Le Corbusier: Chapel (Ronchamp, France, 1950-1955)

"Architecture ... which allows man to grow and create to the limit of his abilities."
Dedicated to my wife
I would like to express my appreciation to Professor Robert F. Lent of the Department of Architecture at the Rice Institute for his guidance and assistance during the preparation of this thesis.

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I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach.

Henry David Thoreau
Walden
PROPOSALS AND PREMISES

To build is an audacious act. The creation of an artifact affects each of those who use it, and originates a far reaching influence on the multitude who see and react to it. Unfortunately, architects—as the creators of the most influential artifacts known to man—are rarely aware of their responsibilities beyond making sure that the structure will stand and the mechanical systems function efficiently. Succumbing to the temptation to act without forethought, we belatedly discover that our sensibilities are usually neither much better nor much worse than those of our non-architectural associates. There are certainly too many monuments to our lack of insight and sensitivity. If we are to act conscientiously, an investigation is first required to illuminate our often unconscious assumptions, to challenge each of our present conceptions, and if they are vague and confused, to crystallize them before inflicting this confusion on our fellow man.

In beginning this, or any other, investigation, the first requirement is to establish a common ground between author and reader by discussing fundamental interests and aims. My general field of inquiry was, of course, architecture, but what would be the particular point of departure for this study? Would it be primarily concerned with spatial or linear proportions, structural considerations, or
perhaps the characteristics of a specific building type?
None of these aspects, or similar ones, were satisfactory.
Rather, my thoughts were concerned with the basic inter-
relationship between architecture and its creator-client:
man. Never before, it seemed to me, had general confusion
and contradictory ideas about this subject been so pro-
nounced as in our current civilization. Moreover, a brief
inspection of the nature of the relationship in the past
served to emphasize our contemporary predicament.

Before this century, theoretical ideals (with the
quality of beauty as the highest ideal) were formulated and
generally accepted as architectural goals. Architect and
builder shared a preference for certain forms and the tech-
niques employed to construct them: the means to the theoreti-
cal ideals. For example, the medieval architect and mason
not only knew how to build a wall or vault (that is, the
actual laying of stone on stone), but its greatest safe
dimensions, resistance to wind and rain, and the amount and
kind of bracing required as well. With such understanding
in most fields of human activity, a compact society was
slowly developed in which means and values were shared, in
varying degrees, by everyone. This common ground established
a definite, secure relationship between architecture and
man, and when forces of change threatened this relationship,
rules and formulas were designed to insure its static and
continuing tradition.
But by the twentieth century, the industrial, political, psychological, and architectural revolutions had overthrown this world, destroyed its unity, and disintegrated its universal values. A new multiplicity of values emerged, few, if any of which, were shared by the majority of people. The adoption of democratic ideals furthered this multiplicity by emphasizing the infinite differences between people and by demanding the individual's right to develop to the limit of his innate abilities. As a result, the existing relationship between architecture and man was replaced by a myriad of unrelated new ones. Certainly there were ample techniques, materials, and possibilities of forms, but general direction and all ordering disciplines were lost. The architect and builder no longer understood each other's goals, knowledge, or his function in the new society; means and ends were separated and even architects were divided into teachers and practitioners.

This is the existing dilemma. To continue our present attempts to relieve the environmental confusion by an occasional fine building is most inadequate. Instead, this thesis proposes to demonstrate the necessity and validity of developing a comprehensive basis for architectural design within the framework of our contemporary civilization. Such a basis must be sought in the essential capabilities of the architectural medium. It must be equally applicable and obvious to
architect and client, and, finally, it must be capable of generating an integrated expression of the purposes and values of our age.

Once this general theme is established, several specific topics of investigation emerge. First, it will be necessary to study the historical development of man's relationship with his architectural environment. Next, the twentieth century theories which seem to conflict with historical trends and ideas must be minutely examined. Here, we will use our most recent insights into the workings of the complex human organism -- its perceptual abilities and the environmental conditions which influence them. Sociology, for example, attempts to clarify the many relationships between society and the individual -- one of these is through the spaces and buildings of architecture. Physiological psychology explores both the physical and mental foundations of the human personality, its responses and learning processes, its synthesis of purposes, judgments and experience. Cultural anthropology studies the broad meaning of artifacts in relation to the whole culture in which they were produced. And all discussions obviously deal with semantics, the study of the definitions, connotations, and influences of language in human communication. From all these fields of knowledge, we shall attempt to discover what man's current needs and ideals require of his architecture, and how architects, through the essential capabilities of their medium, can provide for these requirements.
But in order to juxtapose and analyze this complex variety of facts and ideas from the history of architecture, from philosophy, and from the natural and social sciences, a method of approach and presentation must be determined. Do I want to criticize, "to express a reasoned opinion ... to judge with knowledge?" Yes, I would accept this as a part of my method. But the present connotations of "criticism" seem too restrictive in overemphasizing purely logical judgments and comparison with static standards. Again, "criticism" implies a direction focused almost exclusively on past events and objects that have already been created. For the purposes of this investigation, I choose to expand the usual connotations of the "critical" concept. It will include man's subjective, emotional, and irrational experiences as well as his more objective, intellectual, and rational ones. It's standards will remain dynamic, open to facts and ideas which may change or destroy previously held assumptions. Lastly, its point of view is less concerned with the analysis of past objects than with the creation of new ones.

Only through this enlarged and flexible concept can the critic of the arts become a functional and valuable part of our society. Some critics still exclaim that "the man in the street" is simply not interested in what they have to say,

so he can be safely ignored, but even if this dubious claim
is valid, an attempt is certainly required toward a better
understanding between the critics and the creators, whose
present disdain for criticism often equals that of the most
uninterested layman. Such understanding can only come after
a clarification of the proper significance—the powers and
responsibilities—of the contemporary critic.

Any criticism begins as an individual's response to
some stimulus and, as such, may be quite different for dif-
ferent people. Initially, then, the critic must realize that
his points of contact and identification with his audience
may be limited, the differences many and complex. His most
difficult task is to reconcile and eliminate these differences,
to show a heterogeneous public the relevance of ideas and ex-
periences possibly quite strange to them. Usually, as the
audience does not have the painting, sculpture, book, or
building before them, the critic must bring the object to
life before their eyes. Architectural critics are possibly
the most handicapped in this regard as they attempt to present a
complete three dimensional space which even a multitude of photo-
graphs cannot fully portray. Nevertheless, the attempt must be
made unless the possibility exists for each member of the audience
to examine the object. The audience is largely dependent here on
the good faith and insight of the critic, that is, his responsi-
bility to derive and present the essence of the object as he
sees it without the entangling and obscuring effects of devi-
ous minor points. The critic's difficulty is considerably increased
as he seeks enlightenment and improvement in several groups simultaneously - in the public, the creators, and in himself. Finally, the critic, with his unique position between creator and consumer, has acquired the responsibility, in a democracy, of checking authoritarian control by a few by increasing the knowledge and sensitivity of the many. He must bring a corresponding degree of compassion, sensitivity, and knowledge to his difficult tasks. He must be willing to share his values, judgments, and experiences, not as any form of dogma, but only in the hope that they may prove relevant and stimulating to others.

Before beginning the actual investigation, a final comment must be made about the manner of presentation. Although the underlying purpose of any piece of writing is unquestionably the author's desire to be read and understood, this truism is virtually forgotten in critical discussions of the arts. Instead of objective statements and a reasonable degree of clarity, the reader is bewildered by vague and ambiguous phrases, a seeming delight in the ethereal and unaccountable. Definitions, where they can be discovered, often differ, and a web of connotations—usually unacknowledged by the author—makes the comprehension of basic terms and aims difficult if not impossible. By such methods, a vast and formidable wall of terminology has been erected to the dismay of the intelligent and inquiring public.
This thesis is concerned with statements that can be verified; with words and phrases that can be defined and explained. It aspires to the virtues of clarity and simplicity. Its approach is not an attempt to propagate any predetermined theories of the author, but a true investigation; that is, a willingness to make as fresh a start as possible, to examine only what can truly be examined, and to conclude with however much or little can be conscientiously ascertained.
I know that architecture is life;
or at least it is life itself taking
form.

Frank Lloyd Wright
Modern Architecture
The Evolution of Architectural Absolutism:
architectural theory and practice become consolidated
in a select series of forms and proportions.

Greek, Roman, and Gothic

Throughout the history of the human race, man has created
spaces and buildings to meet his needs. But is the architectural
environment of each age isolated and individualistic, or is there
a continuing tradition of forms and techniques and of the relation¬
ship between architecture and man? Furthermore, if such a tra¬
dition does exist, what is its effect and validity in contemporary
architectural design? In beginning to consider these questions,
a brief discussion of some of the major historical periods of
architecture is necessary.

Surely the ancient Greeks, noted for their high regard for
systematic, logical theories, would have tended to adopt a select
group of architectural forms once their value had been substan¬
tiated and to apply them in all situations. But did this, in
fact, happen? Recent critics, examining the forms, proportions,
and spaces of the time, have observed much variety in these cri¬
teria that they reject any such rigid formula to explain Greek
architecture. Instead, each design seems to have been
produced for its particular site and functional requirements,
tempered by the preferences of the designer for certain forms and proportions.¹

Roman architects, echoing the organizational capabilities of their civilization, came closer to employing the same architectural forms throughout their vast dominions. But instead of simply relying on traditional motifs, they continued to experiment and evolve new forms (the dome and the barrel arch, for example) and materials (notably concrete) and to arrange older forms in new combinations to meet their changing needs.

In the early medieval period, architects continued to design individually conceived buildings rather than to adhere to any universal doctrine. However, several developments increased the possibility of regulating architectural designs. First, the perfection of the groin vault made with pointed arch sections allowed builders to span bays of various shapes with the same structural system. In order to solve some of the problems of church planning side aisles were continued around the apse to form an ambulatory and small chapels were added between the radiating apse buttresses. These two techniques were first united in a system at the Abbey Church of St. Denis (France, begun 1140) which became the prototype for the Gothic cathedral. But although the same motifs of plan, structure, sculpture and stained glass formed a distinct design theory, this theory was never a "pure" architectural one. Rather, it was equally concerned with

architectural, theological, and philosophical problems, and was calculated to glorify and illustrate the perfection of God. Examples of the characteristically medieval combination are seen in the varied applications of the doctrine of the Trinity in many three-part compositions. In music, the favorite form was the three-part motet, its ternary rhythm called "tempus perfectum" because of its Trinity symbolism. In the architectural designs of the great Cathedrals, the three western portals, the nave and two side aisles, and the vertical division of nave arcade, triforium gallery, and clerestory are all examples. Again, medieval builders, instead of adhering to a rigid, unvarying formula, experimented with new proportions and forms throughout the period.

The Renaissance

With the advent of the Renaissance in Italy, new attempts were made to codify rules for building based on the ancient ruins and the rediscovered architectural treatises of the Roman writer Vitruvius. Architects made pilgrimages to Rome for detailed study of each architectural fragment and folios of measured drawings were produced. The Florentine architect Brunelleschi (1377-1466) studied the ruins so carefully that he was "capable of entirely reconstructing the City (Rome) in his imagination."^2

Significantly, however, his own buildings employed highly original forms and proportions together with the newest construction techniques of the time.

But in the intensely logical mind of Leone Battista Alberti (1404-1472), architectural theory and practice were simply approached as a pure intellectual problem. His major theoretical work, De Re Aedificatoria (1450), proposed the specifications which were deliberately imposed on his designs. One example of his fusion of theory and practice is the church of S. Francesco at Rimini (1446-1455) where "a preconceived idea is painfully ... elaborated"\(^1\) throughout, while his application of pilasters to the facade of the Rucellai Palace (Florence, 1446-1451) becomes "a piece of pure empiricism, an intellectual gambit."\(^2\) Juxtaposed in the same period with Alberti's severe objectivity was a completely subjective point of view, typified by the writings of Francesco Colonna. Poliphilus, the hero of one of his dream fantasies, Hypnerotomachia (1497), creates a series of various architectural forms while searching for his lost love. And curiously, these forms and proportions are precisely the ones which Alberti believed were most desirable for architecture. The conclusion is obvious and inescapable; a select species of architecture was becoming preferred above all others, hypothesized in theory and constructed in actuality.

\(^1\) Ibid., p. 41.
\(^2\) Ibid., p. 42.
Alberti: Rucellai Palace (Florence, 1446-1451).

"... a piece of pure empiricism ..."

Colonna: The Hypnerotomachia (1467)

"(the) forms and proportions ... most desirable for architecture"
This trend towards architectural absolutism was given a decisive impetus by the establishment of the French Academies of Art, a logical result of the world of Louis XIV (reigned 1643-1715). Descartes (1596-1650) had based his whole philosophy on the traditional premise that the universe was an orderly system with all forces emanating from a single center. If the sun was the center of the universe, the king easily reasoned, he, "le roi soleil," was the center of the state. Consequently, he would replace natural and human disorderliness with a reasonable facsimile of cosmic law and order. All human activities were included under his protectorship—even art could embellish the cult of majesty. Certainly, it was far too important to be left in the hands of the artist, so the creation of the Academies of Painting and Sculpture (1648) and Architecture (1671) became natural and necessary.¹

The academic movement combined absolute ideas of society, government, and aesthetics. It implied a patriarchal principle through which arbiters of taste approved or rejected the products of the arts, and, as interpreters of the official point of view, they tended to become quite conservative. This restraint was directed against the ecstatic vision of the contemporary Baroque world. Here, rigid patterns and ancient assumptions were being

¹ Fleming, op. cit., p. 489-521.
shattered; irreconcilable opposites—rationalism and mysticism, religious orthodoxy and freedom of thought—were forced to coexist. New and often radical ideas were stimulated by the enlarged concept of the universe advanced by Copernicus (1473-1543), Galileo (1564-1642) and Kepler (1571-1630), a universe where this world was a minor planet in perpetual motion. Architectural conceptions like Borromini's San Carlo alle Quattro Fontane (Rome, 1663-1667) and Neumann's church of Vierzehnheiligen (Franconia, Germany, 1743-1772) shared these ideas. Here, plans and facades set up undulating and syncopated rhythms, stone seemed to become fluid and mobile, and ceilings rushed towards infinite space. But academicism rejected this eccentric exuberance for self-discipline, reserve, and, above all, adherence to definitions, artistic codes, and technical formulas. The historical ideas about aesthetics—of man's perception of his environment, particularly of objects of art—were easily and naturally fused into this system. Primary and fundamental among these ideas was the concept of two separate worlds: a sensuous, emotion-tainted world of change and illusion and an absolute changeless world of true, universal Art and Beauty. The basic problem of life and the goal of art was to bring man from his surrounding chaos of illusionary sensations and selfish desires to a purer, more perfect world. Therefore, in order to perceive even a fragment of true beauty, man was required to eliminate all personal interests, both his emotions and intelligence had to become will-less and disinterested.¹ Instead, he was presumed to depend on a distinct

Borromini: San Carlo alle Quattro Fontane, (Rome, 1663-1667)

"... plans and facades set up undulating and syncopated rhythms ... "
Neumann: Vierzehnheiligen, (Franconia, Germany, 1743-1772)

"...stone seemed to become fluid and mobile..."
species of "aesthetic emotions" which could only be described negatively; that is, by a process of eliminating other emotions.1 These doctrines assigned means and ends to the creator, the observer, and the critic. They formed a theoretical system notably suited for practical implementation by formulas and rules, and the Academies were created specifically to draw up such rules and to enforce them. Through the power of their official position, objectors were suppressed, boycotted, or forced to retire abroad.2

Undeniably, the system was a practical success. Hundreds of skilled artists and artisans were trained and became the founders of a tradition of technical excellence. But such gains in skill and official recognition were more than balanced by losses of artistic freedom and the forced acceptance of principles which easily degenerated from standardization into regimentation.

The solidified Idea

By 1770, Sir Joshua Reynolds could decisively conclude, "As an Idea is of necessity but one, so there can be but one mode of painting."3 This conclusion became the guiding principle for painting, sculpture, and architecture in most of the countries of the Western world. In architecture, academic sanction was quickly given to the ancient Greek and Roman forms and the wide publication of folios of archeologically correct details insured their rapid acceptance. From the Academic point of view, all

1 See George Santayana, The Sense of Beauty, (New York: C. Scribner's Sons, 1896) for an illustration of this approach.


problems of art had been completely solved. A universally applicable set of forms was compiled and declared to be "an absolute style, of which other styles were but the infancy or the decline." Now, the Gothic artist could be regarded as a man who wished to paint like Raphael, to build like Ictinus, or to sculpt like Prexiteles, but could not. So the Academy endeavored to make the task of future artists easier. Instead of struggling to create, they merely had to imitate already prescribed forms and techniques to achieve a portion of universal beauty—the highest attribute of art. At last, the means (the actualities of building) and the ends (the theoretical aesthetic ideals) had become one, component parts of a complete theory endorsed by the ruling elements of Western civilization.

The Contemporary Schism in Aesthetic Thought: twentieth century philosophers challenge the traditional ideas of perception and theorize new ones.

**Historical background**

Since the Academies began to spread their ideas in a compact and stable civilization, two and a half centuries of violent and pervasive change have taken place, drastically altering our physical environment, social structure, and our most fundamental ideas about every phase of human life. First, political absolutism in the form of monarchies with their corresponding social aristocracies were generally replaced by systems in which man had greater possibilities to shape his future. In the natural sciences, diverse developments from the steam engine and nuclear power to theories of evolution forced man to re-examine his traditional beliefs and, in some instances, to discard them. Again, the new sciences of psychology and sociology, in analyzing man's innermost physical and mental processes and their relationship with other aspects of his environment, posed serious challenges to historical conceptions. In all human activity, unity, stability, and sharply defined values were disintegrating: the Absolute was disappearing from the Western world.¹

¹ Ibid., p. 431.
Intuition

The first break with the theories of the aesthetic tradition is evident in the philosophy of Benedetto Croce (1866-1952). Although some of his principles reflect historical ideas, the majority of his concepts are significantly different.

"What is art?" I reply, in the briefest and simplest terms, that art is vision or intuition.¹

"... Intuition just means the absence of distinction between reality and unreality; it is as imaginary as a mental picture, the pure idealism of imagination."²

Here, beauty is no longer apprehended through will-less intelligence or "aesthetic emotions" but by intuition, a fusion of form and content, stimulated by the observer's own will. Now, for the first time, man is accepted as an emotional being capable of creative activity. He uses physical objects as stimulants for his imaginative spirit, and only in this spirit does art live.

But, strangely, in his effort to re-define artistic experience Croce divorces it from all rational knowledge. That is, man must not reason or judge or he may destroy his apprehension of beauty. Paradoxically, Croce has introduced emotion as an acceptable part of human perception, but, at the same time, has rejected the observer's faculties of reason. Therefore, man is still forbidden to employ all his resources in understanding and appreciating art.

² Ibid., p. 234.
Another aspect of the theory of intuition presents further difficulties. If all art resides in the spirit, completely separated from physical facts, the function and value of technique and of the object itself becomes virtually irrelevant. However, to remove these portions of the total situation would seem to impose very narrow limits on the possibilities of experience, "... not to honor, but to bereave the spirit."\(^1\)

**Empathy**

Contemporary with Croce, Theodor Lipps (1851-1914) was formulating a theory of perception which hypothesized new relationships between the observer and the object.

"It is myself that I feel as powerfully alive when I contemplate the beautiful. And I do not feel myself as being in relation to the thing, or against it, but in it... . This is what is meant by empathy: that the distinction between the self and the object disappears."\(^2\)

Lipps held that the observer's activity can contain both positive and negative properties. Without the negative aspect of inner opposition, there is freedom, pleasure, and beauty, with it there can only be conflict, frustration, and ugliness. Above all, only when this fusion or empathy exists can there be possibilities for the experience of art.

Finally, Lipps contends that the observer's activity even seems to affect the object:

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2 Theodor Lipps, "Empathy," Carritt, op. cit., p. 253
"If I emphatically feel my gaiety and cheerfulness in the blue sky, then the blue sky smiles. My gaiety is in it, belongs to it."¹

Here, man has assumed his most important position in the comprehension of art. He has changed from the disinterested being of traditional theory, to Croce's emotional intuitionist, to finally become the primary and fusing force of all the component parts of the artistic experience.

Violet Paget (1856-1935), using the pseudonym "Vernon Lee," was concerned with clarifying certain aspects of the theory of Empathy. Particularly, she wanted to rectify the impression that it merely attributed our reactions when we are looking at an object to the object itself. In analyzing the common phrase, "the mountain rises," she first states that "It is an idea started by the awareness of our own raising of our eyes, head, or neck, and it is an idea containing the awareness of that raising."² Next, this present act contains recollections of all similar acts in our experience and the thought of future ones as well. Finally, these aspects are united in the mind of the observer, their differences eliminated, their similarities intensified. Thus, rather than a simple projection of our own reactions to the object, "Empathy requires a comparative abeyance of the ego,"³ different, however, from the will-less traditional observer. For here, neither observer nor

¹ Ibid., p. 257.
³ Ibid., p. 464.
object remain supreme and detached but are inter-related in a single, complete reaction.

Like Croce's idea of intuition, Empathy contains some bizarre and dubious aspects. For example, some of its proponents have claimed that the spectator's feet, arms, head, and even the breathing rhythm of his lungs comes into the act of union with the object.¹ although such reactions have never been observed or in any way established.

Twentieth century traditionalists

At the same time, many twentieth century critics have denied the validity of these new theories and steadfastly reaffirmed the traditional doctrines. C. E. M. Joad (1891-1953), for example, rejects the basic premise of Empathy by maintaining that

"beauty is an independent, self-sufficient, ... (and) unique factor in the universe. When I say that a picture is beautiful, I am not making a statement about any feeling that I or any person may have or have had in regard to it, or about a relation between my mind or any other person's mind and the picture, but about a quality or property possessed by the picture itself."²

(1881- ...) re-echoes the historical reliance on pure, unemotional form as the sole initiator of the true artistic experience. From this viewpoint, he condemns Gothic architecture as "a mere juggling of stone and glass,"³ claiming

that our reactions to it are based on content and association, and are therefore of no aesthetic value. He also upholds the division of our sensuous existence from the changeless world of universal beauty: "art owes nothing to life . . . it is a world with emotions of its own."¹

Finally, the traditional concept of beauty as an unchangeable quality whose effects are constant to all men of sensitivity and knowledge has had considerable influence in contemporary non-objective painting. The painter Wassily Kandinsky (1866-1914) theorized about the constant effects of pure color—"white is static resistance . . . (and) blue is a call to the infinite"²—assuring us that "the vibrational effects of pure form and color are the same to the souls of . . . sensitive persons."³

At least one attempt has been made to alter the theory of Empathy so as to retain it within the framework of historical aesthetic ideas. Wilhelm Worringen (1881- ) conceived of the whole history of creative effort as contained in related concepts of Empathy and Abstraction. Abstraction is defined as "the highest forms in which man can rest in face of the immense confusion of the cosmos. Abstract art releases the object from its connection with other things and makes it

¹ Ibid., p. 23.
² Wassily Kandinsky, Concerning the Spiritual in Art, (New York: Wittenborn, Schultz, 1947), p. 44.
³ Ibid., p. 144.
absolute;"¹ it enables man to transcendent his human, emotional nature through the contemplation of universal forms. Empathy, Worringer claims, holds our limitless individual consciousness within the limits of the external object. But this view seems diametrically opposed to the major result of Empathy as proposed by Lipps and Lee; that is, to allow man to perceive himself and the object in a complete harmonious experience in which both are changed.

The schism between traditional and contemporary aesthetic thought is too deep to be glossed over so easily: each side offers opposing views of man, his environment (particularly in terms of artifacts), and the relationship between them. Traditional beliefs of the separation of a sensuous world and a purer, passionless aesthetic one, of form separated from and dominating content, and of man as the will-less, disinterested observer are challenged at each point. Contemporary philosophers tend to regard all art and the experience of it simply as aspects of man’s total emotional-intellectual-spiritual-physical existence. Likewise, the form and content or subject matter of an object are held to be indivisible. Next, since each man uses his imaginative and creative faculties as well as his past experience (as in Lee’s description of Empathy) in perception, these philosophers examine each situation separately, even considering the differences between various situations as more significant than

the similarities. Finally, the new theories reject man's historical position as passive receiver, conceiving of him, instead, as active creator and final assimilator of the artistic experience.

How, then, can we gauge the validity of these opposing systems of theoretical aims and ideals for man and art? To discriminate between such diverse concepts, we must increase our knowledge about man's physiological and psychological characteristics, his environment, and the interaction between them by employing the most recent ideas and experiments concerning these subjects.

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CHAPTER III
What of architectural beauty I now see,
I know has gradually grown from
within outward, out of the necessities
and character of the indweller, who
is the only builder.

Henry David Thoreau
Walden
Man's Basic Characteristics: man will exploit all the possibilities inherent in his environment to resolve his conscious and continual desire for change and improvement.

The origins of some of man's basic interests can be traced back even to other stages of evolution. One example of this, especially relevant to architecture, is the desire of many animals and of man for the seclusion of cave-like sheltering spaces and the freedom to gaze at the limitless horizon. Again, many of the basic needs which influence our entire lives are evident in our personalities as infants. Here, needs are limited and instinctive, common to other organisms as well as to man. Such requirements as food, warmth, shelter, and love (the recognition of our individual personalities) are present at the first breath of life. If all organisms share these basic desires to live and grow, what are the distinctive traits of man? Biologists have concluded that man's uniqueness lies in his pattern of growth and its chief characteristic—a conscious desire for change and improvement.¹

This desire is resolved, to an extent, by man's unique mental processes which give him the possibilities of foresight, rational thought, the use of symbols, and the creation of artifacts.

To further satisfy his desire for improvement, he begins, early in life, to assign values to the things and ideas around him which satisfy his interests. At first, he discovers values in food, love, the ability to communicate with others, to manipulate objects, etc. Notably, each interest has an object usually external to the person experiencing it; that is, he is interested in something or wants to communicate with someone.¹ The final result of this immensely complex series of value-judgements is to give man's life a directional quality in the sense that every judgment serves as a springboard for others to follow. Each individual's life-pattern and the history of man's evolution and cultural development exemplify this concept.

However, it is important to note that this growth pattern is not a rigid, deterministic force that pushes each individual in a specific direction or to a particular end. Rather, the direction and conclusion of each person's development depends largely on the possibilities that are inherent in his environment.

¹ Boas, op. cit., p. 19.
Environmental Influences: man's environment influences his acts and techniques, his general purposes and values, but the individual remains the final director of his development.

The infant is the complete ego, a universe of one, unaware of the interests of others. But soon, slowly and almost imperceptibly, this universe broadens as parents, relatives, and neighbors become influential factors. Each physical and emotional experience, seen by itself, is a minute inconsequential event, but together they become a substantial character-moulding force. In later years, the larger concepts of neighborhood, school, church, city, state, and country are introduced and slowly assimilated. And at last, the emerging faculties of the individual begin to test, judge, and give values to the multitudinous objects and concepts of his environment.

Even our most "automatic" acts are the results of this slow process of testing and learning. We use a knife and fork, or open a door, and are unconscious of our actions, for such techniques, once comprehended and practiced, become instinctive. In the same manner, artistic techniques have often become habitual and acquired terminal values; that is, values that are held to be good in themselves—the value of ends rather than means.\(^1\) The changeless, universal forms--

\(^1\) Ibid., p. 27-29.
the "beau ideal"—of the Academies and our "twentieth century Gothic" churches are examples of this. Even current architects, determined to conform to a narrow concept of the contemporary idiom, design flat roofs in climates where snow accumulates in such quantities as to make the roofs unfunctional if not dangerous. These and similar habits, if unquestioned over a period of time, become so compulsive that any alternatives seem unnatural and unthinkable. As a result of this process, not until the late nineteenth century did Western man cease to consider Oriental, African, and Oceanic artifacts as mere curiosities and begin to accept them equally with the art objects of his culture.

Still more fundamental than our acts, our general purposes are also subject to considerable environmental influence. For instance, we may grow up in surroundings where our pattern of growth is socially satisfied if we become a farmer, a minister, or an artist. But only the individual decides on the unique and final direction of his development; that is, how able a farmer, how effective a minister, or how creative an artist. The enormous differences of temperament, innate limits of potential development, and the ability to make judgments which will carry out our purposes account for this diversity and make each person truly unique.
Fundamentals of sight:

man's visual judgments result from his physiology and the lessons of his past experience.

Man's visual faculties comprise the major intellectual tie to his environment. His other avenues of apprehension—tactile experiences, sounds, odors, and tastes—are subordinate to the visual; "when uncertain, we always try to look." Therefore, a knowledge of the facts and ideas about our visual faculties is essential to the study of the relationship between man and that part of his environment which we classify as "architecture."

The human eye sees its surroundings somewhat like a photographic camera. In both, the image projected by the lens on the retina is broken up into dots by numerous rods and cones. Both see objects as inverted mirror images which the human organism, through a psychological correction acquired very early in life, turns around to bring into correspondence with reality.


The human eye causes various distortions of images, commonly called "optical illusions," some of which are particularly significant to architects. For example, one illusion causes a bright figure on a dark background to appear larger than a dark figure on a bright background. We now know that light spilling over the dark edges of a silhouette projected on our retina causes this, but even in classical times, the observation of this phenomenon influenced artists to place their white metope sculptures against darker backgrounds, making them appear larger to the observer below. Again, our tendency to "see" the centers of horizontal lines become concave led the architects of the Parthenon (Athens, Greece, 447-332 B.C.) to raise some of their horizontal lines at the center points, producing the appearance of a straight line (they also lowered some of their lines at the center points, depending on the relation of the line to the height of the observer's eye, to achieve the same result).

All of these phenomena were known and used by historical designers, but several recent discoveries are even more basic to this investigation. First, is the ability of the eye to "continue" and to "close" objects and groups of objects within its field of vision. Perhaps the initial application of this idea was the practice of the French Impressionist painters to replace green pigments in their landscapes with juxtaposed blue and yellow strokes of varying intensities.
Consequently, the observer's eye fuses these colors and actually "sees" green. Likewise, as illustrated in simple diagrams, the eye can and does construct such "latent connections" between groups of dots, lines, planes, and masses.

Second, research has revealed the eye's fundamental need for change and movement, its inability to concentrate on a single object or color for more than a short time. Without change, a green area will begin to appear red and objects become blurred and indistinguishable from their backgrounds. To provide what scientists call "regeneration of the receptors," relationships within our visual field must be actually changing or susceptible to change, contrast and "rest stops" become necessities. As a practical example of this theory, lighting engineers have become aware that large unvarying planes of light can become extremely irritating to those who work under them. Conversely, much more favorable reactions are obtained when artificial lighting conditions compare to the changing intensities and patterns of natural light.

Finally, definite linkages have been established between the brain and the millions of tightly clustered receptors in the retina of the human eye. Only after the image pattern on the retina is instantly sent by electrical nerve impulses through the optic nerve to the back of the brain is the object really

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"... the eye constructs ... latent connections"
"seen."¹ This is a significantly different concept of vision from the one accepted in the past. Historical theorists believed that when the eye sees—or the ear hears, or when the other senses are acting—there is an immediate and purely physical reaction; that is, the brain was not involved. One of those immediate reactions, but of a higher undefinable kind, was the aesthetic, dissociated from man's memories of past experience lodged in the brain. Even when the "aesthetic emotion" was considered to be of reflective or thoughtful origin, they insisted that this reflection was limited to a will-less, impersonal kind, completely divorced from the experience of the observer.

But we now realize that our visual processes are neither so simple nor so compartmentalized. First, the eye and the brain—(the container of all experiences)—are always combined in the act of seeing. Second, it seems that above a very basic physiology, the human eye literally teaches itself to see. Observations of people who have been blind from birth but gain sight in later life show that they have to spend a considerable amount of time in this learning process.² And what happens during this process? "It usually requires many days for the once blind to distinguish—without touch—between an egg and a cube of sugar, for eye and brain initially have no coordinated visual

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¹ Ibid., p. 126.

image of these objects to draw on.\textsuperscript{1} The conclusion is clear: we "see", or rather make our visual judgments, on the basis of our past experience.

\textsuperscript{1} "New Light on the Eye," \textit{Architectural Forum}, \textit{op. cit.}, p. 128.
The Hanover Institute experiments:
a detailed analysis of man's perceptive faculties

A series of experiments have been conducted at The Hanover Institute (Hanover, New Hampshire) to study the full implications of the new ideas about man's perceptive processes. Each of these demonstrations, although set up to explore a specific aspect of man's perception, becomes a component part of a larger and quite conclusive picture.

Three cubes—identification

In the first demonstration, the observer is asked to look through a series of three separate peepholes, each about the size of the pupil of the eye. In each case, the observer reports that he sees similar size cubes at about the same distance away from him. When he is allowed to look behind the boards through which the holes were cut, he discovers that one of the holes does indeed have a wire cube behind it. But another has a drawing on a plane, with hardly any of the lines running parallel and behind the last hole is merely a number of strings stretched between wires running away from the peepholes. However, although the observer now "knows" that neither of the latter two objects is anything like a cube, if he returns to the peepholes, he again "sees" cubes.

A set of small cameras reveals that the retina pattern
The Hanover Institute experiments: three cubes--identification

This is what we see when we look behind the scenes. The one at the left is a cube made of wires. The center one is a drawing on a flat surface. The third is a set of wires with strings on them. This latter one is also shown in a side view. The second and third ones do not resemble cubes in any regard. They lack rectilinear sides and one of them lacks three dimensions.
of the observer in the last two views was a set of intersecting and non-parallel lines on one plane. Why, then, did he continue to report that he "saw" a cube? He obviously decided that the material before him was a cube, regardless of its size, shape, or position. But we know that this perception could not have come from the material or the retina pattern (that is, his present environment) or from the future; therefore, it seems to come from the past. The observer takes what he "sees" (acknowledges to exist) and interprets it on the basis of his experience.

Two cubes—location in space

This experiment was set up to explore the relationship between our ability to identify an object and to locate it in space. As it begins, the observer's head is placed in a head-rest so that he can see two cubes in front of him. The right-hand cube is about three feet away while the left-hand cube is about twelve feet distant. As a second step, a small shield is placed before the observer's left eye to prevent this eye from seeing the far cube; that is, both eyes can now see the near cube (on the right), but only the right eye can see the distant cube (on the left). Finally, the observer is told to move his

1 Kelley, op. cit., p. 25-28
head slightly to the right, thus allowing the inner vertical edges of the cubes to coincide. He then reports that the distant cube seems to be moving forward to a position even with the nearer one and that this "moving" cube now seems smaller and non-cubical in shape. But throughout this experiment, as in the preceding one, the pattern of the two cubes on the observer's retina remained the same.\(^1\) Again, we must conclude that the spatial position we assign to an object, as well as its identification, seems to come from our past experience.

But, one might complain at this point, the validity of these conclusions is limited by the narrow range of the demonstrations employed. Isn't the observer being denied the use of his usual faculties to determine what is really before him? In actual situations, we move back and forth and turn our heads sidewise to "get a better slant on things," to judge the size and position of objects. Only after using all these clues, the protest might conclude, do we make our decisions. Perhaps, though, since our environmental clues are usually good, we tend to think they are perfect. And are they really so?

**Two balloons—the clues of size and brightness**

This experiment was evolved to test the reliability

of two of our visual clues. Its equipment consists of two balloons of equal size, lighted from above, and constructed so their size and brightness can be varied mechanically. In the first stage of the experiment, when one balloon is made larger and the other smaller, the observer "sees" the larger one move toward him and the smaller one move away. If the size is varied continuously, the balloons seem to move rapidly back and forth through space. In the second stage, when size is kept equal but brightness is varied, the brighter balloon seems to come nearer, the dimmer one to move away. Finally, if a balloon is made simultaneously larger and brighter or smaller and dimmer, its apparent movement and speed of movement increases considerably. From this experiment, it follows that our usually dependable clues of size and brightness can be sometimes unreliable. Moreover, similar experiments with our other clues obtain the same results.

None of the results of these experiments can be explained by referring to "reality" because "reality" and the observer's perception simply do not agree. Instead, we must conclude that man's estimate of his environment is never exactly right, but an assumption, based on previous experience, that what has been most probable will so remain.

1 Ibid., p. 434-437.
The distorted room--perception and action

Another demonstration was evolved to discover whether or not man uses assumptions based on previous experience to direct his actions. For this purpose, a room is designed with its floor sloping up and to the right, its rear wall receding from right to left, and its windows various sizes of trapezoids. Additional equipment consists of two similar metal balls hung from the ceiling, one in the left-hand corner and the other in the corresponding right-hand corner. After the observer is shown the true size and shape of the room and the position of the metal balls, he is asked to put on a special pair of glasses which makes all the various angles in the room appear as right angles. Now, when asked to touch the left-hand ball with a sufficiently long stick, he is unsuccessful; a following attempt to quickly touch the other ball also fails. Only after several very tedious trials can he succeed at either of these tasks.1

Intellectually, the observer obviously knew that the room wasn't rectangular, but he acted on his perception that it was. As a result of the wrong assumption, the action failed, but the observer could not have acted in any other way. Only after repeated attempts did his perception change and the action succeed, although here

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1 Kelley, op. cit., p. 38-41
This is a drawing of the distorted room. It does not show the distortion fully, because the back left corner does not appear to be far enough away from us. The reason for this is that there are so many things built into the room which violate the usual rules of perspective. For example, consider the two back windows. If they were the same size, the left one should look smaller than the right one, because it is farther away. It is actually larger, and when drawn larger, the left corner refuses to go back where it belongs. In order to realize how far away the back left corner is, we have to have the plan view, which is a horizontal cross section of the room. For the experiment, the observer is placed nearer the right wall than the left one.
again the retina pattern remained constant. Man seems to choose the perception that has the best predictive value, based on experience, for carrying out his purposes.

The lenses—the sense of surety

Previously, we have noted that man employs many indications or clues to perceive his surroundings. He is most content when all his environmental clues are complementary, mutually assuring, but when one or more of these clues is contrary to expectation, his "sense of surety" is disturbed. To demonstrate this theory by experiment, an observer is fitted with a set of lenses which makes the surrounding walls of a room seem to slope inward and the floor to slant up very sharply. Then, if he sees another person step into the room, he reacts violently, sure that the intruder will fall. When these lenses are worn outside the laboratory, trees seem to slant away from the observer and the ground rises steeply and unexpectedly before him. He cannot physically endure these distortions of his familiar environment for more than a few minutes, becoming frustrated and sometimes angry at his predicament. Likewise, participants in several of the previous experiments refused to admit the distinction between what


2 Kelley, op. cit., p. 49.
they perceived and what was actually happening; they could not broaden their perspective to include the radically and completely new factors confronting them; their past experiences had solidified into an absolute, closed group of terminal values.

When brought together, all these scientific observations and experiments about man and his environment share similar viewpoints and conclusions. Man is now considered as an extremely complex organism of many aspects, all closely inter-related in every activity. Mind and body (psyche and soma) act simultaneously; reasoning and learning are no longer purely logical, abstract processes, but are influenced by emotion, purpose, and past experiences as well. Similarly, emotions are not simple muscular or nerve responses, but are enmeshed with other aspects of the whole organism. Man uses all his faculties in assigning values to objects and ideas in his surroundings.

And how is this new picture of man related to his environment? First, without denying the existence of the "external world," we conclude from the demonstrations that the only aspects of it that man can know anything about are those aspects that are either helpful or thwarting in carrying out his purposes. Second, the origin of our sensations is in our past experience and their characteristics are largely determined by our individual histories. Next, sensations are no longer conceived of as ends-in-themselves.
but as aids for potential action to carry out our purposes. Again, these sensations do not come to us as completed wholes, but as innumerable clues which we assimilate and put into action.

Finally, the experiments emphasize two basic demands that man makes of his environment: a minimum of familiar clues—security—on which to base his judgments, and possibilities for constant change, growth, and improvement. He finds a large measure of security in the "approved" customs and values of his surroundings, many of which he adopts as his own, but significantly, (as shown in the distorted room demonstration) he will reject the familiar when it fails to satisfy his purposes. However, when existing conditions oppose his purposes and new opportunities are not apparent, or when he doesn't see what he expects to see, he is attacked by anxieties and frustrations (the distorted room and "sense of surety" demonstrations exemplify this). Man is always willing to learn and change, but faced with completely new situations, he actively seeks direction from his environment.\(^1\)

These conclusions contain apparent and fundamental implications for architects as designers of much of man's environment. Furthermore, the obvious differences that such implications have with past theories about architecture, man, and the relationship between them, encourage us to re-examine and re-evaluate the historical conceptions in the light of this contemporary knowledge.

\(^1\) Cantril, op. cit., p. 49.
CHAPTER IV
Perfection of means and confusion of aims seem to be characteristic of our age.

Albert Einstein
A Re-evaluation of Aesthetic Thought: the validity of previous aesthetic theories in the light of contemporary knowledge of man and his perceptions.

The conclusions we have drawn from our current ideas and experimental information about man seem to invalidate many of the concepts of traditional theories of perception while generally agreeing with the opposing theories of twentieth century philosophers. First, we now consider man's emotional, intellectual, spiritual, and physical aspects as inter-related, inextricably mixed in every action. And the various parts of his environment—levels of social, political, economic, philosophical, and artistic activity—are likewise indivisible, each a continual influence on all the others, each a contributing factor in every judgment. From this viewpoint, traditional divisions between a sensuous world and an artistic-aesthetic one and between form and content in objects of art must be rejected, for as art is an indivisible part of man's total environment, no association, emotion, or knowledge can be irrelevant to the experience of it.¹

Next, any single, static standard of artistic and architectural achievement seems inadmissible. We acknowledge

immense variations in time and place and differences in experience, purpose, and innate creative abilities which influence each perception of each person. Therefore, we now hold a relativist position in which the history of art objects becomes, to a large extent, the growth and expansion in the varieties of value which different people find in them.¹ It follows that, instead of emphasizing general, abstract theories of Art, we will discuss and analyze each of the several arts, with its own history, materials, limitations, and relationships with other aspects of man's environment.

Again, we reject traditional concepts of the disinterested, will-less observer and of the object as the originator of all aesthetic sensations. And on these points our principal differences with Croce's theory of intuition and the Lipps-Lee theory of Empathy are clarified. The Hanover Institute experiments lead us to conclude that the origins of man's sensations are in his past experience. But in contrast to Croce's virtual neglect of the object, medium, and technique, we affirm the value of these factors to stimulate particular sensations from man's vast store of experience. So, man and the object are both necessary: man as the creative force and the object as the point of departure for his creative activity. In opposition to Empathy, man does not change the object, but rather seeks to draw every potential possibility from it.

¹ Boas, op. cit., p. 61-63, 211-235.
And here, the final, and vast difference of our new position from all previous systems of theoretical ideas becomes evident. For instead of considering man's perceptions when he looks at objects of art as ends-in-themselves, we conclude that they are only the means which he uses to advance his individual aims in new actions. As we previously discovered, the unique trait which distinguishes man from all other organisms is his continual desire for growth and development. To implement this basic desire, he makes two requirements of his environment: it must provide a minimum amount of security, of reliable clues, from which he makes future judgments, and it must contain potential opportunities for his growth. Furthermore, although each man's general purpose is to grow and develop, only the individual gives specific and final direction to this purpose. We can conclude, then, that all the elements of man's environment—one of which is architecture—become instruments, perceptual fragments, which he assimilates and uses to the limit of his innate creative ability. The traditional theorists recognized the first of man's environmental needs: security on which to base his judgments. But in their efforts to provide such security through a system of rigid universal values, they ignored man's capabilities and needs as a creative being. We accept man as a whole being of complex and inter-related components. And we recognize that he is always more than the simple sum of
these parts, for only the individual adds the final ingredients of unique purpose, experience, and ability to the perception of his environment.

Now, as the last preparatory step in developing a valid, comprehensive theory of architectural design, we need to correlate this new view of man and his environment in reference to contemporary conditions in architecture and society.
Contemporary Multiplicity and Relativism: a flux of dynamic forces, often ephemeral and contradictory, without the stability of any ordering disciplines.

The political absolutism, common religious and philosophical beliefs, and rigidly structured social systems which established a unity of goals and values in the Western world are gone. Certainly, there had been changes, and vast ones, in the past, but now, the standards, the fundamental absolutes of existence are disintegrating. As Henry Adams explains, "... all these (past) changes had never altered the continuity. Only in 1900, the continuity snapped ... . The child born in 1900 would, then, be born into a new world which would not be a unity but a multiple ... an infinite chaos of motion ... where order was an accidental relation obnoxious to nature."\(^1\) Einstein advanced the scientific explanation for the new multiplicity in his *Theory of Relativity* (1905). In his observations of physical phenomena, he saw a world where everything was in motion and all valid calculations had to be based on the relative position of the observer. Newton's absolute static space and his absolute time which flowed on uniformly were replaced by a dynamic, flowing space and time measured only by the duration of movement.\(^2\)

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2 Fleming, *op. cit.*, 759-761.
Finally, the democratic ideal—the new political basis of Western civilization—emphasizes the infinite differences between each person, allowing for many competing images of man and therefore a maximum of diversity. Twentieth century man, like the participants in the Hanover Institute experiments, is encountering a suddenly new and essentially strange environment. His old standards of measurement—the absolute ideas in government, society, science, and art—which formed his historical basis for security are gone. And without this familiar basis, lost without new standards to replace the old, he is attacked by anxieties and frustrations.

The deep and pervasive uncertainty which characterizes our age creates a new problem for both the creator of artifacts and his public. In the past, most artists took the fundamental values of their culture for granted; that is, Phidias didn't speculate on the divinity of Athena nor did the Master of Chartres on that of Christ. Biased by the efforts of nineteenth century artists to establish a separate, self-contained world of art, we tend to consider past works as embodiments of the individual artist's purposes and values, forgetting the influence of their environments. Certainly, past artists did not always agree with every value of their society, but commonly apprehended values existed as a stabilizing force, a standard of measurements for all.

1 Malraux, op. cit., p. 616
Moreover, these basic values established a milieu, a common environment, which acted, so to speak, as mutual security for the artist and society. A thirteenth century European, for example, could enter the Cathedral of Notre Dame at Chartres (c. 1194-1260) and, without knowing or even being able to comprehend the purposes of the builder, would derive personal values from it and share in the experiences and concepts it reflected. Perhaps some of these concepts had to be simplified and interpreted for him in sculpture and stained glass narratives, but they were available, latent in the architecture, and shared, in varying degrees, by everyone. Similarly, by the nineteenth century in both England and America, the practical application of the Academic forms in the Georgian house had established definite connotations of grace, serenity, and status in the public mind, large sections of which still linger today.

But no more than fragments of such once universally accepted values remain. How, then, has our society attempted to stabilize its chaotic foundations, to provide a minimum common basis of security for man? One solution has been a conscious retreat to absolute forms of political and economic organization, often through violent means. Recent attempts to overtly force the same purposes and values on large masses of people are exemplified in the Fascist and Soviet Communist movements. Other attempts,
Cathedral of Notre Dame (Chartres, France, c. 1194-1260)

"... concepts ... latent in the architecture, and shared, in varying degrees, by everyone."
perhaps subtler and even of an un-conscious nature, have been observed in countries outwardly professing the democratic ideal of civilization. There, social pressures have raised conformity and group acceptance to the position of prime importance; a rigid system is established in which privacy and individuality—the professed ideals of the system—become highly suspect. In Park Forest, Illinois, a recently built suburb of Chicago, the fervent search for common denominators even induced the occupants of one residential block to alter their originally different house facades so as to make them more nearly identical.

The shallowness and self-defeating qualities of these solutions, whether subtle or overt, is evident. Both are attempts to impress old answers on new problems, but the essential characteristic of this age predetermines the failure of such actions. That is, no rigid, static solution, whether a totalitarian political organization or a uniform facade, can continue to exist among the ceaseless changing purposes and values of contemporary man. But however useless such attempts may be, they serve to emphasize the crucial problem of our age: the paradox between publicly expressed ideals and values and the

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2 Whyte, op. cit., p. 310-390.
actualities of daily life, the seeming inability of man to solve the new problems that he has created.

As architects, we too easily place the blame for this condition on economic, social, and political trends or on the lack of public sensitivity and education. But before accepting such a position, let us investigate the developments in contemporary architecture to determine if they have supplied man's environmental needs—a basic familiar set of values and clues and the possibilities for constant growth and development—within our dynamic, relativistic society.
Characteristics of Twentieth Century Architecture:
radically new architectural materials, forms, and
corcepts parallel the social characteristics of
our time.

The static "absolute" style of architecture, composed
of classical forms and proportions, sanctioned by the
academic system, has had persistent and far-reaching influence. Even in our contemporary dynamic, relativistic
society, some architects uphold these forms as the single
mode of building suitable for man, to which he must
eventually return.\(^1\) And beyond its distribution of certain
motifs, the academic system established the theory of an
absolute mode of architecture so firmly that when other
historical styles were resurrected, each one, in its turn,
was declared the only true architecture.

But even in this absolute realm, the vast changes
of the late eighteenth and nineteenth centuries were
acknowledged. In recognition of the new technologies of
the industrial age, the Ecole Polytechnique was created in
1794 and separated from the new Ecole des Beaux Arts
(1806),\(^2\) echoing the widening gap between engineering and
architecture, a schism that was finally to end the un-
challenged rule of academicism. For the old methods and

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1 For example, see Henry H. Reed, The Golden City, (Garden

2 Fleming, op. cit., p. 673.
materials, even with their numerous virtues of excellent plans, permanent construction, and carefully designed proportions, were losing their relation to the needs and purposes of the new age. Architects began to question the validity of railroad stations in Roman baths (Pennsylvania Station, N. Y., McKim, Mead, and White, 1910), banks in Greek temples (Second Bank of the U. S., Philadelphia, William Strickland, 1819), and skyscrapers with Gothic encrustation (Woolworth Building, N.Y., Cass Gilbert, 1913). They saw contemporary engineers using new materials and the most advanced structural and mechanical techniques to solve their problems and began to reject the application of ancient motifs to modern demands. This rejection was largely responsible for a new functional expression in architecture, based on a simple, but revolutionary, creed. Foremost, it demanded that the practical, material needs of the occupants of a building and its structural system be expressed, unencumbered and undisguised. It also emphasized contemporary forms, materials, and techniques rather than traditional ones, the contemporary values of the engineer rather than of the eclectic architect, the dealer in styles. Next, the new theorists tried to incorporate the dynamic, relativistic concepts.

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of the Cubist painters into their architecture. These painters had begun to depict objects from a succession of viewpoints in space and time (recalling the Theory of Relativity). They allowed themselves to move inside as well as outside an object, below and above it, in and around it, and to paint their observations by using overlapping and interpenetrating planes and volumes.

In the architectural analogy, this theory gave renewed emphasis to the use of space as the prime element of design and added the factor of relative time. The observer's reactions as he moves through a building, studying it from a constantly changing series of viewpoints, became the fundamental architectural problem. Aided by the new structural possibilities of steel and reinforced concrete to span relatively great distances with a minimum of support, architects expressed this space-time concept in the "open plan." In their rejection of isolated, closed boxes of space, they opened the "box" varied its volume, and grouped several of them in a related pattern of cubes. Asymmetrically placed vertical planes were used to create an uninterrupted flow of advancing and receding spaces as in Mies van der Rohe's Pavilion at the Barcelona (Spain) Exposition (1929) and as the final similarity to Cubist painting, walls of transparent glass were constructed, allowing the observer to see the exterior and interior of the building at the
Mies van der Rohe: German Pavilion, (Barcelona, Spain, 1929)

"... the 'open plan' ... an uninterrupted flow of advancing and receding spaces ..."
same time. Walter Gropius' design for the Bauhaus (Dessau, Germany, 1925-1926) is an excellent example of this technique.

But although the new materials, forms, and concepts satisfied many architects and critics, the public was deeply dismayed, and with good reason—every familiar form and concept, all of the mutual basis of security between architect and public, was destroyed in the path of this new architecture. Vast walls of glass, concrete, and synthetic materials replaced the familiar textures and proportions of stone, brick, and wood; columns were now of exposed steel or concrete instead of stone or plaster; pilasters, cornices, and baseboard moldings of historical design were rejected as needless encrustations. In terms of the Hanover Institute experiments, a great many of man's visual clues to his architectural environment were gone, his sense of surety in the realm of tangible objects shattered. However, even more fundamentally, the intangible clues—the milieu of common experiences, purposes, and values—to the architectural environment were also gone. Instead of the physiological and psychological assurance which the observer had in former static, contained spaces, he was suddenly confronted with only partially defined spaces, dynamic with movement and limitless perspectives, devoid of all familiar clues.
Walter Gropius: The Bauhaus (Dessau, Germany, 1925-1926)

"... the architectural analogy ... to Cubist painting ..."
One last step and the destruction of the old environment was complete. The theoretical ideal of Beauty as the highest function of architecture, fused with practice and impressed into the common experience by the formulas of academicism, was now rejected or ignored. Instead, a new group of selective ideals were proposed for architecture in the criteria of functional and structural expression and technological excellence. But these new functions, structural techniques, and technological advances were so far removed from the common consciousness as to further open the schism between architect and public. If neither the architect nor the workman could speak knowledgably about these new means, it was certainly impossible to attempt a public understanding of them, and, if the means were generally unknown, the ends or values that architects theorized from these means remained even more incomprehensible to the observer. It is true that during the period of approximately sixty years since the introduction of the new architectural concepts and forms, they have been widely spread and accepted, to a degree, by the public. But other now materials and possibilities of form are even more rampant today. How can the public, devoid of any familiar basis of security, become knowledgable about these myriad new means and values?

I submit that the forms and concepts of contemporary architecture have been met with resigned acceptance rather
than any degree of true understanding. The only answer to the dismayed public's question of "Why are you doing this and why should I accept it?" has been the architect's "Because I told you so." That is, the public, its familiar basis for architectural judgments removed, cannot understand the new ideals, limited to the fulfillment of functional and technological requirements, which have been thrust on them. We can conclude that contemporary architecture has failed to meet the basic requirements of man: a set of familiar clues on which to base his judgments and the possibilities for growth and improvement in terms of his unique purposes and creative abilities. Rather, the new theorists formulated a group of ideals as static, as selective, and as unsuited to contemporary man as the academic ones which they so violently spurned. The functional-technological ideals, like the traditional formulas and rules, are attempts to wrest order from chaos, but they are static anachronisms in a dynamic relativistic world where the only permanent factor is change. Architects, like the householders in Park Forest, have failed to change with a changing world, to analyze the basic rather than the superficial aspects of their problems, ignoring rather than solving them. Architecture, as an instrument of man's purpose, has no validity if it fails to meet his requirements, and, as we have demonstrated, it has failed to
fully do this. We must therefore endeavor to create a basis for architectural design founded entirely on the needs and ideals of contemporary man and on the unique capabilities of the architectural medium to satisfy them.
Capabilities of the Architectural Medium: the means of attaining a basis for architectural design

Probably everyone has once attempted to envisage the endlessness of the universe by lying on his back a looking up at the stars, only to recognize his inability to grasp, to dwell in, infinite space. In order to alleviate this difficulty in furthering his purposes, I created a frame of reference in which he could comprehend space. This frame of reference is composed of the space and buildings we have defined as architecture. It is distinguished from the natural space framed, so to speak by the sky, earth, and sea, since it is not only inhabited by man, but is created by and specifically for him. Man is the creative and the causal force in architectural space. Furthermore, this design of space and the planes and masses which define it is the peculiar province of architecture, the feature which distinguishes it from all other forms of art. Painting can only depict the three-dimensional world on a two-dimensional canvas, sculpture creates a three-dimensional world but man must move around, not through it. Only architecture works with a full three-dimensional vocabulary which man can experience both from within and without.

We can benefit from the concise description of the
fundamental position of spatial design in architecture formulated by Geoffrey Scott early in this century:

"... To enclose a space is the object of building; when we build we do but detach a convenient quantity of space, seclude it and protect it, and all architecture springs from that necessity. But aesthetically space is even more supreme. The architect models in space as a sculptor in clay.

... Nothing, therefore, will serve the architect but the fullest power to imagine the space-value resulting from the complex conditions of each particular easel; there are no liberties which he may not sometimes take, and no 'fixed ratios' which may not fail him. Architecture is not machinery but an art, and those theories of architecture which provide ready-made tests for the creation or criticism of design are self-condemned. None the less, in the beauty of every building, space-value, addressing itself to our sense of movement, will play a principal part."

This passage echoes our earlier concern with the relationship between space, time, and the observer in contemporary architecture. Even current designers too often conceive of space in negative terms as a cavity or void. Instead we affirm space as positive and dynamic, a reality recognized by man's whole being as he moves through it and experiences it. Again, this "space experience" is not merely the privilege of a few exceptionally talented persons, but is a basic biological function in every human being. But, one might interject, how can

the same man who fails to appreciate the new ideals and means of functional and technological theories experience and comprehend these spatial concepts? First, the ability to comprehend space is an innate ability of the human organism; that is, man moves through his environment, from the first breath of life, experiencing the qualities of his surroundings, understanding various forms as he moves in relation to them. The dance is, of course, an elemental means, common to all cultures, for expressing our basic impulses for movement in space. Second, two fundamental concepts which have become common to Western man through long association are helpful in this comprehension. Since the invention of perspective systems of drawing by the fifteenth century Italian painters, man has had a pictorial tool with which he could abstract the three-dimensional world, record and preserve it for the experience of future generations. Next, the detailed demands of modern civilization have given man a very great awareness of the time element compared to more primitive cultures where such awareness was not necessary. This awareness of time is emphasized in architecture as man, moving about within the building, studying it from successive points of view, himself creates, so to speak, the fourth dimension.  

Therefore, we can conclude that space—

1 Ibid., p. 27.
time conceptions are the unique and fundamental means through which the architect can communicate with the observer.

Once we think of architectural conceptions not as a retreat from space but as a life in space, the capabilities of the medium are instantly enlarged. Each building becomes concerned, simultaneously, with two types of spaces: the space defined within the building envelope and the space between the envelope and its man-made or natural surroundings. Consequently, the architect's powers and responsibilities involve man's total environment rather than any isolated, self-contained segment of it.

By emphasizing spatial concepts in architecture, we are not denying the validity and value of other approaches. Aspects of structure, mechanical equipment, circulation, construction details, etc. are all components of a work of architecture and can serve as points of departure for valuable comment and criticism. But enmeshed with and primary to each of these aspects is the spatial concept, for here is the unique, the clearest voice of the architect speaking to man, creating not only structural stability, mechanical efficiency or ease of circulation, but a vital part of the total human environment. Here, then, are the means with which a new principle of architectural design can be expressed; it remains to be demonstrated how these means can be used to produce the
values that man requires of his contemporary environment.
CHAPTER V
The teacher who walks in the shadow of the temple among his followers, gives not of his wisdom but rather of his faith and his lovingness. If he is indeed wise, he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind.

Kahlil Gibran
Requirements and Responsibilities

We have seen that the unique characteristic of architecture emerges from its capability of using a full-dimensional space-time vocabulary in creating spaces and buildings which man can experience both from within and without. Furthermore, we stressed that the basic purpose of architecture is to meet the needs and ideals of man, to become a vital force in his environment.

If, then, we are curious about the "meaning" of architecture, we see that it only has meaning insofar as it fulfills the purposes of its creator—man; it functions not merely as a representational, abstract, or non-objective art, but as a social art. Therefore, the value of architecture rests on its ability to meet the two basic demands that man makes of architecture and of his whole environment: for security, a minimum set of familiar clues on which to base his judgments; and, the potential to grow and develop his purposes to the limit of his abilities.

Let us see if contemporary architecture can provide a measure of security in our constantly changing, relativistic society. To begin, a quick reading of man's
need for familiar clues might lead to the false conclusion that constant repetition of the historical forms and proportions are necessary. But this view neglects the inter-relatedness, demonstrated by the experiments, of perception and purpose. For example, the repetitious use of a Roman temple facade to denote a bank does not necessarily give that form any value from the point of view of twentieth century men; rather, such associations that are incongruous with modern purposes are worse than no associations at all.

What, then, are the elements from which a valid basis of security can be created? Although the experiments emphasize the enormous differences between each individual, and the democratic ideals of our civilization uphold the value of those differences, all men perceive a common environment to a large degree. Most fundamentally, this perception evolves from men's common requirements of food, warmth, and shelter, the demands of his visual organism for movement, change, contrast, and "rest stops," common visual illusions resulting from the unique structure of the human eye, and the limits to his physical dimensions and bodily movements. Next, common environmental pressures on our general purposes, similar social units of family, city, state, and country, and relatively similar, mutually comprehensible arrangements of social, political, and economic activity join us together. This basic similarity among dissimilar parts, of unity in diversity, is also a professed ideal of democratic civilization.
a dynamic cohesiveness from the freedom of each man to create and assimilate for himself out of the similar abilities and needs of the human organism. All of these common elements are of use to the architect in designing buildings which function qualitatively—humanistically—as well as meeting the quantitative demands of circulation, structure, and technology. For example, ancient Egyptian designers apprehended the human requirements of movement, change, and "rest stops", and used them to arrange the spatial sequences in their temples. In the Temple of Khons (Karnak, Egypt, 1200 B.C.), spaces of movement, complexity, and brightness—some open to the sky—lead to a smaller, simpler space, the dark solitude of a distant sanctuary. Today, the dynamic circulation of the "open plan" can lead to, and be juxtaposed with, a static, contained space as the following diagram illustrates:
Spatial concepts also can be used to emphasize common purposes and experiences among groups of people. For example, the State Fair Arena at Raleigh, North Carolina (Nowicki and Deitrick, 1953) is designed as a single unified interior space defined on the exterior by a single continuous form emphasizing that many people come here to see large spectacles.

Next, contemporary architects must re-emphasize and re-create man's collection of visual clues, not by imitating, but by emulating the skills of historical builders in using scale, materials, and textures. The functionalists, in their desire to design only with new materials and techniques, tend to forget the still valid, although possibly anachronistic, aspects of historical works. Their pleasure in vast unbroken walls of concrete and glass is rarely shared by the public which is often perplexed by what appears to be a strange and sometimes forbidding environment. First, the ability of the observer to recognize the scale of contemporary buildings, to correlate its size with his own, is particularly difficult among the immense forms now possible in steel and reinforced concrete. We can easily recall the numerous architectural photographs devoid of human figures or artifacts which fill the professional journals; here, it is often virtually impossible to formulate the proportion of the human figure to that of the building. But the use of simple devices can alleviate this condition. As illustration, looking at a
blank concrete wall, a man may be any number of possible sizes in relation to it, but by placing a door (an element of familiar scale) in the wall, we can more easily establish its dimensions. Again, by the device of sub-dividing large forms, a recognizable scale can be provided. That is, the scale of a large brick wall can be more easily grasped if the wall is sub-divided into panels.

Another virtue of ancient buildings was the various levels and viewpoints from which they could be enjoyed. The distant observer first apprehended the whole mass and scale of the building in its surroundings, but approaching closer, his attention was re-established by a profusion of finely executed detail and forms of more intimate scale; finally, upon entering the building, a further series of spaces and materials were revealed to him. These are some of the qualities that the public finds lacking in current architecture when they refer to its "lack of warmth." But, surely, we can use the traditional means for our own purposes and ends without losing our identity as contemporary architects. In his chapel at Ronchamp, France (1950-1955), LeCorbusier has captured much of the interesting complexity of many historical buildings. The approaching observer is visually invited to move around the building and to explore its multitude of exterior forms. Varieties of silhouette, texture, light and shadow constantly hold his attention before he enters the building where a new group of forms and spaces await him.
Le Corbusier: Chapel (Ronchamp, France, 1950-1955)

"... (visual invitations) to explore the multitude of exterior forms."
Certainly, we now acknowledge that transparent facades are not the only answer or, in many cases, the best answer to the frequently different problems of interior (within the building envelope) and exterior space (between the envelope and its surroundings). These problems can be solved individually, as LeCorbusier has done at Ronchamp, without losing the organic unity of the whole design, adding, instead, the elements of suspense and surprise to the spatial composition.

Lastly, in our eagerness to use mass-produced, machine-made materials, we often neglect the need of man for contrast, his security in familiar objects that change gradually with time as he does himself, his desire to touch the various textures of materials—needs that were often met in historical designs. Without abandoning our synthetic, unvarying materials, we can place them beside others which mellow and change with time, of more familiar dimensions and textures. Using these familiar materials as clues, man will have a basis from which to compare and contrast, to give value to the new and to re-awaken interest in the old.

All these suggestions, however, only aid in providing for one half of man's requirements; his desire for a basic security. How can architectural design help man to further his individual growth and development? To begin, we recall that man does not use his perceptions as ends-in-themselves, but as aids to carry out his purposes through action. In this action, the individual fuses his abilities, experience, purposes, and values to continually change his surroundings.
We can conclude that man constantly seeks the opportunity to re-create his environment in order to further his individual purposes. Architecture, then, through its unique capabilities, must allow and encourage man to create. Le Corbusier realized this basic architectural fact when he remarked that "man is conscious of great happiness when he feels he is creating"\(^1\) and that "architecture should allow man to employ fully his gifts of memory, of analysis, of reasoning, and of creation."\(^2\)

To implement this concept, we will employ the essential ability of architecture—the design of space. We submit that the democratic ideals of freedom of choice and maximum opportunity for each individual must be inherent in our architecture as well: freedom in space to reaffirm and encourage the freedom of man in all human activity. This is certainly sufficient reason for architects to free themselves from the last vestiges of two-dimensional design, no matter how carefully proportioned and finely articulated their achievements may be to create with the full potentials of space and time. We must reject designs which, although employing the materials and technical skills of our age, are conceptually static and rigid. Instead, changing, latent relationships must be available for the observer to complete and assimilate through his own abilities and purposes, the creative powers of the architect.

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1 Le Corbusier, *op. cit.*, p. 207.
and of the observer inter-acting in a multitude of possibilities, a flux of dynamic relationships. We suggest such fragmentized, changeable spatial concepts for the same reason that the Chinese philosopher Lao-tzu preferred the empty cup to its already filled companion: in the former, potential growth is possible, while in the latter it is not. As he expressed this concept:

"Completeness without completion is useful. Fulfillment without being fulfilled is desirable."

Here, then, is the opportunity for the observer to realize his creative abilities and to act as the final cohesive force in architectural design.

Most simply, man can use his creative abilities to "continue" and to "close" architectural spaces as well as the groups of dots and lines previously mentioned (Figure 6, Page 31). In the following example, the designer has provided purposely fragmentized, incomplete spaces, partially defined by vertical and horizontal planes. The observer now has the opportunity to compose one or several of the suggested spaces, using his individual purposes and creative abilities.
The next composition offers similar choices and creative opportunities, allowing the observer to "close" the spatial gap between the two wall planes, to leave the gap open and direct his attention outward, or to follow the direction of the plane on the left, through the opening, to the distant perspective.

Employing this technique of continuance and closure in conjunction with the full space-time vocabulary of architecture, a multitude of potential relationships becomes possible, even in the most simple designs. This is a new source for richness, derived from the desire to provide for the wider creative needs of man through the capabilities of the architectural medium. In the past, Academic designs tended to produce box-like spaces of similar heights, connected only by doors, the outside environment visible through holes (windows) punched in the walls. Later, the "open plan"
and the transparent facade enlarged the possibilities of movement and spatial contrast in two dimensions, although variety was rarely attempted in the vertical plane. Now, however, let us further expand our spatial potential to the vertical dimension as well, providing invitations to the observer to explore and create in all dimensions and directions. Varieties of ceiling heights and "cells" of space suspended within larger spaces are simple architectural means to implement this idea as shown in the next illustration.
In all these suggestions, it is significant that we are as concerned about the relationships between the various planes and spaces as about the planes and spaces themselves. We propose a flux of dynamic relationships between fragmentized spatial components, a unity in the midst of movement and change through purposeful incompletion and diversity within unity. That is, we no longer cling to a single rigid pattern as the definition of unity; rather, the unity that we submit as an architectural requirement can contain a multitude of forms, but with a single aim. The multiplicity of reasons for each form results in a greater precision of concept.
In this situation, for example, ample opportunity is provided for directional choice and spatial creativity, but, at the same time, the defining planes of roof, walls and balcony rail act as restraining elements, uniting the whole concept by their directional movements. The observer may concentrate on the distant scenery or create one or several of the possible spaces, but ultimately, the restraining planes return him to the initial unity and stability of the design.

The fuller development of these concepts of unity in diversity and of purposeful incompleteness is exemplified in Le Corbusier's Ronchamp chapel and in Frank Lloyd Wright's home and workshop at Taliesin West (near Scottsdale, Arizona, 1938-1959). In Taliesin West, many different spatial requirements result in a wide variety of spaces, but a dynamic cohesion is established by a sequence of overlapping yet clearly defined individual spaces shaped by the wall, ceiling, and floor planes. The observer is invited to move visually around and through the building and to create from the vast supply of "purposefully incomplete" spaces surrounding him. Spatial contrast is used to make the observer more aware of his environment: spaces with high ceilings are juxtaposed with ones so low that he must bend to move under them, becoming more sensitive to his surroundings. A multitude of choices is always available: to go forward, to retrace his steps, or to turn an inviting corner, the
Frank Lloyd Wright: Taliesin West (Arizona, 1938-1959)

"... a wide variety of volumes (linked) by an organic flow of space ..."
Frank Lloyd Wright: Taliesin West (Arizona, 1938-1959)

"... a variety of silhouette, texture, light and shadow ..."
architect and the observer sharing the desire and opportunity of creation. Here, too, the use of light as a design element, varying in amount and intensity, increases the vocabulary of potential relationships. Wright has contrasted the workrooms where roofs of stretched canvas soften the desert sun with open passageways where the full powerful light cuts between the shadows of the stone piers. Le Corbusier likewise uses space and light in all their diversity in his chapel. As the observer first steps into the interior, the slope of the floor towards the main altar makes him gradually aware of the focus of the design. And from out of this dominating central space, several side-chapels invite the observer's exploration; they act as spatial fragments, inviting him to join several of them into a single completed whole. Additional interest and opportunities for concentration are provided in the deeply-punctured side wall, glowing with color and translucent light.

In all these examples, a new relationship between architect and observer is apparent, for now both are working together, sharing in the creation of their environment. Such a relationship enables the contemporary architect to enrich and intensify man's ever-changing pattern of growth and creation.

Our investigation showed that, in the past, the architect and society shared a milieu, a common environment of mutual purposes. The Academic system fused these purposes

"... spatial components with which the observer can create, joining several volumes into a completed whole."
Le Corbusier: Chapel (Ronchamp, France, 1950-1955)

"... opportunities of broad and creative experiences for man."
with commonly understood building techniques and materials to establish a select, static species of architectural forms. The purpose here, and one with which our contemporary conclusions agree, was to provide a basic security by means of a stable set of visual clues (means) and values (ends). Furthermore, in investigating the effects of the functional-technological revolution on twentieth century architecture, we concluded that the new theorists likewise formulated a selective set of ideals for an architecture which destroyed the secure historic environment without providing a comprehensible basis of its own. Both of these systems, then, failed in meeting the two basic requirements that man demands of his environment: the first provided security but no opportunity for personal growth through creativity, the second lacked all security and direction to help man in comprehending and developing freely his purposes within the contemporary world.

A humanistic basis for architecture recognizes that designing man's environment does not imply the application of a rigid set of any kind of rules, but rather demands both security and the opportunity for a continuous pattern of growth. It replaces and supersedes the previous theorized aims of architecture because it allows man not only to exist in the security of unified space but to develop through dynamic growth and creativity to the limit of his individual abilities. Here, it bridges the gap between the professed
democratic ideals of our society and its actual practice, providing spaces and buildings which represent the free organic life of the people who live in them.

The acceptance of a humanistic design principle places immense new responsibilities on the architect. First he becomes a vital active force in the evolution of mankind, as each design becomes a stimulus from which new purposes and values emerge. That is, after man created the wheel and the numbers system he extended their application far beyond the purposes he originally intended for them; similarly, each architectual conception, whatever its intended specific use, originates and influences new purposes, and becomes a part of a far reaching pattern of experience and growth. Again, this principle denies the architect recourse to easy imitations of any style, ancient or modern. It transcends our narrow tendencies to functional and technological exhibitionism. It rejects the existence of any absolute, universal solution for man's environmental design problems. Instead, it requires an approach to architecture focused on man in all his diversity as the final integrating and creating force of his surroundings.

An architect, then, must concentrate on analyzing and educating himself as well as the public. His obligations to society exist equally as a member and as a leader, to lack concern with either aspect is a negation of responsibility. Without assuming a false position of
dictatorship, he must simultaneously provide direction and potential growth for the public and develop his own purposes and creativity to the limit of his abilities. This is no easy task. He requires a vast knowledge of his medium, an understanding, compassion, and sensitivity towards his fellow man, and the ability to synthesize these factors into three-dimensional spatial concepts. Certainly our civilization has provided us with virtually infinite possibilities of form, materials, and techniques. The means are all around us, we need only understanding and conviction: an understanding that the true client of any work of architecture is mankind, and the conviction and ability to put this belief into practice.
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