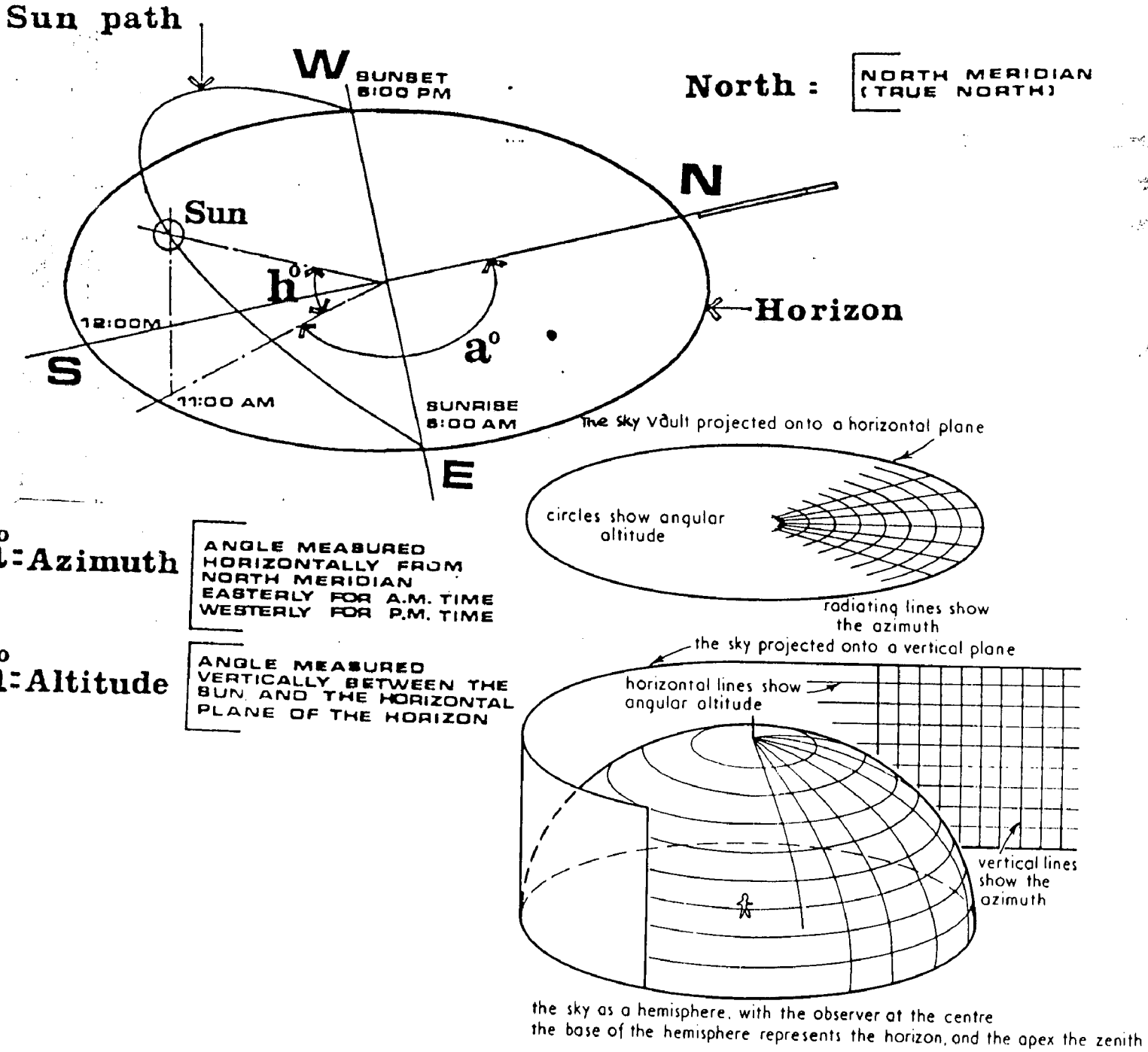


Fig-25 *projections of the sunpath diagrams*

Thus orientation of a building is fixed by studying the sun diagram indicating the path of the sun at a particular place during the day and during the year. Based of this for example, Walls facing, be it, the East, south or west are protected by shading devices to cut off rays of the sun whenever not required and to regulate the flow of light and heat through openings in the wall.

The control of the sun's ray by a roof over-hang and other means of sun shading devices can naturally change the elevational treatment and form of a building at large./ *fig.27*/

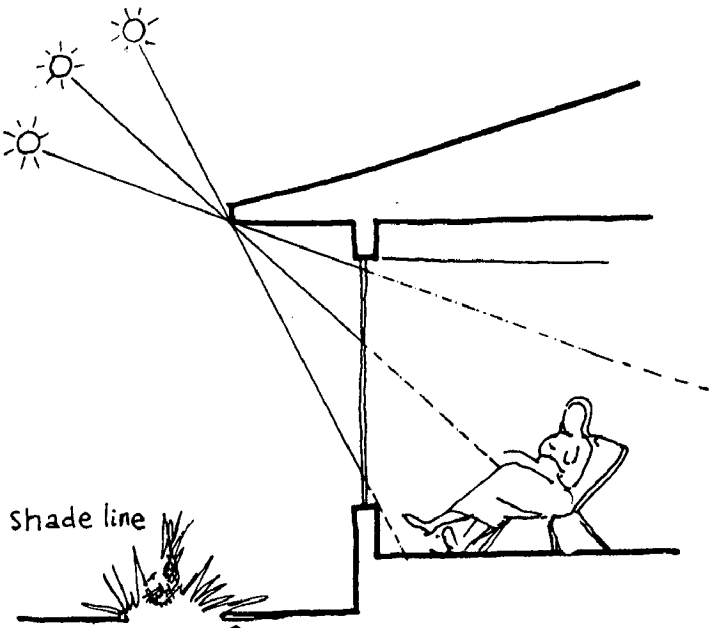


Fig 26 Shade line

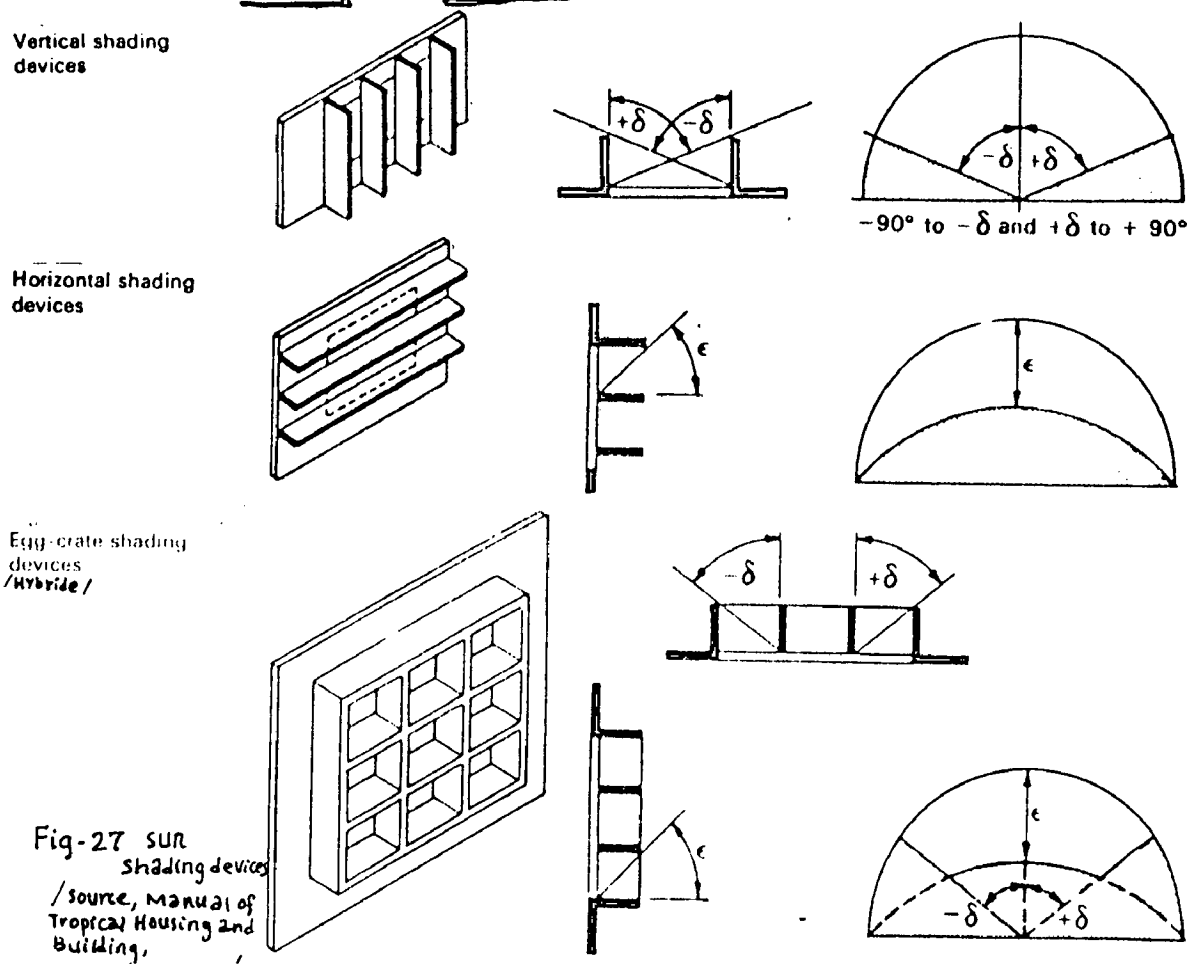


Fig-27 Sun Shading devices /Source, Manual of Tropical Housing and Building, Koenigsberger./

The Prevailing Wind:

Air affects the human environment in three ways: by its temperature, its humidity and its movement or wind. As the moving air/wind/is more responsible for carrying the temperature and humidity with it, having the Global wind pattern as a reference is very helpful although micro and macro geographical sites can naturally affect it./ *See appendix 3/*

Air temperature: air heats up mainly by coming in contact with hot surface, i.e., by convection, not so much by the direct rays of sun, nor by radiation from secondary sources of heat. For this it remains relatively cooler than the surrounding surfaces. The human body at rest everywhere has a normal temperature of approximately 36°c. If the surrounding has a temperature of 21°c there is pleasant heat loss of the body and *feel comfort*; if higher than body temperature, there is more heat gain yet, acute discomfort is felt , and sweating occurs. Air is also heat resistant, i.e., it transmits heat very slowly. Its resistance to heat is however influenced by its humidity.

Humidity: is the capacity of air to absorb moisture. Dry air is one that contains less moisture, and is thus ready to absorb more. Humid air has already a high content of moisture and is unable to absorb much more. Dry air is more heat resistant than humid air. To the human body, depending on sweating for losing heat, dry air is more welcome because it is able to absorb more moisture and thus assist sweating. Humid air has the reverse effect. But suppose the problem is not of losing heat but conserving, as for example in a cold climate; eventhen dry air is more pleasant because the dry air trapped in clothing warms up from body heat, but does not rapidly lose this to the colder surrounding air. But in order to function in this way the air movement must be almost nil. Dry air movement assists much sweating than humid, so for the later to improve its performance, its speed has to be much greater.

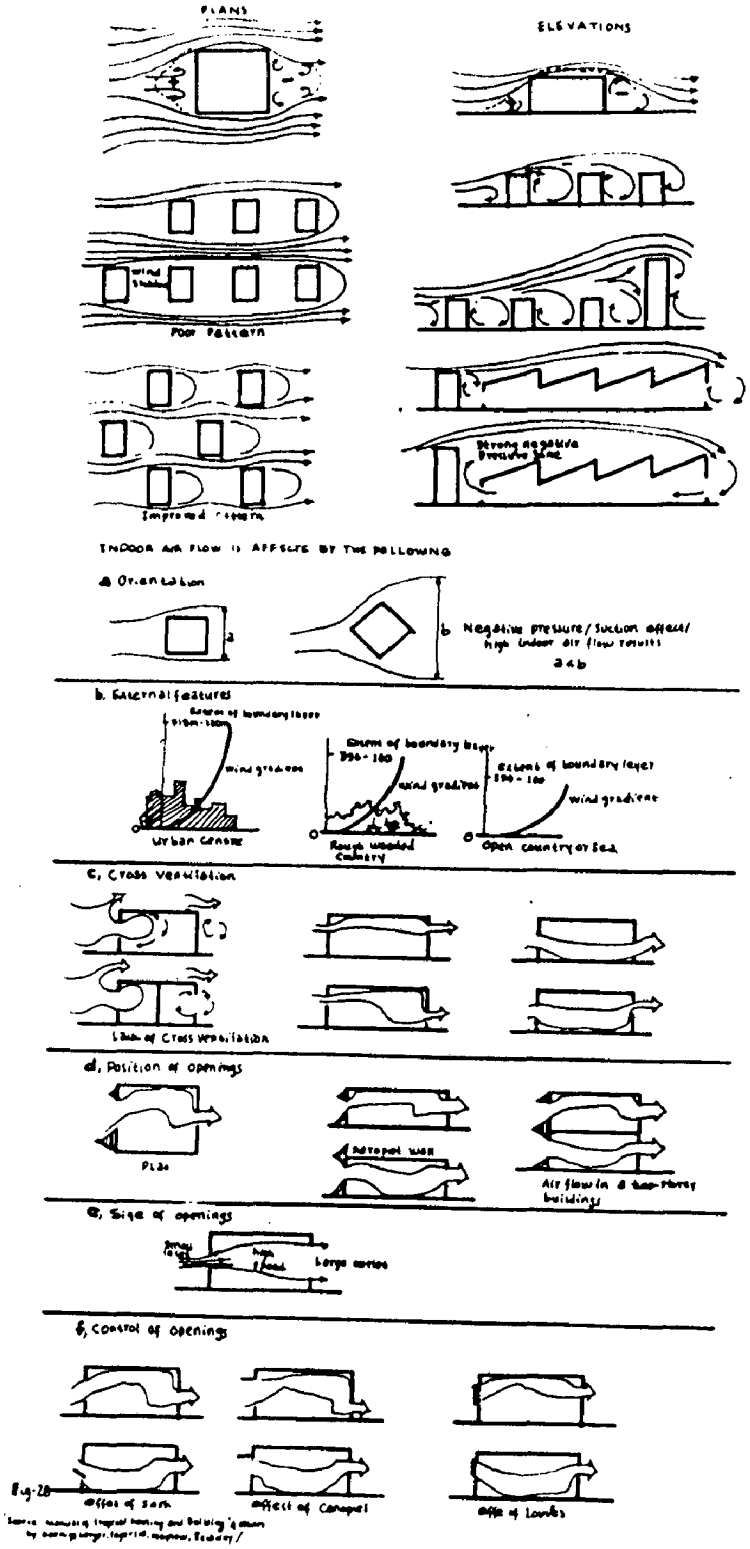
Ventilation: is the impute of constant fresh air into internal spaces, both by

- Supply of fresh air, and
- convective cooling which involves the movement of air at relatively slow rate

Here, the motive force can be either thermal or dynamic/ *wind/*. The movement of air past the skin surface/ *Physiological Cooling/* accelerates heat dissipation in two ways,by:

- increasing convective heat loss, and
- accelerating evaporation.

Altogether the following factors can be considered to be causes for modifying the pattern and velocity of air flow; which intern to affect the overall form of a building or built environment./ *fig.* 28/



Building form: a building heat loss or gain must increase with the area of surface it exposes to the air outside and there is a thermal argument for keeping this to a minimum for the volume enclosed. This means a *hemispherical* building theoretically, but practically/ for difficulty of other considerations/ something approaching a *cube* is an ideal solution.

'Nature adapts form to climate and so do traditions in buildings. For example, in the cold latitudes, the conifer with its short-spines is a compact,' *introverted*', sort of tree, closing itself away from the air around it, just as the log cabin is compact. In temperate climates, vegetation can merge more freely with its surroundings, and so can buildings there. Freer planning still involves some thermal penalty, especially in winter, but it is less severe and, hence, acceptable if other planning advantages result. Hot humid climates see similar expansiveness with buildings shaded against sun but open- walled for ventilation. In hot dry climates, the cactus and desert buildings are emphatically back in compact from. But, even in temperate regions, a two -story, i.e. cubic version of the small house, could be around 20% cheaper to heat in winter than the flatter single-story version with the same floor area. Thermally speaking, the house should, ideally, have no projections on plan, no small extensions. Just as a heating radiator has fins to increase heat transmission,, so the building skin should be plain to minimize it./ *fig.* 29 / The following illustration can literally give us a clue about the architectural character of a region.

Further more the following design examples can show us some approaches in building lay-out as well as their enclosing structure detailing to combat unwanted climatic impacts./ *fig.* 30 /

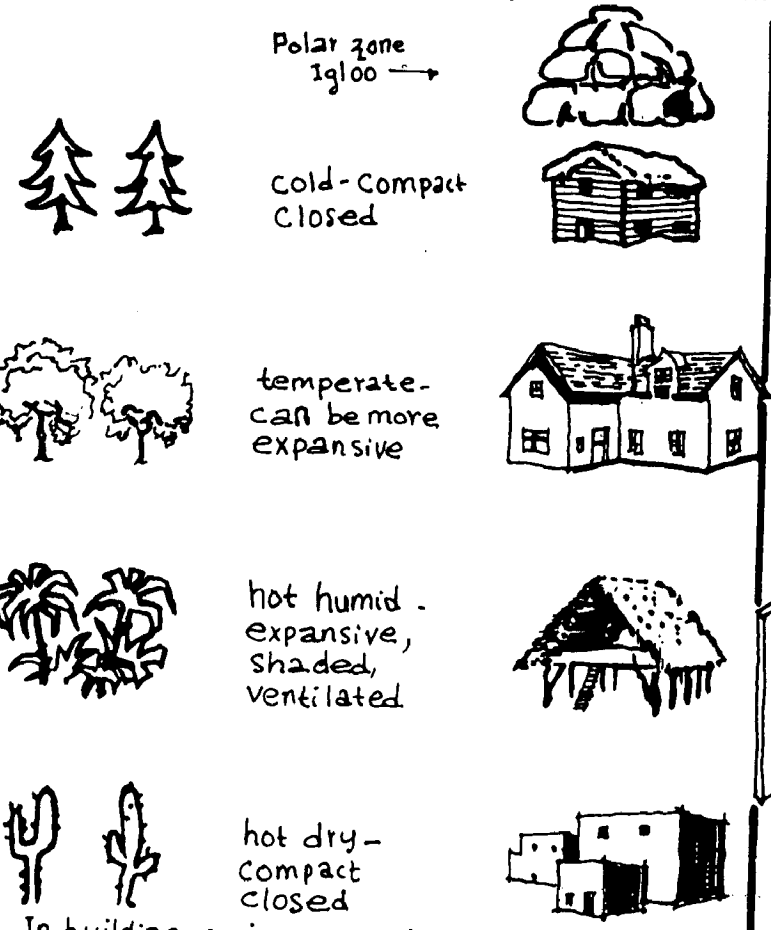


Fig-29 In building, as in nature, form adapts to climate
/ Modified from Reid. Esmon 'understanding buildings, 1959'

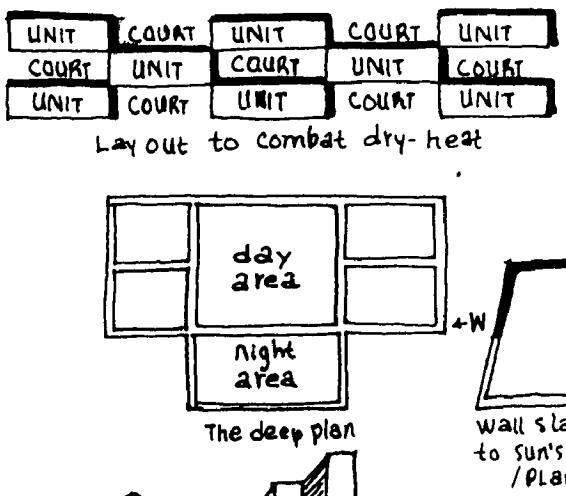


Fig-30

Building material: The material nature from which a building is made affects the heat gain and loss of it. Materials with high specific gravity/ density/ and loss of it. Materials with high specific gravity/ density/ and dull surface finishes absorb more heat than less dense, light, and porous materials with bright surfaces which reflects more. Hence while the former becomes hot the later remains relatively cool. and appears brilliant. And keeping this attributes constant, the periodic heat flow, from indoor to outdoor or vice versa, through say the wall/ roof material of a building which depends on the thermal diffusivity, can be characterized by the time-lag/ phase shift,ϕ/ and the decrement factor/ or amplitude attenuation, denoted μ/. And the thermal diffusivity dependency is as follows:

: i, the rate will be faster if the material has a high conductivity

ii, if it is a dense material and it has a high specific heat, the ratio will be slower./See appendix/

Precipitation: the overall built forms of a town or hill nature can intern affect the state of an expected rain to be received. Thus, such the following phenomena can be taken for advantage to regulate the entire town/ cityscape; or vice versa. When more heat absorbent surface reach high temperature or hills forces the air mass to rise, as it rises it cools and can no longer support the moisture carried. Conversely, a descending air mass increased in temperature and it can absorb more moisture, rather than to precipitate any./ *fig.* 31 /

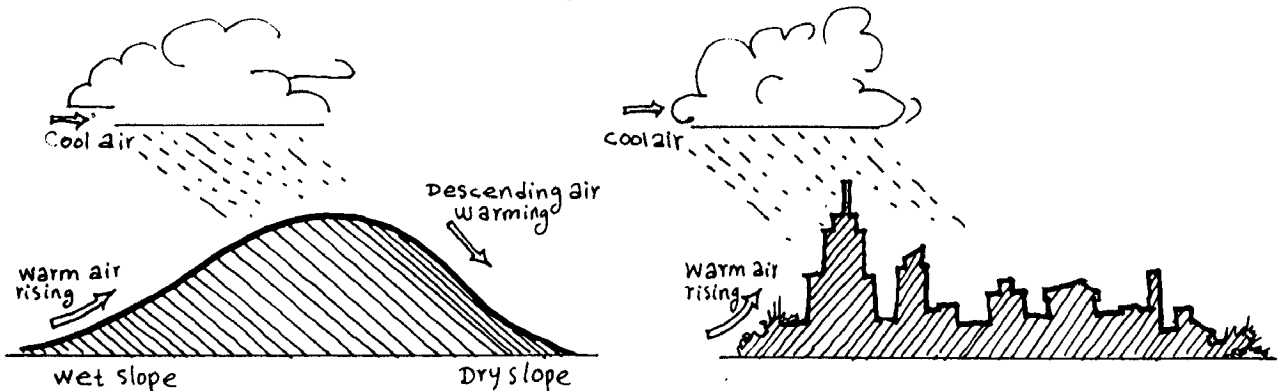


Fig-31

The whole attempt in this section is to see how the human comfort criteria, in creating a pleasant environment to assist his good emotional response computed with respect to the climatic factor, shape his building/habitat/overall form. And eventually to get a topological format that can be adopted as a general concept.

O. Olgyay/Australian/constructed a bioclimatic chart which shows the comfort zone of a man, by the combination of *temperature* and *relative humidity* (P,H)- expressed as the ratio of the actual amount of moisture present/All/ to the amount of moisture the air could hold/SH/at the given temperature. The chart also shows the corrective measures required when the combination of the temperature and humidity fall outside the comfort zone. These measures include air movement, radiant heating, evaporative cooling and additional clothing. This helps as a reference with respect to which to design our living environment./*See appendix- 5*/

4-1-3 Landscape

Land becomes *Landscape* when it is described or seen interms of its physiographic/topographic or impacts of geologic features/and environmental characteristics. Landscape is a reflection of dynamic, natural and social systems. The ground may be sloping sharply, as in a mountainous terrain, or sloping gently as in hilly terrain, or be flat. The soil may be rocky, sandy or hard earth. The site may have existing natural features such as groups of trees, rocky out crop, ditches, depressions, etc. Some or whole of the site may be in a low- lying area, i.e., one in which flooding will occur in the rainy season. The boundaries of the site may be irregular. These are some of the features that characterize a site. Landscape architecture is concerned with the planning and design of land and water for use by society on the basis of an understanding of these systems. "*planning*" implies a futuristic approach to land- *Land* is regarded as resource to be considered in relation to the demands and predicted needs of society and its values. "*Design*" refers to the qualitative and functional arrangement of parcels of land set aside in the planning process for some specific social purpose such as housing, education recreation, etc.

The overall form and response of a built environment is highly affected by the physical characteristic of the site, i.e., its Site land form and the surrounding condition, elements and features. The following are some of the minor and major natural elements that we as planners can and cannot alter respectively. For example the minors that we can modify are: hills, woods, streams, and swamps, etc. And the major ones we must accept and adapt ourselves and our planning are: mountain ranges, river valleys, coastal plains, lakes, oceans etc.

In the developing of any natural landscape area or feature there are four general courses of action. These varying approaches are illustrated below with the hill as an example. */fig.* /

I) Preservation of the natural form

ii) Accentuation of natural form

iii) Alteration of natural form

iv) Destruction of natural form

The essence of land planning for any project:

1. Seek the most suitable site
2. Let the site suggest plan forms
3. Extract the full site potential

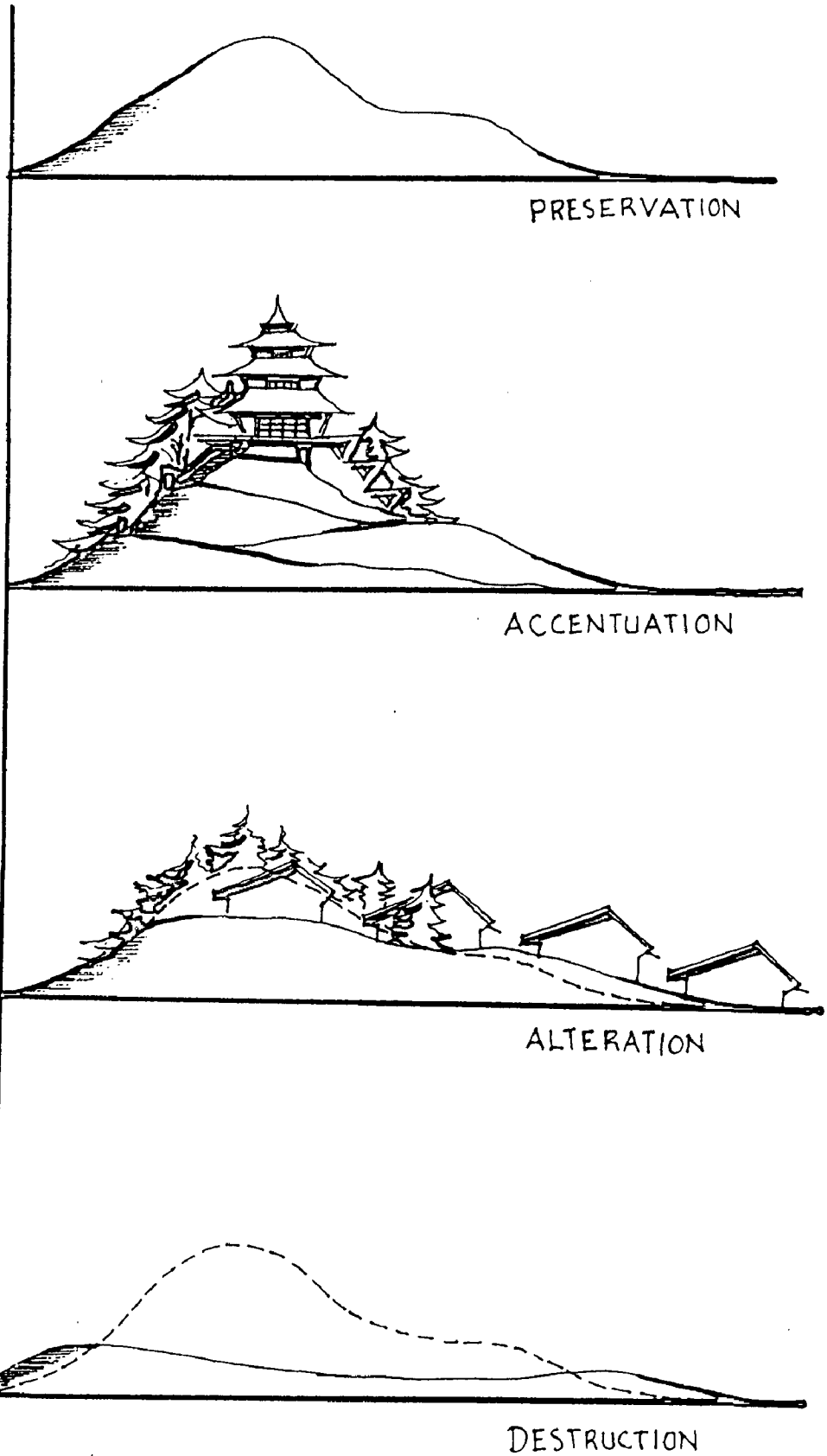


Fig-32

Source, from Simonds 'Landscape architecture'

Site analysis diagram: After the topographic survey is furnished by the surveyor is taken into the field and, from actual site observation, all site features or factors that supplement or interpret the Ssurvey are plotted on it in the planners own symbols. Such additional information may include:

1. Best view, poor views, objectionable views.
2. Which trees of those plotted should be preserved, if possible and which is to be removed.
3. Flood level from site evidence untrained or swampy land.
4. Off-site nuisances with their bearing and approximate distances
5. Logical building areas of the site, logical points of ingress or egress.
6. Sectors where high or low points on the horizon give protection from or add force to sun and wind
7. Sun diagram
8. Prevailing wind and breezes
9. Frost Study: low-lying pockets or trapped air
10. Micro-climate analysis of the area
11. Other natural features such as springs, and unusual shrubs, well-knitted ground cover, depth or lack of top soil, eroded ground, sunken areas- as over mined out coal- and the like.
12. Any other factors of especial importance to the particular project proposed.

In addition to such information observed in the field, supplementary data gleaned form careful research may be plotted directly on the survey or included in the survey file. Such information might include:

1. Gas and water pressures, normal and guaranteed
2. Names of utility Companies whose lines are shown, company addresses, phone numbers, engineers
3. Routes and data on projected utility lines
4. Power capacities
5. Projected approach roads
6. Approach patterns of existing roads, drives, and walks
7. Traffic counts
8. Easements, rights of way
9. Zoning restrictions, building lines

10. Mineral rights depth of coal, mind out areas
11. Water analysis, if drilled wells are proposed
12. Core boring data and logs.

Thus to such analysis can then be logically related all plan areas and elements. And all these intern play a significant role in the shaping of a proposed project.

For example related to topography survey, we can consider the following six basic types of land forms and how they affect an overall built form character. The following are their lists with respective illustrations./ *fig.35/*

1. level, gently soling or rolling hills
2. Sloping sites backed by steeper slopes or by hills
3. Valley or gorge sites
4. Bow-shaped sites.
5. Fan-shaped sites.
6. Ridged or hill top sites.

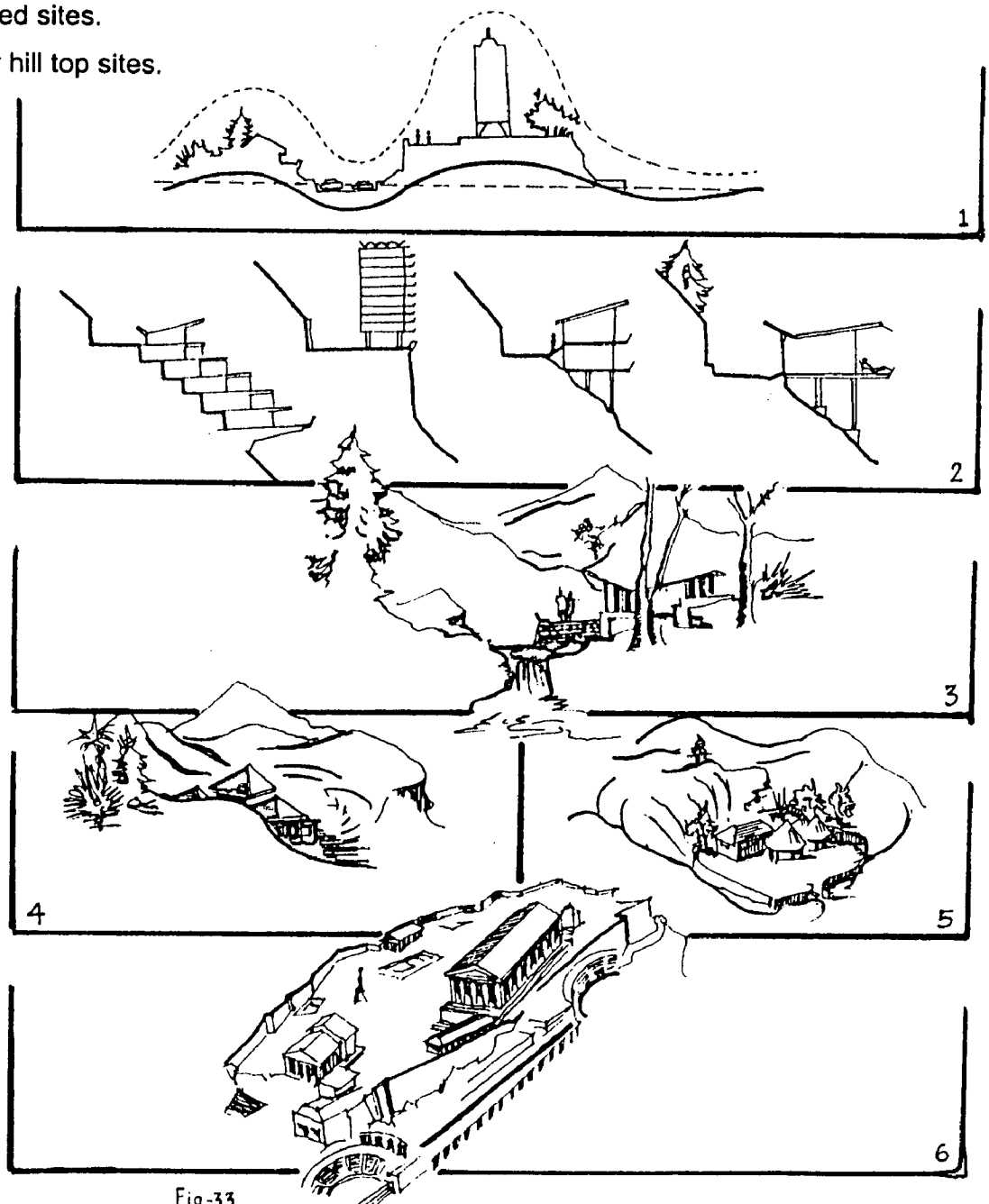


Fig-33

4-2 Man made Environment

'Man is a very complex animal. Hence other things being equal, he is to a great extent the product of social and physical environments. 'Illinois institute of Technology, chicago

Birds and Other animals live by making adjustments with the surroundings and also without harming to the natural environment. It is the only man who shapes or destroys his surroundings including hills, rivers and valleys to suit his fancy. He requires buildings and towns for livings, education, industries, transportation, and other purposes. Hence to meet these requirements, various types of construction materials are required; and of course produced. The various activities and experience man has come through in his long aged evolutionary phenomenon has constituted his cultural medium. The tasks he is performing, the ambitions he has developed all have been taking certain format being the product of both his physio-anatomical and behavioral reflections. As a result man in his existence has learned to tailor certain spatial qualities generated by the *anthropocentric* and *ergonomic* requirements which are more responsible to the measurement of his dynamic pattern of activitied centering comfort criteria. The following list shows the requirement of his environment make-up./ *table.4*/

4-2-1 The physical

"*The leaders of this era sincerely believed that health and happiness were natural corollaries of the right way of building and they even believed that the human nature could be conditioned or changed by the right physical environment.*" A comment given by Ada Louise Huxtable.

The creation of the right physical environment is the main objective of the regional or town planning, urban design, architecture- this including landscape architecture, keeping in mind the desired relationship of ecology, environment and man. For example urban physical form is generated by the accumulation of component urban mass- like buildings, walls, trees, statues, etc., and their arteries as roads, drives, streets, walkways, etc., on the base plane, over a long period of time. Each such artifact is shaped to satisfy specific function. This components and functions, however, should exist in an integrated and defined relationship to constitute a unified total urban form. See the following some of urban mass./ *fig.* /

Table.4 HUMANBEINGS HAVE BUILT THEIR BUILDING AND E NVIRONMENT SEEKING

FUNCTIONAL PURPOSE QUALITY AS

- Residential:
  - Individual Units:
    - -Detached
    - -Semidetached
    - -Duplex
    - -Triplex
    - -Row hhouse
    - -Town house
  - Multiple Units:
    - -Apartment
    - Low risae
    - High Rise
- Commercial:
  - Single Storey
  - Low rise
  - High rise
    - -Stores
    - -Show rooms
    - -Offices
    - -Theatres
    - -Testaurants/ night clubs/
    - -Recreational
    - -Hotels/Motels
    - -Shopping Centre
    - -Service Stations
    - -Service Centres
    - -Department Stores
    - -Combination of any of the above
- Industrial:
  - Single Storey
  - Multiple storey/Loft building
    - -Low rise
    - -High rise
  - Manufacturing
    - -Light
    - -Heavy
  - Warehouse
- Institutional:
  - Schools
  - Hospitals
  - Religious Institutions
  - Penal Institutions
  - Special Govt. Buildings
- Manumental and others

SPATIAL QUALITY AS

- Physiological needs:
- -Ergonomic Comfort
  - -Handicap access
  - -Health & Safety
- Psychological needs:
  - Habitability
  - -Calm
  - -Beauty
  - -Excitement
  - -View
- Sociological Needs:
  - -Adjacencies
  - -Privacy
  - -Contact
  - -Security
  - -Prestige
- Economic Needs:
  - -Space Conservation
  - -Material Conservation
  - -Time conservation
  - -EnergyConservation

SENSORY REQUIRMENTS QUALITY

- Thermal:
- No numbeness
  - Frost bite
  - -No Drawsiness
  - Heat Stroke
  - -Sense of Warmth
- Air
  - -Air purity
  - -Not closed in, stuffy
- Aural:
  - -No hearing damage
  - -Speech clarity
  - -Quiet, soothing
- Visual:
  - -No glare
  - -Good task illumination
  - -Orientation
  - -Spacious
- Tactile:
  - -Smooth surfacs
  - -fairly rough surfaces
  - -patterned surfaces\
  - -and other textures

4-2-2 The Non-Physical

'... past the provision merely of shelter, past the expressive manipulation of materials or even of space, it (architecture) is the creation of place, what Susan Larger calls as *ethnic domain.'*
'... the space in which we live and act is not what is treated in art at all.' And in her conclusion she said ' *Pictorial art is concerned with scans, sculpture is concerned with kinetic volume and architecture is concerned with ethnic domain.'*

In the non-physical/social/environment all aspects of humane thought that shapes his life pattern or quite simply all his culture is included. Our living place/ habitat/is the manifestation in physical terms of our way of life, pattern of social bondage. Thus architecture and other sister disciplines are the language of this domain.

For example to consider one aspect of our culture, the formulation of Some environment planning and building design and construction laws, apart form the *folk* and *vernacular* 'traditional-laws' is of great importance to see how it shapes the total built form of our living space/place/. In meeting the, previous, goal of a unified built physical environment for a secured, healthy and happy life of the community and related purposes, besides the planning and design requirement fundamentals, there are certain constraints that evolve with the change in demand and life style as a reflection of varied spatial pattern needs of the society. The environment, with its community life, working and moving styles, as a living entity is in a state of continuous change, containing past traditions and present modifications, therefore, within it is also the seeds of the future. And this reality suggests the proper handling of all resources/ here like land most important ,and others/ to effectuate sustainability, .and for the posterity welfare. In other terms, since man, if confronted with excessive freedom is usually lost; the need for formulations of building policies, legislation's, regulations and bye laws becomes a must to protect expected hazards that can lower the standard of the shared environment. For example, a country house planted in the center of a commercial urban area would look as incongruous as a sky- scraper in the middle of a rural area although each building may be perfectly logical if judged exclusively in terms of its particular site. Thus every building is subjected to satisfy the merit of its own right, the site and its surrounding. As to this the following phrase is modified from Mujica, 1929, as: efforts should be made to regulate the *size* and *bulk, height* and *arrangement, setback* and *street relationship, density* and *sun access* angles, *surface* and *texture*, etc., of building and urban- masses erected within the limits of a city, in order is effectively use the limited space, arrest the seriously increasing evils of the shuttering of light and air from other buildings and

from the public streets, to prevent unwhole some and dangerous Congestion both in living condition and in street and transit traffic and to reduce the hazards of fire and pert to life.
Besides other design constraints, the following building codes and zoning ordinances are of very important since they are in frequent use. Hence the that follows notes code items that often affect a building's over all design. The list is selective. Individuals can include or omit. Building codes tend to tell an architect how a structure can be built; zoning regulations tell him/her where the structure can be built and how bulky it can be.

Some of the building codes:

1. Total permitted area as a function of construction materials.
2. Total permitted height as a function of construction materials.
3. Number and location of required stairs and exits.
4. Required amount of natural and/or artificial light.
5. Required amount of natural and or artificial ventilation.
6. Required number and types of plumbing fixtures for washrooms.
7. Pipe spaces required for plumbing and storm-drainage systems.
8. Heating equipment
9. Air-conditioning equipment
10. Elevator machine rooms and shafts.
11. Electric-equipment spaces and shafts.
12. Fire-protection systems
13. Fire-extinguishing equipment
14. Total building size as a function of building

Among the major items covered by most zoning ordinances are the following;

1. Building use permitted in each area of the community
2. Lot area regulations
3. Yard-size regulations
4. Building height and setback requirements
5. Distance between buildings
6. Parking and truck-dock requirements
7. Ratio of floor area to total building size.
8. Ratio of open space on the ground to the maximum height of the structure.

See the following illustrative examples on building bye-laws and regulations.

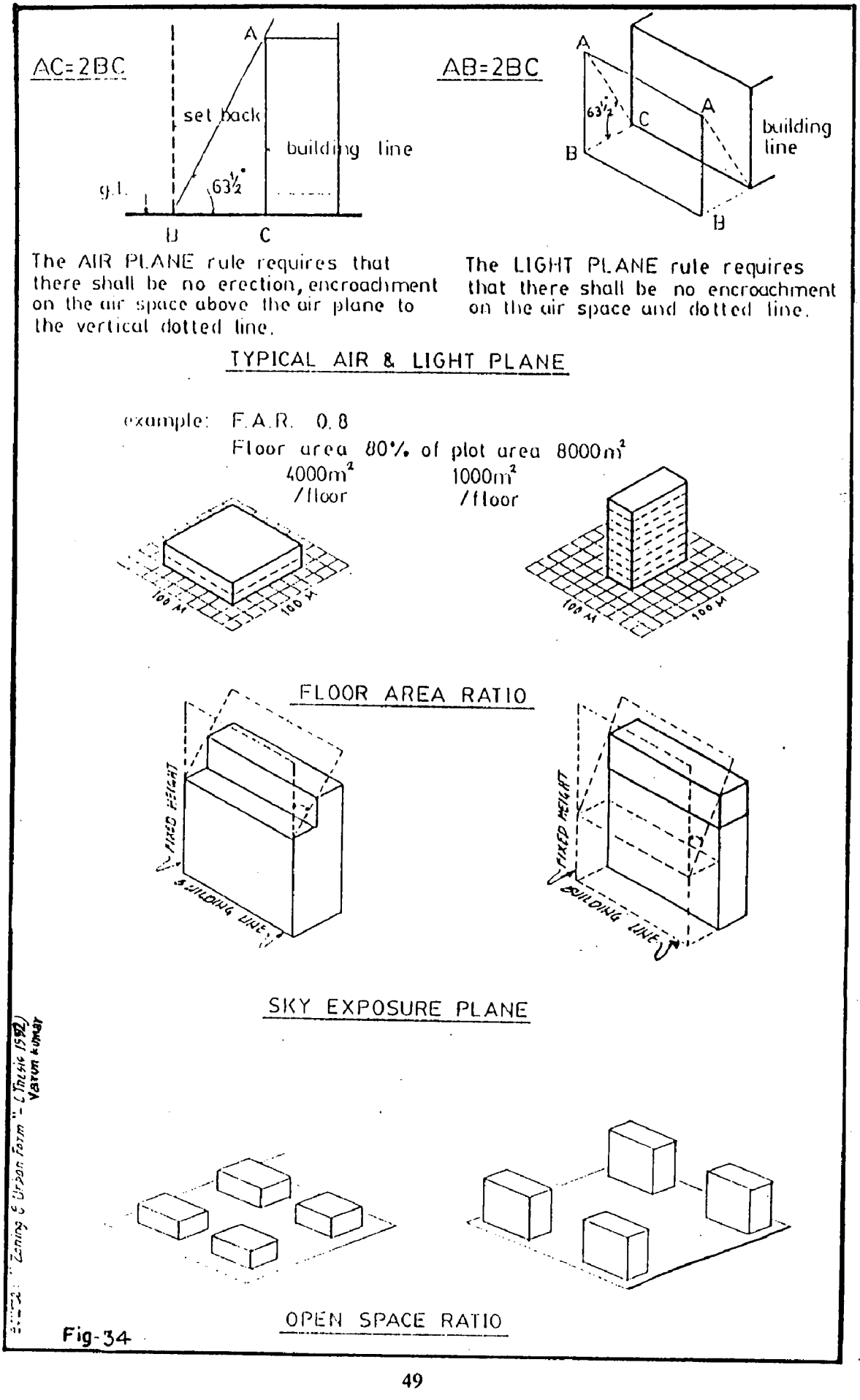


Fig-34

CHAPTER-5

THE BUILDING ASPECT

Architectural buildings are distinct space definers, raised by human beings, for what so ever uses that the site of them may contribute to their mental health, power, and pleasure, and operates in harmony with nature.

The following classification is made to show the content of the building aspect in a broad spectrum./ *table.* /

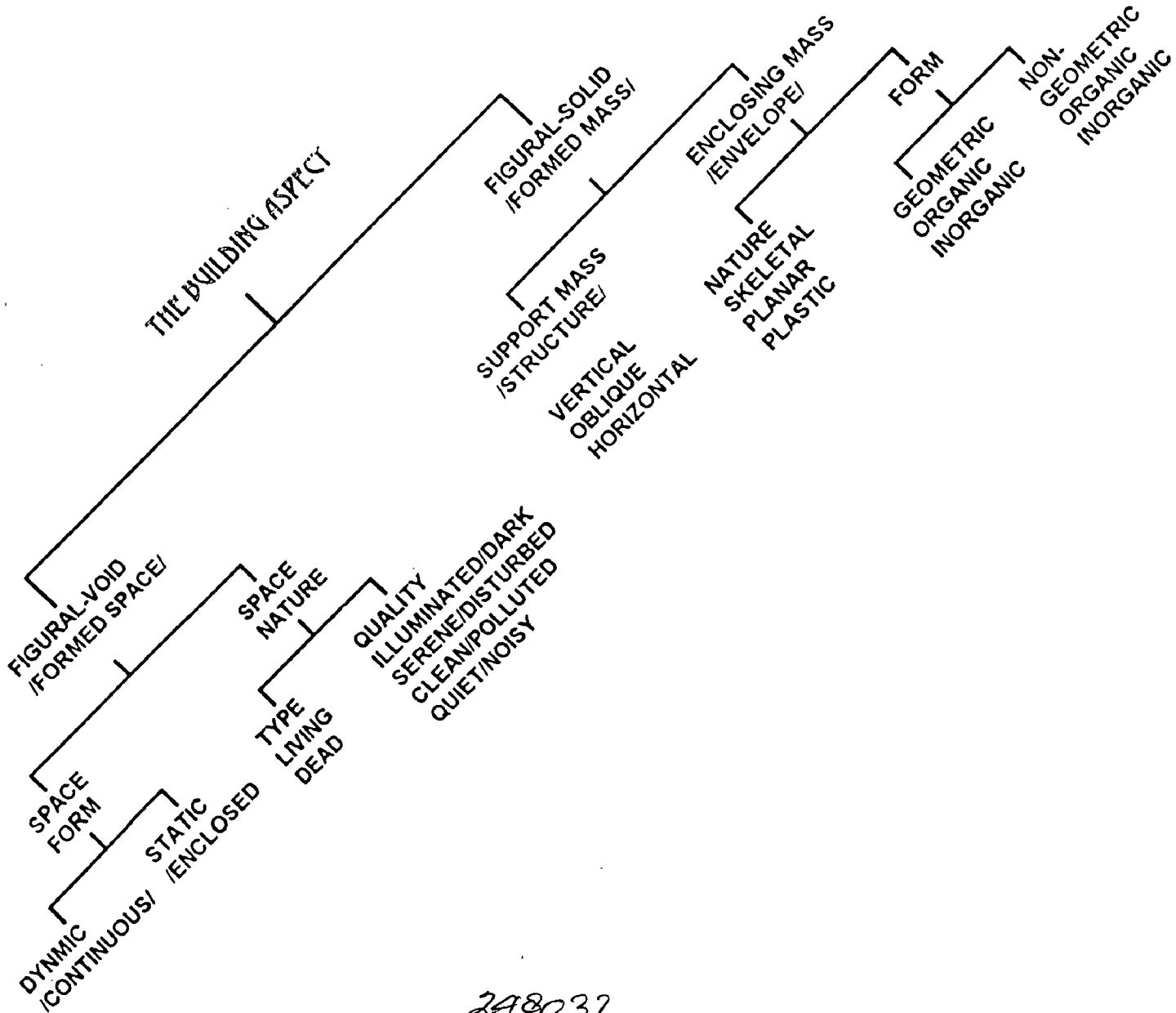


Table 5

5-1 Figural Void / Formed Space /

Building enclosures/ as *figural solids*/ impose on space their symbolic, visible iconic presence; the space imposes on the building enclosure its invisible fields of energy to justify coherent unity. They superimpose on reality thier inherent opposite essences; and the inhabitant is naturally more loyal to the space so formed by the enclosing structure/ as *figural voild*/. in chich he acts. See the following representation of spatial fields of energy./*fig.*35/

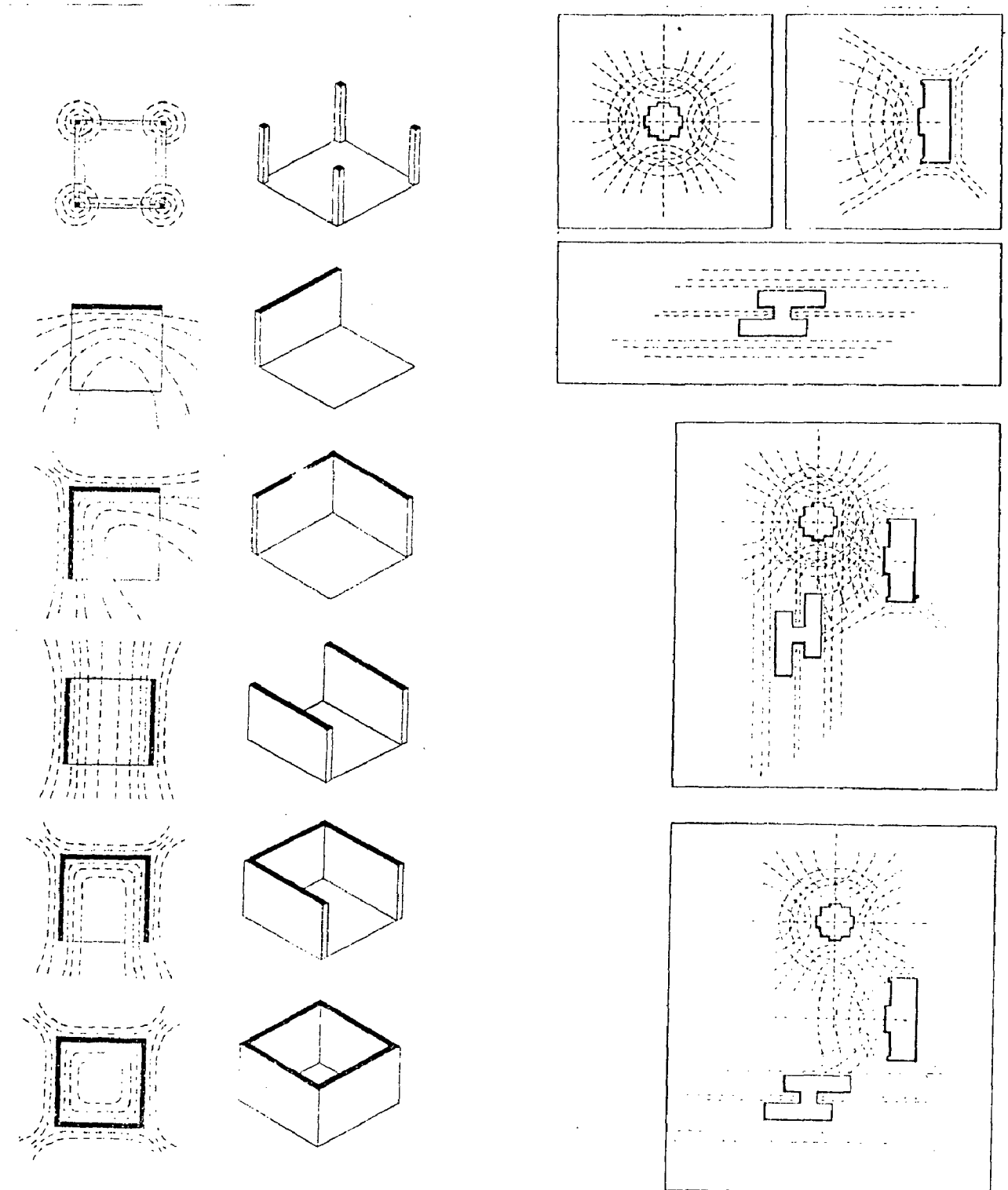


Fig-35 Sorce, 'Elements of architecture from form to place' by Pierre Von

5-1-1 Architectural space

'Architectural space may be defined as a 'concritization' of existential space. Existential space is a psychological concept, donoting the schemata man develops, interacting with the environment inorder to get along satisfactority.' It is a distinct portion in the continum of the biosphere, and is carefully tailored for comfortable habitability and coordinates the varied human activities into a cultural synthesis. Forming space in harmony with the right activities of the humane is the soul of architecture or urban design which needs more verification. One can actually make a distinct perception between the defined/formed space/ and the enclosing structure although they are inseparable entities. The former is a mental construct while the other is the manifestation of the same. Quite simply, because the production of pleasant habitable space is necessarly informed by the material and formal parameters that will eventually define it, and since designers can not remain in the releam of the mental construct alone, so happens a case for the invisible/ space/ to be visible through the visible/ envelope/. As to this EL Lissitzky has quoted the following:

' Space: that which is not looked at, through a key hole, not through an open door. Space doesn's exist for the eye only: it is not a picture: one wants to live in.'

The fact that space is not, except theoretically, identical with its defining/ enclosing elements, i.e., with floors, walls, roof and what not, seems obvious, for space is defined as the thing between these surfaces. Referring the enclosing structure/ envelope.skin.shell.canvas..etc./ ,whatsoever impositions on this will automatically affect the space defined Different descriptions on the spatial properties of schemes, like positive space... negative space... layered space... flowing space...vertual space...folded space...etc., are all the results of the figural solid molding.

For understanding sake, let us see the following heuristic approach for the classification of existential space in general and the concern of architecture in particular./*table. 6*/ See also the representational model building./*fig.36*/

Existential Space/S/

Living space/L/		Dead space/D/	
Enclosed space /E/	Open Space /O/	Space taken by enclosing,Supporting, and other Structures /R/	Totally sealed space left for environmental responses or others /T/

Table - 6

Existential Space: is that portion of space which can naturally support life andextendable to the releam of the biosphere. Here is is divied as '*Living space'* and '*Dead space'*

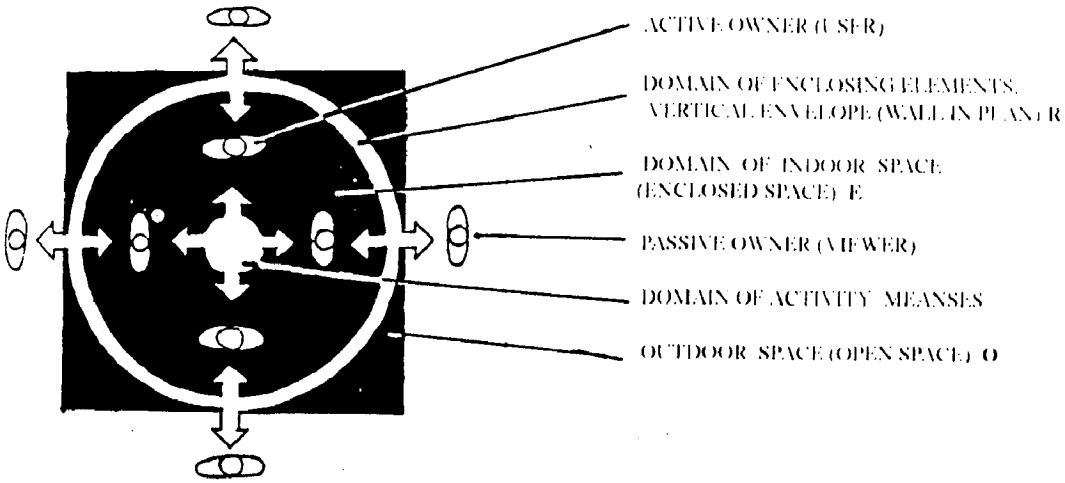
Living Space: is the built portion of the existential space that accommodates varied human activities which again is divided as '*enclosed space* and ' *open space'*

**Enclosed space:* is the space enclosed by a building skin/ enclosing structure/

*Open space: is an activity space which is defined by buildings and remain for environmental responsiveness or other requirements.

Dead Space: is the portion of the existential space which doesn't accommodate direct human activities and is divided as follows:

* Space taken by enclosing, supporting and other structures, and
* within the built space the portion which is not employed by any kind of human activity and can either be a completely sealed inside the building structure space or the one outside the building. Here details as voids can also be included.



Representational horizontal section
of a model building (Plan)

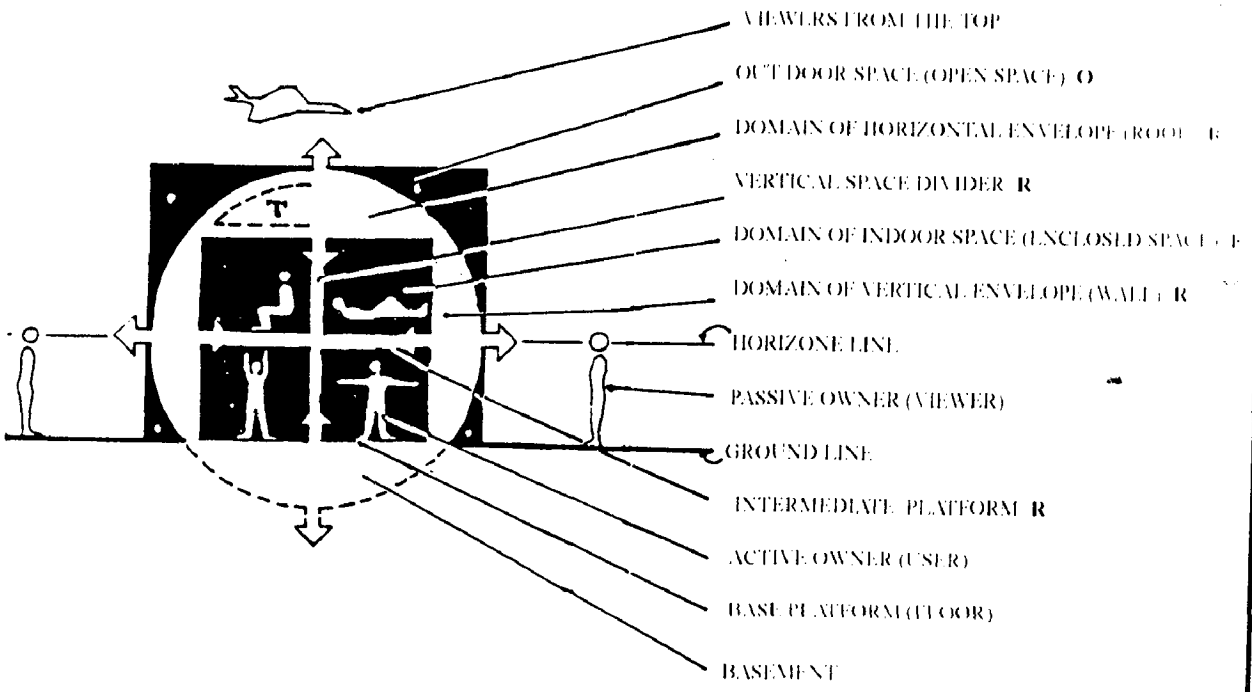
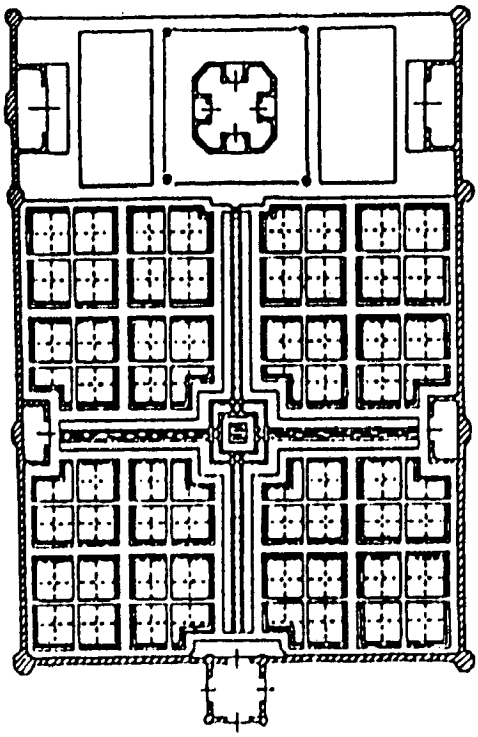
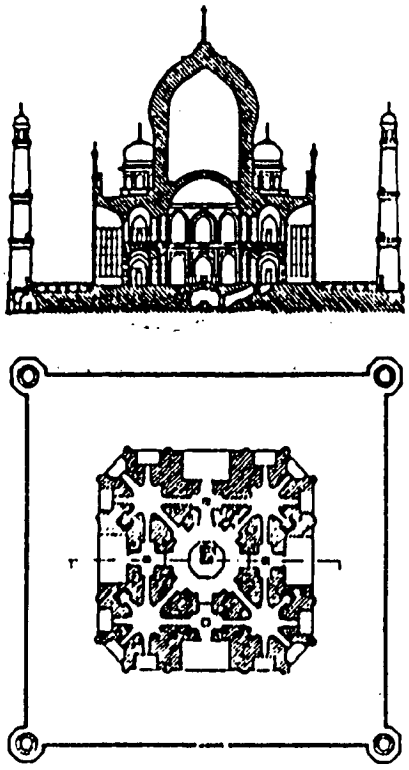


Fig-36a

Representational vertical section
of a model building (Section)



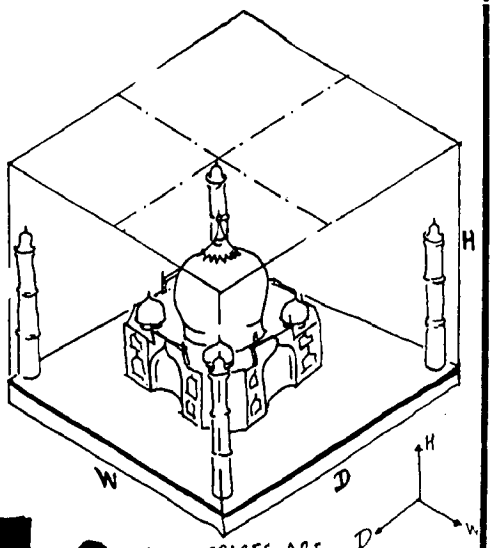
Plan of the complex



Plan and cross section of the mausoleum

THE PERCENTAGE OF THE SPATIAL VOLUME CREATED AS A SPECIFIC VOLUME OF UTILIZABLE SPACE BY THE MATERIAL USED IS GIVEN AS:

$$\frac{\text{VOLUME OF MATERIAL} \times 100}{\text{VOLUME OF SPACE CREATED}} = S\%$$



● SHADED SPACES ARE THE CONCERN

$S(V)_{\text{VOLUME}} = L + D = W \times D \times H = 100\%$

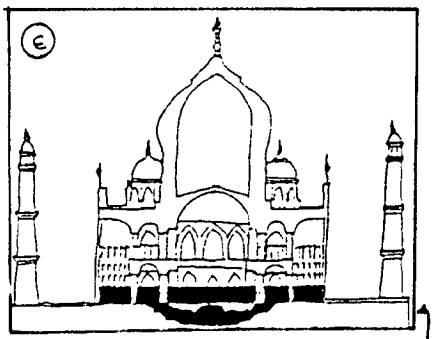
$L = E + O$

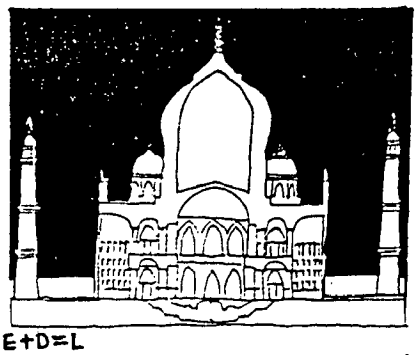
$D = T \cdot R$

$R = R_{in} + R_{out}$

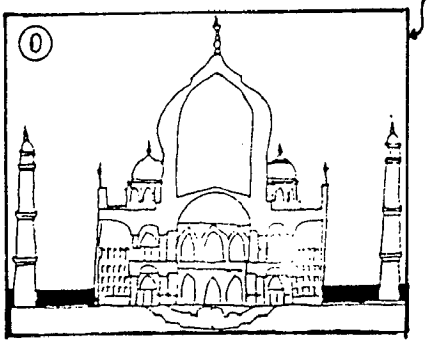
$D = R + T$

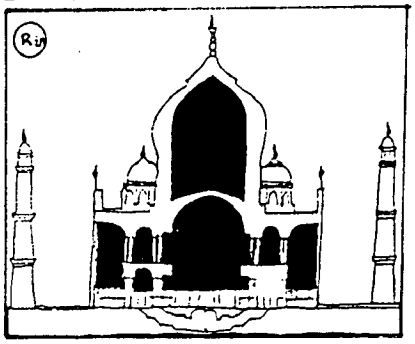
THE PROPORTION OF THE OTHERS CAN ALSO BE COMPUTED





E+D=L





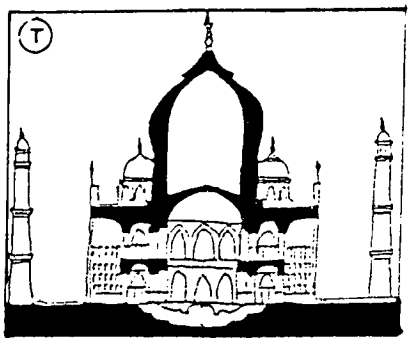


Fig-36b

Space nature: Spaces, by nature, may vary from the vast to the minute, from the light and airy to the heavy and ponderous, from the dynamic to the serene, from the crude to the refined, from the simple to the complex, and from the somber to the dazzling. Spaces, in their size, shape, and quality, may vary endlessly.

A confined space may be static. It may hold interest, induce repose. It may direct and concentrate interest and vision inward. The whole spatial shell maybe made to seemingly contract and bear, to engender a feeling of intensity or dynamic compression.

Alternatively, a space may open out. It may direct attention to its frame and beyond. It may fall away, or seem to expand. It may burst outward. It may impel outward motion.

A space may be flowing undulating space, suggesting directional movement.

A space may be developed to have its own sufficient, satisfying qualities, and seem complete within itself; or it may be incomplete —a setting in which to introduce objects.

A space may be in effect a vacuum.

A space may have expulsive pressure.

A space may be developed as an optimum environment for an object or a use.

A space may be so designed as to stimulate a prescribed emotional response; or it may be so developed as to produce a predetermined sequence of such responses.

A space may doninate an object, imbuing the object with its partinlar spatial qualities. Or it may be dominated by an object, drawing from the object something of its nature.

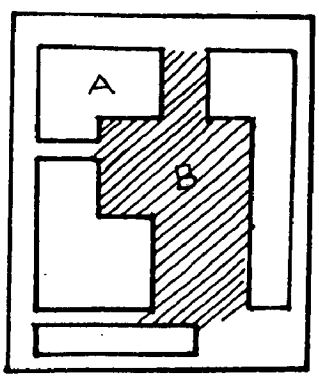
A space may have orientation —inward, outward, upward, downward, radial, or tangential.

A space may relate to a force, an object, or another space, and may gain its very meaning from the relationship.

A component space in a composite space is colored by the grater space.

A total or composite space assumes to a degree the qualities of its component spaces or cell volumes, and must relate them into an effective entity.

In architecture, a positive concept of environmental space in which the space between buildings is just as potent as the spaces they contain. In the following illustration space indicated by 'B' is as potent as 'A'./ *fig 37/*



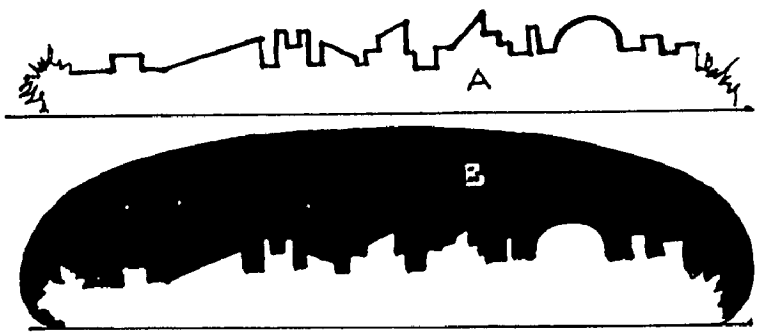


Fig-37 B is as potent space as A.

Space form: the fact that space form is necessarily informed by the material and formal parameters that will eventually define it, then its form, size and quality will entirely depend on the organization of the defining elements, as buildings, wavs, trees and other structures. However, any defined space by a structure can not necessarly develope an architectural space form. In his poetics of music (1942) Stravinsky pointed out that isolated natural sounds such as, *" the murmur of the breeze in the trees, the rippling of a brook, the song of a bird," are not music, but merely" promises of music."* Then he argued that

" tonal elements become music only by virture of their being organized."

Man has been extracting and adopting many events from nature and his own practices that suits him best. His architectural understanding evolving along a trial and error basis but being directly linked to natural conditions and measured against anthropometric needs, spatial concepts are carried completely within his mind's eye. As such, he ,for example, has observed typical pattern elements within an organized space, which are then adopted as typologic formats to generate other designs of good spatial virture. These elements are thought to fundamentally characterize the over all form of a composition.

asymmetry
axiality
balance
colour
continuity
contrast
datum
decoration
deforming/destorting
emphasis/attention/form
harmony
enter locking
horizontally
light
linearity
movement
neutrality
ornamentation
overlapping
penetration
prespective representation
proportion
rythem
scale
size
superimposition
summetry
texture
unity

Hence, our space from, subjected to the merit of the enclosing structure, are the results of the nature of these form generators. The later, the enclosing structure, in turn is dictated by the modalities of massing and other design operations.

5-2 Figural Solid / Formed Mass /

The visible entity of the built environment that contains and contained in space for the fullest expression of it in the purpose of space definition and for unwanted environmental impact protection. The later can include all aspects of the surrounding that creates discomfort, such as, extreme weather changes, incongruent views, etc. This aspect is entirely affected by the structural system choosen and the type of material used to accord site conditions while defining certain volume of space.

5-2-1 Modalities of Massing

In a building enclosure design, there are form-giving operations which are agents of material transformation into certain modals or extraneous form properties, may be as *skeletal*, *planar* or *plastic*. Some of the operations are listed here under; and they are suggestive of the material nature, both in form and organizational assembling.

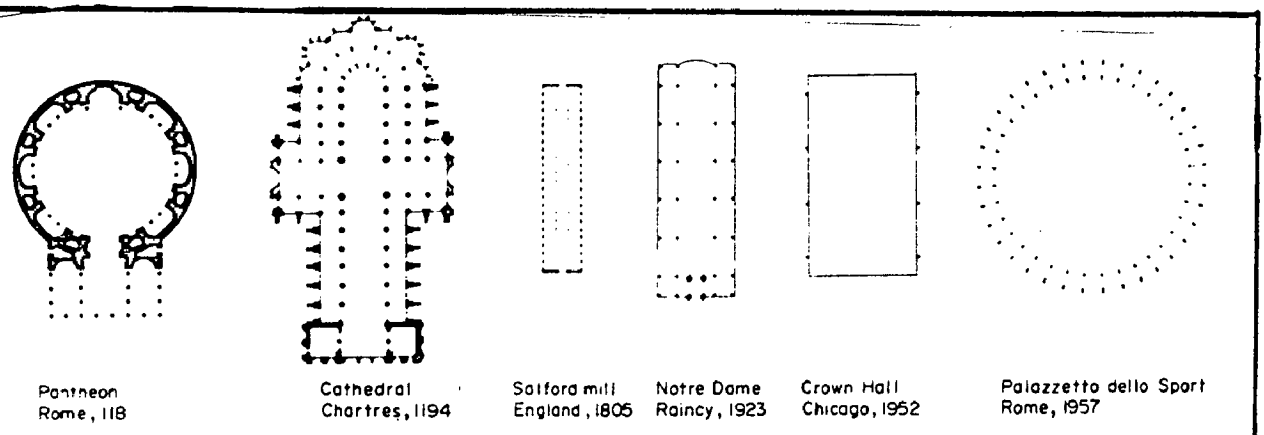
anchoring	extruding	Molding
bending	distorting	painting
breaking	forming	Plastering
corbelling	Laying	rolling
deforming	Leaning	Standing
folding		

Building materials

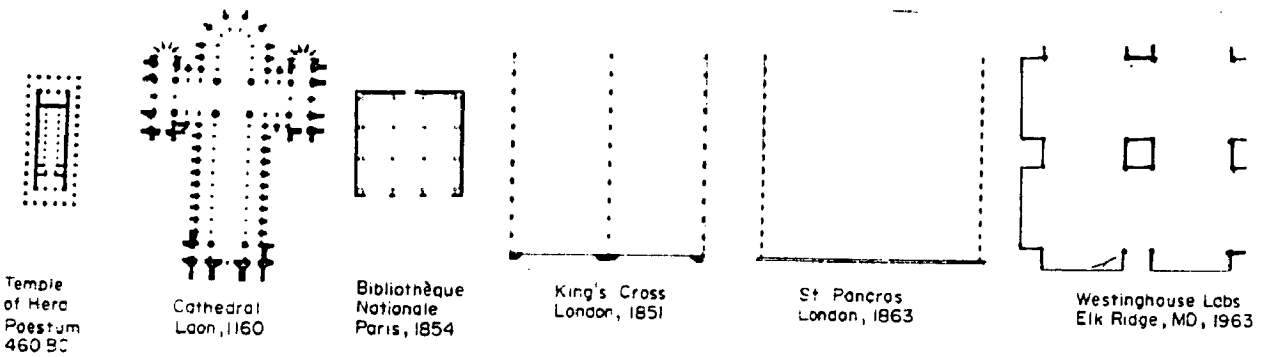
The type, availability and physical properties of different materials ultimately decide the possibility of building creation. The form and size of the enclosed space is very much a function of it together with other factors. For example when we see the spatial characteristic and surface texture of urbanization, it tells us about the salient influence of the construction materials that can range form earth/mud/ in rural areas to concerete, the modern steel, glass and the fabulous new crops of plastic, laminates and other revolutionary products which are temendously employed for building in urban centres./ *fig.38*/

Fig-38 Material Use profile with Urbanization trend

Also, the reduction in dimension of enclosing and support elements in buildings over the years, a process that profoundly affected the architecture and urban nature of the times in their spatial organization, is a good reference for appropriate selection of materials./ *fig.39*/



The reduction in plan area of vertical support systems from Roman to modern times



The development of long span structures

Fig-39

In their analysis each material possesses its own particular design language, which is the expression of three main qualities that characterize it /as given by P.J.Grillo/:

- *Structure*: which determines the particular way it reacts under stress, and will determine the structural design and form directly.
- *Texture*: Which directs the choice of tools to use, that is in accord with its internal structure
- *Aspectt*: Which tags its particular color and outside skin after tooling. Although a direct result of the first two, it is by this quality that the material is best known to the layman.

Here, we will particularly insist on Structure in our study, as it is , in the end ,the most important quality in design. In this respect we can make the following classification based on the origin (molecular organization) of the material as well as its functional nature computed in regard to an inherited character.

Hence, we can have

1, *Rock material*: that we find in its natural state in the ground, like stone and clay

2. *Oragaic Material*: Which is, like wood, of cellular organization

3. *Metal Material*: As a refined product of the most compact molecular organization found in nature.

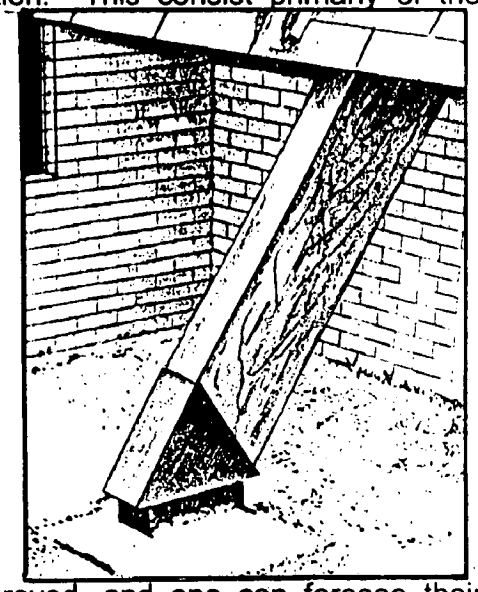
4. *Synthetic Material*: Like glass and plastics, products of Man's industry.

5. *Hybrid Material*: Like concrete or adobe/born from the marriage of two or more of the preceding materials.

And with respect to their functional response as the stuff of the building structure, those which are used to hold up and support the building/structural materials/.

A *structural material* is one that, when used to construct a structure, will withstand the substantial loads intended for it without undergoing significant deforation. This consist primarly of the following group

- *Wood-* As used in building framing and laminated structures
- *Steel-* As used for structural steel and reinforcing steel
- *Cement and concrete-* As used in concrete in-situ and prefabricated construction
- *Masonry-* As used in bearing walls and other supporting structures.



Fig·40

Now even materials like glass and plastics are being improved, and one can foresee their structural use in the near future.

Others, which are considered as the balance and their purpose are mainly functional, as envelope and aesthetics; and most of the above groups can be their examples.

Building materials can have also different strength and durability subjected to their material composition nature; and this inturn to affect the overall final form of a built composition. For example in the above, a hierarchy of durability is expressed with concerete submerged in the earth, masonry touching the earth, steel above the earth , and wood higher than steel./*fig.* 40/

Building Materials and Structural form:

The shapes that are considered to represent the sprit of a particular materialare those that result from the primary manufacturing procests, are made of a single piece, and are structural. These are referred to as *primary forms.* All other product shapes are called *Secondary forms.* Secondary forms generally result form a second manufacturing process or special adjustments to the standard primary manufacturing process. They are often made from or with primary forms. Forms are described by their geometry, attitude (Straightness), and refinement.

Forms fall into one of the three basic geometries; linear planar or blocklike.

Linear: Forms are those with one dimension significantly larger than the other two. eg. Structural steel, wooden structures, and reinforced concrete beams and posts.

Planar: Forms have two dimentions significantly larger than the third .eg. glass, liminated wood, plastics and concerete plates.

Block like : forms have three dimensions without significant differences between them. e.g. Masonry products, glass blocks, others.

It is advisable to use intuitive judgement that specific ratios that separate the geometrics to determine whether a product seems more like a line, flat, or block./ *fig. /*

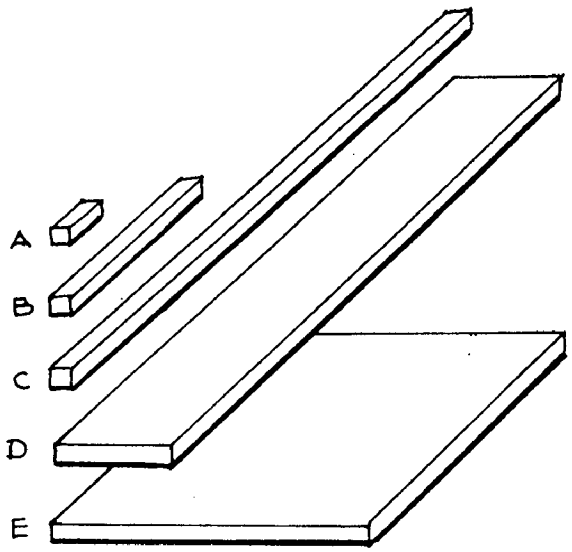


Fig-41

The form of A is blocklike
C is linear
E is Planar(assuming that is large enough. to be a structural plane).
B&D are borderline Cases

Also see the following summary./ *table-6/*

	WOOD	MASONRY	STEEL	CONCRETE
Form				
Geometry	Linear[a]	Blocklike[a]	Linear[a]	Planar[b]
Attitude	Straight[a]	Curved[b]	Straight[a]	Curved[b]
Refinement	Low[c]	Medium[c]	Very high[c]	Medium[c]
Strength				
Tension	Medium[c]	Very low[c]	Very high[c]	Very low[d]
Compression	Medium[c]	Very high[a]	Medium[d]	Medium[d]
Bending	Medium[c]	Low[c]	Very high[c]	High[c]
Durability	Very low[c]	High[c]	Low[c]	Very high[c]
Workability	Very high[c]	Low[c]	Medium[c]	Very low[c]

[a]Absence of other options.
[b]Most unique of several options.
[c]Highest limit.
[d]Below highest limit but necessary for philosophical reasons.
[e]Higher than actual capability relative to other materials but necessary for philosophical reasons.

Table-6

Support Structure:

We humans experience an atavistic perceptual response to the control of structural forms and foreces on them. We are conscious of the space membrane between columns and the spatial sanctuary around them. We emphasize the vertical integrity of the column, the compressive strength of the arch, the tenuous ductility of the cable. The combination of structural elements such as walls, columns, beams, piers, arches, domes, etc., to create complete space-enclosing systems involves the provision of adequate support for each element and the ensuring of over all stability, sometimes under adverse conditions of wind or earth-quake. All these are the multifaces of structure, the essence of architecture. It is this pivotal aspect, together with the other factors, about which all kinds of architectural forms revolve to be inherently shaped. The historical development of building structure can, through interpretation, be traced back to the first act of human being to perceive the function in nature. Some of the most sophisticated and efficient structures can be found in plants, animals and animal houses. Through adaptation to a specific environment, overtime, natural forms may be refined until they are nearly perfect responses to a given set of forces, the mechanics of nature; and their overall form will be the reflection of that responses. Because of the success of many natural forms, they are copied in the design of building. See the following examples. */fig.42/*

Thus, adoption of principles of "resistance to loads through form" from nature and experimental experience and applying those principles to suit the needs of a particular design problem is of an exciting inportance. The complex and varied structural forms we have today have dated for their evolution from the primitive conception of structures from such an approach. Today there are several structural systems and elements found in buildings, each of which embodies a different type of structural behaviour. The more complicated forms are made up of combinations of the basic or are extensions of the same concepts. The basic elements and stresses they develop under load are as follows:

Cable-	Pure tension
Post	Cimpression(and sometimes bending)
Beam	Bening and shear(Beam is a generic name hence can be used for girder, beam,joist and purlin)
Truss	Tension and compression
Arch	Compression(and usually bening)
Shell	Memberane(tension and/ or compression, evenly distributed through the shell thickness)

In the following example, the besis of classification being primarly geometrical, the basic structural forms with their structural potenitial and the manner of loading is shown. For some of the elements the nature of the support is indicated by arrows denoting the direction of the support reactions./ *fig.43/*

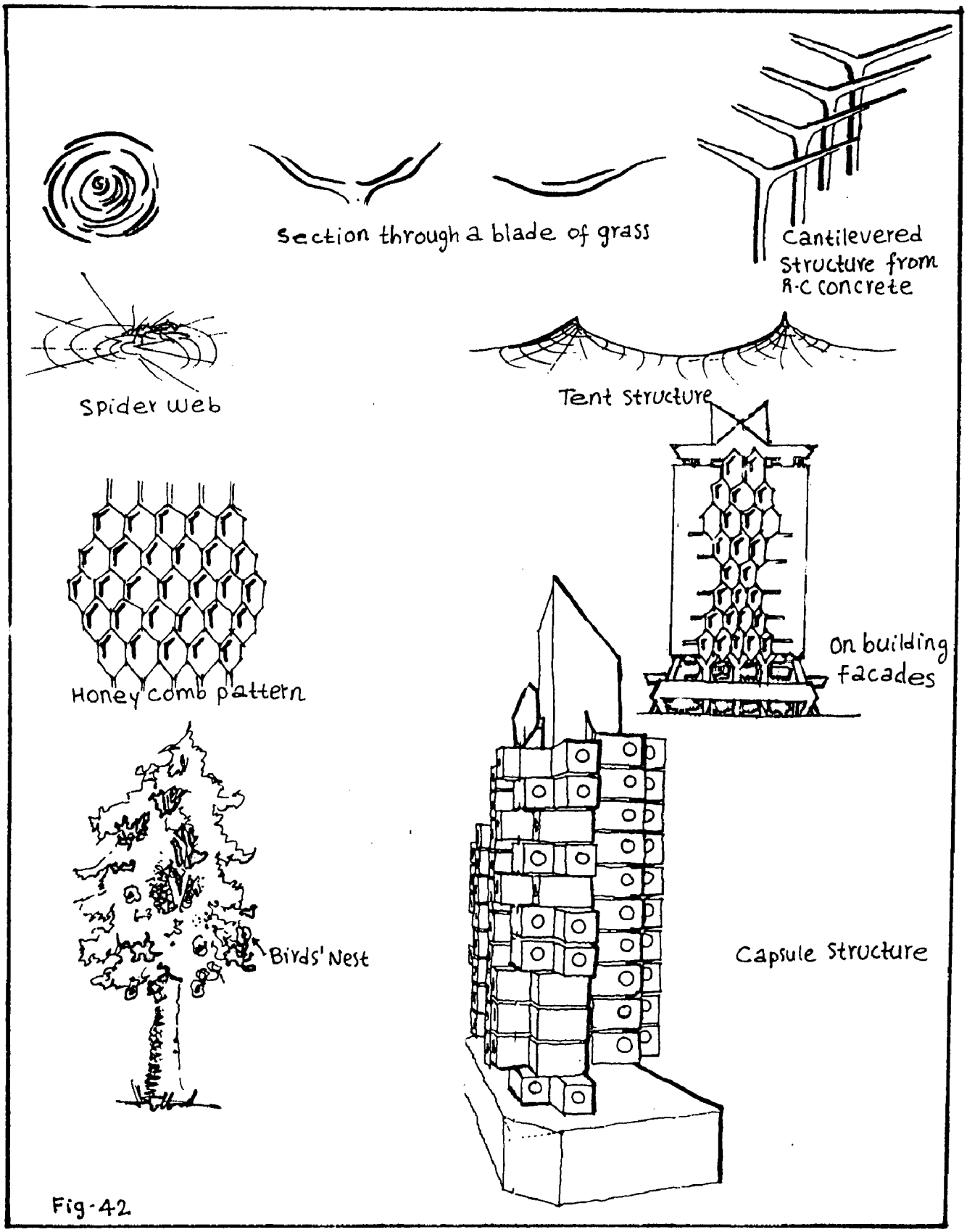
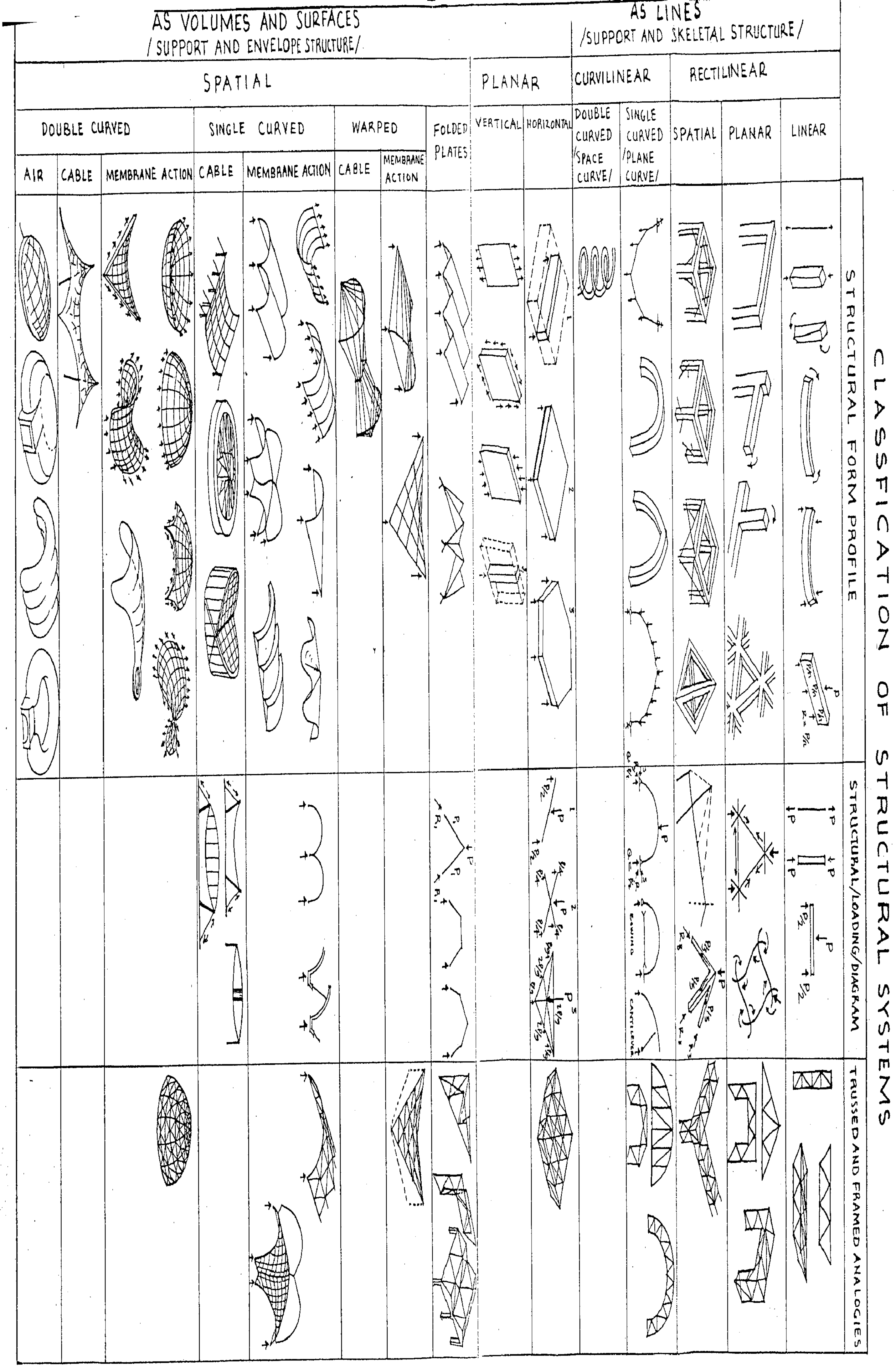


Fig-42.


CLASSFICATION OF STRUCTURAL SYSTEMS
AS VOLUMES AND SURFACES
/ SUPPORT AND ENVELOPE STRUCTURE/
AS LINES
/SUPPORT AND SKELETAL STRUCTURE/
SPATIAL
PLANAR
CURVILINEAR
RECTILINEAR
DOUBLE CURVED
SINGLE CURVED
WARPED
FOLDED PLATES
VERTICAL
HORIZONTAL
DOUBLE CURVED /SPACE CURVE/
SINGLE CURVED /PLANE CURVE/
SPATIAL
PLANAR
LINEAR
AIR
CABLE
MEMBRANE ACTION
CABLE
MEMBRANE ACTION
CABLE
MEMBRANE ACTION
STRUCTURAL FORM PROFILE
STRUCTURAL/LOADING/DIAGRAM
TRUSSED AND FRAMED ANALOGIES

Envelope structure:

The envelope structure of the building aspect/figural solid/ acts as selective filter separating internal volume from external environment exercises environmental control by modifying various aspects of *macroclimate* to produce more acceptable *micorclimate*. It resists various loads and controls access and egress. See the following illustrative model building enclosure./*fig.* 44/

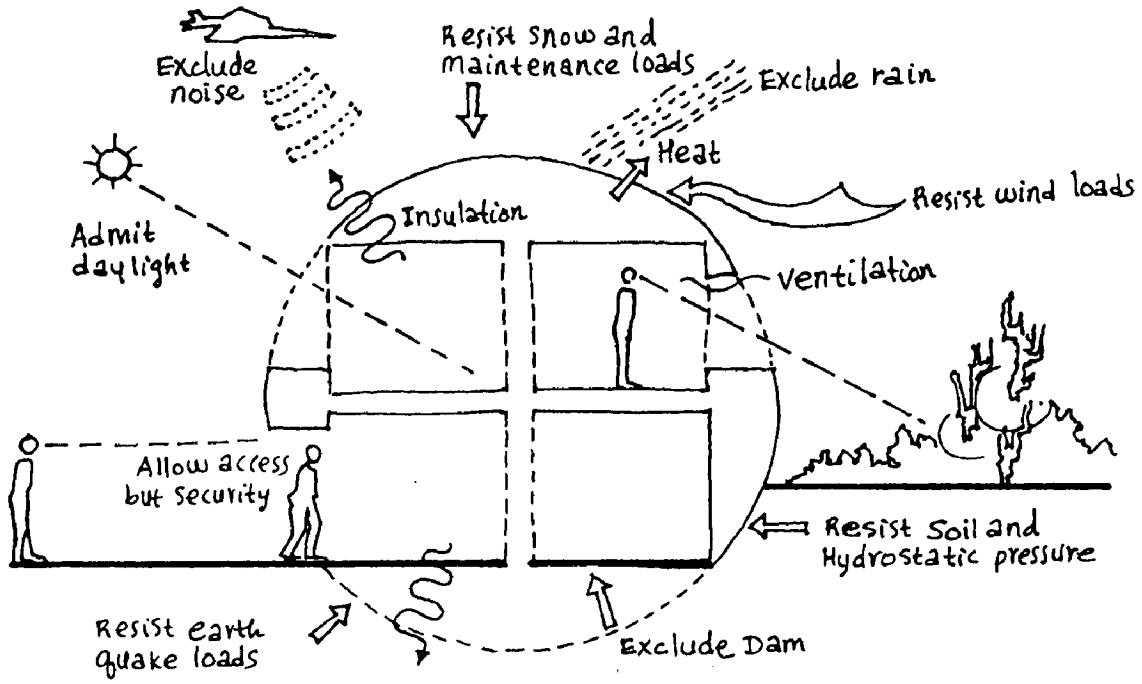


Fig-44

It is then this common element, the envelope structure, shared by both the public and private releam, which defines the edge of the two spatial releams and at which the walls/ roofs/ or definers of, not only the private space/as interiors/ but also our collective external spaces, feel their presence. And it is at this particular interface that the blessed professional exercises an exciting challenge to assure symbiotic existence or the inside and the outside for the integrity of the holistic built environment. His choice of enclosure form, its refinement and its setting is that all what matters the architectural merit of a building in the overall built environment composition. Architects sometimes use different volumetric forms directly as the primitives of compositions. LeCorbusier suggested this in his well known sketch/ *fig.*45/: he introduced a vocavolaty of basic volumetric elements, then showed how these might be assembled into a complex architectureal composition. As a child, Frank Lioyd Wright played with Froebel Blocks./*fig.*46/ and many of his mature architectural compositions clearly emerge from a process of taking simple volumes and intersecting them is space to produce something richer.

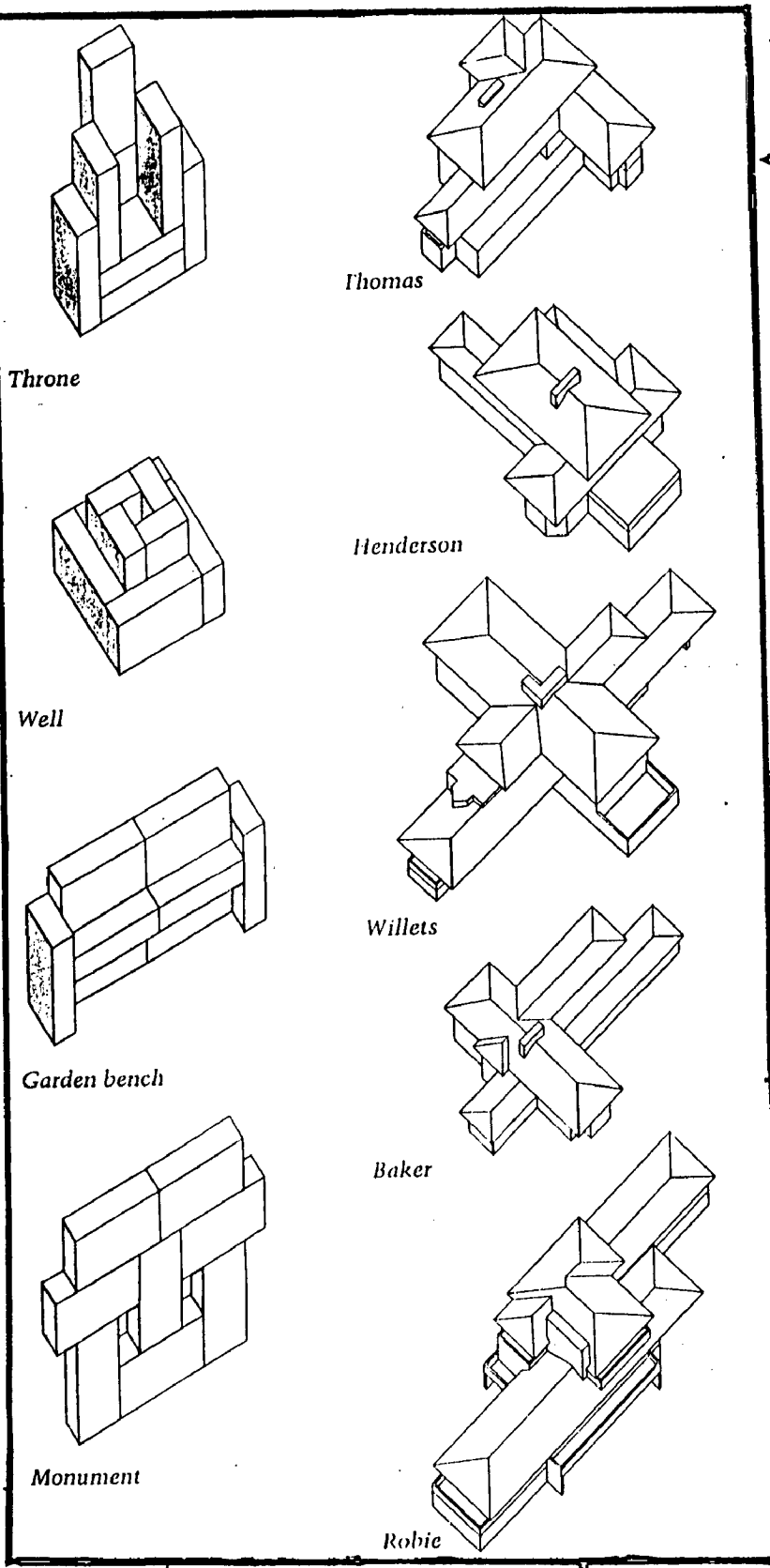
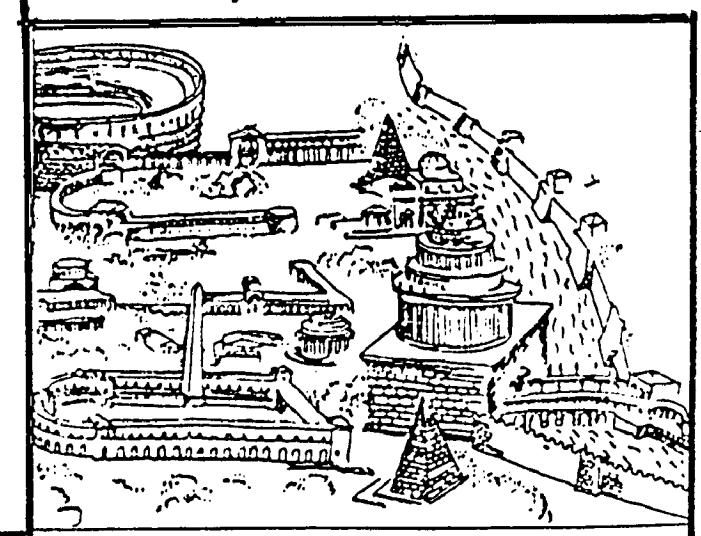


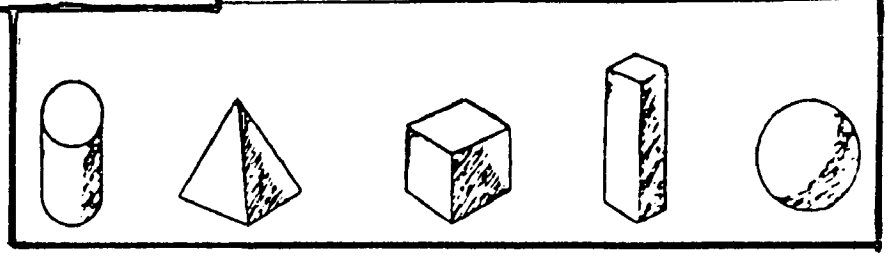
Fig. 46
Composition of closed volumes: some forms constructed with Froebel blocks

Source. 'The Logic of Architecture'

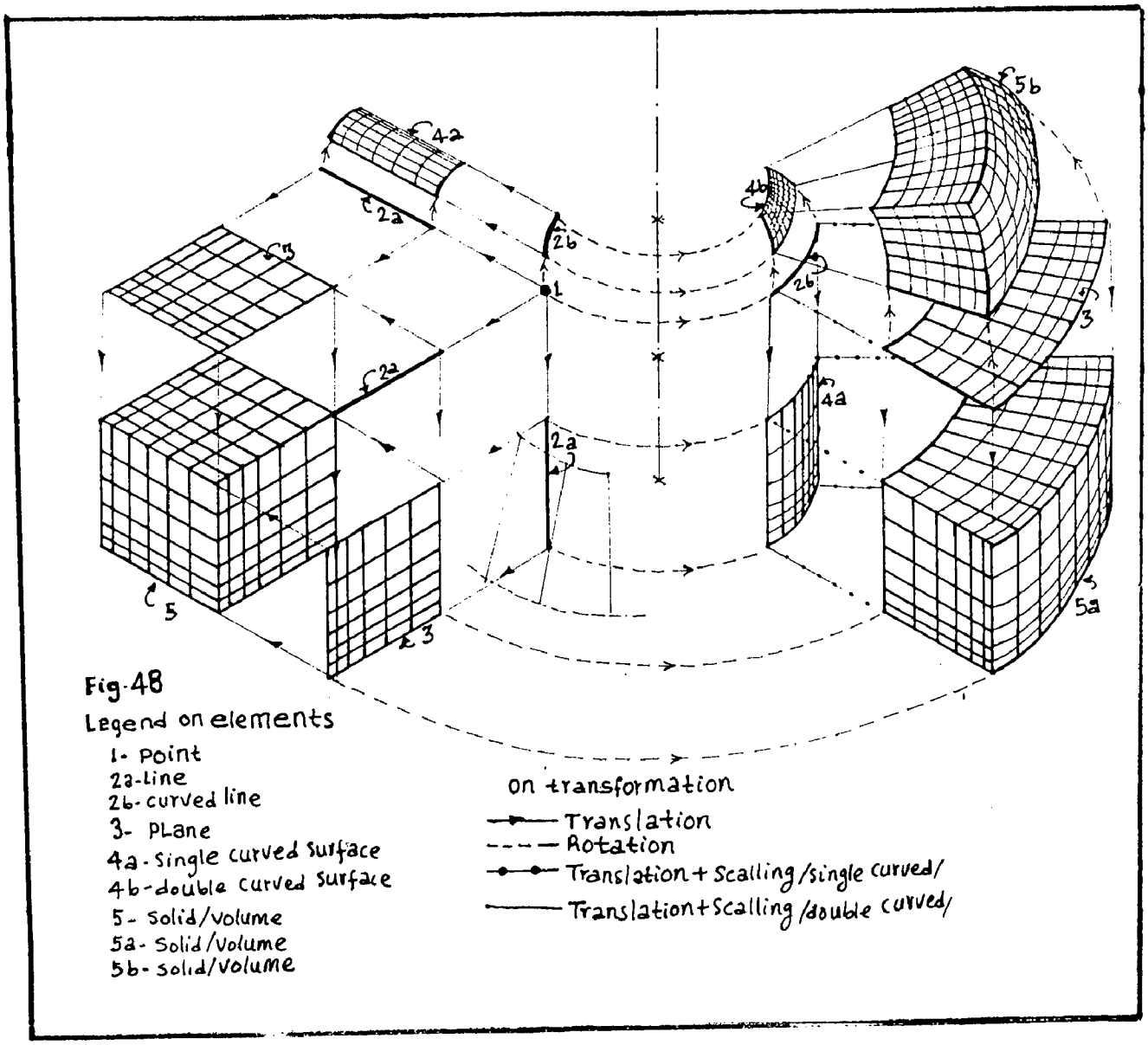
The combination of simple hip roofs to produce more complex volumes in Frank Lloyd Wright's prairie houses (after Koning and Eizenberg, 1981)

Fig 45
A sketch by Le Corbusier from *Vers une architecture* (1923), showing how architectural compositions can be assembled from simple volumetric solids





Hence, although in architectural design practice, the architect must not start with the geometry but with the people/users, knowing the basic geometric and non-geometric form typologies of an enclosing structure will have a lot to do in the selection and modification of the right form by virture of which to resist certain load conditons as well as for simplification of construction. In the following illustration is the classification of basic geometric and non-geometric forms including aspects of their extraneous modality as organic and inorganic and eventually their dimensional attribute i.e., the focal, linear, plannar or spatial properties./*fig.47*/. Furthermore, a graphical representation of geometric transformations is shown as it is a useful vocabulary for describing spatial relations between shaps in a composition. In this, the generation of different lines,. surfaces, volumes/ or solids/from a point through transformations of *translation*, *rotation* and *scalling* is given./*fig.48*/



In architectural buildings form development, keeping the propriety of the other factors like the modalities of elevational treatments, juxtaposions, shade-shadow effects, texture and pattern factors, colors, etc., a change in the roof style of an enclosing structure greatly affects the appearance of the elevation and thus the overall form. hence, in the following different roof types for reference purpose are shown which, by the creative approach can directly be adopted or be modified for use. /fig. 49/

Although this roof shapes/forms are often used for simple residential buildings, which are more intimate to human beings in life, their adoption for complex and high rise building elevation termination becomes frequent.

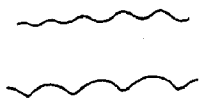
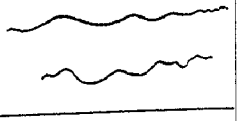
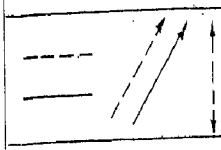
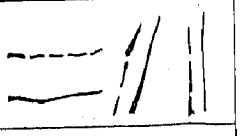
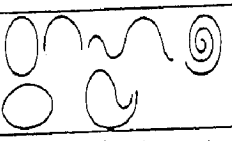
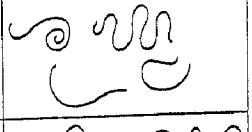
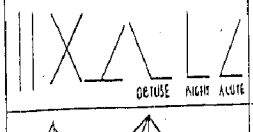
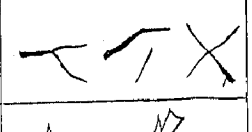
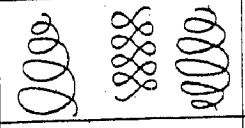
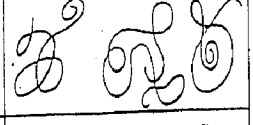
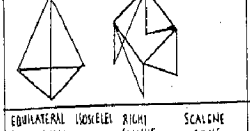
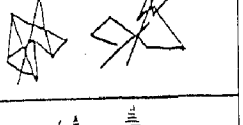
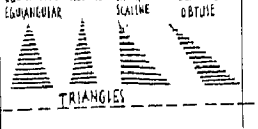
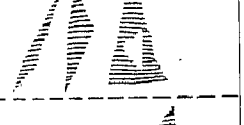
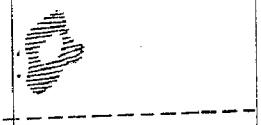
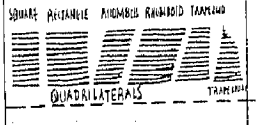
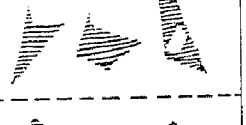
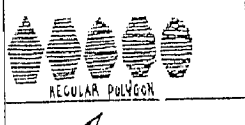
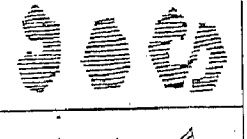
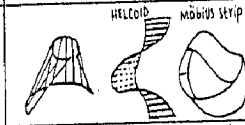
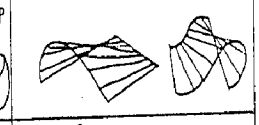
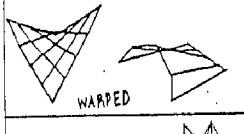
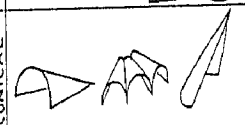
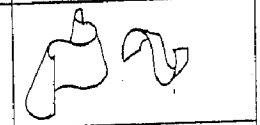
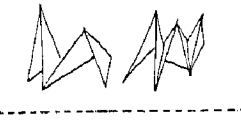
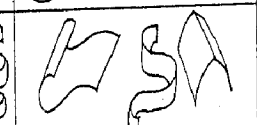
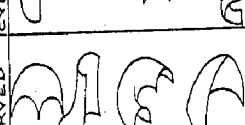
Finally, a format for the classifications of building typologies is made based on the modalities of massing/ skeletal, planar, plastic or hybrid type/ and modalities of total form/ orgainc/inorganic and under each geometric/non-geometric and hybrid types/. fig.50

This classification helps to find many possible typologies or combinations under a given modality category and by which to make the following.

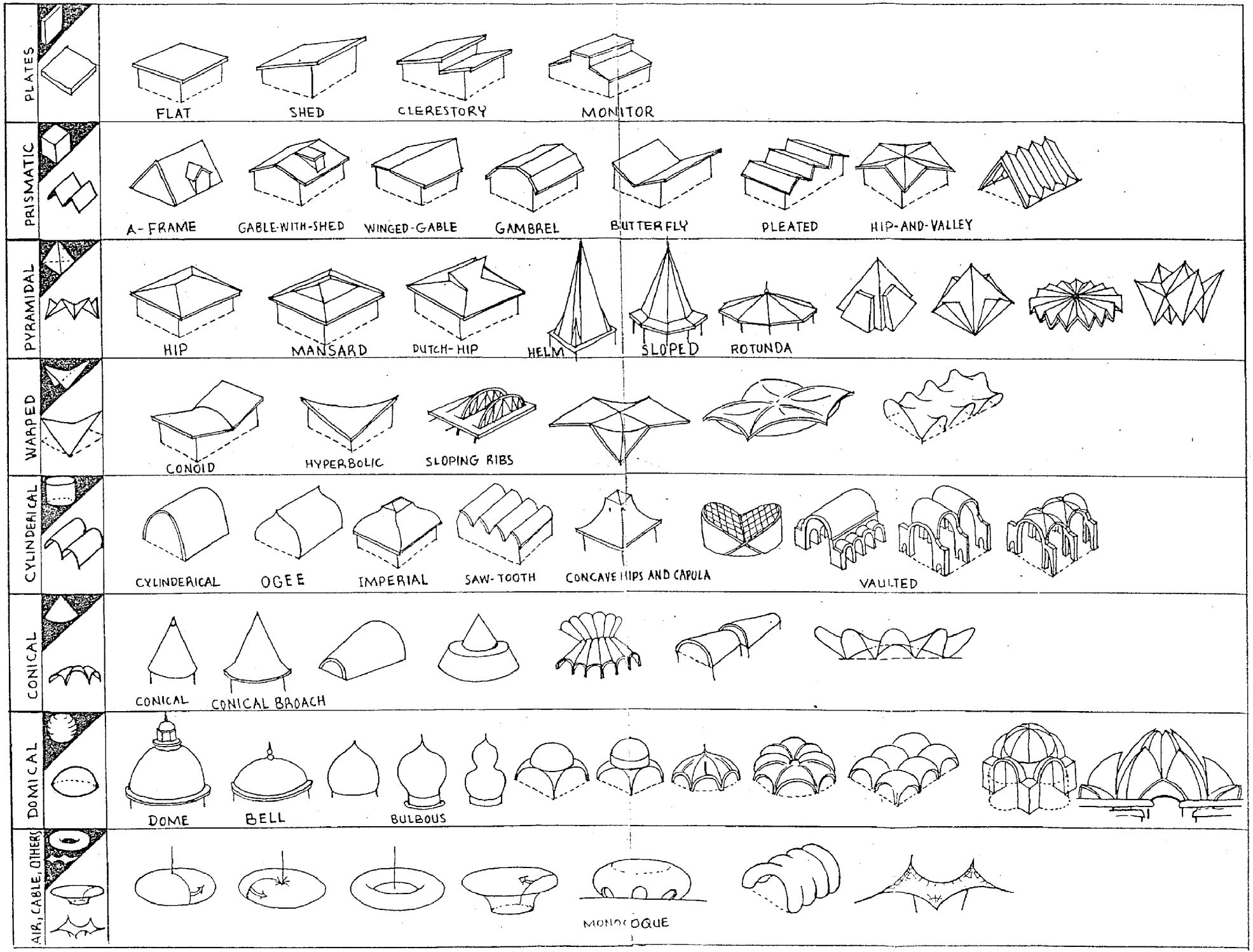
- to associate the frequently used forms to certain buildings class, may be, to residential, commercial, institutional or industrial
- to study the tendency of an architect to which type of form he has likings and, therefore, to expect what type of design philosophies can come out of his arguments.
- and most importantly, to know which form category in general is adopted by evaluting the frequency of a randomly taken building for test of its grouping merit, and others.
- Ultimately, after knowing or getting grouping merits of certain building forms, cross checking will be made with respect to the graphical representation of emotional responses. And this result will be extrapolated to be used for other similar class of building designs, if the result is for good emotional arousal.

And most of the buildings selected as examples here are choosen because they are relatively well known and often studied. Others are choosen because their forms and detailing are useful in clarifying certain principles sought.

POINT, LINES, SURFACES, VOLUMES AND

		ORGANIC - /SOFT/		INORGANIC - /HARD/		HYBRIDE
		GEOMETRIC	NON-GEOMETRIC	GEOMETRIC	NON-GEOMETRIC	
POINT	FOCAL OR DISPERSAL					
LINES	LINEAR					
	PLANAR					
	SPATIAL					
SURFACES	PLANAR					
						
						
	SPATIAL — SINGLE CURVED — WARPED					
	SPATIAL — SINGLE CURVED — CONICAL					
	SPATIAL — SINGLE CURVED — CYLINDERICAL					
	SPATIAL — DOUBLE CURVED					
VOLUMES	QUADRICS — WARPED					
	QUADRICS — SINGLE CURVED — CONICAL					
	QUADRICS — SINGLE CURVED — CYLINDERICAL					
	QUADRICS — DOUBLE CURVED					
HYBRIDE						

CLASSIFICATION OF ROOF TYPOLOGIES



MODALITIES OF MASSING

Fi- Fine
Cr- Course
H- Hybride
U- Unifide
C- Composed
F- Fragmented

	PLASTIC			PLANAR/SURFACES			SKELETAL		
	H	Cr	Fi	H	Cr	Fi	H	Cr	Fi
ORGANIC — SOFT / GEOMETRIC									
U									
C									
F									
ORGANIC — SOFT / NON-GEOMETRIC									
U									
C									
F									
INORGANIC — HARD / GEOMETRIC									
U									
C									
F									
INORGANIC — HARD / NON-GEOMETRIC									
U									
C									
F									

← HYBRIDE

▨ POSSIBLE NUMBER OF HYBRIDE MODALITIES / MASSING × VOLUME / OF BUILDING CONFIGURATION

FROM COMBINATION SERIE' EQU.

$$\sum_1^{Rn} = C_{R_1} + C_{R_2} + \cdots + C_n$$

FOR MASSING

$$\sum_1^3 = \frac{3!}{1!(3-1)!} + \frac{3!}{2!(3-2)!} + \frac{3!}{3!(3-3)!}$$

$$3 + 3 + 1 = 7$$

$$7 \times 3 = \boxed{21}$$

FOR VOLUME

$$\sum_1^4 = \frac{4!}{1!(4-1)!} + \frac{4!}{2!(4-2)!} + \frac{4!}{3!(4-3)!} + \frac{4!}{4!(4-4)!}$$

$$4 + 6 + 4 + 1 = 15$$

$$15 \times 3 = \boxed{45}$$

POSSIBILITES COMBINATION SASSON'S THIII CLASSIFICATIO

TOTA = $45 \times 21 = \boxed{945}$

CHAPTER-6

APPROACH TO A COMPREHENSIVE DESIGN METHODOLOGY

A comprehensive design methodology is an attempt to find a compendium network on which to base an integrated design guidelines that fundamentally considers the compulsory facts from the human, the environmental and the building aspects; that inevitably dectate any architectural design theme.

Before getting down to the entire approach behind the guidelines, let us have a fresh look at design.

6.1. Architectural design

Architectural design is the creation and interpretation/art/; and discovery/science/ of an edifice to achieve soul charged living and working invironment. It brings this through an imaginative dealing, intution, and render it flesh by exploring facts that suit the created subject, i.e., the edifice and its tailored environment so desired. A consistent generation and recreation of an apparent 'contrary' impulse to the usual in its perception for orginality and to invoke emotions of pleasure is central to it. And to effectuate this different approaches have been made to develope design methodologies and regulations.

The expressions:

"form follows function" Sullivan-

"Less is more" Mies-1960

" Less is a bore" Venturi- 1970

" I am a whore" Johnson- 1980

" Organic architecture" F.L.Wright-

are a few simplistic architectural concepts that show a design philosophy.

History has shown that certain periods of architecture- such as Greek, Roman, and Renaissance actually developed formulas or guidelines to evolve building design. However, buildings are good, from subjective evaluations point of view, because of the creativity of the designer, not because rules were followed dutifully. The analysis of any building is likely to reveal violations of accepted rules and philosophies. Buildings and built environments are not necessarly less successful because of the violations. Although a design methodology give the creative process direction and purpose, it seems obvious from observation of scores of buildings produced each

year with varied levels of regard for traditional and contemporary design theories, neither to suggest that designing in harmony with certain formula leads to great architecture nor that violating them gurantees failure. However, an intutive progress for the genius it may be, purposeful manupulation of form and detail in reference to a common ground of artistic test for aesthetic and an educated approach to matters of practical common sense/ as building construction, physical environmental factor considerations, etc./gives the designer greater control of a buildings overall impact on the users/ active owners or passive owners/, than does accidental manupulation relying upon serendipitive success. This is in a sense although it is obvious that design is not a process but is an intutions it is well known in western art and eastern philosophy that the power of the mind to intuit can be cultivated, as Bruce Allsopp has mentioned it. Thus, if a design methodology for architecture/ an underlying structure to base design logic/ is extracted from an experimental experience of man/ learned knowledge or cummulative wisdom/ and creative inspiration as a product of the symbiotic interaction between man's physical, anatomical, behavioural and thus cultural aspects as learned experiences in his environment, It can some how focus the mind and assist in control of the design progress. And this may help to produce aesthetically conceived and sound architectural built environment form. As such, eventhough it is not possible to comprehensively discuss the fundamentals of architectural design in the span of one chapter here, but discussing some of the series of logical steps and inevitable considerations/ as a summary of what is explained throughout this disseration/,. can help to fulfill the requirements of good design. hence in the following we shall see how a design business is walked through in procedure to achieve a desired architectural buildings and their site for a better human environment.

6.2 User Analysis: *from the human aspect*

For physiological needs- this is a concern to relate the biological structure of man to his built environment

- Anthropomentrics

- relate human physical structure with the minimum space requirement for a given purpose space enclosure./consider scale and proportion/

- Ergonomics

Study the comfort range of the ambient elements as light, sound, air, temperature, humidity, precipitations and other environmental considerations.

For perceptual needs- this is torelate the perceptual impact, with special focus onvisual perception, of built forms on humanbeings.

- Study those factors which can affect the proper visual perception, like illusion, organizational phenomena, etc., as given on page 18, and either to avoid or use for special effects in the design theme.
- Study and apply properly the quantified enframement approaches that assist in defining the terminus size in which vistas of predetermined Scene to be created for full perception at a single glance./See fig.51/ This helps to decide:
    1. Location of structures from walkway and driveway distances for a single glance full perception
    2. Building to street relationships, height control and others
    3. Bulk texture configurations to classify as course and fine/visual bulk control/
    4. Figural void and figural solid proportions.
    5. Skylines and appropriate areas for segmentations in building form development
    6. Considerations of panoramic and skyramic views
    7. Special help in locating buildings based on aesthetics to function ratio weightage,
    8. important detail viewing locations

All of the points are for enhancement of strainless and comfortable perception of built forms at a single glance for a better and more acute appreciation of modalities of built forms.

For emotional need- this is to relate certain graphical representations to a predetermined emotional arousal and to evoke varied feelings.

- The adoption of studied forms to the real built environment thus conceived can be done./Refer to fig.22b/
- The choice of forms which can be further modified and be used are classified according to their graphic geometry other forms are the hybride or combined results of these forms./ see fig. 47/

For intellectual needs- this is To relate the educated test of an individual for acute state appreciation of a design theme and other technical facts. This experience evolves through formal learning, like architecture education or informal learning through traditional craft studies and vernacular trends.

- Knowledge of construction techniques, detailings, etc./see structural and roof forms/

Having the knowledge of design principles conceived from spatial organizations, etc. and applying them in a design merit evaluation.

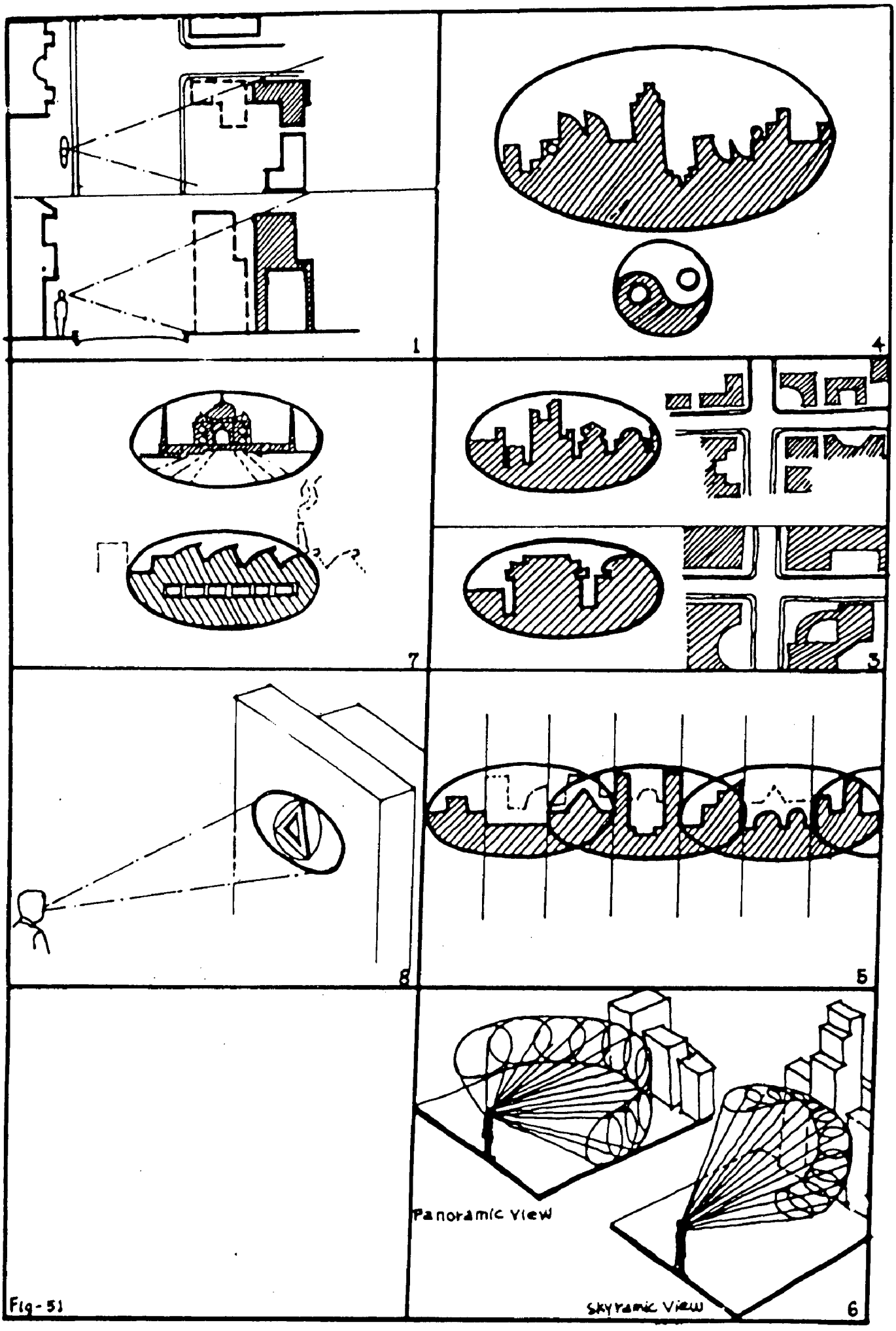


Fig - 51

6.3 Site Analysis: *from the environmental aspect*

The natural environment

Site conditions- in this the site analysis of physical land features which aids the designer in making proper design decisions and ensuring appropriate land use will be made / refer to site analysis diagram given on page- 43/

Three types of site analysis techniques can be used to develope a final site analysis drawing as given by Hepler, D.E. and wallach, P.I. in their book of Architecture : Drafting and Design.

Soil Analysis Soil is composed of gaseous, water, organic, and rock constituents. Variations in the percentage of these ingredients. determine the physical characteristics of the soil and its capacity to support the weight of sturctures (its bearing capacity). In general, coarse- grained soils, because of their drainage and bearing capacity, are preferred for building but are not ideal for planting areas. Conversely, fine-grained soils with high organic content are preferred for planting areas but not for building. To aid in the analysis process, soils for building can be classified as:

1. .Excellent: Course-grained soils- no clays, no organic matter
2. Good to Fair: Fine, sandy soils (minimum organic and clay content)
3. Poor: Fine-grained silts and clays (moderate organic content)
4. No development: Organic soils (high clay and peat content)

To prepare a soil analysis drawing., follow these steps:

1. Obtain a soil classification for the site from a country soil survey or from private borings.
2. Draw areas on the base map representing the different soil types.
3. Note the bearing capacity, and depth to bed rock, for each soil category.
4. Provide a legend showing the categories of soil types and describe the soil characteristics of each type. On the drawing, note developmental potential and constraints.
5. Color-code each soil capacity type in the legend and on the drawing.

Slope Analysis : The slope of a particular site greatly affects the type of building that can or should be designed for it. The slope percentage may also determine what locations are accepatable, preferred, difficult, or impossible for building. The cost of building may also be acutely affected by excessive slope angles. To complete a slope analysis drawing, follow these six steps:

1. To a base map add contour lines derived from map of the area. If the site is very hilly, additional contours may be needed to provide a more detailled description of

the slope of the site. These contour lines should be dotted, since the finished contour grade lines will later be drawn solid.

2. Identify four classifications of slopes on the drawing: may be from:

   0% to 5%-- excellent

   5% to 10% good/ fair

   10% to 25% poor

   over 25% no development

3. Identify each slope category by the use of colors or tones to show the degree of development potenitial of each section.
4. Note both potential andconstraints for development for each slope category.
5. Note economic assets and/or limitations for each slope category.
6. Note erosion or drainage problems(if any) for each category.

Visual Analysis: The architectural designer must be able to discover and analyze the aesthetic and environmental qualities of a site and visualize its potential. Because visual observations and aesthetic qualities are often subjective and elusive, some organized method of recording and analyzing is important. By following the steps listed here, a visual analysis drawing can be prepared to provide input for the future design conceptualization phase.

1. On the base map locate the direction of the best views from each important viewer position,. Show the viewer position with an x and a line and arrow pointing in the direction of the view. lable the nature of each view and rate its value good, fair, or poor. Also make recommendations for the treatment of each view ("enhance" or "screen," for example). Use cone of vision for vista analysis.
2. Identify existing structures on the base map and describe their condition as good, fair poor, unsound, or hazardous. Note suggestions to enhance, remove, or rehabilitate, and note any possible uses such as storage.
3. Draw the outline and locastion of all existing and significant plant material such as large shrubs and trees. label the type, and indicate the condition of each as good, fair, or poor. Also locate, draw, and indicate large stands of ground vegetation to be saved.
4. Identify any wildlife population and habitat areas to be saved. Indicate animal food and water sources.
5. With directional arrows, show the direction of prevailing winter winds, Also show the direction of prevailing summer breezes.

6. Find and lable the source of any desirable fragrances and/or undesirable odors. For the latter indicate possible solutions, such as minimizing with aromatic vegetation,screening, or removal of thesource.
7. Locate and label exposed open space, semienclosed public space, and private space.
8. Add side notes to the base map to include the average annual rainfall of the area, average high and low temperatures, depth of local frost, and average sun days per year. All of this data is available from architectural reference books such as time Saving Standards, or from local weather bureaus.

Composite Analysis: Once the soil, slope, and visual analysis drawings are completed, the information needs to be combined into a composite analysis drawing. The major purpose of the composite analysis drawing is to determine the best location zones for the placement of structures on the site. Location zones are divided into four categories:

1. Excellent development potential
2. Good or fair development potential
3. Poor development potential
4. No development potential

To prepare a composite analysis drawing, the following steps can be followed:

1. Place the soil analysis drawing directly over the slope analysis and align them with the features on the base map and tape the base map to the drawing board.
2. Attach tracing paper over the slope and soil drawings and trace a line around each distinct area.
3. Determine which development zone of each of the areas outlined represents. For exampl, if a 0 to 5 percent slope area overlaps with a coarse grained soil area the zone is labeled "1, excellent potential," If a poor, clay soil area overlaps with a 20 percent slope area, the zone is labeled "3, poor." If any area, in any categorty, falls within a no development zone, obviously the zone is "4"..
4. Place the overlay drawing over the visual analysis drawing and repeat the same outlining of areas covered in step 3 to complete the composite analysis drawing. Apply your own judgment concerning priorities when overlapping areas conflict.

Climatic Conditions- Consideration like the following can be made:

- General weather, including the most severe, based on meteorological datas.
- Prevailing winds control by means of landscaping treatment
- Orienting the building in relation to the sun/see also on page- /

- Proper drainage provision for the maximum anticipated rainfall.

For more details refer to the previous pages on climatic considerations.

The man made environment.

The physical- Unless the site is people devoid and is to be dealt from the scratch, existing physical features will naturally shape the entire built form thus conceived.

All classes of existing structure: as buildings, fences, trees, monuments, gardens, infrastructures and other urban masses should be well studied not to obstruct view, air movement pattern, sun access angle, and other diesign considerations.

Traffic flow: Consider whether pedestrian movement between buildings and from parking areas work well

- Include major walking patterns such as corridors to schools, recreation centres, shopping places, etc.
- Channel vehicular traffic flows than to let it dominate the entire site
- Careful patterns of traffic flow for service vehicles shall be provided, for fire birgade, ambulance and others.

The Non-physical- This as part of users analysis which includes all cultural aspects that have a direct bearing on the physical form of the built environment; quite simply the expression in the design theme of the way of life./ eg. see the illustrastion; to show the evolution of way of life as suggusted by Simonds in his book of Landscape Architecture,/

- The activity pattern nature of a building purpose when computed with the aesthetics to function ratios suggests their merit for appreciation of beauty. For such aspects of conception people creates certain domain as a non- physical dimension and this should be tackled carefully. Like giving Symbolic monumental nature to reflect a deeprooted culture.
- Consider also building bye laws and zoning ordinances formulated by people for the minimum safety measures which ultimately affects the design. /See *fig.34*/

6-4 Conceptualization; from the building aspect in reference to the user and its analysis results,

The figural Voild

Although the form development of the space/figural Void/ is a function of the space requirements and relationships based on users descriptions of specific usage,/ table 4/, it is also determined by enclosing structure form choice in satisfying certain emotional responses/ *fig.*43/ and span

requirements computed with respect to the available material nature, i.e., its structural merit, texture, and aspect;/ See on page.61/

- Identification of *activities / purpose /* to determine minimum spatial requirements which is later to be modified applying certain principles in space organization and lines of circulation for transforming the form.

See the following example of categorization of buildings according to their purpose.

-Religious Buildings

-Monumental / Philosophical Buildings

-Public Sector Buildings

eg: secretariat, municipal corporation buildings etc.

-Public Buildings

e.g.: community complexes, office buildings etc.

-Cultural Buildings

e.g.: cultural centers, musical facilities etc.

-Residential Buildings

Low Rise , High Rise

-Educational Buildings

-Health Buildings

-Commercial Buildings

e.g.: hotels, shopping complexes

-Recreational Buildings

Active , Passive

-Transportational

-Industrial

-Exhibition Structure

-Categorization of buildings according to their planning merit which is used to decide the nature of space thus required is given below /see fig-

Under Centralized Systems

-Religious Buildings

-Monumental Buildings

-Cultural Buildings

-Recreational Buildings

-Transportational Buildings

-Industrial Buildings

Under Decentralized Systems

-Residential Buildings

-Exhibition Structures

-Health

Repetitive Systems

-Education Buildings

-Commercial Buildings

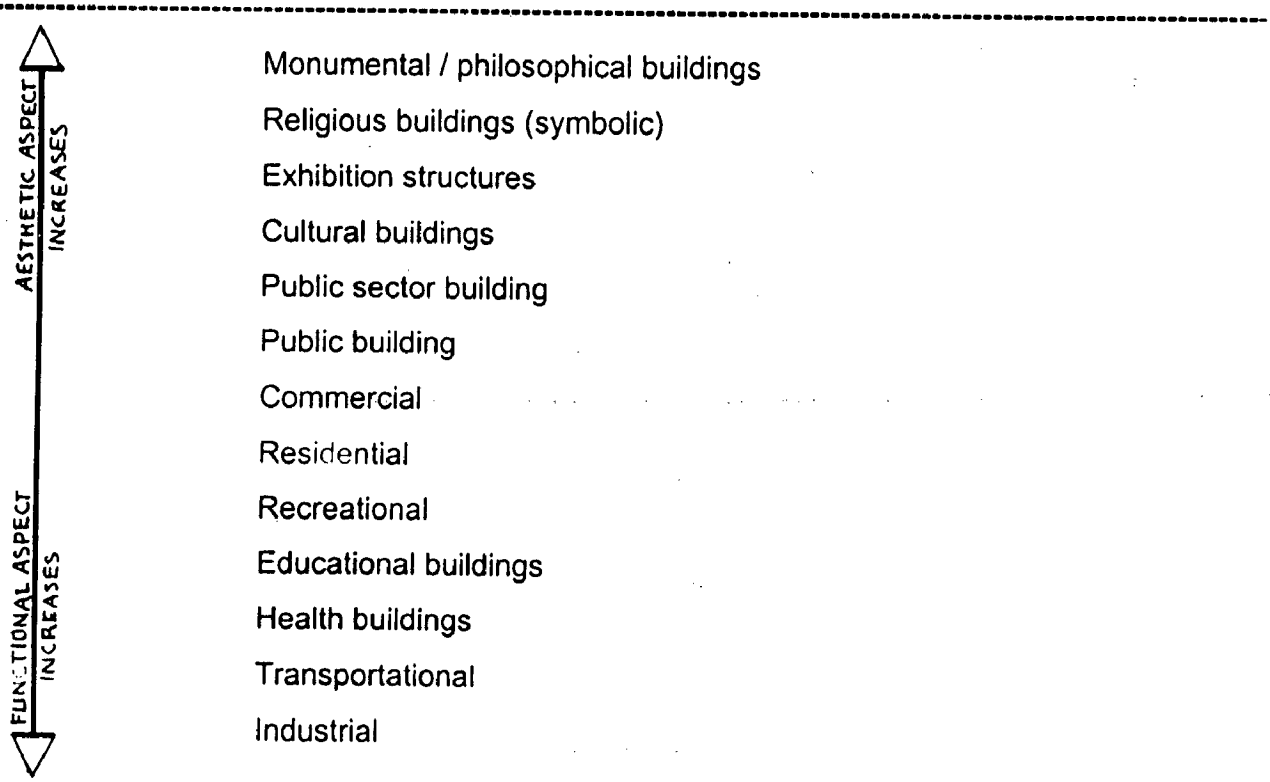
-Public Buildings

-Public Sector Buildings

The aesthetic to function ratio also affects the setting and configuration of each building. In this the enframemnt of the terminus plays an important role in deciding whether the building under consideration is to be put on the site so that it can be fully viewed from certain depth. e.g. Like monumental buildings need to be seen fully at a single glance position; while big industrial buildings may not.

See the following example of classification of buildings according to their aesthetic/function ratio

Aesthetics



Function

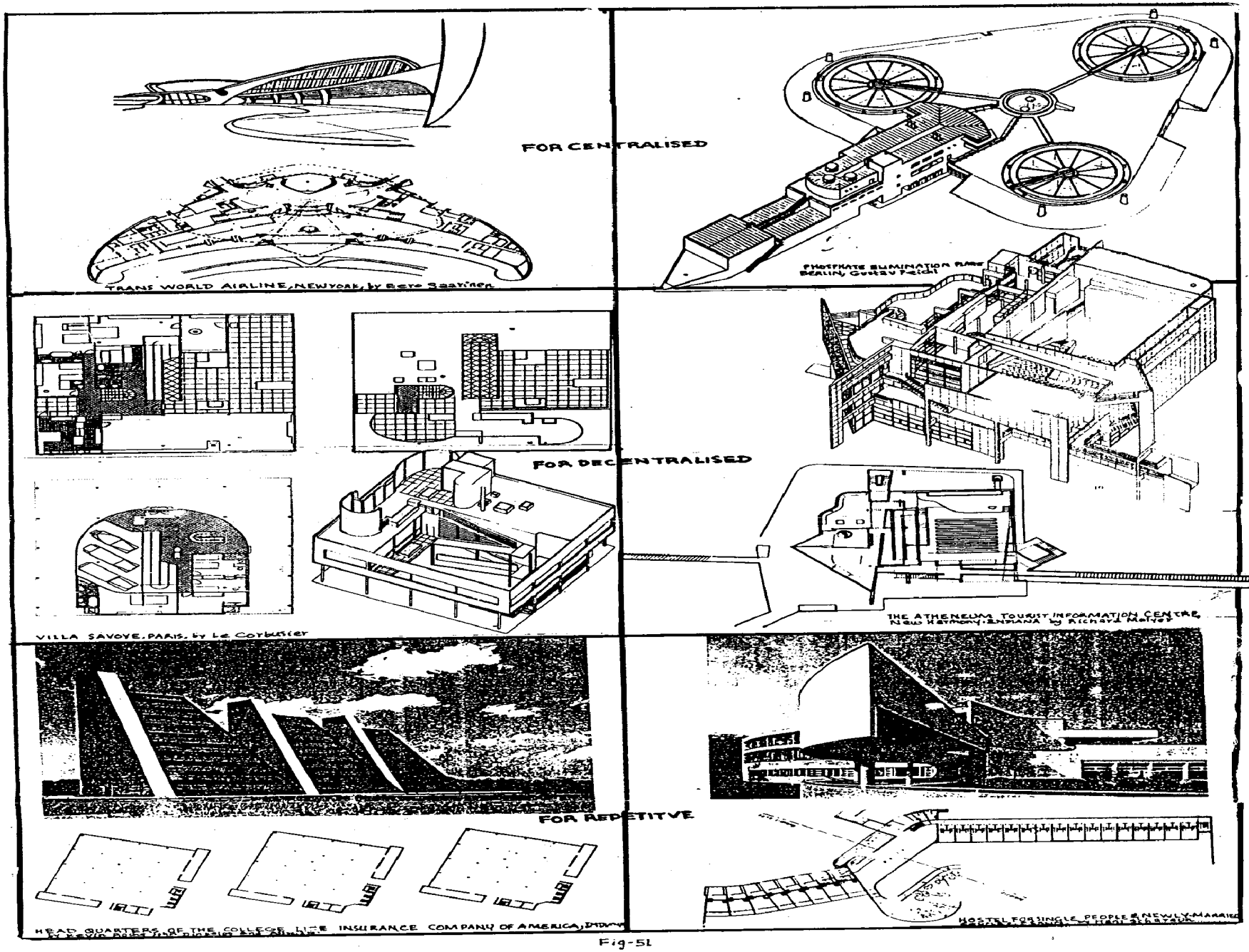

FOR CENTRALISED
TRANS WORLD AIRLINE, NEW YORK, by Eero Saarinen
FOR DECENTRALISED
VILLA SAVOYE, PARIS, by Le Corbusier
THE ATHENEUM TOURIST INFORMATION CENTRE, New Harmony, Indiana by Richard Meier
FOR REPETITVE
HEAD QUARTERS OF THE COLLEGE LIFE INSURANCE COMPANY OF AMERICA, Dallas
HOSTEL FOR SINGLE PEOPLE & NEWLY MARRIED

Fig-51

The figural Solid

The enclosing structure which affects the interior/ exterior space in many ways should be dealt critically. Wall/roof moldings and trimmings as soothing treatments for insecured emotional desire; which all to endow the subject a nature that reducers elements down to a mannerist set of principles,. and which intern to affect our living space, should be avoided as the subject is far from an approach limited by such surface aesthetics.

- The intrusion of more structural elements, columns, irregular beams exposed, etc., into the room spaces of a building design, will all endow the space a store profile, so all these shall be reduced.
- The reduction in dimension of enclosing and support elements in buildings over the years, a process that profoundly affected the architecture and urban nature of the times in their spatial organization, is a good reference to appropriately select and employ building materials./ See *fig.59/*

Having considered all these aspects, it will be helpful to carefully study the design guide enclosure given in the appendix. Hence from such conceptualization the following procedures will be performed:

- Ideal diagram of a conceived enclosure
- Site related diagram will then be developed
- finally form generation following the previous form studies of source domains will be worked.

Thus, with the understanding of such self-evident facts, a genius designer with his intuitive convictions can bring the best to satify, A good architectural design requirement.

CHAPTER-7

CONCLUSIONS AND RECOMMENDATIONS

Of all challenges in the discipline architecture that which invites more heated debate is regarding the issue of seeking design methodology. Most efforts which are put to this are still bouncing abruptly before touching the deep foundation from which to evolve a concrete meanse an architect can use to solve the tasks he is facing. But the thing rather was not to be that, although architecture is obviously operating on ethnic domain in coordinating human activities into a cultural synthesis and thus can take a thousand face panorama, it undoubtedly needs some sort of communal conception in the extraction of certain fundamental features useful as meanse of design guidelines.

Since it is known that good architectural design emerges when various forces reach a state of equilibrium in the universal scheme of things, and as the sources of the forces are obviously known to be the human, the environmental and the building fabric as the basic components of architecture, the next imperative stage seems only the proper delineation of the integrity of these components as symbiotically - interactive living entity. And eventually to put this into effect, an integrated approach that considers the environment which exerts pressure on man and viceversa, for the later fights the pressures by seeking a reconcilling and filtering buffer- the building fabric as shelter is approached. This approach is preferred because it is thought to circumvent architecture learners and practitioners from dealing with the clipped portion of the subject like 'atomists' in the understanding of its vast and interwoven nature. Hence before getting down to the integrated manifestation of the above components that constitute the design trade, it is worth mentioning the imperative necessity of history of architecture as it is the source of experimental experiences and commulative wisdom to extract good design secrets. Anthropology, too, can relate, from the very beginning of human existence, the social bond as it is expressed through the physical structure of shelter, in the evolution of the way of life.

As man perceives and appreciates space form and its envelope structure from distinctly but interrelated attitudes - from the physical, from the emotional, and from the intellectual, it is sensible that the built environment in all its conditions shall satisfy this need by responding to the anthropometric and ergonomic requirements criteria. That is, the physical environment should be related to the biological make up of man. Our perception, specially vision which provides the most detailed and extensive information about the environment being assisted by the balanced use of other senses suggests its prior consideration in our built environment design and

development. Hence some facts on perception that have a direct bearing in the alteration of a design theme are considered./ See on optical consequences and some facts on perceptions *fig-*/10,11,12,13,15,16,17/

Spatial and temporal effects are clearly apparent in the sense of this sight domain. Hence a fresh look is given to the study of vision where by the quantification of enframement that defines terminus size for vista delineation is possible/ *fig.*18/

This helps to decide the inclusion of a required scene at a single glance for certain depths Say; a distance from a walkway to building elevations or setbacks and others. Visual bulk control, configuration textures, Skyline of built environments and other building regulations can be cross-checked to satisfy the advantages generated by this approach to relate our building Laws more to the human biology and to create a better human environment.

It would seem also that the architectural design analysis and synthesis must begine with the study of the emotional responses derived from the purpose of a project and expressed interms of space organization and the modalities of its enclosing structure. Thus lines, shapes/ forms, contour, texture, collour, pattern of sounds, all have in the abstract certain predictable impacts on the human intellectual- emotional response.. And the choice of an appropriate shape profile or form to invoke moods of pleasure or any other predetermined emotion can with careful study be made as proposed by Simonds./ See on page 29/ Then it is only through such an approach that we can be a good friend of our own designed habitat and avoid the strange nature of our buildings. That is to say our buildings are not deemed to be single units, but their functional relationship with man, with his environment, with the natural environment, the surrounding is solved in a unified fashion. Using ecological reasoning as a framework, buildings must be judged not only interms of their individual design and utility, but also on the basis of whether or not they are good neighbours.

The form and nature of the space we are in to define a place is determined by features and events of the natural environment as landscape, climate and obviously the man made environment. The geoclimatic distribution, the existing builtforms of a site like urban masses and the cultural medium with its law formulations shape the overall form of buildings. In this it is crucial to consider the most important aspects of the impact of the sun on building orientation and form configuration including material type selection, land forms and building regulations to ensure the fulfilment of proper ergonomic requirements for human contorl. Man has been extracting and adopting of many events from nature and his own practices that suit him best. Our living space form, subjected to the merit of the enclosing structure is affected by some form

generators conceived and adopted in the organized space, often considered as design principles./see on page.51/

The form and size of the enclosed space is very much dictated by the type, availability and structural properties of materials. Specially the source of dead- space, which is the dormant presence of the enclosing structure, needs careful tackling to minimize the ratio of the volume of material to volume of space created /fig.36/

The proposed geometric forms/ *fig.* 47/, structural forms / *fig*43/ and roof typologies/ *fig*-49/ to inspire certain architectural form conception as source domains are presented. such studies and manipulation of forms is thought to influence the tendency and form likings of some architects at later ages as observed in Wright,F.L../ See Fig. 46/

Having all such considerations, the task of integrating these fundamental components of design to make a clear response through the composition of pleasant forms with less material bulk and enhanced spatiality, set against the various internal and external conditions or aspects of the building and the entire built environment, is given to the reader. It is then through such a comprehensive approach that the passage of knowledge of architecture can regain its foothold and organize a deep defense against the terror of short-life trends while proposing a guiding principle of design for it.

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GLOSSARIES

Analysis: Separation or breaking up of a whole elements or component parts.

Anatomy: systematic description of the body. Ten major systems -skeletal, muscular,

Integumentary(skin), circulatory, respiratory, alimentary, urinary, nervous, endocrine(glandular) and reproductive.

Anthropometrics: direct measurement of the human head and body-statistical analysis of those dimensions.

Deduction: Deriving a conclusion by reasoning. Inferring from a general principle.

Ecology (human): study of man as an organism in relation to his physical environment, effects of geographical location, climate, food supply, shelter, interactions with other species for growth, size and development of physical characteristics.

Ergonomics: study of variations in illumination levels, noise levels, temperature, air movement, etc. as a basis for design. It is the "scientific study of man in his working environment.

Generalization: A general statement, law, principles, or proposition.

Geometry: a branch of mathematics that deals with the measurement, properties and relationships of points, lines, angles, surfaces and solids; broadly the study of properties of given elements that remain invariant under specified transformations.

Heuristic: Serving to guide, discover or reveal. Valuable for stimulating or conducting empirical research but unproved or incapable of proof.

Hypothesis: A proposition, condition or principle which is assumed, without belief, in order to draw out its logical consequences and by this method to rest its accord with facts which are known or may be determined.

Induction: Reasoning from a part to a whole, from particulars to generals, from individual to universal.

Methodology: The approaches employed in the solution of a problem; a branch of logic that analyzes the procedures that should guide inquiry in a particular field. Methods of inquiry, techniques, procedures used in a particular field.

Organize: To put in readiness for co-operative action.

Physiology: systematic and structural analysis of the ways in which different parts of a living organism are adapted to each other, and of their interactions and functions.

Principle: An empirically derived conclusion about irreducible qualities of a system. The particular abstractions that summerize the phenomena of a given subject field.

Psychology: study of behaviour of man; study and correlation of his abilities, especially those contributing to intelligence, measurement of personality traits, effects of heredity and/or environment on personality, function of the nervous system, physiology and psychology of perception.

Rational: Power to make logical inferences and draw conclusions that enable one to understand the world about him and relate such knowledge to the attainment of goals.

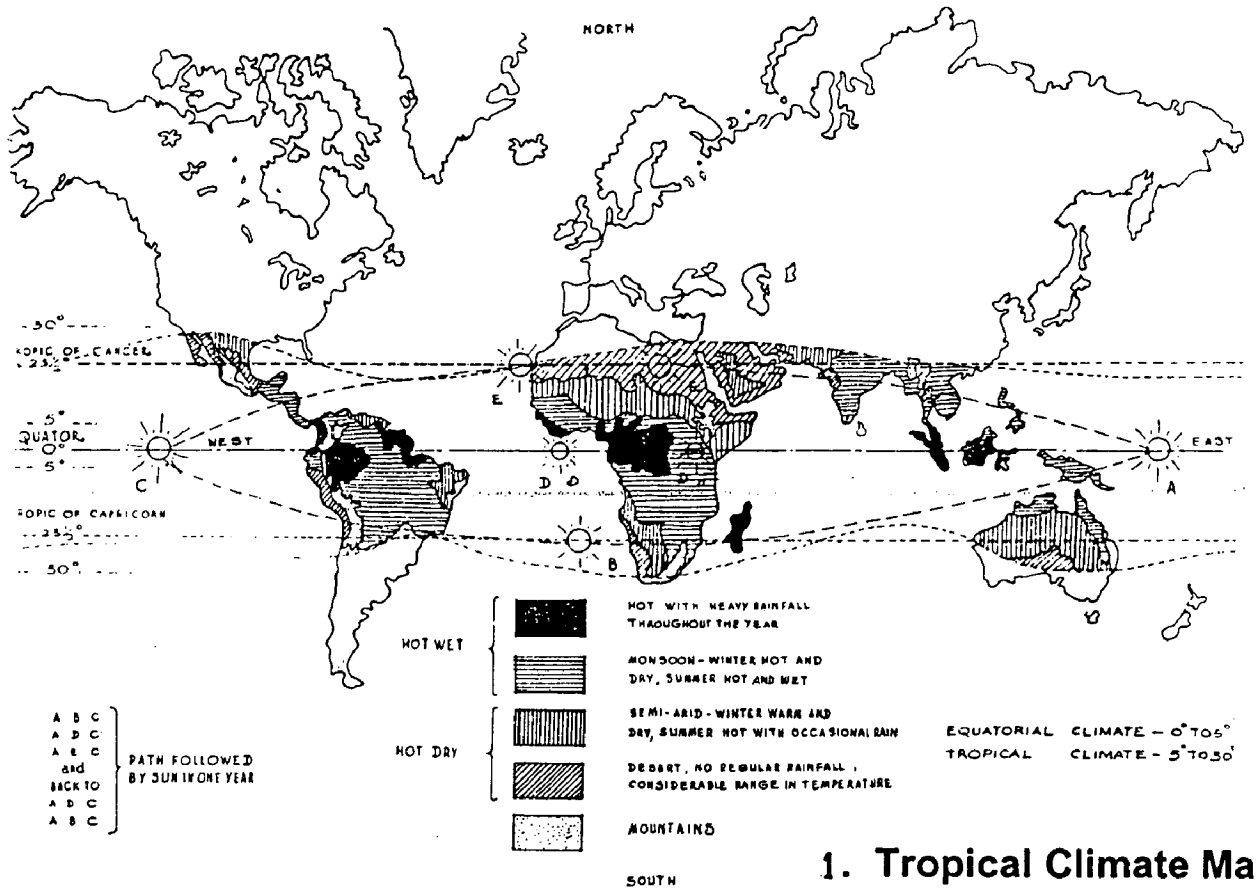
Research: Critical and exhaustive investigation or experimentation having for its aim the discovery of new facts and their correct interpretation.

Social psychology: observation of people in groups and of their effects on each other in terms of output, efficiency, wesll-being, etc.

Sociology: the study of society in terms of all that happens to human beings by virtue of their reactions to each other with reference to social structure, social functions and social change.

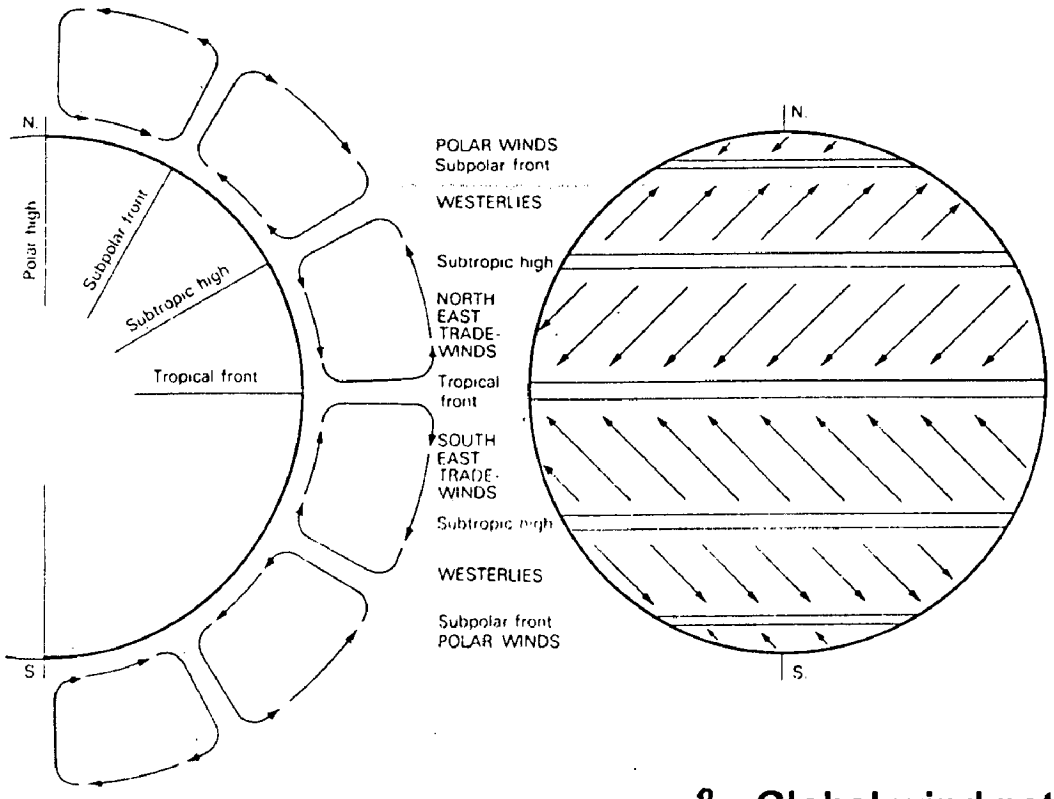
Synthesis: Composition or combination of parts or elements so as to form a coherent whole.

APPENDICES



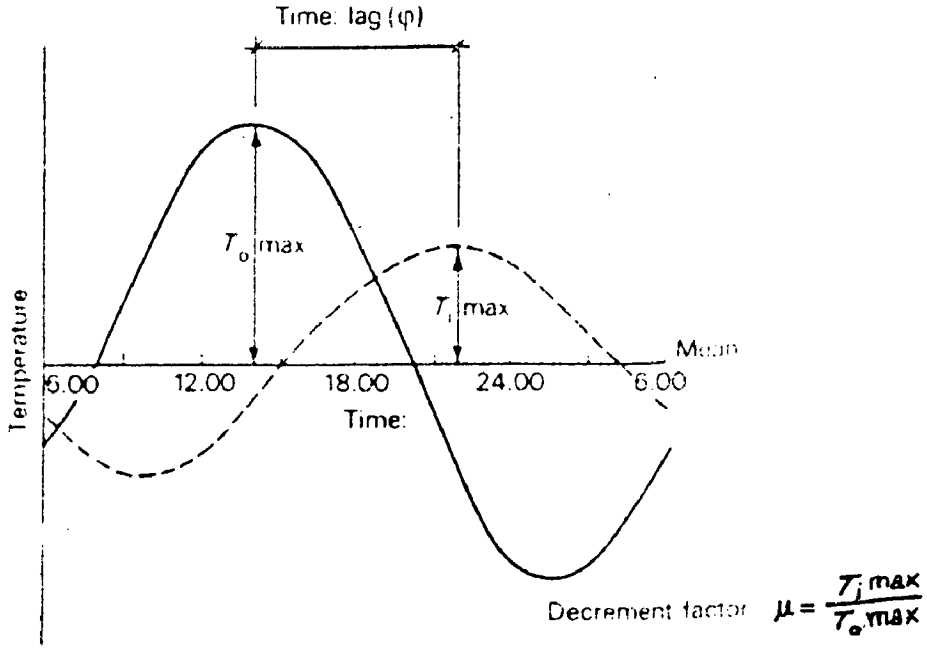
1. Tropical Climate Map

Map Showing Tropical Climate and Tropical Zone

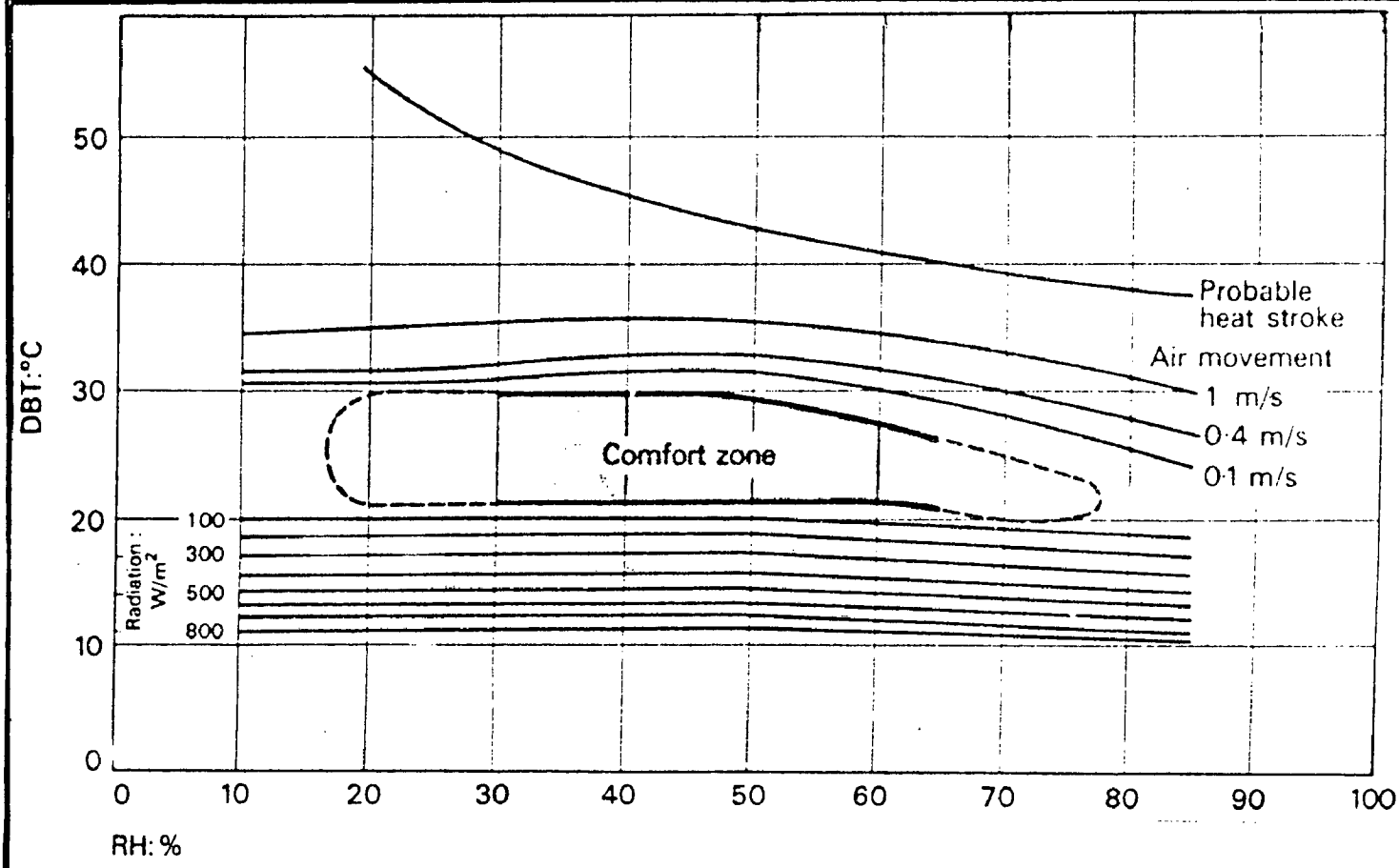


2. Global wind pattern

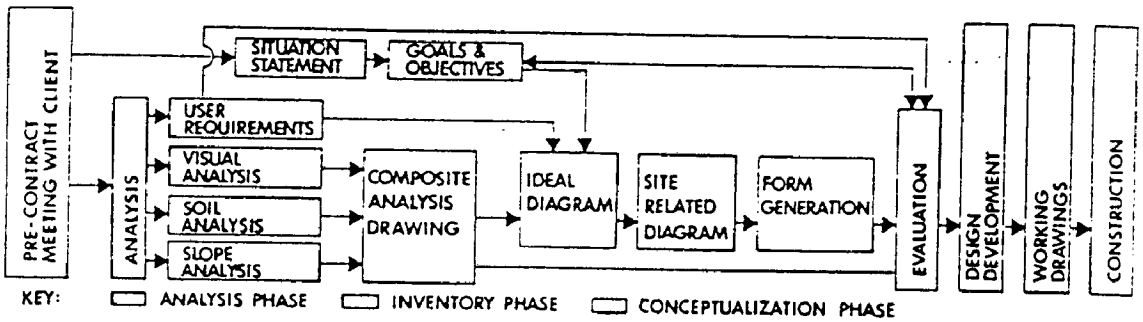
source, 'Manual of tropical housing and building' by Koenigsberger, Ingersoll, Mayhew, Szokolay



3. Time-lag and decrement factor



4. Bioclimatic Chart /After O.Olgyay/



5. The architectural design activity

/by Hagler D.E. & Wallach P.I./
'ARCHITECTURE DRAFTING AND DESIGN'

6-Characteristics of Selected Spanning Systems

Primary means of resisting loads	Spanning system	Usual materials and types		Usual span range(ft)	Typical span/depth ratio	Typicalspan/thickness ratio
Tension	Cable	Stress with joist or concrete panel deck		100-500	DNA	300+
Compression	Arch	Tincer, glued-tamnated		70-130	DNA	35
		Tntcer truss		1100-220	DNA	40
		Steel truss		130-330	DNA	40
		Renforced concrete, ccirvoluted or ribbed		70-220	DNA	30
Bending and shear	Flate deck, floor	Record	Joist with plywood subfloor	8-20	20	DNA
			Beam with planks	12-30	18	DNA
		Steel	Beam w/Steel subfloor or concrete slab	15-50	22	DNA
			Bar Joist with steel subfloor	12-60	22	DNA
		Renf. Concrete	Flat Plate w/or w/o drop panels	10-20	30	DNA
			Beam with flat stab	15-35	15	DNA
			Pan joist	15-35	20	DNA
			Waffle pan	20--50	22	DNA
			Precast Plank	20-40	38	DNA
Tension and compression	Truss	Timber members		25-100	5-12	DNA
		Steel members		70-200	5-15	DNA
Membrane action / tension & compression	Dome	Reinforced shell concrete thin		50-150	DNA	200
		Reintorced (convoluted or ribbed) concrete		100-300	DNA	40
		Steel truss		150-500	DNA	60
Membrane action / tension & compression	Vault	Reinforced concrete thin shell		60-160	DNA	175
Bending and shear	Barrel vault and folded plate	Reinforced concrete thin shell		60-120	12	200
Tension & compression	Space frame	Steel members		70-300	30	DNA
Membrane action / tension & compression	Warped surface	Reinforced concrete thin shell		70-200	DNA	200
Tension	Cable net	Steel		100-350	DNA	600+
Membrane action Tension	Air	Fabric- supported		150-600	DNA	1000+
		Fabric-inflated		70-180	DNA	30

From 'ELEMENTARY STRUCTURES FOR ARCHITECTS AND BUILDERS'

BY SHEAFFER R.E.

COLLECTION OF DATA

DATA REQUIRED

design requirements
- building type, purpose, occupancy
- flexibility of internal spaces
- security, protection
- users' preferences
- environmental requirements

design constraints
- client's economic policies
- client's building economic policies
- cleaning, maintenance policy
- design life, durability
- availability of resources
- construction programme
- dimensional basis
- insurance, fire brigade, legislation

design context
- site, climate
- programme
- structural context

↓

performance requirements for building fabric
- structural, fire resistance, security
- design life, durability
- cost limits
- environmental performance

DESIGN OF EXTERNAL ENVELOPE

TAKE BASIC DECISIONS

POSITIONS, SHAPES AND SIZES OF OPENINGS

walls and roofs
- consider access and egress
- consider view
- consider daylight and sunlight
- consider ventilation
- consider noise
- consider heat
- review decisions

CHARACTERISTICS OF OPENINGS

walls and roofs
- consider heat, air and sound control
- consider light, view and privacy

CHARACTERISTICS OF SOLID FABRIC
- review earlier structural decisions
- decide solid wall fabric
- decide solid roof fabric
- decide solid lowest floor fabric
- review decisions

↓

TAKE DETAILED DECISIONS

solid fabric
- decide details of wall fabric
- decide details of roof fabric
- decide details of lowest floor fabric

openings
- decide details of wall openings
- decide details of roof openings

junctions
- decide joint sizes
- decide joint shapes
- decide joint materials

↓

TAKE FINAL DECISIONS

whole envelope
- finalise drainage
- finalise cleaning and maintenance
- finalise appearance
- finalise cost plan
- review decisions

DESIGN OF INTERNAL DIVISION

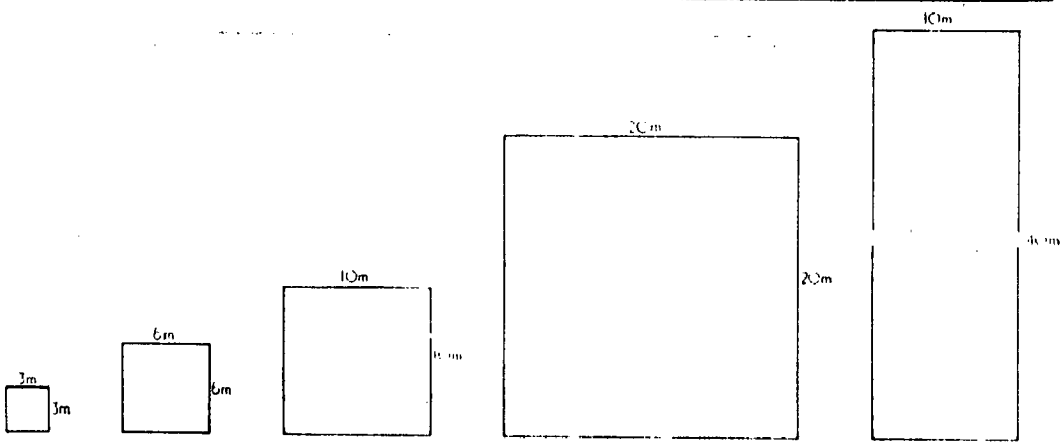
RELATE DESIGN DECISIONS TO PERFORMANCE REQTS.

partitions/floors/ceilings
- adjacent elements
- structural requirements
- support/fixing facilities
- radio-active screening
- dirt resistance
- thermal performance
- sound control
- light and view
- ventilation
- fire resistance / security
- accommodation of services
- durability, maintenance, appearance
- dimensional considerations
- cost plan check

7. Design guide-Enclosure

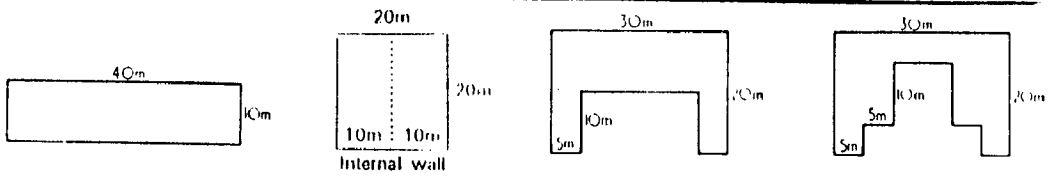
/ From 'Hand book of building enclosure' A.J. 1974 /

Table I Effect of plan size and proportions on cost of enclosing wall element



	Shape A	B	C	D	E
Perimeter (m)	12	24	40	80	100
Area (m²) of enclosing walls (£8 per m²)	36	72	120	240	300
Floor area (m²)	9	36	100	400	400
Wall/floor ratio	4·0	2·0	1·2	0·6	0·75
Cost (£) of enclosing wall element per m² of floor area	**32·00**	**16·00**	**9·60**	**4·80**	**6·00**

Table II Effect of plan shape on cost (£) of substructure and primary elements (all shapes are the same area ie 400 m²)



	Shape F	G	H	J
Floor slab (£4 per m²)	1600	1600	1600	1600
Perimeter foundation (£9 per m)	900	720	1080	1170
External wall (£8 per m²)	2400	1920	2880	3120
Flat roof (£8 per m²)	3200	3200	3200	3200
Roof edge (£3 per m)	300	240	360	390
Internal foundation* (£7 per m)	—	140	—	—
Internal wall (£8 per m²)	—	300	—	—
Total cost	**8400**	**8120**	**9120**	**9480**
Cost per m² of floor area	**21·00**	**20·30**	**22·80**	**23·70**

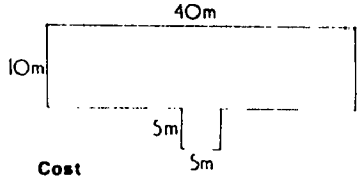
*An internal foundation is assumed to run across the width of shape G

Table III Actual savings achieved by reducing length of F to 30 m

	Cost £
Floor slab 100 m² at £4	400
Perimeter foundation 20 m at £9	180
External wall 60 m² at £8	480
Roof 100 m² at £8	800
Roof edge 20 m at £3	60
Total	**1920**

Note: this is less than ¼ of the floor area (ie £2100)

Table IV Additional cost of small bay added to F



	Cost £
Floor slab 25 m² at £4	100
Perimeter foundation 10 m at £9	90
External wall 30 m² at £8	240
Roof 25 m² at £8	200
Roof edge 10 m at £3	30
Total	**660**

Note: this exceeds the saving achieved on floor area (ie £625)

8. Information sheet enclosure

/ From Hand book of building enclosure' AJ 1974/

9. Information sheet external walls

	Building shape[6]	Siting and orientation[6]	Window area[7],[15]	External shading[1]	Internal shading[1]	Special glasses[4] (mainly affecting radiant energy)	Double glazing (affecting conductive energy)
Heat gain	Elongation of east-west axis increases solar gain less than elongation of north-south axis, or square plan form. Significance of cooling load due to heat gain through windows diminishes with increased building depth	Consider carefully incident radiation on facade orientations, as this has most significant effect on thermal balance[11]	Heat gain is proportional to glass area. Also consider interaction with noise[7]. In noisy surroundings windows tend to be kept closed, and heat loss due to ventilation is reduced. So heat gain may increase	Can be designed for total sun exclusion. Consider relative benefits of horizontal or vertical shading elements (depending on orientation)	Will obstruct direct radiation but unless highly reflective, will release absorbed heat rapidly to internal air	Wide range of special performance glasses diminish radiation by various degrees[4] (See table II)	Little effect unless special glass is incorporated as outer glazing, when comments are as for previous column
Heat loss	Significance of heating load due to heat loss through windows decreases with increasing building depth. Heat loss is proportional to surface area. Cube is efficient enclosure but not best shape for optimum heat balance	Topography of land can appreciably affect air flow and exposure. Exposure degree is related to orientation[6] Stack effect in tall buildings increases window infiltration loss. Exposure increases with height	Heat loss is proportional to glass area. Only in Scotland is window area included in composite required wall U-value for statutory standards	No effect	Curtains and closed venetian blinds can marginally reduce U-value as well as radiant temperature	Little or no effect	Double glazing brings U-value to 2·8 W/m^2. Optimum separation is about 12 mm ($\frac{1}{2}$in). Little further benefit obtained from greater separation. Reduced heat loss probably not significant in cost terms (see below) but important for comfort
Visual daylight[1]	Daylit building is usually thermally capricious. Daylight for task illumination will determine narrow shape, but daylight for amenity will allow deep plan shape	Little effect except for presence of urban obstructions	Reduction of glass area usually means loss of task lighting; but natural amenity lighting is still possible	Fixed external shading diminishes daylighting, the degree depending on design	Good control—convenient if flexible natural lighting levels can be achieved during maximum radiation	Light transmission is related to total heat transmission[19]. Problems of colour rendering	No effect
Visual glare[1]	Shape has no effect on sky glare, but can cut out glare from low-angle sun	No effect on sky glare. Low-angle sun may penetrate from east to west (am) and opposite (pm)	Sky glare is little or not at all affected by glass area in walls	Can reduce sky and sun glare. Consider relative benefits of horizontal or vertical shading	Good control	Little effect on sun glare but they can contribute to control of sky glare	No effect
View out[1]	In high building view out from top floors may require different treatment of window shape than lower floors	This can be significant consideration in building conception	View out does not require large glass areas although it may be restricted	Does limit view out depending on design	Requires correct choice of shading type	View out significant only if light transmission is below 20 per cent. Problems of colour rendering	No effect
Visual sunlight[1]	Little effect	Sun penetration should be carefully considered[13], [14]	Sunlight effect is possible through small glass areas	Shading to exclude heat gain may exclude sun	Blinds and louvres can preserve 'effect' of sunlight	Benefit of sunlight is preserved	No effect
Noise	Incident sound energy on facade can be significantly masked by building obstructions	Incident sound energy can be significantly diminished by siting and orientation[13]	Effect of transmitted external noise is not directly proportional to window area but there is a relationship	Little or no effect	Little or no effect	No effect	Insulation increases with glass mass and spacing width. 100 to 200 mm width spacing is 5-10dB improvement on single glazed
Flexibility and control	Simple wide open spaces are easily adapted	No effect	Absence of continuous fenestration may limit flexibility	Can be made adjustable but such types are usually costly to install and maintain	Very good	No effect	No effect
Cost (capital and running)[6]	Difficult to estimate, but cost is related to thermal loading in relation to optimum building shape[6]	Good siting and orientation lead to significant reduction of services required and also some reduction of running costs	Glass and window frames are usually considerably dearer than the equivalent area of solid cladding. Running cost is high in terms of maintenance and thermal loss	Could significantly reduce services required in hot climates, hence running costs, but initial cost is high, particularly for movable shading. Maintenance of shading is expensive unless structural	Marginal reduction of services and running cost. Comparatively low initial cost, giving good visual benefit. Maintenance costs significant	Reduction of services depending on thermal properties of glass used. Initial costs generally proportionally to performance. Very low maintenance cost	Reduction of heating services and running costs. Consideration should include non-quantifiable benefits obtained from reduction of condensation downdraughts and cold radiation[9]

/ From Hand book of building enclosure AJ 1974/

Studies were made on this anthropometries to relate the physical form of man and the pattern of his activities both to the objects he is using and more importantly to his spatial requirements. For example, Leonard davinici and other renaissance theorists have found that the man's naval marks the center of a circle; and the outstretched hands can reach this circle's periphery./*fig.* 3 /

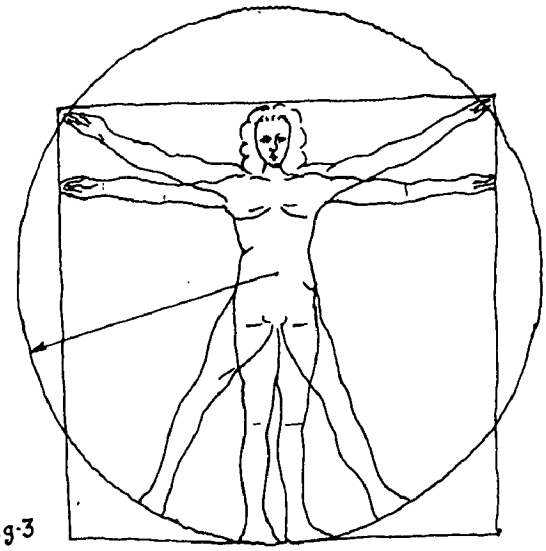
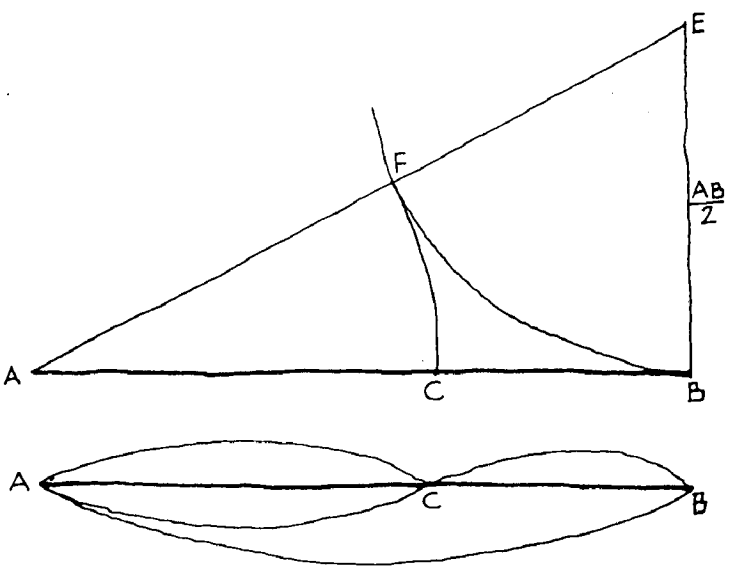
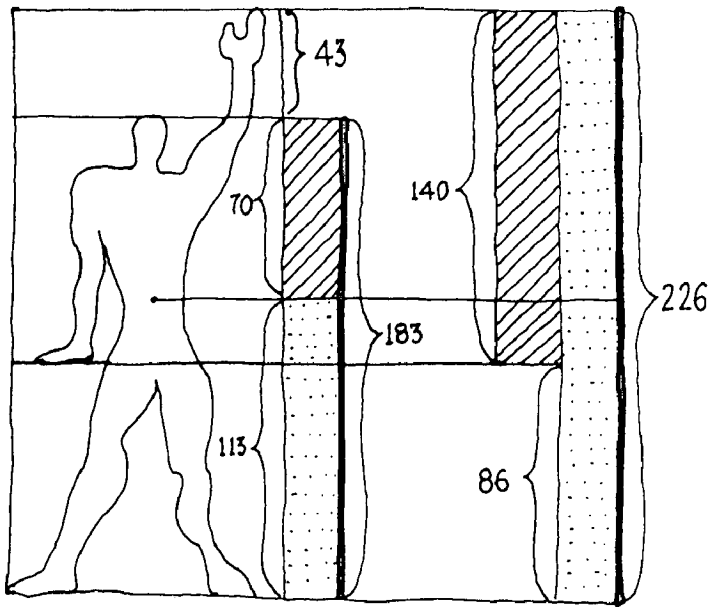


Fig-3

Also, Le Corbusier, basing his theory on the series of the eleventhcentury mathematician Fibonacci, takes the credit for reducing the Golden Number/very close to a ratio of 5=8/ to rational numbers applicable to architecture. Le Corbusier's contribution lies in his success in combining a fundamental, geometric principle with rational numbers and dimensions of significance for the body and movements of man. And this is automatically to be applied in the design of man's spatial requirement and its compositional proportion. / *fig.* 4 /





CONSTRUCTION OF THE GOLDEN SECTION

AC: CB = AB: AC

Fig-4 Le Modulor, Le Corbusier

The following is the summary of his principle.

A man with his arm stretched upwards is inscribed in a rectangle of 113x226 cm formed from two squares superimposed. At the level of the navel. A successive division of the total height into segments, whose neighboring ratios correspond to the Golden Number, gives the Fibonacci Series 226, 140, 86, 53, 33, 20, etc., (`blue Series'). A successive division of half of the height, that is to say from the square of 113 cm, gives the second Fibonacci Series 113, 70, 43, 27, 16, etc., towards the bottom, and adds towards the top the stature of the `standard' man; 183 cm = 70 cm + 113 cm (`red series'). As the two series start from a ratio of 1:2 (113 and 226), this is continued in the immediate vicinity of the series/with some approximations in the lower figures/. Le Corbusier designed the vertical dimensions of united de habitation by this principle. */fig.5/*

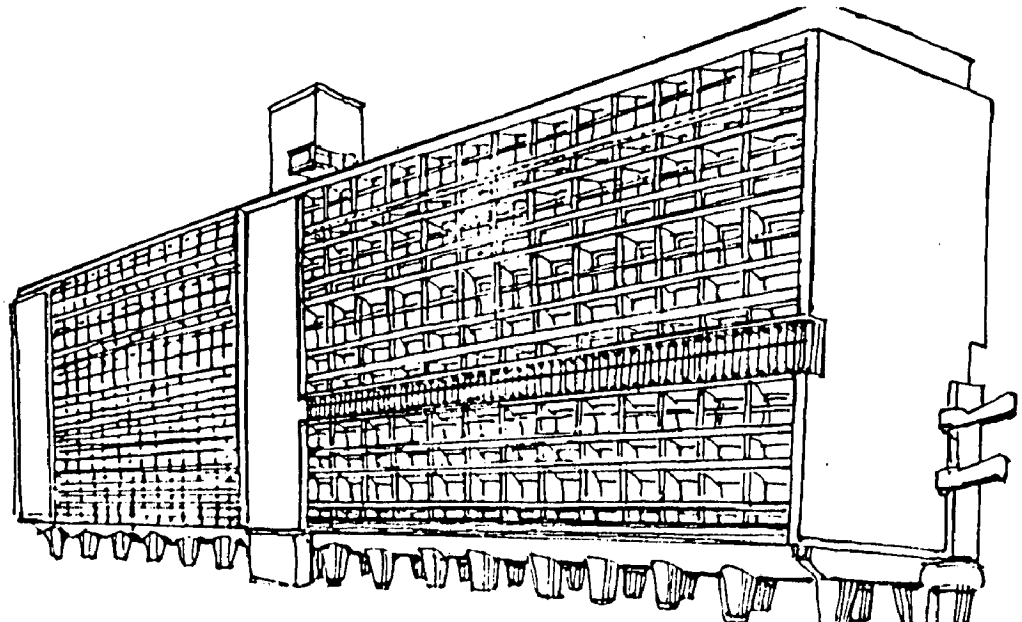
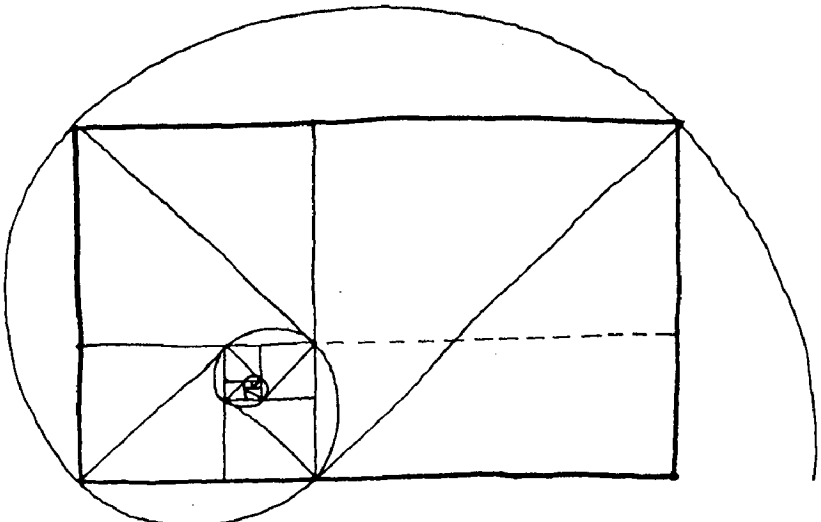


Fig-5 L'Unite d'Habitation, Marseilles, France, Le Corbusier, 1946-52.



Compare elevation pattern breadown with this

All built environment expressions fall within the range from 1 to 6 and the responses and emotions evoked depend on this range and the experience will show a definite variation from a high intensity emotion to a generalized emotion.

Because the neck is capable of turning in all directions, and so are the eyes, the vertical cones can tend to be a complex combination of various angles. For example, where the neck is moved around in a horizontal plane, the *Panoramic* views are formed instead of a linear view, and obviously the *skyramic* view are formed when it moves in a vertical plane. / *fig-* 22 /

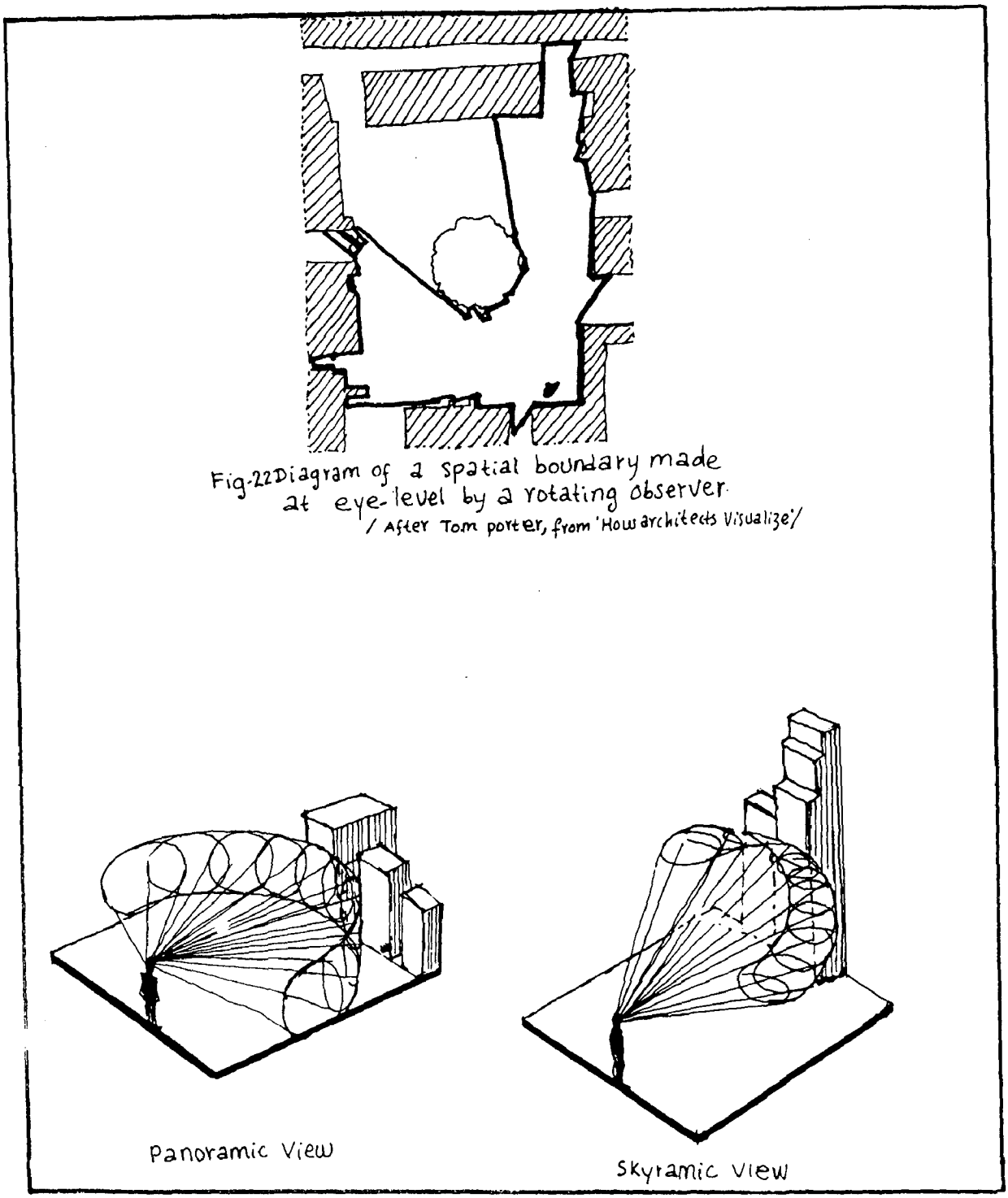


Fig-22 Diagram of a spatial boundary made at eye-level by a rotating observer.
/ After Tom porter, from 'How architects Visualize'/

The framed field of vision and Visual depth in Use:

'The look of a building when seen close at hand is onething, on a height it is another, not the same in an enclosed place, still different in the open.',Vitruvius

All proportions drawn/ constructed/ during design are in reality never perceived the same by the eye. The perspective distortion, and the fact that buildings and other landscape elements normally rises far above the horizontal eye level, alters these dimensions considerably. So; either the height of structures shall be reduced to a reasonable scale or they shall be put farther enough to avoid perceptual distortion, else creation of illusions by some means will be compulsory. The judgment of the third dimension in the field of vision may occurs in a number of ways by a change in the size of an object when it is seen at varying distances from the spectator; by changes in the clarity of detail; pattern and texture related to the apparent size of the whole object; by the overlap of the object and other features in the field of vision, and so on. See the following illustration how the elevational proportion of a built form is modified in relation to the framed field of vision./ *fig-* 18 b/