"MODEL OF THE ADVANCEMENT OF ARCHITECTURAL THEORY"

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ABSTRACT

The thesis presents a framework for addressing the corpus of architectural theory and its conceptual evolution.

Part I outlines a general description of the functions of architecture according to five "perspectives"—precedent, social and economic, perception, climate and physiography, and technology—that together comprise apparent preoccupations of architectural theory. Here, the assumption is that architecture is both a functional synthesis of these multifarious perspectives, and a reconciliation of objective and subjective polarities found within each perspective.

Part II sketches a model of the process by which the structure of these perspectives changes in response to external cultural and internal professional influences. In this process advancement proceeds formally, from a critical appraisal of preceding theoretical approaches, toward programmes designed to solve general classes of problems. Subsequently, when formalism becomes dogmatic, attention is once more directed toward concrete problems, and upon a critique or revision of preceding programmes the process recommences.
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INTRODUCTION

Human understanding is of its own nature prone to abstractions. In High Gothic architecture, Panofsky explains, "we are able to infer ... the organization of the whole system from the cross section of one pier." Indeed, it is also true of literature that a narrow and detailed description may conceal a broader generality. But are such abstractions determined by the single law of nature, or is their corpus comprised of various and unrelated local generalities; is the whole something more, or nothing more, than the sum of its parts? This philosophical question is rhetorical, for to comprehend its enormity, nature must be reduced to tractable parts.

The intention of this thesis is to discuss this dilemma by two means; through the corpus of architectural theory and through its conceptual evolution. More specifically, the intention is to provide a framework by which ideas concerning the many functions of architecture and the process by which these ideas change in response to professional and social influences, can be rendered comprehensible.

It is, therefore, writings of a very particular kind that
provide the material for the thesis. Writings that, on the one hand, pronounce the physical and social function of architecture as opposed to prescribing in a methodological sense its assemblage, and, on the other hand, explain the process by which the currency of ideas is refined, reformed and redefined; in short, the process by which theory becomes advanced. "It is irrelevant," wrote Karl Popper, "whether we have obtained our theories by jumping to unwarranted conclusions or merely by stumbling over them ... the question 'How did you first find your theory?' relates, as it were, to an entirely private matter." Such may be the case with the process by which the architectural object is determined, it is here assumed to be a private matter.

Once executed the architectural object, and its theoretical underpinnings, is subject to public debate; that is substantiation and refutation. It is the literature of this debate that comprises the field of research. A field of critical writings that define either implicitly or explicitly the "proper" function of architecture, and claim the primacy of their interpretations and the obsolescence of others; a body of work with a colourful history.

Unfortunately this definition of the topic is not precise
enough. By including those writings that proclaim either what architecture is or should be, and excluding those writings that explain how such an architecture can be achieved, we are still confronted with the problem of comprehending a vast spectrum of ideas and propositions. To help overcome this difficulty it is worth citing Isaiah Berlin's elucidation of the contrasting personalities of the hedgehog and the fox. By reference to the Greek poet Archilochus, "The fox knows many things, but the hedgehog knows one big thing," Berlin writes:

For there exists a great chasm between those, on the one side, who relate everything to a central vision, one system less or more coherent or articulate, in terms of which they understand, think and feel - a single, universal, organizing principle in terms of which alone all that they are and say has significance - and, on the other side, those who pursue many ends, often unrelated and even contradictory, connected, if at all, only in some de facto way, for some psychological or physiological cause, related by no moral or aesthetic principle ... The first kind of intellectual and artistic personality belongs to the hedgehogs, the second to the foxes. 3

To return to the problem of comprehending a vast field of ideas, let us proceed with the personality of the fox in mind - an animal who pursues many ends - and attempt to tractate this spectrum of propositions of what architecture is, or should be, and erect a few categories in order,
as Bruner would say, to reduce the complexity of the problem. 4

A definition or general description, however, requires something like a plunge in the dark. There are implicit in the entire body of theoretical writings many systems of categorization, but it is only with hindsight that we are able to know the value of our initial pigeon-holing. So, with this reservation in mind, let us group our propositions into five categories, that for the purposes of this thesis shall be called "perspectives": the perspective of precedent, the social and economic perspective, the perspective of perception, the physiographic and climatic perspective, and the perspective of technology.

In order to qualify this seemingly arbitrary classification it is necessary to clarify three issues. Firstly, propositions that pertain to the "proper" function of architecture may be grouped equally well into four or six classes. Here, the particular merit of five perspectives is the familiarity of convention. We are accustomed to discussing issues in these terms, reinforced by the corresponding academic institutions. 5 Secondly, by the "proper" function of architecture we mean its many purposes beyond merely
fulfilling certain social and anthropometric criteria; "every act in which an object is used," Mukarovsky writes, "can simultaneously pursue more than one purpose. It is also possible to use a thing for another purpose and with another function in mind than its usual one." It is; therefore, toward elucidating the functional ambiguities and multiplicities of architecture that the thesis is directed. Thirdly, how inclusive are the five perspectives? Implicit in the corpus of architectural writings is the spectrum of functions we wish to articulate and as we are not concerned with the ontological question 'What is architecture?' one form of classification may be as appropriate as another. Let us assume, therefore, that the sequence of perspectives - precedent, social and economic, perception, climate and physiography, and technology - represents that implicit spectrum of functions, ranging from the general to the particular, from the less predictable to the more predictable, in fact from the Humanities to the Sciences.

But what is the advantage of these five perspectives over the traditional Vitruvian categories of "commodity, firmness and delight"? The advantage is certainly not a more inclusive description, but rather a more explicit description. For although our three Vitruvian virtues are broad and
inclusive, they are also vague and inarticulate by not clarifying significant functions required of architecture.

Before completing this discussion of the theoretical assumptions involved in the concept of functions and perspectives, it is necessary to make one further distinction, to add another dimension as it were. "In all matters," Vitruvius writes, "but particularly in Architecture, there are these two points:— the thing signified, and that which gives it significance. That which is signified is the subject of which we may be speaking; and that which gives significance is a demonstration on scientific principles." If we apply a fairly catholic interpretation to this statement, we might infer that Vitruvius meant an object has both an objective existence, demonstrable by science, and a subjective meaning, demonstrable by its self-evident message. An analogy with Levi-Straus's distinction between science and magic may further clarify this point:

Magical thought ... forms a well-articulated system, and is in this respect independent of that other system which constitutes science ... It is therefore better, instead of contrasting magic and science, to compare them as two parallel modes of acquiring knowledge.

... art lies half-way between scientific knowledge and mythical or magical thought. It is common knowledge that the artist is both something of a scientist and of a 'bricoleur.' By his craftsmanship he constructs a material object which is also an object of knowledge.
It is with this distinction in mind, between the objective and the subjective, as two "parallel modes of acquiring knowledge," that the internal structure of the perspectives will be presented. If art, as Levi-Straus suggests, lies half-way between scientific and mythical thought, then let us assume that by inference so does architecture. Our central concern will be to characterize the aims of architecture: to give, that is, some account of the distinctive purposes and goals properly pursued by architecture, and how these change over time.

The model we shall develop to explain how these purposes and goals change will be constructed from a critique of existing epistemological models, especially those concerned with the advancement of scientific ideas. The beauty of Popper's model, as we shall see, is the simplicity and universality of its application. At odds with Popper's theory, however, are those of Lakatos, Kuhn and Toulmin, who describe change as an incremental and gradual process. The strength of their descriptions lies in the plurality of their models. On the one hand, embracing advancement by hypothetico-deductive reasoning, and, on the other hand, introducing a second order of advancement or change.
The conceptual evolution of architecture, we shall argue, proceeds in a similar fashion in response to internal professional and external social influences, and, therefore, requires two accounts of change within the bounds of a single descriptive model. These two accounts we shall term "formalization" and "reorientation." Formalization is characterized as the tendency to select and refine specialized procedures into "programmes" designed to solve or anticipate general classes of concrete problems; "the mind" Francis Bacon writes "longs to spring up to positions of higher generality." When, in that process, the pursuit of abstract formal elegance is championed at the expense of solving concrete problems, there occurs a reorientation. Subsequently, attention is once more directed toward concrete problems, albeit "new" problems, and so the process continues. In evolutionary biology, the survival of a species is a function of both its environment and ancestry. So it is with the process by which the currency of ideas concerning the function of architecture advances; it is a function of both context and heritage.

It will be clear by now that we are not headed in the ontological direction, that the thesis looks to discern the ingredients, rather than looking to eke out the essence of
a thing - a good recipe depends as much upon its blend as upon its vital substances. It is an idea of definition very different to the one Nikolaus Pevsner proposes in the introduction to "An Outline of European Architecture":

A bicycle shed is a building: Lincoln Cathedral is a piece of architecture. Nearly everything that encloses space on a scale sufficient for a human being to move in is a building: the term architecture applies only to buildings with a view to aesthetic appeal.11

The difficulties with this definition are self-evident. If we are to assume categorically that architecture is a subset of building, then objects that do not enclose space on a scale sufficient for human activity, such as bridges or the facade of S. Maria Novella, must presumably be erased from the histories of architecture.12 What is more, if ostensibly utilitarian objects, such as bicycle sheds, are beyond the pale, so to speak, at what point to aesthetic considerations outweigh utilitarian considerations enough for them to be placed in the coveted class of Lincoln cathedral? Clearly the criteria of aesthetic appeal is not the essential or sufficient condition of architecture.

Nor, as Susanne Langer would have us believe, is the "ethnic domain" the essential or sufficient condition. Arguing that neither utility nor functionality is the essence of architecture, Langer explains:
As Scene is the basic abstraction of pictorial art, and kinetic volume of sculpture, that of architecture is an ethnic domain...
A place, in this non-geographic sense, is a created thing, an ethnic domain made visible, tangible, sensible. As such it is ... an illusion. Like any other plastic symbol, it is primarily an illusion of self-contained, self-sufficient perceptual space. But the principle of organization is its own: for it is organized as a functional realm made visible - the center of a virtual world, the "ethnic domain" and itself a geographical semblance.¹³

Langer's definition, a distinct improvement on Pevsner's, acknowledges that the architectural properties of an object are independent of its size and function. The definition, however, is not inclusive enough, for while certainly no less parochial than Pevsner's, it excludes that element of architecture that transcends its ethnic context. Or, as Mumford puts it:

... there are two elements in every architecture, indeed in every aesthetic or cultural expression. One of them is the local, the time-bound, that which adapts itself to special human capacities and circumstances, that belongs to a particular people and a particular soil and a particular set of economic and political institutions. Let us call this the regional element, though one must of course include this term for more than purely geographic characteristics. The other is the universal: this element passes over boundaries and frontiers; it unites in a common bond people of the most diverse races and temperaments; it transcends the local, the limited, the partial.¹⁴

The ontological question is, of course, rhetorical - for if of the regional and the universal it is asked "Which is the more essential?" the answer, a priori, is neither. But we only know one by contrast to the existence of the other.
The theoretical assumptions upon which the thesis is predicated are by now hopefully clear, that the essence of architecture is as much a single all-embracing idea as it is a reconciliation of many varied and often conflicting intentions or ideas; that distinctions between bicycle sheds and cathedrals amount more to intellectual or professional snobbery than to insightful taxonomy. By implication, therefore, to speak of the difference between architecture and building is a question of degree rather than kind. Or, to continue the culinary metaphor, the recipe of ingredients and procedure for preparing one is only a more seasoned version of the other.

It is with these prejudices in mind that the first part of the thesis will attempt to give an account of the functions of architecture, the second part of the thesis will describe the process by which these functions change over time, and the epilogue will conclude with some observations regarding the value in retrospect of the entire undertaking and the possibilities for further research.
NOTES


5 The respective academic institutions of history, sociology, psychology, climatology and geology, and structural engineering.


8 Vitruvius, Bk. I, Ch. I, p. 5.


10 Ibid., pp. 13-22.


12 Although not erased from Pevsner's "Outline of European Architecture," p. 184.

13 Langer, "Feeling and Form," pp. 3-5.

PART ONE
II THE PERSPECTIVE OF PRECEDENT

A knowledge of history, Vitruvius argues, is a necessary component of an architect's education. This is in order that he might know, for example, that Caryatids are the symbolic form of the wives of the Caryae people who, defeated with the Persians, were subsequently taken in slavery to Greece and represented with the marks of their married status as supporting columns in indicative atonement for the sins of their belligerent nation. Reliance on Greek precedent determined much of the treatise of Ceasar's famous architectural theoretician. The well known account of the origins of the three orders, by reference to the story of Dorus, Ion and a "freeborn maiden of Corinth," is one example of Vitruvius's many references to the authority of Greek precedent, cited to substantiate his architectural observations concerning "all the principles of the art."

Vitruvius's acknowledgement of Greek precedent was as great as Palladio's acknowledgement, in turn, of Roman precedent. Indeed, the last book of "I Quattro Libri dell'Architettura," describing "the Ancient Temples that are in Rome ... & some others that are in Italy and out of Italy," is devoted entirely to precedent. A reliance on precedent is, as it were,
respectably preceded. In fact, antecedents have exerted influence since scholars first investigated and recorded their heritage. Of course, in the form of preserved building, antecedents exist today, cheek by jowl with modern building as testimonial to the timeless qualities of architecture. But the central question in this chapter is 'Under what guises does the influence of precedent assume the proper function of architecture?' Or, to put it another way, what responsibilities does modern architecture have to the history of architecture?

To question the value of precedent and to determine under what conditions precedent is less or more pertinent to design, and by implication to criticism, is a salutary task. It is also a relevant task, particularly at a time when the capricious and wilful pillaging of the histories of architecture has almost imperceptibly become recognised practice, despite its contradiction of fundamental canons of the Modern Movement. Indeed, it is so pervasive a practice these days that to ignore precedent is considered, paradoxically, in some quarters tantamount to regression.³

What is it about the histories of architecture that lend themselves so amicably to plagiarism? William Lethaby, the founding principal of the London Central School of Arts and
Crafts, wrote in "Architecture, Nature and Magic":

Modern histories of old 'architecture' have been accounts of how mere forms appeared to our eyes apart from any meaning they might have. The writers supposed they know what they 'liked' and told us of their approval or otherwise of Egyptian, Babylonian and Greek works of art.

Lethaby's observation, concerning the historian as arbiter of tasteful interpretations of form, is borne out by any cursory glance at the histories of architecture. It is also an observation Reyner Banham makes in the introduction to "The Architecture of the Well-tempered Environment":

The art of writing ... the history of architecture has ... become narrowed to the point where almost its only interest outside the derivation of styles is haggling over the primacy of inventions in the field of structure ... the great bulk of so called historical research is little more than medieval disputation on the number of influences that can balance upon the point of a pinnacle.

To demonstrate the prejudice toward formal or stylistic interpretations, "apart from any meaning," we can select a building and choose five passages, from five different histories of architecture, devoted to its elucidation:

... nobody ... can at once understand of what elements it is made ... (the architect) has given the dome absolute supremacy over the arms. Their corners are bevelled off so that the walls under the oval dome read like elongated lozenges opening out into shallow chapels, the dwarfed arms of the original Greek cross ... Space now seems hollowed out by the hand of a sculptor, walls are moulded as if made of wax or clay.

... shows ingenious planning to meet the difficulties of
a small and cramped site ... discards the typical Renaissance plan made up of clearly demarcated geometrical elements and adopts a scheme which, although resolving itself ultimately into an elliptical pendentive dome running east to west, begins at wall level internally as an undulated Greek cross, made up of four concave lobes passing into one another in convex curves. ... a provocative reinterpretation of a centrally planned church. The oval dome is placed over a modified Greek-cross plan which has its axis running from entrance to main altar. The dome is supported on four broad-footed pendentives which are themselves supported by pairs of fully-round columns. The longitudinal direction is reinforced by a semicircular apse and entrance bay while the cross arms are portions of flattened ovals ... marks the first reappearance, since Hadrianic times, of a completely undulating wall surface. This is a tiny church, so small that it is virtually no more than a chapel, but it is packed with ingenuity and with architectural innovation. Its plan is highly complex, based on two equilateral triangles with arcs and segments drawn from various points of their intersection, but it resolves itself at the level of the dome into an oval, and at the lantern into a circle. The whole of architecture here becomes plastic, almost molten. Beneath all the undulating forms there is still ... the ghost of a classical building. ... basically oval, but the play of convex and concave surfaces gives the impression that it is much larger than it really is. Like most Baroque churches it is only lit from above, the light from the dome falling on the undulating surfaces of the walls. In the apse, the concave surfaces of the pediment and the decreasing pattern of the coffers in the semi-dome create an illusion of depth. Although the bulk of these passages, written of Borromini's S. Carlo alle Quattro Fontane, comprise purely descriptive prose, we would be hard pressed to imagine the spaces without the aid of illustrations. But we do learn something about
what constitutes the Baroque: spatial unity, undulating or sculptural wall surfaces, illusions of depth and lighting exclusively from above. What has transpired, by reading these passages, is the discovery, or re-discovery, of a category: the category of Baroque as opposed to Gothic or Renaissance.

The advantages of categorization, as Bruner has pointed out, are many. Firstly, categorization reduces the complexity of the environment; we no longer have to view the history of architecture as so many individual instances, but can group buildings to perceive an entire history in terms of comprehensible components. Secondly, it is a means by which objects are identified; we recognise a Baroque church or a Gothic cathedral. Thirdly, it reduces the necessity of constant learning; what we learn about Baroque in one instance we can apply in another. Fourthly, it provides for instrumental activity; we see what appears to be a Baroque church and subsequently ask questions of it to either qualify or refute our original supposition. Finally, it permits one to order and relate classes; we know of a relationship between Baroque and Renaissance, for instance, and of Baroque and Rococo.

But it is not by categorization as such that our passages fall foul of Lethaby's and Banham's observations. It is,
rather, by the formal or stylistic criteria that alone determine and define the created classes. For, by measured inspection, we may discover that our buildings today exhibit less or more Baroque characteristics, but by less quantifiable evaluations we may not be so sure. In any case the descriptions of S. Carlo are not only partial, they are also of little value to the practising architect. Between "the known and the imagined facts of the universe," as Lethaby puts it, they exist the difference between "the Heavenly Temple and the Earthly Tabernacle." Or, as Worringer explains:

... changes in will whose mere precipitates are the variations of style in the history of art cannot be arbitrary or fortuitious. On the contrary, they must have a consistent relation to those spiritual and mental changes occurring in the constitution of mankind, changes reflected in the development of myths, religions, philosophical systems, world conceptions.14

The descriptions of S. Carlo ignore, for example, that in 1609 Kepler published "New Astronomy with Commentaries on the Motions of Mars" which proposed elliptical planetary motion, or that the geometrical precision of Borromini's architecture had a contemporary and topical counterpart in the geometrical precision of Galileo's science. The answer, therefore, to our original question 'What is it about the histories of architecture that lend themselves to plagiary?' is possibly this: by presenting the history of architecture from the
vantage point of the twentieth century - primarily in terms of formal or stylistic considerations - we are reducing history to that ubiquitous aspect of twentieth century phenomenon the consumer commodity. If, alternatively, we are presented the history of architecture primarily in terms of its religious or social significance, then it would appear, by contrast, equally unapproachable. But it was with just such a sentiment in mind that the early nineteenth century historians joined forces with their architect colleagues to recreate and re-enact the myth of Gothic architecture:

As the art of ancient Greece was the purest and loveliest child of mere intellect and taste, of mere aspirations after the noble and beautiful, that of mediaeval Christendom is the holiest offspring of moral power ... These two styles then, as being beyond all others the true expression of a great pervading idea, must ever remain the centres of deep and philosophical investigation in architecture; and of the two, Gothic, as the expression of the nobler idea, even more than its rival.15

This evocative use of precedent is a characteristic of the genesis of the Gothic Revival in England, and although the roots of that evocation could be found elsewhere - in literary, political and social activities - its sources were often uninformed and results erred more toward illusion and the picturesque, than toward reality and scholasticism. For instance, in answer to the question of why the early exponents of the Gothic Revival in England never "produced Gothic
buildings which subsequent generations have seen fit to praise," John Summerson has this to say:

"An analogy with literature may help to supply the answer. In those novels of Sir Walter Scott ... we are presented with descriptions of events, scenes, and buildings in which the author is at great pains to give an impression of truthfulness to period ... these descriptions give anything but a medieval impression ... It is not merely that the descriptions are inaccurate ... it is that there is a conscious insistence on detail - heraldic and architectural - which the narrative does not require and which can only please, if the reader shares the author's mood of wonder that such things have a historical reality. That mood is fugitive and to-day can be recaptured by a very innocent or exceedingly flexible mind."

Insistence upon trite detail, inaccurate and superflous, was also characteristic of the architecture of the Gothic Revival. Indeed, the misinterpretation of authentic gothic, of which Wyatt's Fonthill was only one example of many, was so pervasive that during the twenty years immediately following Waterloo:

"... one seeks in vain either for scholarship or for originalities more captivating than superficially new arrangements of the round and octagon towers of the Dowton school."

The Gothic Revival had become an accepted precedent built upon an incomplete and romantic understanding of its progenitor, and although it was part of a much broader social awareness and response to the need for a national style, it could also
be justified in terms of the rationality of its architecture:

The two great rules for design are these: 1st, that there should be no features about a building which are not necessary for convenience, construction, or propriety; 2nd, that all ornament should consist of enrichment of the essential construction of the building...

Strange as it may appear... it is in pointed architecture alone that these great principles have been carried out... from the vast cathedral to the simplest erection. Moreover, the architects of the middle ages were the first who turned the natural properties of the various materials to their full account, and made their mechanism a vehicle for their art.19

So wrote Pugin in the opening paragraphs in the first lecture from "True Principles of Pointed or Christian Architecture." As an argument it is both an elaborately disguised tautology, written with the logic of a syllogism, and more than mere coincidence that "the two great rules for design" represent two essential characteristics of gothic architecture. Great architecture of the past was secured by the application of certain principles which if reapplied, Pugin syllogizes, are sure to procure once again great architecture: gothic architecture.

It is possible to formulate an argument that bestows reason upon the most insidious of acts. Pugin was showing that intuition and reason make more conceptive bed-fellows than if they sleep alone. His assumption that, beneath the picturesque appearances of gothic architecture, there existed
reason, was borne out by the subsequent and more thorough investigations of the gothic precedent. Investigations which the early experimenters, such as Wyatt, were unable or unwilling to undertake.

It was not enough, as we shall see, to ensure longevity by replicating the letter and not the spirit of the gothic precedent. The progress of any revival depends as much upon the rationality of its theoretical underpinnings, as upon the nature of the problems created by the cultural context. During the nineteenth century the problem of parish churches, townhalls and libraries was adequately solved by a rational and a national style; regardless of the scholastic authenticity of the architecture. However, the problem of train sheds, bridges and other long span structures could not be solved by the statics of the rib vault.

More recently society appears once more fertile to the seeds of precedent. And, although the contemporary problems, presented for solution by means of "straight revivalism," have been scarcely more demanding than suburban house extensions, its justification has many champions. Charles Jencks writes:

The argument here might be that Georgian or Edwardian terraces work better than modern estates, because a
tradition — whichever one it is as long as it is unbroken — contains more values, and well-balanced ones, than a modern architect can invent or design. People enjoy these terraces more than new inventions, they are often cheaper to build than the system-built alternative, and they fit into the urban context, in language and scale. Thus one selects a pattern language suitable to the area and only modifies it piecemeal if there is a need for a garage door here, or a refrigerator there. Otherwise tradition always gets the benefit of the doubt: architecture is a social craft, not a creative art.20

On the face of it the argument is moderately persuasive and would please the speculative developer of revival housing estates and condominiums; should they ever confront Jenck's picture book. However, on closer inspection the argument appears to be a peculiar attempt to give credibility to a fundamentally materialistic tendency. For if, on the one hand, it is the spirit or values, as opposed to the bricks and mortar, that we are to covet above all else, then we might not immediately recognise the product in terms of Georgian or Edwardian architecture. And if, on the other hand, it is the packaging itself, and not the content, that embody the tradition then it is absurd to speak of "more values, and well-balanced ones," unless we covet the wrapping paper above the gift.

Furthermore, if a tradition is only valid so long as the ancestral thread is unbroken, then we, by implication, are
irrevocably separated from pre-Modern Movement traditions; and therefore to speak of the relevance of Georgian or Edwardian terraces is a self-contradiction. In any case, the view of architecture as a "social craft" requires the skills of a "creative art," and is not the consequence of endowing stylistic traditions with "the benefit of the doubt."

It is a perverse irony that the formal or stylistic emphasis of many twentieth century histories of architecture - characteristic of pro-Modern Movement historians such as Pevsner - make history more and not less susceptible to historicist plagiarism. And even more ironical that contemporary historians, in attempting to elaborate upon the formal or stylistic studies of their academic predecessors by placing their subject emphatically within its social and intellectual context, have made the past even more alluring. One often wonders whether it is not the way of life rather than the architecture to which we must aspire:

These historians, especially the younger ones ... are on the edge of influencing present practice, but their commitment has been mostly to the past as being over and done with. Still, if we are concerned with the growth of a post-modern tradition, their historical research is needed because they show the virtues of an eclectic architecture just before it was over-powered by Modernism.21

Historical reference of a slightly different kind is also
characteristic of a more humorous and less value-ridden attitude toward precedent. In an interview with the editor of "The Harvard Architectural Review" Denise Scott Brown has this to say of Venturi and Rauch's reliance on precedent:

Take the Yale Math Building for instance; there's a little Gothic reference in there, a quotation. It's wit, it's not to be taken too seriously. It's not the most important part of the building. It's one extra little fillip.22

In a campus so emphatically gothic as Yale, the joke could hardly go unnoticed; it is humour of the most accessible kind. However, humour of a less accessible kind, although presumably not to the original patron, is the Palazzo del Te in Mantua; of which Peter Murray writes:

... a closer examination shows that the building as a whole is full of surprises and contradictions which are obviously intentional and which ... were intended to appeal to a highly sophisticated taste since most of the established rules of architecture are deliberately flouted in such a way that the educated spectator is intended to feel a thrill of delicious horror.23

No doubt the dropped keystones and the collapsed entablatures appealed to Gonzaga's "highly sophisticated taste" and set he and his cultured courtiers reeling about the Palazzò in learned laughter. Enjoyment of the joke, for it is still moderately amusing, requires an education of the established rules of architecture and, perhaps, a rather perverse turn of mind. For what seems so quaint, in retrospect, about
Guilio Romano's humour is that it is inextricably bound up with the education and lifestyle of the Mantua elite of the 1520s. The educated layman in sixteenth century Italy probably knew a great deal more about architecture than he does today, and, conversely, the ordinary layman probably knew a great deal less.

The value of humour regardless of the degree of education it assumes, as the professional comic well knows, depends upon its accessibility to those outside its immediate peer group. The recent trend within the architectural profession toward self-referential and esoteric historicism, a source of "delicious humour" to many, has been explained partly in social and economic terms:

This is an attempt to overcome recent frustrations, to deny the separation between reality and desire, and to turn inward for approval to the closed world of peers or of the office drawing board, where everything becomes possible. This collective narcissism has helped to blur the distinction between wielding professional tools and effectively acting upon the man-made environment. It has helped to bolster a feeling of contentment and ward off a sense of wretchedness before the architectural profession's steadily shrinking sphere of activities.24

Whether or not the recent trend toward a metaphorical reliance on precedent is a reaction against the declining range of the architects responsibilities is not here in question. Nor is the idea of the reliance on precedent in principle, but rather,
it is to question its appropriateness in all situations as the sole supplement to anthropometry and function as determinants of architectural form. It is not simply the fine line between plagiarism and creative interpretation, it is also the line between wilfulness and empathy. For when the use of metaphor continually over-rides a more explicit or contemporary means of communication it is questionable whether this practice is not the hallmark of stylistic self-expression, rather than the method of a judicious and discriminating mind.

But to return to the moment architecture was "overpowered by Modernism," let us trace an alternative objective or abstract, as opposed to subjective or metaphorical influence of precedent. While the pioneers of the Modern Movement refused publically to acknowledge the importance of classical models, they recognised implicitly their universal importance. This theme has been taken up by William Jordy:

At least from the thirties onward, even critics sympathetic to modern architecture called for an architecture less rigidly mechanistic than that of the twenties. According to such criticism architecture should be more aware of nature, of history, of monumentality, of ornament. It should, in short, tap the full range of human experience - and almost always with the implication that what had been modern architecture should be substantially abandoned in the process of attaining this end. The contrary is ... true. Symbolic objectivity has opened the way to architectural expression of non-mechanistic aspects of human experience ...
In a totally practical sense it is difficult to conceive of an architecture that does not make some reference to precedent, however abstract, for the evocation of an antecedent is evident in the simplest of structural openings, the most subtle of axes and the most chaste of spaces. Indeed, an architecture that makes no reference to the history of architecture would not be known as such; it is unimaginable.

And so the pertinent question we must ask of the Modern Movement is: was history considered an anathema and irrelevance to be purged as far as possible from contemporary architecture, or rather, was history considered a secret society whose mysterious initiation ceremony, once celebrated, opened up the rites of precedent, but whose sign was only ever abstract? Jordy favours the latter interpretation:

... the modernism of the revolutionary decade provided three possible openings for the infiltration of history into modern architecture. The first was the Neo-Platonic and neoclassicist simplicity of shapes and perfection of parts, especially associated with Le Corbusier, Mies and Oud. The second was the interest in primitive and vernacular structures stemming from the desire of modern architects for austere shapes and for elemental things, seemingly beyond design but intensely expressive of their world... Finally... was Le Corbusier's use of Choisy's cross-sectional, isometric diagrams in Vers une Architecture. These presented buildings as complex objects assembled of simple shapes.26

There was also a fourth possible opening for the infiltration of history; that of typology. In an essay entitled "Typology
Alan Colquhuon suggests that, despite the emphasis placed upon function as the major determinant of form in Modern Movement theory, functional considerations are not sufficiently deterministic to totally resolve the architectural problem. With reference to a statement by Tomas Maldonado, Colquhuon writes:

"... so long as our classification techniques were unable to establish all the parameters of a problem, it might be necessary to use a typology of forms to fill the gap.... He (Maldonado) is suggesting that the area of pure intuition must be based on a knowledge of past solutions to related problems, and that creation is a process of adapting forms derived either from past needs or on past aesthetic ideologies to the needs of the present."

There can be no dispute with the importance of typology, it has been instrumental in the refinement of Greek temples, gothic cathedrals and contemporary office buildings, to name but a few "types" that have built upon and consolidated traditions and cultural values. However, what is disquieting about Colquhuon's essay is the assumption that the design process or "creation" is underdetermined, that there exists a vast cultural vacuum left by the indeterminacy of anthropometry and social function, which typology, and typology alone, is admirably suited to fill. It is a central tenet of this thesis that the process of design, like any complex social action, is overdetermined. The problem is not so much how
to fill the vast cultural vacuum, as to discriminate between the plethora of well suited candidates, all claiming to determine the architectural assemblage.

Although, in a heuristic sense, typology is synonymous with conventional problem solving techniques - we proceed from the antecedent of a problem to a redefined solution - its appropriateness as an overt means of architectural expression is relative to the consistency and cultural significance of preceding "types." There exists a pedigree for the church plan, for example, and to disregard that pedigree, like re-inventing the wheel, requires the re-acquisition of the same knowledge, within the span of a design project, previously procured over centuries of cumulative experience. Furthermore, by pursuing the imperatives of typology - and the inevitably ambiguous distinctions between "types" - are we not in danger of allowing the limitations of an inadequate taxonomy to unduely compromise the uniqueness and appropriateness of contemporary design solutions? Even when the architectural problem is only a minor modification of previous problems, it should not be supposed that typlogy is sufficiently inclusive to determine the totality of the new solution.

If evidence is needed to substantiate this proposition then
Colin Rowe's essay "The Mathematics of the Ideal Villa" is proof enough. Rowe writes that despite the precise proportional and actual correspondence between the Villa Stein and the Villa Malcontenta:

... in their forms and evocations (these two buildings) are superficially so entirely unlike that to bring them together would seem to be facetious; but, if the obsessive psychological and physical gravity of the Malcontenta receives no parallel in a house which sometimes wishes to be a ship, sometimes a gymnasium, this difference of mood should not be allowed to inhibit scrutiny. 28

The spectacular mathematical similarities between the two villas does not disguise the fact that in most other respects they are as spectacularly dissimilar, a fact of which Le Corbusier was patently aware. The architect of the Villa Stein was evoking a very different precedent than any nineteenth century architect had considered, a contemporary and non-architectural precedent of steamships, airplanes and motor cars. The result appeared to fly in the face of every sacred tenet of the architectural profession; but appearances can be deceptive.

If we wish to bring into accord the polarities to which we have been referring - the subjective or metaphorical evocation on the one hand, and the objective or abstract on the other - they can be found in the most recent work of Kallman and McKinnell. Indeed, Noel McKinnell describes the American
Academy of Arts and Sciences as a resolution of "Attican and Arcadian themes" in essence the polarity of the perspective of precedent:

The order and optimism of the classical spirit and the romantic, tragic reminder of the ultimate fate of our work implicit in even the most pleasing decay - are here joined. In both plan and elevation the building is evocative of the rustic and rational idealism whose progenitor inhabited Greece:

The plan of the Academy demonstrates the same dialogue between order and circumstances as the elevation. In an Albertian sense it is city-like and resembles Miletus: the same four elements are present - the imposed Cartesian grid; the found, circumstantial boundary; the agora, court or atrium; and the unique, circular geometry of the amphitheater.

We have discussed the infiltration of history from two points of view; the subjective or metaphorical and the objective or abstract. Initially, we debated the view of precedent embodying certain subjective values, complementing the "urban context, in language and scale," arguing that this appropriation should not be the excuse for materialistic or stylistic self-expression. But, rather, it is the opportunity for critically and judiciously appropriating the continuities of a culture. Subsequently, we discussed precedent as embodying transcendental values, for example the "simplicity of shapes and the perfection of parts," concluding that, although characteristic
of the Modern Movement, this abstraction of history to its essential forms is ultimately reductive; it is impossible for architecture to exorcize its ancestry. Finally, we discussed typology as a quasi-objective means of involving the history of architecture in the design of architecture and emphasized the heuristic limitations of this approach. Ultimately, however, the value of precedent rests upon the act of appropriation itself and not upon the metaphorical or abstract conveyance of meaning or message. What is of greater cultural significance is not the remembrance of things past, it is, rather, an actual awareness of things present.

To conclude this chapter on the perspective of precedent it is worth drawing an analogy between architecture and law. Both professions rely heavily upon the value of precedent to determine the course of their actions, and while in a pragmatic sense they are accountable to no one but themselves, in a much broader sense they are accountable to those to whom they administer justice. And when an interpretation of, or reference to precedent, is no longer able to substantially characterize the nature of a specific problem or case, then other models are sought to resolve the dispute; lest the knowledgeable fall in love with their knowledge and the law become an ass.
NOTES

1 Vitruvius, Bk. 1, Ch. 1, p. 6.
2 Ibid., pp. 102-4.
4 Established in 1894 on Morris's principles of the importance of craftsmanship to architecture—first school to include teaching workshops for crafts.
14 Worringer, "Form in Gothic," p. 37.
17 Ibid., p. 513. The Downton school refers to the precedent established by Richard Payne Knight at Downton Castle, Herefordshire, 1774-8.
18 Ibid., p. 513.
19 Pugin, "True Principles of Pointed of Christian


21 Ibid., p. 96.


26 Ibid., p. 186.


30 Ibid., p. 83.

31 Ibid., p. 85.
III THE SOCIAL AND ECONOMIC PERSPECTIVE

The basic abstraction of architecture according to Susanne Langer, whose point of view we confronted in the introduction, is that of "an ethnic domain." A culture, Langer explains, is made up of many human activities; "a system of interlocking and intersecting actions." It has physical ingredients, or artifacts, but it also has physical symptoms, "the ethnic effects that are stamped on the human face" as Langer puts it, which are the expression of a culture. This expression can be seen in "the influence of social condition on development, posture, and movement of the human body." These factors comprise the ingredients of a culture; the architect, Langer argues, must create its image: "a physically present human environment that expresses the characteristic rhythmic functional patterns which constitute a culture."

Architecture has always been, and inevitably so, an expression of the "social condition" of a culture, either implicitly or explicitly. Indeed, in Vitruvius's observations regarding the social structure of ancient Rome, and the consequential architectural prescriptions, we find a mirror of our own predicament:
For capitalists and farmers of revenue, somewhat comfortable and showy apartments must be constructed, secure against robbery; for advocates and public speakers, handsomer and more roomy, to accommodate meetings; for men of rank who, from holding offices and magistracies, have social obligations to their fellow-citizens, lofty entrance courts in regal style, and most spacious atriums and peristyles, with plantations and walks of some extent in them, appropriate to their dignity.

In addition to expressing distinct social groups, Vitruvius writes, architecture must also provide for both community and privacy. On the one hand, private rooms - such as "bedrooms, dining rooms, bathrooms, and all others used for the like purposes" - are those into which nobody has the right to enter, and on the other hand, public rooms - that is "entrance courts, cavaedia, peristyles, and all intended for the like purpose" - are those into which everybody has the perfect right to enter, even without invitation. Planning according to these principles to suit "different classes of persons" will leave "no room for criticism," Vitruvius explains, "for they will be arranged with convenience and perfection to suit every purpose."

No less astute, and no less prescriptive, are Palladio's observations with regard to his social context. We can assume that the manner in which Palladio presents to us his recommendations for the houses of "great men" and "gentlemen
of a meaner station" owes a great deal to its Roman predecessor:

... for great men, and particularly those in a republic, the houses are required with loggias and spacious halls adorned, that in such places those may be amused with pleasure, who shall wait for the master to salute, or ask him some favour: and for gentlemen of a meaner station, the fabrics also to be less, of less expense, and have fewer ornaments. For judges and advocates, they ought likewise to be so built, that in their houses there may be handsome and well adorned places to walk in, that their clients may remain there without inconvenience.5

But what is most surprising to find, is that same manner of vague and arbitrary presentation a characteristic of twentieth century observations and prescriptions. The modern equivalent of those observations by our two eminent Italians, differs rather in style and content, than in method and principle:

Our individual roles should probably not show themselves too much in the dwelling, as this would contradict the democratic equality of private persons. But our places of work should be differentiated to show that the individual roles participate in the varying phenomenal contexts. The surgery of a physician should not only be practical, it must also appear clean and sanitary. In this way it calms down the patient. The office of a lawyer, on the contrary, should soothe the worried client by appearing friendly and confidence-inspiring, at the same time as it expresses that the lawyer is an able man.6

Buildings with "spacious atriums and peristyles" or with "loggias and spacious halls adorned" could be construed "confidence-inspiring" abodes for "great men"; if rather unfriendly and intimidating. However, our contemporary
contribution argues that the dwelling is not the appropriate vehicle through which to express "individual roles." We may infer from this a distinction between two views of the social function of architecture, and some general conclusions about the different social contexts from which these views originate. But, on closer inspection we find the contemporary point of view has many adversaries; our conclusions may not be so general:

Let us try and contribute to an environment which gives people more chance to impress it with their own individual characteristics. It must also be responsive to loving attention, thus enabling it to be taken over by each person as an essentially familiar place. The more involved a person is in the shaping and maintenance of his surroundings the more appropriate they become and the more easily appropriated by him.

Hertzberger, the author of the preceding passage, is referring to the design philosophy behind a project for eight prototype "carcase" houses at Delft. It is a philosophy more appropriate to housing than public buildings with transitory populations. For the cinema-goer to take "possession of his surroundings" - to furnish the auditorium with the memorabilia of his character - would be obviously impractical.

There is, however, a paradox in both these contemporary points of view. Regardless of the extent to which the architect "objectively" discharges his social design responsibil-
ties upon the user, the architect remains responsible for deciding in what way the user is permitted to appropriate his surroundings; whether it be by geraniums or gypsum board. But what is more important here, is the dilemma such a dichotomy presents to both practitioners and historians of architecture; is it "places of work" or places of rest, that "should be differentiated to show that individual roles participate in varying phenomenal contexts"?

The question is rhetorical, but to the social historian of architecture it presents a very real problem. If architecture is socially conditioned, then, by implication the history of must embody the history of social values. With this point of view in mind, "dialectic materialism" in its substantive form, Arnold Hauser undertook to write "The Philosophy of Art History." Hauser's argument runs like this: all art is to some extent conditioned by social values, but not every-thing in art can be interpreted in sociological terms. Most important of all artistic excellence cannot be so interpret-ed. Similar social conditions can give rise to valuable and to utterly valueless works of art. At the very most, all that sociological enquiry can do is account for the outlook on life manifested in a work of art in terms of the values of the social mileux from which the work of art originated.
To illustrate the truth that there exists no precise correlation between artistic excellence and social conditions, Hauser cites the erroneous nineteenth century belief that political progress could be equated with genuine art, democratic feeling with artistic feeling, and humanitarian values with universally valid rules of art; a fantasy without any basis in fact. And in situations where despotism, as opposed to liberalism, was the order of the day, Hauser draws attention to the Middle Ages and the Ancient Orient, where spiritual dictatorship, far from precluding the production of artistic quality, created conditions of life under which the artist most surely flourished. Nor should we be duped, Hauser argues, into supposing that artistic talent is dependent upon economic conditions.

The most persuasive argument for recognising the limitations of sociological enquiry is Hauser's own account of the work of Michelangelo:

What do we really know about the artistic problems with which Michelangelo had to wrestle, about the individuality of his means and methods, when we have noted merely that he was contemporary with the formulae of the council of Trent, the new political realism, the birth of modern capitalism and absolutism? ... we perhaps understand better his restless spirit, the turn that his art took in the direction of mannerism, possibly even in some measure the astounding inarticulateness of his last works ... Here we come up against the definite limits of sociological inquiry.
On the face of it, Hauser's theory—limitations and all—offers a valuable contribution to a philosophy of art history; dialectic materialism promises a more profound understanding of artistic achievement. However, as Ernst Gombrich has pointed out, the wisdom of Hauser's theory is at odds with the willfulness of its application in practice. For, as every social historian well knows, the overgrown path between a social act, whether political or artistic, and its social origins is very often too circuitous and indistinct to trace, particularly when that act is as expressively abstract as architecture.

"The Social History of Art," Gombrich argues, is addressed to those readers familiar with the artists and monuments under discussion who seek proof of the universal validity of Hauser's theory in terms of the history of art. This emphasis on the facts selected to fit the theory is exemplified, Gombrich writes, by such statements as:

... the unification of space and the unified standards of proportion (in Renaissance art) ... are the creations of the same spirit which makes its way in the organisation of labour ... the credit system and double entry book keeping.

This interpretation of Renaissance art is consistent with Hauser's general theoretical stance:

To him (the sociologist), philosophy, science, law, custom, and art are different aspects of one unitary
attitude to reality: in all these forms men are searching for an answer to the same question, for a solution to one and the same problem of how to live. If this was the case, however, that historical periods could be interpreted and understood in terms of "one unitary attitude to reality" - one formula - then there would be no limit to the possibilities of sociological enquiry. This is obviously not so. But the panacea, or rather placebo, of the dialectic materialist is the postulation of the concept of "inner contradictions" in history; the intellectual snare of too dogmatic a faith in sociological enquiry; a tendency discernible in the pages of "Space, Time and Architecture."

For example, as a preface to an analysis of Le Corbusier's projects between 1938 and 1953 Giedion has this to say of their social context:

These projects coincided with general signs of a new humanization of urban life on the horizon. Man is no longer satisfied to remain a mere onlooker, whether at a football game or a television screen. His spontaneous reactions can be seen in every part of the world during the moment in which the passive spectator has become transformed into an active participant. There is a world-wide trend toward creating centers of social activity, and this calls for far more from the architect than just technical capacity. His task today is infinitely more complicated than that of his predecessors at the time when Versailles was built. They had to give concrete form to an exact program placed before them by a clearly stratified society. Today the architect has to anticipate needs and to solve problems that exist only half consciously in the crowd.
To suppose that today we live in a society that is less "clearly stratified" than it was in seventeenth century France, is to suppose that in the last three hundred years mankind has mysteriously discarded the security of the social group in preference for the anonymity of the crowd. And to suppose, in addition, that today, as a possible consequence of more leisure time, a world-wide trend has caused people to be more participatory, than they were in nineteenth century Europe, is a similarly curious suggestion.

There are most certainly differences between the France of Hardouin-Mansart and the France of Le Corbusier; it has become a more egalitarian society where distinctions between social groups are no longer insurmountable and based more upon occupation, ability and interest than upon wealth and power; a fact of which Le Corbusier was obviously more aware of than Giedion.

The value of explaining historical events in terms of unitary trends, cultural spirits or zeitgeists - one unitary attitude to reality - depends upon the pre-existence of such forces. We cannot say, a priori, cultures conceal a hidden pattern, that once discovered, explain every dimension of that culture: some cultures are more pluralistic than others. For example,
the thesis that between Gothic architects and scholars, in a hundred mile region around Paris in the thirteenth century, there existed considerable concurrent and convergent intellectual methods, is persuasively demonstrated in Erwin Panofsky's book "Gothic Architecture and Scholasticism." The technique of reconciling the irreconcilable, for instance, was perfected to a fine art that determined the form of academic instruction, the ritual of public disputes, the process of scholastic writings, and ultimately the evolution of Early and High Gothic architecture:

Every topic had to be formulated as a quaestio the discussion of which begins with the alignment of one set of authorities (videtur quod ...) against the other set (sed contra ...), (and) proceeds to the solution (respondeo dicendum ...) ... An attitude similar to that of High Scholasticism must be presupposed in the builders of the High Gothic cathedrals ... And this, I believe, accounts to some extent for the apparently erratic yet stubbornly consistent evolution of Early and High Gothic architecture; it too proceeded according to the scheme: videtur quod - sed contra - respondeo dicendum.17

Panofsky corroborates this thesis with reference to three characteristic gothic problems; the rose window in the west facade, the organization of the wall beneath the clerestory, and the conformation of the nave piers; sociological enquiry in this instance has yielded fruitful insights.

If evidence be needed to support a contrary thesis, however,
that there are occasions in history when the social values expressed through architecture most emphatically do not concur with those of society at large, then it can be found, for instance, in the facts of disapproval associated with the fall from grace of Victorian architecture in England during the decade from 1870 to 1880.\textsuperscript{18}

We may now regard the sociological view into art and architectural history - a view that in Hauser's terms unites philosophy, science, law and art into one common attitude - as a mootable position, the insights gained being dependent on factors exterior to the claims and explicit domain of the theory. And that the notion of "inner contradictions" is not a satisfactory explanation for the frequent time lags between social and stylistic change, or for the fact that different artistic media are often at different stages of development.\textsuperscript{19} In short, there occasions in art and architectural history virtually impervious to sociological enquiry.

This conclusion raises a more general philosophical question of the difference, or not, between the methods of the natural and social sciences. For if, as is suggested, there are occasions in architectural history resistant to sociological enquiry - of the kind we have been discussing - then it is
reasonable to reinforce Hayek's recommendation that the social sciences should adapt "their methods more and more to their own particular problems" rather than "showing their methods (to be) the same as those of their brilliantly successful sisters." To elaborate why this distinction is significant Hayek writes:

The physicist who wishes to understand the problems of the social sciences with the help of an analogy from his own field would have to imagine a world in which he knew by direct observation the inside of the atoms and had neither the possibility of making experiments with lumps of matter nor the opportunity to observe more than the interactions of a comparatively few atoms during a limited period. From his knowledge of the different kinds of atoms he could build up models of all the various ways in which they could combine into larger units ... But the laws of the macrocosm ... would scarcely ever enable him to predict the precise outcome of a particular situation; and he could never verify them by controlled experiment - although they might be disproved by the observation of events which according to his theory are impossible.20

This distinction, according to Karl Popper, far from emphasizing the differences between the natural and social sciences, actually confirms the similarities; the deductive process in either science is equally unpredictable:

We are very far from being able to predict, even in physics, the precise results of a concrete situation, such as a thunderstorm, or a fire ... There is no doubt that the analysis of any concrete social situation is made extremely difficult by its complexity. But the same holds for any concrete physical situation.21

The most obvious counter argument states that social situations
most certainly are more complex, and therefore incomparable. But this retort, Popper replies, is based on two prejudices. Firstly, comparisons made between concrete social situations and insulated physical situations are fundamentally misleading; similarly, comparisons between concrete social situations and artificially insulated social situations such as prisons or experimental communities. And secondly, the mistaken belief that the explanation of a social event should involve the psychological states of everybody involved:

But this belief is not justified; it is much less justified even than the impossible demand that the description of a concrete chemical reaction should involve that of the atomic and sub-atomic states of all the elementary particles involved. This belief also shows traces of the popular view that social entities such as institutions or associations are concrete natural entities such as crowds of men, rather than abstract models constructed to interpret certain selected abstract relations between individuals.

But what is most surprising is Popper's suggestion that "social science is less complicated than physics" and that "concrete social situations are in general less complicated than concrete physical situations." In most social situations, Popper argues, there exists an element of rationality and although human beings never act totally rationally, people nevertheless act more or less rationally, and so it is possible to construct comparatively simple models as predictive approximations. More precisely, Popper suggests the adoption
of the "zero method" by which a model is constructed on the assumption of complete rationality, and presumably possession of complete information, and of calculating the deviation from the model behaviour.

Popper's recommendation implies a complete isomorphism between the methods of the natural and social sciences. An isomorphism that Christopher Alexander in the field of architectural theory, for instance, sees between the method of designing a vacuum cleaner, on the one hand, and an environment for a million people on the other; the methodological differences are, apparently, a matter of degree rather than kind:

Consider ... the choice of materials to be used in the mass production of ... a vacuum cleaner ... This typical design problem ... falls easily within the compass of a single man's intuition. But what about a more complicated problem?
Consider the task of designing a complete environment for a million people ... The difference between these two cases is really like the difference between the problem of adding two and two, and the problem of calculating the seventh root of a fifty digit number. In the first case we can quite easily do it in our heads. In the second case, the complexity of the problem will defeat us unless we find a simple way of writing it down, which lets us break it into smaller problems. 24

A similar attitude can be found in Robert Sommer's book "Personal Space." Sommer's thesis is that the failure of the "behavioural realm" of architecture is due to the arbitrary reliance on casual observation, anecdote or intuition;
a failure that can be rectified by a more systematic approach similar to that, for instance, employed by structural engineers:

The stage that each design profession has reached can be measured along a scale from pure artistry at the one end to pure scientism at the other. Closest to the artistic end are the interior designers. Architecture is further along, relying heavily on the accumulation of experience. When it comes to materials and structures, architects join engineers. But in the behavioural realm, the way buildings affect people, architects fall back on intuition, anecdote, and casual observation.  

But Sommer is careful not to make outrageous generalizations, for his goal, he writes, is to stimulate individuals in their own field to undertake research: "even if the research is of inferior quality." Generalizations may only be possible, Sommer concludes, when a considerable number of case studies indicate consistency, but otherwise there is no way of predicting, for instance, how customers will react to an open-plan bank, or a round auditorium. It is this difficulty that Popper recognises to be the main difference between the methods of the theoretical sciences of nature and of society:

In physics ... the parameters of our equations can ... be reduced to a small number of natural constants - a reduction which has been successfully carried out in many important cases. This is not so in economics; here the parameters are ... quickly changing variables. This distinction reduces the significance, interpretability, and testability of our measurements.
If this distinction holds for economics, then we can assume it holds for architecture, where rationality is a less pervasive motive. For we cannot attribute to disparate cultural perceptions of privacy, for example, absolute rationality; such significant differences are by their very nature irrational; despite our being able to understand them in rational terms. The Germans, Hall writes, view privacy in very different terms to Americans, and are uncomfortable with flimsy and open office doors:

In offices, Americans keep doors open; Germans keep doors closed. In Germany, the closed door does not mean that the man behind it wants to be alone or undisturbed, or that he is doing something he doesn’t want someone else to see. It’s simply that German’s think open doors are sloppy and disorderly. To close the door preserves the integrity of the room and provides a protective boundary between people. Otherwise, they get too involved with each other.

There are many such apparently irrational "behavioral" differences between cultures. The idea of urban centrality in Japanese society, for instance, depends in part on a traditional idea of concentric spatial and social organization. Proximity to the core represented loyalty to the ruling nobility or shogun, and conversely distance from the core was a sign of mistrust and disloyalty. While it is necessary to perceive disparate cultural phenomena in terms of universal abstractions - such as the idea of a common
rationality - architecture proceeds, *sine qua non*, from those abstractions to local, specific and tangible solutions. We think in abstraction in order to generalize and predict; but we build in concretion in order to enrich abstractions with the pertinence of people, place and time.

In response to this dichotomy, between apparently irrational cultural differences on the one hand and universal abstraction on the other, we must welcome Chermayeff and Alexander's sentiment that "the development of a unified field of environmental control" can only occur when "art will once again be tempered by the purposeful discipline of science, and science be inspired by the insights of art"; although we should be less receptive to their practical conclusions:

... adjoining domains must be preserved at all times, in spite of traffic between them ... A general planning principle inherent in the structure of a whole class of problems has been exposed. The transition points that at first appeared as secondary joints between realms now emerge as important primary elements in their own right. They are fully fledged and vital physical entities, crucial planning elements suited to a mobile, mechanized, and noisy world.

The emphasis on transition spaces as primary elements is as much a stylistic device as a universal harbinger of privacy. The nature of transitional spaces is affected by metal climates, pervading attitudes and social norms, which are influential in perceptible and imperceptible ways; but are also about as
capricious as the weather or the outcome of a football match.

If we approach the study of architecture and its social context with too simple or beguiling a scientific theory, and apply it with more regard for the integrity of the theory than for the integrity of the facts, then we are cheating ourselves of the rich fruits that sociological enquiry can bear. Prescriptive social theories are something of a presumption. They presume a society reducible to at best a recognisable abstraction, and at worst an ugly parody of itself. The social sciences, unlike the natural sciences, as Hayek has argued, does not deal with the relations between inanimate objects, on the contrary, it deals with the relationship between men and objects, men and ideas, and men and men; and while in abstraction the two sciences may be comparable, in a concrete sense they are not. The sociologist is concerned with man's needs and actions and attempts to explain the unintended or undesigned results; a phenomenon far harder to predict than the boiling point of water.

Proceeding from the intuitive and traditional expression of "social values" in architecture - characteristic of Vitruvius and Palladio - we confronted the paradox of an indeterminate social architecture, where appropriation is contingent upon the "taste" of the architect. Subsequently we discussed the
scientific sociological approach, explaining events in terms of "one unitary attitude to reality," and emphasized the relationship between the plurality of the cultural context and the explanatory powers of the theory. Popper's proposition of complete rationality, complete information and a calculable deviation as the basis for prediction, may well be theoretically sound. But it is hardly an inclusive basis for a prescriptive design methodology. It is possible to reduce the social function of architecture to a rational abstraction of reality, Fuller's Dymaxion house would be an example, but it would be at the expense of cultural nuances and subtleties that, while no less tractable to rational explanation, are no less important to architecture.

The predicament we find reflected in Vitruvius's timid social prescriptions is a predicament we face today, it cannot be resolved by anything short of a thorough understanding of man's social needs and actions in their general social context. In applying recondite formulae to this predicament we are not only deluding ourselves into thinking that our prognosis may be established upon a fallacious reciprocity between cause and effect; but more important we are also partners to a process that, by either innocence or malice, reduces the social significance of architecture to an insipid jest of life.
itself. But ultimately, the nuances and subtleties of reality are predicated upon, and must be reconciled with a broader social generality.
NOTES

2. Ibid., p. 96.
10. Ibid., p. 9.
11. Ibid., p. 11.
12. Ibid., p. 15.
22. Ibid., pp. 130-143.
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<td>23</td>
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<td>Ibid., p. 157.</td>
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IV THE PERSPECTIVE OF PERCEPTION

The discovery that the Greek musical scale depends upon the division of a string of the lyre according to the ratios: 1:2 (octave), 2:3 (fifth), 3:4 (fourth) and 1:4 (double octave), is attributed to Pythagoras in the sixth century B.C. This discovery that the first four integers express all the consonances of the Greek musical scale:

... seemed to hold the key to the unexplored regions of universal harmony. Moreover, if the invariable of all octaves is the ratio 1:2, it must be this ratio, the Greeks argued, that is the cause of the musical consonance. Perfection and beauty were therefore ascribed to the ratio itself.¹

We know that ratio is also a significant factor in Greek architecture. The plans of rectangular Greek temples conform more or less to the ratio 1:2. The peristyle of the Basilica at Paestum, for example, is built to the ratio 9:18, the temple of Zeus at Olympia 6:13, and the temple of Artemis Lencophryene at Magnesia-ad-Maeandrum 8:15. Approximately one hundred years after Pythagoras the Parthenon was built with a peristyle of the ratio 8:17. The most persuasive argument to explain this discrepancy between the precision of musical ratios and the imprecision of architectural ratios is that the conformity of the object to abstract ratios was necessarily modified to suit the eye of the

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spectator. Deviation from precise numerical ratios was an optical device used to synthesize what was known of the universal properties of ratios with what was known of the human properties of perception. This explanation is consistent with what we now know about the different characteristics of aural and visual perception; the optic nerve contains roughly eighteen times as many neurons as the cochlear nerve;² it is easier to satisfy the ear than to satisfy the eye.

The Greek optical refinements of the fifth century B.C. - embodied in such buildings as the Parthenon - were the result of centuries of empirical investigation centred upon a single building type; the temple. It is possible to summarize the more obvious of these refinements as, firstly, a slight upward curvature of the stylobate and entablature in order to counteract a sagging effect arising from the sloping form of the pediment, secondly, an inward inclination of the column axes according to the two sloping directions of the stylobate, thirdly, the entasis or swelling and diminishing column girth, and finally, an increased diameter for the corner columns of the peristyle which would often be seen in silhouette especially since Greek planning stressed the oblique as opposed to the orthogonal viewpoint. There are many more observations regarding the optical devices of Greek temples,
indeed entire books have been written on the subject, suffice it to say, ratio and the modicum of visual adjustment largely determined the development of the Greek temple.

A similar faith in the universal properties of ratio is expounded in the writings of Vitruvius. However, the Roman architect relied on ratio more to determine the internal proportions of space than the external proportions of form:

In width and length, atria are designed according to three classes. The first is laid out by dividing the length into five parts and giving three parts to the width; the second, by dividing it into three parts assigning two parts to the width; the third, by using the width to describe a square figure with equal sides, drawing a diagonal line in this square, and giving the atrium the length of this diagonal line. Should these three ratios, 3:5, 2:3 and the Golden Section 0.618:1 - also known to the Greeks - not result in "the beauty which is due to true symmetry," Vitruvius explains, "it will be permissible to make diminutions or additions in the symmetrical relations." Vitruvius, also realised that the application of abstract ratios was not in itself a guarantee of "beauty."

In addition to Vitruvius's three ratios Palladio suggests an additional four to determine the "proportions of the principal rooms":
The most beautiful and proportionable manners of rooms, and which succeed best, are seven, because they are either made round (tho' but seldom) or square, or their length will be the diagonal line of the square, or of a square and a third, or of one square and a half, or of one square and two thirds, or of two squares."

With the exception of the circle, these ratios, 1:1, 0.618:1, 3:4, 2:3, 3:5, and 1:2, were tied to a further method of calculating the room heights. As Wittkower has pointed out, Palladio used three formulae for calculating the ceiling height, from the length and width, by a geometrical as well as by an arithmetical process. Applying the first formula, suppose a room measures 6x12 (1:2); its height will be 9. The second formula would determine a ceiling height of 7.5 from the same sized room. Using the third formula to the same room, the height would be 8. In actual fact the resultant ceiling heights, in these three examples, represent the "arithmetic, geometric and 'harmonic' mean between each of the two extremes"; in short, three proportional systems attributed to Pythagoras, without which it is conceivable there could be no rational theory of proportion, as least as we know it today.

Concerning the relationship of the parts to the whole Palladio is less explicit, excepting pragmatic advice such as "... in all fabrics it is requisite that their parts should correspond together, and have such proportions, that there may be none whereby the whole cannot be measured, and likewise all the other parts." Or concerning the disposition of columns
Palladio suggests they be "properly placed, and in a just proportion to the whole edifice."\textsuperscript{10}

Although Palladio's system of ratios was by no means comprehensive, and seems to us a rather ad hoc collection of proportions, on the one hand scientific, and on the other semi-mystical, for there can be no scientific explanation for the proportional properties of the Golden Section. It nevertheless represents the conviction that architecture embodies certain universal values - ratios - associated with the whole and each of its components. This system of mathematical ratios may be called the basic axiom of Renaissance architecture;

As man is the image of God and the proportions of his body are produced by divine will, so the proportions in architecture have to embrace and express the cosmic order.\textsuperscript{11}

The image of man also plays a singularly concrete role in the architecture of Le Corbusier as an absolute unit of measurement for all things built. Ratios, however, not determined by the Greek music scale, but by the anthropometry of the human figure were those with which Le Corbusier obtained the measure of his structures. This was not simply because human proportions represented immutable fact but also because, as Le Corbusier wrote in "Vers un Architecture", "an architecture must be walked through, traversed....it is made to be seen by our human eye placed at 63 inches from the ground." Le Corbusier believed
that an architecture scaled to the human figure would be perceptibly so, and what is more, acceptably so. The "Modulor" represented an objective academic solution to the very general problem of human scale in architecture. Paradoxically it was developed by one of the most outspoken critics of academe. Nevertheless Le Corbusier imagined the modular scale would be a complement to the traditional imperial or metric scale, appropriate to every object for human use and corresponding to a single all-pervading harmony.

Le Corbusier's "Modulor" was based upon the Fibonacci series: 

\[ a, b, a+b, a+2b, 2a+3b, 3a+5b, \ldots \text{etc.} \]

For example the series, 

\[ 1, 2, 3, 5, 8, 13, 21, \ldots \text{etc.}, \]

is a Fibonacci series. The initial "Modulor" of 1948 was based on a height of 175cms, or 5 feet 9½ inches, however this dimension was difficult to translate into an imperial Fibonacci series and accordingly "Modulor 2" determined 182.9 cms or 72 inches as the more appropriate dimension. Seventy two, incidentally falls well into the Fibonacci series: \( \frac{1}{2}, 1, 1\frac{1}{2}, 2\frac{1}{2}, 4, 6\frac{1}{2}, 10\frac{1}{2}, 17, 27\frac{1}{2}, 44\frac{1}{2}, 72; \) as does 1829: \( 9, 15, 24, 39, 63, 102, 165, 267, 432, 698, 1130, 1829. \) It is also interesting to note that the proportions of the ascending Fibonacci series rapidly approach the proportions of the Golden Section.
The "Modulor," however, was constrained by the disparity between imperial and metric units of measurement. For, despite the apparent resolution in "Modulor 2" Le Corbusier's contrivance is of more symbolic than practical value. As Peter Collins has pointed out, even Le Corbusier's application of his own system, at the Unite d'Habitation, resulted in uneconomic and cumbersome structural concrete dimensions. \(^\text{13}\)

In addition to the "Modulor" Le Corbusier advocated the use of simple geometric forms such as triangles, squares, circles and Golden Sections. There is no relation between these geometric forms and the "Modulor" except, as we have said, that the ascending Fibonacci series rapidly approaches the Golden Section. The use of pure geometric forms was part of a French tradition that transcended both Classical and Gothic design. For instance, Francois Blondel claimed that his design for Porte S. Denis was determined by precise geometrical forms; although his successor Jacques-Francois Blondel refuted this, suggesting that the design does not correspond to the geometric rules expounded in "Cours d'Architecture." \(^\text{14}\)

Claude Perrault, however, asserted that if we associate certain proportions with the idea of beauty, it is because
we have grown accustomed to such an association. And even Le Corbusier felt quite at liberty to amend the outcome of too vigorous or too literal an application of the "rules" of proportion when the results did not concur with his intuitive understanding of beauty:

I will fight against any formula and any set of instruments which take away the least particle of my freedom. I want to keep that freedom so intact that at the very moment when the golden figures and the diagrams point to a perfectly orthodox solution I may reply: 'That may be so, but it is not beautiful.'

We have returned full circle to the discrepancy between what is known and what is seen, from Greek optical refinements of the fifth century B.C. to Le Corbusier's "disclaimer" of the twentieth century A.D., and from harmonic ratios to Golden Sections. Each attempt to determine a formal order, proceeding from the immutable fact of number to the mutable act of perception, must be seen not as a failure to reconcile the irreconcilable, but rather as part of the western humanist tradition of, on the one hand, symbolizing an evolving concept of the "universal," and on the other hand, of recognizing that in order to perceive the intangible, it must first be made tangible. The importance of psychology is that it claims for sensibility its own universals. It has turned our paradigm upon its head.
The idea of a science of perception seemed to hold the promise of an escape from the quagmire of the arbitrary, for rather than searching for universals in external sources — such as mathematics — perception theory claimed its own. The impact on architectural education was immediate. In 1943 Walter Gropius writes:

For many years I have systematically collected facts about the phenomenon of human sight and its relation to the other senses, and about our psychological experiences with form, space and color ... I consider the psychological problems ... as basic and primary, whereas the technical components of design are our intellectual auxiliaries to realize the intangible through the tangible.17

Gropius's interest in "the phenomenon of our human sight" must be due in part to the contemporaneity of the Gestalt and Bauhaus schools in Weimar Germany. The idea of a "basic" design course first occurred at the Bauhaus and, as we know, relies heavily upon Gestalt theory.18

The theories of the Gestalt psychologists are well documented,19 they set out to discover the rules that govern the appearances of shapes, and suggested there is a direct correlation between what the eye sees and the physiological structure of the connection between the eye and the brain. To use Kohler's own words:

... experienced order in space is always structurally identical with a functional order in the distribution of underlying brain processes.20
But we know Gestalt more by its terminology than by its theoretical underpinnings. Such terms as "figure-ground," "field-forces" and "isomorphism" have become common usage in basic design courses in schools of architecture. And no less familiar are the Gestalt laws most applicable to the built environment; the law of Pragnanz, the law of proximity, the law of equality, the law of continuity and the simplicity of form.

By analogy with Information Theory we know that most scenes comprise the new and the familiar, and that the over emphasis of one at the expense of the other can lead to either boredom and redundancy, on the one hand, or disorientation and over complexity on the other. The observer, Prak writes:

... must be able to perceive a difference as a difference ... there must be something known to compare it to. Therefore a certain amount of redundancy is a prerequisite. Perceptions without redundancy are just as uninteresting as highly redundant ones.

And, regarding depth perception, we know that tonal contrast, overlap and the existence of different sized objects are all cues we subconsciously use to determine the reality of the visual field; as are movement parallax, the process of focusing, and the convergent lines of perspective. However, unless the architect is intending to create an illusion of space - at odds with the reality of that space - then:
In general, the various cues for space perception are of more importance to draughtsman and painters than to architects. A draughtsman may try to create an illusionary space perception with the position of objects, overlay, size, perspective and light and shade. The architect does not need such an illusion, for the building is really three-dimensional.25

The importance of this research into visual perception is that it presupposes the existence of certain "laws" that transcend the social and cultural context and upon which predictions can be made. In this sense perception theory represents a truly scientific approach.

It is this scientific approach that Rudolf Arnheim adopts, and in the introduction to "The Dynamics of Architectural Form," for example, he writes:

If we restrict our analysis to the cultural and individual conditions prevailing in the observers, we proceed without any knowledge of the perceptual object they are receiving; and we are left with the absurdly distressing conclusion that since they all see different things, there can be no shared experience and no communication. If on the other hand, we restrict our analysis to the target "T," we can ignore the substantial modifications introduced by the point of view of any individual or collective observer. In this equally one sided way we can get at the common core ... to isolate - invitro, as it were - some of the objects' qualities most likely to survive the changing tastes of the ages.26

It is a prepossessing and by now familiar idea. Not altogether dissimilar from Vitruvius's intentions, or those of Palladio and Le Corbusier, to determine those qualities of the object most likely to transcend time and place. If,
however, any theory of perception ignores the "substantial modifications introduced by the point of view of any individual or collective observer" we must presume those modifications to be either inconsequential or irrelevant. On the question 'What is the significance of social and cultural influences on perception?' there is considerable disagreement. As Forgus has pointed out, psychologists are critical of the classical gestalt approach which emphasizes the stimulus determination of perception:

The main assertion of Bruner and Postman was that past experience selectively sensitizes the organism to different aspects of the stimulus complex. The differential "sensitization" acts as a set which selectively predisposes the organism to respond to different aspects of the stimulus complex and in different ways. This is a function of prevailing needs, motives, attitudes and personality structure, all of which result from interactions between the organism and his social environment.27

If we assume that the human organism becomes selectively sensitized to certain arrays of stimuli rather than others, as a function of the individual's membership in one cultural group, then the evidence to support such a proposition is far from unequivocal.28 However, what few experiments that have been done in this field, using for instance the "Muller-Lyer" or "vertical-horizontal" illusions, suggest that cultural influences are more significant than the Gestalt psychologists maintain, and that with further experiments
there is a "considerable likelihood of documenting authentic perceptual differences across cultures."  

An extreme example of perceptual differences is given, for example, by Hall when describing the problems of orientation encountered by the Aivilik Eskimo, compared to those of the American traveller. There are occasions in the Arctic region, Hall explains, when there is no horizon, when visibility is reduced to a hundred feet, and in these circumstances:

... the Aivilik have similar, though natural, reference points. By and large, these are not actual objects or points, but relationships; relationships between, say, contour, type of snow, wind, salt, air (and) ice crack.

The direction and smell of the wind, and the feel of the ice and snow provide the cues for the Eskimo to travel a hundred or more miles across visually undifferentiated waste. In this environment notions about overlap, different sized objects, movement parallax and convergent perspective - our traditional cues for depth perception - would be of little value. We must assume the Eskimo's highly developed awareness of subtle tonal contrast to be an example of the way in which the environment "selectively sensitizes the organism to different aspects of the stimulus complex." A further example of the influence of landscape on perception is the Australian aborigines' definition of boundary and place.
We have traced a theme. In designing objects to be perceived, architects have attempted to express that which is conceived to be universal, tempered by what is known about the act of seeing. This has been discussed in terms of abstract formal systems, devoid of specific cultural meaning, concerned initially with numerical ratios and subsequently with psychological theories of perception. In each case we encountered a discrepancy between what is known and what is seen, between the universal abstraction and its regional context. This is not to imply that in these instances, and in all instances, there exists two contradictory ideas, essentially irreconcilable, but rather that the abstract world of numerical ratios and the clinical world of neutral extra-cultural perception experiments, represent the search for a universal order, and the optical refinements of Greek architecture or the peculiar vision of the Aivilik Eskimo represent, by contrast, the trial or testing of the inclusiveness of that order against its diverse cultural context. They are essentially complementary ideas, for it is only possible to perceive one with the conception of the other.

If we digress for a moment and pursue the linguistic analogy we are confronted with the exact same dilemma. For when, in addition to viewing architecture as a system of abstract and
formal relationships, we also view it as a system of figu¬
tive and symbolic representation, then we are perilously
close to stating, ipso facto, architecture is a language.

John Summerson has pursued this analogy, and has demonstra¬
ted that the ingredients of syntax and semantics are indeed
present in Greek, Roman and Renaissance architecture. We
know, for example, that the Doric order does not need a ped¬
estal and often does not. It does, however, require an entab¬
lature. But it was not until Serlio that the rules of
classical architecture were enshrined in "the first full-scale
fully illustrated architectural grammar of the Renaissance."

We also know that the Doric order is derived from a primitive
type of timber construction and that triglyphs represent
beam ends, taenia the binding material and guttae the pegs.
What is more, the orders symbolize personalities. Vitruvius
associated the proportion, strength and grace of a man's
body with the Doric order, feminine slenderness with the Ionic
order, and the slight figure of a girl with the Corinthian
order. Serlio suggested the Doric order for churches devoted
to extraverted male saints and militant personalities, the
Ionic order for matronly saints and men of learning, and the
Corinthian order for virgins. The "classical language"
embodied both a rigorous syntax and an accessible semantics.

The study of architecture as a system of communication, it has been argued, presents its primary function as the "formation and transmission of cultural values, and in a more general sense, of specific social and cultural identities." Architecture can best be understood from within, the argument continues, in terms of its own criteria which the history of architecture has established. And although architecture may be viewed in this light as an autonomous language with its own rules:

... it does not necessarily follow that architecture ought to be assessed only within its own terms as an independent form of artistic creativity. On the contrary, the very autonomy of architecture implies that the only proper way of understanding the special qualities of architecture is to contrast architecture with a different 'form of life.'

If that other 'form of life' be the written or spoken word, then it is upon such an analogy or comparison that the architecture of Graves and Eisenman is based. Proceeding from Gandelsonas' definition of language as a set of factors comprising, sender receiver, channel, code, referent and message, and by further distinguishing between those factors that comprise the syntactic dimension - channel, code and referent - and those factors that comprise the
semantic dimension - sender, receiver and message - we note that Eisenman's work emphasizes the syntax at the expense of semantics, while Graves' work emphasizes semantics at the expense of syntax:

Compared to Graves' work, Eisenman's may seem almost impossible to approach on any known level; the reason for this is that a "known level," or context, is precisely what is absent from his architecture. Communication is inimical in Eisenman's work; he attempts to eliminate all factors at the communication level. 40

But, compared to the "classical language," both Graves and Eisenman share a similar exclusiveness and inaccessibility in their obsessive pursuit of a mischievous and esoteric analogy, and their failure to acknowledge - given the linguistic point of view - the inseparable nature of syntax and semantics. If semantics and syntax were separable, it would be impossible to account for the three meanings of such sentences as: the shooting of the hunters is terrible; of the four meanings of the sentence: I like her cooking; 41 in each case semantics dictates the syntactic structure. The idea that syntax and semantics could be distinguished and discussed independently was recently postulated by Noam Chomsky:

... there is a distinct level of deep syntactic structures that is distinct from a level of logical and semantical representation. 42

However, more recently linguists have argued that distinctions cannot be made and that "syntax and semantics are inextricably
The linguistic analogy represents a point of view, but it is not an inclusive perspective. If architecture were purely a language then its most basic function, of providing people with shelter, would be a redundant function. And conversely, if we had something to say we might as well build it, rather than speak it or write it. However, architecture is partly a means of communication, and if the linguistic analogy is useful in clarifying this dimension, all well and good; but this is not the means to determine a complex and multifarious phenomenon from a single and subordinate perspective.

We have discussed the perspective of perception by delineating opposites. Initially we discussed the disparity between abstract and formal systems, ratios and psychological theories, on the one hand, and the modifying influence of culture on the other. Subsequently we discussed the disparity between the syntactic and the semantic components of the linguistic analogy. In each instance we suggested this disparity is not an obstacle, but rather a necessary and complementary phenomenon.
In 1966 Kahn spoke of the relation between the column and the beam:

I would think that if you are dealing with a column, you must give it a beam. You cannot have a column without a beam. It is an elemental thing. You can't have a column and slab. If you have a column and a slab, you know the slab has a beam inside of it. That consciousness will cause less serious errors in the making of architecture.44

The Maison Domino will never look quite the same again.
IV NOTES

3 Vitruvius, Bk. VI, Ch. III, p. 177.
4 Wittkower, op. cit., pp. 84-89.
5 Vitruvius, Bk. VI, Ch. III, pp. 177-80.
6 Palladio, Bk. I, Ch. XXI, p. 27.
8 Ibid., p. 101.
9 Palladio, Bk. IV, Ch. V, p. 84.
10 Palladio, Bk. I, Ch. XI, p. 11.
14 Ibid., pp. 79-83.
15 Ibid., pp. 79-83.
19 An example would be Kohler's book "Gestalt Psychology."
23 Ibid., pp. 15-22.
24 Ibid., pp. 36-39.
25 Ibid., p. 45.
29 Ibid., p. 68.
30 Hall, op. cit., p. 73.
32 Summerson, "The Classical Language of Architecture."
33 Ibid., p. 10.
34 Ibid., p. 12.
37 Ibid., pp. 39-47.
38 Ibid., pp. 39-47.
40 Ibid., pp. 68-87.
42 Ibid., p. xi.
43 Ibid., p. xi.
In the introduction to "Design with Nature," Lewis Mumford writes:

... man's life, in sickness and in health, is bound up with the forces of nature, and that nature, so far from being opposed and conquered, must be treated as an ally and friend, whose ways must be understood, and whose counsel must be respected.¹

Science has taught us a great deal about "man's life" and relation with "the forces of nature." It has taught us that human survival depends in a very general sense upon a balance with nature, and more specifically upon certain physiological or biological mechanisms that temper adverse environmental conditions and maintain this balance. For instance, we know that the human body is an inefficient processor of energy, that for every 500 BTUs produced 400 BTUs are dissipated. This rate of dissipation is decisive, for if dissipation is too slow we feel "hot" and if it is too fast we feel "cold."² However, the equation is more complex. It involves considerations of age, activity, health and climate among its variables. A man walking up stairs, for example, will produce 17 times more heat than a man lying in bed, and consequently must be able to dissipate heat 17 times as efficiently; lest he expire half way up. When the body temperature rises toward 105 F or falls towards 80 F activity is seriously impaired.²
The maintenance of thermal balance, it seems, is a prerequisite of existence.

This thermal balance, or homeostasis, is affected by such micro-climatic factors such as the radiant temperature of the ambient air, its moisture content and movement rate across the body. It is these factors that are significant in determining the sensation of comfort. However, although the idea of comfort is by no means a universal one, the innate ability that enables the human being to adjust to diverse and extreme climatic environments most certainly is. Adaptability is so efficient, that even between cultures, existing in disparate climatic regions, notions of comfort vary considerably.

The architect can considerably ease the adverse effects of climate by siting structures in a fashion appropriate to the natural topography, to avoid harsh exposures, and by taking into account the albedo and conductivity of both the surrounding surface and available building materials. In hot and dry climates, for example, where night temperatures are characteristically low, the use of high heat absorption materials, such as adobe or pise, mud stone or various combinations of these, facilitate cool interior daytime and warm interior night time temperatures. This system can be subtly adjusted by painting the exterior surface of the building a colour with an albedo
different from that of the natural building material, and appropriate to reduce the thermal extremes between day and night time interior temperatures; or, in short, to even out the diurnal temperature curve. Furthermore, to even out annual temperature curve it is possible to plant deciduous trees, for example, to obstruct summer solar radiation and to admit winter solar radiation. In addition to the relationship between climate, building materials and the sensation of comfort, there is one further relationship between physiography, use and maintenance. Steep slopes are susceptible to erosion and less adaptable to use, wind can also cause erosion at the crest of a hill, and sites within flood planes are obviously open to flooding unless otherwise protected.

We have discussed in non-cultural terms the phenomena of homeostasis, physiography and building materials in relation to climate. It remains to be said that scientists have somewhat simplified the climatic map of the world by delineating seven regions: Subtropical, Low Latitude Steppe and Desert, Rainforest and Savanna, Highlands, Subarctic and Tundra, Continental Steppe and Desert, and Temperate. From this map we are able to predict with relative precision, that Arctic and Subarctic climates are characterized by winters of intense and continuous cold, little solar light or heat, and high winds,
and by summers of moderate temperature and intense solar radiation. Tropical rain forest, by contrast, is characterized by little seasonal variation, hot days, warm nights, intense solar radiation, high humidities and heavy seasonal rainfall.\textsuperscript{11}

Knowledge of the heterogeneous nature of climate is nothing peculiar to twentieth century architects. Of the importance of climate Vitruvius writes:

If our design for private houses are to be correct, we must ... take note of the countries and climates in which they are built. One style of house seems appropriate to build in Egypt, another in Spain, a different kind in Pontus,\textsuperscript{12} one still different in Rome, and so on with lands and countries of other characteristics.\textsuperscript{13}

This advice is consistent with Rome's imperial ambitions, for we know their empire extended south to North Africa, west to Spain and east to Asia Minor. However, advice of a more domestic nature can also be found in Vitruvius's writings. He suggests\textsuperscript{14} that winter dining rooms and bathrooms should have a southwestern exposure - the evening light and the setting sun "lends a gentler warmth to that quarter" - and that bedrooms and libraries ought to receive morning light as opposed to a damp southern exposure, which will "breed and nourish the worms." Dining rooms for Spring and Autumn orientated towards the east "leaves such rooms at the proper temperature at the time when it is customary to use them." Summer dining rooms to face the north and similarly picture galleries and
embroider's work rooms, such that the "fixed light may permit the colours used in their work to last with qualities unchanged."

Vitruvius was also aware of the relationship, more recently elucidated, between climate and health:

Mytilene in the island of Lesbos is a town with magnificence and good taste, but its position shows a lack of foresight. In that community when the wind is south, the people fall ill; when it is north-west, it sets them coughing; with a north wind they do indeed recover but cannot stand about in the alleys and streets, owing to the severe cold.

To remedy this situation Vitruvius recommends drawing an Octagon, facet orientated, the eight sides representing the eight Wind Gods, according to the Tower of the Winds. The lines connecting the external points of the octagon with its centre, the "division between the quarters of two winds," should determine, Vitruvius writes, the direction of the streets and alleys. There is clearly logic in these prescriptions, albeit predicated upon a mystical assumption.

Palladio was also aware of the importance of physiography and climate. With regard to choosing an appropriate site, he recommends building adjacent to a river for reasons of transportation, agricultural expediency, and because the river by "cooling the air in summer ... will afford a
beautiful prospect." If no river could be found Palladio suggests building upon "elevated and cheerful places," well ventilated and "purged of all ill vapours and moisture."

But more specifically and with reference to the importance of physiography Palladio writes:

One ought not to build in valleys enclosed between mountains; because edifices ... are there hid, and deprived of feeling at a distance, and of being seen. These are without dignity and grandure, and also entirely contrary to health.18

But the unsuitability of valleys cannot entirely be justified in terms of health, it must also be due to the penchant by the aristocracy of the Veneto, for both architectural prominence and panoramic magnificence. Finally, when necessity dictated a mountainous site, Palladio explains:

... let a situation be chosen facing a temperate part of the heaven, and which is not by higher mountains continually shaded, nor scorched by the sun's reverberation from some neighbouring rock, for in either of these cases it will be exceeding bad to dwell in.19

And, with reference to the similarities between the requirements of both urban and rural sites, Palladio writes:

... in the choice of a situation for building a villa, all those considerations ought to be had, which are necessary in a city house; since the city is as it were but a great house, and, on the contrary, a house is a little city.20

Ultimately though, it is the reciprocity between Palladio's villa forms and the topographic forms, between the curved
colonnades and the low out-buildings of the Villa Badoer, or the commanding prospect of the Villa Capra, and the rural Vicenza landscape, that give his words there poignancy.

For, as Pevsner has pointed out:

... here for the first time in Western architecture landscape and building were conceived as belonging to each other, as dependent on each other. Here for the first time the chief axes of a house are continued into nature; or, alternatively, the spectator standing outside sees the house spread out like a picture closing his vista.21

Let us turn from the rhetoric of environmental influences to actual examples, from prescriptions to descriptions, and begin with what James Marston Fitch describes as "Primitive Architecture," or "the buildings of preliterate societies." As he points out:

... primitive architecture reveals a very high level of performance ... It reflects a precise and detailed knowledge of local climatic conditions ... a remarkable understanding of the performance characteristics of the building materials locally available.22

Of the many indigenous responses to the problem of habitat, the example of the snow igloo is perhaps the most sophisticated. It is constrained by both a severe poverty of materials and an extreme austerity of climate and yet, theoretically at least, it is hard to conceive of a better solution to the problem of shelter against the arctic winter:
Its excellent performance is a function of both form and material. The hemi-spherical dome offers the maximum resistance and the minimum obstruction to winter gales, and at the same time exposes the least surface to their chilling effect. The dome has the further merits of enclosing the largest volume with the smallest structure; at the same time it yields that volume most effectively heated by the point source of radiant heat afforded by oil lamp.

The intense and steady cold of the Arctic dictates a wall material of the lowest possible heat capacity; dry snow meets this criterion admirably, though at first glance it seems the least likely structural material imaginable. The Eskimo has evolved a superb method of building quite a strong shell of it, composed of snow blocks (each some 18 inches thick, 36 inches long and 6 inches high) laid in one continuous, insloping spiral. The insulating value of this shell is further improved by a glaze of ice that the heat of an oil lamp and the bodies of occupants automatically add to the inner surface. This ice film seals the tiny pores in the shell and, like the aluminum foil on the inner face of modern wall insulation, acts as a radiant-heat reflector. When, finally, the Eskimo drapes the interior of his snow shell with skins and furs, thereby preventing the chilling of his body by either radiant or conductive heat loss to the cold floor and walls, he has completed an almost perfect instrument of control of his thermal environment.}

The compendiums of "primitive" or vernacular architecture abound with such examples of the close fit between man and his environment. Another example in this incidence of harmony, is cited by Heschong in "Thermal Delight in Architecture." The Anasazi Indians, Heschong explains, were remarkably adept at selecting sites for their cliff dwellings:

They invariably chose locations shaded in the summer by an over hanging ledge of the cliff, but exposed to
full sun all winter long. With their backs to the cliffs, the dwellongs were protected from the winter winds and also took advantage of the thermal mass of the earth to moderate the temperature flux.\textsuperscript{25}

As a further example Heschong cites,\textsuperscript{26} the relationship between daily and seasonal climatic variations, and the social patterns of North African cultures. During the Tunisian summer, the traditional two-story courtyard house is occupied during the day on the first floor where the thermal mass of the building protects the interior from the sun's heat. At night the family will occupy the roof which rapidly loses heat to the night sky. In wintertime the opposite happens. The day is spent on the roof and the night is spent inside the rooms of the upper story.

To this point we have postulated a case for climatic determinism in architecture. That from what science has taught us of comfort, physiography, building materials and climatic regions, and what history has taught us of building conventions, it is possible to predict or rather prescribe the appropriate architectural solution to any given climatic or physiographic problem. We could prescribe, for example, that in regions characterized by dry heat, as we have already indicated, the use of high heat capacity materials such as adobe or pise, mud or stone, to construct a compact community of compact geometric forms, that provide maximum volume and
and minimum surface area, would be an appropriate architectural solution. Or that in regions characterized by humid heat, the use of low heat capacity materials, such as bamboo or woven coconut palm leaves, to construct a dispersed community of dispersed geometric forms, that provide maximum volume and maximum surface area, would be an appropriate architectural solution.

However, we have ommitted to make explicit the cultural or spiritual significance of the various climatic, physiographic or material phenomena. The Romans, for instance, associated the north wind Aquilo and the west wind Favonius with the poets, the former as a type of rudeness and the latter as a type of gentleness. To Palladio the visibility of the building in the landscape, as we have indicated, was a significant factor irrespective of its climatic appropriateness. And the Anasazi Indians chose cliff dwellings for their strategic significance, after all, the thermal advantage must have redressed, to some extent, by the distinct thermal disadvantage of extensive climbing.

A further illustration of this discrepancy between climate and culture is given by Rapoport:

In the Amazon, wise jungle settlers got Indians to build houses for them, but the Rubber Barons imported brick and marble and built thick-walled mansions. These absorbed and held moisture, mouldered, and led to disease.
Of greater interest to us here, however, are instances of a profound correlation between physiography and culture. One such instance, that of the relationship between the Gretan Palace and its surrounding landscape, is given by Scully:

The Gretan Palaces and their use of site represent a late and full ritualization of the traditions of Stone and Bronze Age culture...a clearly defined pattern of landscape use can be recognized at every palace site...each palace makes use, so far as possible, of the same landscape elements. These are as follows: first, an enclosed valley of varying size in which the palace is set; I should like to call this the "Natural Megaron;" second, a gently mounded or conical hill on axis with the palace to north or south; and lastly a higher, double-peaked or cleft mountain some distance beyond the hill but on the same axis. The mountain may have other characteristics of great sculptural force, such as rounded slopes, deep gullies, or a conical or pyramidal massing itself, but the double peaks or notched cleft seem essential to it. These features create a profile which is basically that of a pair of horns, but it may sometimes also suggest raised arms or wings, the female cleft, or even, at some sites, a pair of breasts. It forms in all cases a climatic shape which has the quality of causing the observer's eye to come to rest in its cup. Though there are many overlaps in shape and many unguessed complexities in their meanings, still the cone would appear to have been seen as the earth's motherly form, the horns as the symbol of its active power. All the landscape elements listed above are present at Knossos, Phaistos, Mallia and Gournia, and in each case they themselves—and this point must be stressed—are the basic architecture of the palace complex.  

But it is perhaps in the Chinese practice of Feng-Shui or geomancy that we find the apparent disparity of culture, climate and physiography, most explicitly reconciled. In its Korean form Feng-Shui involved the search for an auspi-
cious site for either burial or habitation. An auspicious site was synonymous with a place endowed with "vital energy," that is to say endowed with those abstemious qualities most appropriate to support life on the broadest possible sense. It was believed that certain sites, on account of their physiographic configuration, tempered the natural phenomena of wind, clouds, sun, rain and thunder, and by that temperative process actually transferred and transposed the energy of natural phenomena into the "vital energy" of an auspicious place. 31

By classifying mountains, or "Dragons," firstly according to their form or degree of animation and their relationship to adjacent mountains, secondly according to the animal and Element symbolism of Chinese culture, and thirdly according to their orientation, it was possible to determine, by prescribed rules, a certain auspicious disposition. For example, classification according to Element symbolism, that is to say when mountains are perceived in terms of the Five Elements Theory, would necessitate a configuration determined by the prescribed sequence: Wood, Fire, Earth, Metal, and Water. 32 Having satisfied this requirement a potential site would subsequently be perceived according to the rules of animal symbolism, to ensure the existence of the Four Spirit Gods - Azure Dragon, Black Turtle, Red Bird and White Tiger - each
endowed with specific personalities and functions, and characterized by a recognisable physical manifestation. Similar rules applied to the form and degree of animation of mountains, and their orientation, the shape, flow and direction of water courses, the existence of underground water, and the conditions of the soil. And thus by a part mystical, part scientific, process of elimination a site might be pronounced auspicious.

Having selected an auspicious site for housing or burial, the geomancer prescribed a further set of rules to ensure an auspicious house. For example by dividing the eight points of the compass into two sets, the Eastern Four Houses and the Western Four Houses, Feng-Shui would ensure consistent orientation of the major elements of the house and its entrance, that is to say consistent with the four directions of either one set or the other.

In addition, a house was said to exhibit certain "deficiencies," that pre-empted poverty, if, for instance, the house was too large for the occupants, the main gate was too large for the house, or the surrounding fence was incomplete. And, conversely, a house was said to exhibit certain "fulfilling factors," that pre-empted wealth, if, for instance, the house-
hold kept the six prerequisite domestic animals, or the adjacent water course flowed towards the southeast.  

The general significance of Feng-Shui or geomancy was the ensuing balance between nature and culture. The encouragement of crowding protected the extended family system and yet implicit in geomancy was a kind of ecological population control, for an auspicious site surrounded by mountains could not extend beyond its natural boundaries. In short, geomancy encouraged the maximum utilization of the natural environment and its minimum despoliation, in both a material and a spiritual sense. The specific architectural significance of geomancy was that it synthesized the rationality of the physical, with the irrationality of the spiritual, it employed a system of rules both scientific and mystical, secular and sacred, that captivated the breadth of a landscape and encapsulated the depth of a culture.

To return to the relationship between culture and nature in western society, and more specifically to the relationship between architecture, climate and physiography. It is perhaps in studying the early work of Frank Lloyd Wright that we find this relationship most artfully harmonized. For as Banham has pointed out, the generous cantilevers of the Robie House roof function in more ways than one:
The emphatic horizontality of the Robie House, reinforced by the great cantilevered roof, can also be interpreted as a response to the flatness of the Illinois landscape. The interdependence of architectural form and physiographic form, as Montgomery Schuyler has pointed out, is one characteristic of Wright's architecture:

The horizontality of the Egyptian temples has... been ascribed to the level sands of the desert, and perhaps... the uneventful expanse may have something to do with the character of the architecture... In times and countries in which architecture is a living art, the general form of building corresponds to the environment, and the bristling pyramid of the Abbey of Mont St. Michel would be as impossible in the midst of the Roman Campagna or of an Illinois prairie as the spreading expanse of the temple of Karnak on the spike of the Mont itself.36

In the pre-eminent building type of the gothic style was the cathedral, then its pre-eminent site, in physiographic terms, must surely be upon the crest of Mont St. Michel. The same can be said of Wright's prairie houses and their relationship to the wide plains of the Middle West.

Later on, Wright was to design with different climatic and
physiographic parameters. Nevertheless, the response, in principle, remained the same as that in the early Illinois projects:

The houses with their broad masses widely spread out, with their low proportions and the long horizontal lines of their roofs, follow these large contours of the landscape. Like dense thickets rooted firmly in the earth, their low building-masses stretch out over the ground, always turning towards the light, following the natural tendencies of the site, adapting themselves pliantly to every fold of land, every elevation of ground, with far-stretched low walls framing the garden, trees and other vegetation of the surroundings and pulling them, as if with fangs, inward to the house.37

For if the streamline appearance of the Robie House looks somewhat at odds with the fractured forms of Taliesin West, it is not solely a span of twenty nine years that distinguishes them, but rather their disparate climatic and physiographic contexts. In Wright's own words:

... the desert is no place for plain, hard walls, all is sculptured wind and water ... A desert building should be nobly simple in outline as the region is sculptured ... The broken or dotted line is the line for the desert; not the hard line nor the continuous knife edge.38

This revealing comment explains much of the stylistic discrepancy between the Robie House and Taliesin West, and reminds us that Wright, far from settling for either trite or recondite portable formulae, confronted each problem with a modicum of visual preconceptions. A characteristic that was initially a virtue and ultimately, with the Marin County
commission, a sterile and humourless vacuum.

More recently, in the light of the ecological and environmental debate, Wright's predilection for a harmony between nature and culture seems especially pertinent. Today the necessity for such harmony extends beyond merely picturesque and physiographic considerations, to a matter of economic constraint and even constitutional rights. The awareness of the precarious balance between man and his environment, to which we alluded at the beginning of this chapter, has become an issue of such importance in national and international affairs that architecture can no longer assume the role of spectator.

The wilful ignorance of ecological and environmental issues, reiterated by the day-to-day act of moving from a hermetically sealed air-conditioned lobby to a neglected no-man's land of street or parking lot, cannot be remedied by extending the interior corporate domain from the office building to the shopping mall and living room, by way of the motor car and enclosed garage. Nor should we scoff at the mildly eccentric cult figures preaching the merits of solar, wind or tidal power. Until society at large takes stock of its resources and views nature more as an "ally and friend"
than a "patsy" for entrepreneurial self-interest, we can only regard the pioneers of aerobic compost and alkaline batteries with healthy respect. The current interest in alternative technologies is not simply a consequence of man's quizzical nature, it is also part of a much broader reaction against the spiritual bankruptcy of a materialistic and paternalistic society.\textsuperscript{42}

From discussing the scientific aspects of the relationship between climate, physiography, homeostasis, and building materials, we proceeded to place this preoccupation in its historical context. Here we found that Vitruvius and Palladio, for example, sited temples not only according to physiographic and climatic criteria, but also appropriate to the personalities of the various deities. Venus, Mars and Vulcan, "those who incited men's minds to lasciviousness, to wars, and to broils" were located outside the city, and "those that presided over charity, over peace, and good arts," Jupiter, Juno and Minerva, would be located within the city.\textsuperscript{43} Subsequently, among "primitive societies," we found economical examples of the use of materials and landscape, appropriate to the climatic context. Turning to the symbolic aspects of climate and physiography, we saw from the example of the Cretan Palace and especially
the Chinese philosophy of Feng-shui, the possibility of a reconciliation between culture and nature. More recently in western society, with the example of Wright's Illinois and Arizona projects and in the light of the environmental debate, this harmony is imperative - in order, as Ian McHarg puts it, to realize "man's design with nature."
NOTES

1 From the introduction to "Design With Nature" by Ian McHarg.


3 The body has an extraordinarily sophisticated system for balancing heat loss against heat production to maintain a constant temperature close to 98.6°F. This process is one by which the body responds to external thermal stimuli in order to maintain a steady state or "homeostasis." When the temperature drops, skin pores contract, perspiration reduces, and capillary veins contract. Shivering can create muscular heat and in extreme circumstances the body, by assuming the fetal position, can reduce surface area to a minimum. Conversely, when the temperature rises, heart beat accelerates, arteries expand, blood moves from the inside of the body to the surface, pores expand and sweat glands increase production.

4 For example, a room with a temperature of between 70°F and 80°F and with a humidity of between 20% and 50% is said to be comfortable. However, should the humidity level rise to 75% the room is said to be uncomfortable. A room with a temperature of 85°F, 20% to 50% humidity and air movement of 200 feet per minute is said to be tolerable. Drafts of between 50 and 100 feet per minute are hardly noticed, between 100 and 200 feet per minute noticeable, and drafts of between 200 and 300 feet per minute annoyingly unpleasant. Statistics taken from: Kevin Lynch, "Site Planning," p. 61.

5 The British, for example, consider the range from 58°F to 70°F comfortable, Americans 69°F to 80°F, and inhabitants of the Tropics 74°F to 84°F. Statistics taken from: Olgyay, "Design With Climate," p. 17.

6 Wind speeds at the summit of a hill may be up to 20% greater than at the foot, and wind is generally quieter on the lee as opposed to the weather side of a hill. However, this latter condition may be reversed if the lee slope is gentle and the weather slope is steep. Strong winds on the weather side tend to carry rain.
and snow over a ridge to be deposited on the leeward slope. We are also aware of the nocturnal effect of cool air floods on open sites. Cold air, having dissipated its heat by radiation, will collect in a thin layer near the ground. This film of cold air will tend to flow down hill, much as a river follows the declivity in the natural landscape, and result in cool breezes in open valleys.

7 The fraction of incident electro-magnetic radiation reflected by a surface.

8 If the ground has a low albedo and a high conductivity, for example, then the resulting micro-climate will probably be mild and relatively stable since the heat absorbed while temperatures are high is subsequently reradiated when temperatures drop. Conversely, surface materials of high albedo and low conductivity make for micro-climates of extremes, or rather, the extremes of the macro-climate are only moderately tempered by the materials of the micro-climate. The oasis and surrounding desert is an example of the dramatically different micro-climatic conditions within the same macro-climatic region.

9 Slopes of 4% appear flat and are appropriate for most kinds of activity. Slopes of between 4% and 10% are suitable for informal movement, and slopes over 10% appear steep, require an effort to climb and descend, are most adaptable to hill sports or free play and are the most expensive upon which to erect buildings. Drainage and erosion are also a function of gradient. 1% slopes do not drain well and slopes over 50% and 60% cannot be protected from erosion unless terraced or otherwise stabilized.


11 Ibid., p. 136.

12 Ancient region in north-eastern Asia Minor along the southern shore of the Black Sea.

13 Vitruvius, Bk. VI, Ch. I, p. 170.

14 Ibid., p. 180.
15 C. E. A. Winslow, "Temperature and Human Life."
16 Greek island in the Aegean off the western coast of Turkey.
17 Vitruvius, Bk. I, Ch. VI, p. 25.
18 Palladio, Bk. II, Ch. XIII, p. 47.
19 Ibid., p. 47.
20 Ibid., p. 47.
22 Marston Fitch, op. cit., p. 134.
23 Ibid., pp. 136-7.
24 Examples can be found in Rudofsky's "Architecture Without Architects," Rapoport's "House Form and Culture," and Scully's "Pueblo."
26 Ibid., p. 25.
27 Amos Rapoport, "House Form and Culture," p. 89.
28 Ibid., p. 93.
29 Ibid., p. 21.
31 The existence of "vital energy" was considered indispensable to support all living things. See: Hong-key Yoon, "Geomantic Relationships between Culture and Nature in Korea," p. 25.
32 Certain individual mountain configurations were associated with one or other of the Five Elements and, accordingly, a group of mountains had to conform to the prescribed sequence.
33 Yoon, op. cit., p. 83.
34 Yoon, op. cit., p. 83.
39 This debate can be dated in America from the passing of the National Environmental Policy Act 1969, whereby every governmental project is required to account for its environmental impact.
42 Howard T. Odum, op. cit., pp. 174-205.
43 Palladio, Bk. IV, Ch. I, pp. 80-1.
VI THE PERSPECTIVE OF TECHNOLOGY

The unity between architecture and technology is a peremptory condition and to suggest their independence would amount to profanity. Yet, as Giedion has pointed out, during the course of the nineteenth century a gap developed between science and its techniques, on the one hand, and art and its craftsmanship on the other. The schism between architecture and technology, embodied during the nineteenth century in the Ecole des Beaux-Arts and the Ecole Polytechnique respectively, represents a dichotomy as yet not broadly resolved:

Every architect is torn between two concepts of architecture. On the one hand, architecture is seen to consist of unique works of art, the creation of individual sensibility. On the other hand, it is seen as belonging to the public sphere, where private sensibility is under the control of "techniques" in the broadest sense of the word.  

If we assume the stance of technological imperator then we are bound to be elevated, for instance, by descriptions of the international exhibition halls constructed between 1851 and 1889, and their intoxicating statistics. The Crystal Palace, we are proudly told, covered some 18 acres of ground, measured 1851 feet by 450 feet, used 3300 iron
columns, 34 miles of guttering tube, 2224 girders, 1128
gallery support bearers, 205 miles of sash-bar and was
constructed in nine months. The Palais de l'Industrie of
the 1855 Paris exhibition measured 48 metres by 192 metres
and at the time was roofed by the largest unsupported iron
structure. The Galerie des Machines of the 1867 Paris
exhibition was totally enclosed by metal arches spanning 35
metres. The gigantic rotunda of the Vienna exhibition of
1873 spanned some 102 metres, and the Galerie des Machines
of the 1889 Paris exhibition was enclosed by a series of
single metal arches spanning 115 metres along a length
of 420 metres. In the space of 38 years that same 18
acres, upon which the Crystal Palace once stood, could
now virtually be enclosed by the single span of a metal
lattice arch. In 1889, and probably for the first time,
the possibilities of technology must have seemed as
limitless as the statistics themselves.

To many participants, and to many spectators, the techno-
logical achievements of the second half of the nineteenth
century must have appeared as only the overture to a grand
opera with the engineer cast in the heroic title role. In
the precise and predictable world of machines and mathe-
matics there loomed a vision of an alternative future, an
escape from the claustrophobia of Victorian Europe, into the clean and rarefied world of technological attainment. The ensuing euphoria for technology pervaded theatre, dance, music, art and, not least of all, architecture.

But the ground work for these spectacular technological accomplishments had been laid in the eighteenth century. It is to Coulomb and Navier that a science of the precise techniques of structural design is attributed. Coulomb not only solved the classical problem of the bending stress of a beam, by applying an abstract understanding of materials to a concrete problem of engineering, but also touched upon shearing stresses, developed a theory of masonry and vaulting failure, and advanced techniques for measuring the strength properties of materials. But it is because of Navier and his didactic influence at the Ecole Polytechnique that the isolated discoveries of his predecessors in the fields of applied mechanics were first integrated into a systematic programme of building statics and structural analysis.

The theoretical structural research of the eighteenth century in France was sustained during the nineteenth century in England in a more empirical and pragmatic guise.
It was here, as Finch puts it, that by "a combination of tests, experiments, and analysis, the practical science of structural mechanics gradually evolved." Tredgold pioneered the testing of timber and cast iron, Telford made tests on wrought-iron suspension bars, and the experiments took place that ultimately led to the production of steel. Furthermore, Smeaton's use of Italian pozzuolana at the Eddystone Lighthouse in 1756 foreshadowed Joseph Aspdin's patent for artificial cement, that by the 1840s was in widespread industrial production both in England and on the continent.

Among the proponents of this technological rationality, and its importance to architecture, was Viollet-le-Duc. Not only did he condemn the uncritical application of revivalist styles - a predilection that partly explains his unpopularity at the Ecole des Beaux-Arts - but he also demanded a more honest means of architectural expression:

His plan settled upon, his elevations are a part and an expression of them; he sees how he should construct them, and the dominating idea of the plan becomes the principal feature of the facades. Considerations of stability and of the most economical methods of construction suggest to him the character of his exteriors.

And were the architect to speak for himself, he would undoubtedly have said, "Let the material I have to use, and the manner in which I must put it together to obtain stability govern me in my elevations."
Viollet-le-Duc's pronouncements were prescriptive in a methodological, as opposed to a stylistic sense. The fact that he built very little - albeit tainted with medieval detailing - and that the "Dictionnaire Raisonne" used gothic examples to illustrate principle rather than appearance, suggests that his influence can be attributed more to the rationale of his theories than to the passion of his interest in the gothic precedent. Although there was considerable empathy between the nineteenth century rationalists, such as Viollet-le-Duc, and the structural rationalism of gothic architecture, of which Panofsky has so lucidly written, the gothic style was something of an anathema in an age of industrial imperatives.

What seemed more appropriate stylistically, to an age that placed a premium on technology and mass production, was the easily replicated materials of concrete, glass and steel, and the historically preceded pure geometric forms of spheres, cylinders and cones. This new stylistic objectivity, ostensibly value free and linked to a technological age, can be traced in the work of Kasmir Malewitsch:

Interrelation, hovering, and penetration form the basis of Malewitsch's half plastic architectural studies ... These objects are not intended for a particular purpose but are to be understood simply as spatial research. Interrelations are created between these prisms, slabs, and surfaces when they
penetrate or dislodge each other.\textsuperscript{10}

And, as Frampton has pointed out,\textsuperscript{11} the Productivist/Constructivist group in post-revolutionary and pre-Stalinist Russia — including Lissitzky, Tatlin, Melnikov and Ginzberg among its membership — considered such "intellectual materials" as colour, line, point and plane as thematically equal to such "physical materials" as iron, glass and wood. Therefore, the monument to the Third International,\textsuperscript{12} in its liberation of both materials and form, can be seen more as a metaphor of the "new social order," than as either a purely utilitarian or purely technological object. The emphatic internationalism of the socialist message had found its counter-part in the internationalism of an eminently exportable style; but it was an internationalism very different than the kind Couloumb and Viollet-le-Duc had in mind. With reference to Lissitzky's Tribune to Lenin of 1920, Frampton writes:

This incongruous juxtaposition of abstract, non-objective elements with empirically engineered form was to characterize Lissitzky's work until the early 1930s ... Lissitzky's approach came to be a point of departure for an international and 'objective' style of building.\textsuperscript{13}

In western Europe the materials of a technological age were similarly imbued with the same superficial metaphorical significance. To Paul Scheerbart the virtues of glass as
a building material assumed the urgency of impending and necessary change:

The surface of the Earth would change greatly if brick architecture were everywhere displaced by glass architecture. It would be as though the Earth clad itself in jewellery of brilliants and enamels...

It was the steam railway that produced the brick metropolis culture of today from which we all suffer. Glass architecture will come only when the metropolis in our sense of the word has been done away with. That it must be done away with is perfectly clear to all those who aim at the further evolution of our culture. This is no longer worth talking about...

The only thing that can help us to do this is glass architecture, which must transform our whole life— the environment in which we live.14

Four years after Scheerbart's "Glass Architecture," Mies van der Rohe produced a design for a glass office building in Berlin. Mies was no less aware than Scheerbart of the crystal and reflective qualities of glass, but he was more profoundly aware of the architectural implications of an impervious, transparent and skin-like material that could be completely separated from the building structure.

Glass in Mies's hands was the means by which the structural order of a building became transparent; the kind of internationalism Coulomb and Viollet-le-Duc did have in mind.

However, the more familiar architectural discourse to extol the virtues of technology, and perhaps the most influential,
is "Vers un Architecture." Le Corbusier, although intrigued by the visual possibilities of technology, also saw beyond its superficial stylistic associations:

The airplane is the product of close selection. The lesson of the airplane lies in the logic which governed the statement of the problem and its realization. The problem of the house has not yet been stated. Nevertheless there do exist standards for the dwelling house. Machinery contains in itself the factor of economy, which makes for selection. The house is a machine for living in.15

But had Le Corbusier reduced architecture to "the logic which governed the statement of the problem and its realization"? For, of the hundred or so illustrations accompanying "Vers un Architecture," one third comprise mere images of technology - grain elevators, industrial buildings, liners, airplanes, motor cars and other contemporary mechanical equipment. Was there a shift of emphasis - "a revolution in the conception of what Architecture is"16 - or was Le Corbusier just updating the imagery? What Augustus Pugin had written in 1841 sounds, in spirit at least, very similar to what Le Corbusier had written a hundred years later. Of the two great rules for design, Pugin wrote, the first is that "there should be no feature about a building which is not necessary for convenience, construction, or propriety";17 a credo with which Le Corbusier must have greatly sympathized. But what was it
about grain elevators Le Corbusier admired, the efficiency, the construction, or was it the form?

William Jordy has argued that a profound change did occur in architecture at the beginning of the twentieth century that was far from cosmetic: "The essence of the radical movement of the twenties would seem to be a symbolic objectivity, a mythic factuality omnipresent in modern experience." Jordy explains that the basis for the technology of early modernism, the skeletal frame, was objective fact. This technological objectivity combined with the "tradition of an objective aesthetics" - which in the case of early modernism comprised the Neo-Platonic bias for austere form, the alleged objectivity of contemporary movements in painting, and the apparent objective reliance on mechanical imagery - such that the combination of technological fact and visual purism "contributed to the metaphysical essence of symbolic objectivity."

If we are to take Jordy at his word, that the early twentieth century architects traded, let us say, the unpredictable subjective for the predictable objective, and furthermore that this objectivity, despite its technological origins, had a subjective and symbolic value which served as the
material for art. If we accept this then we are forced to conclude that the radical shift of emphasis, in Jordy's terms, was actually reductive, for if the architectural significance of technology exists only in the by-products of its methods - objective fact - then metaphysical essences are no more than stylistic pretensions. This effort to make mechanical images and objective fact a subject of art - as no doubt a reaction against the Victorian tendency to make classical images and subjective associations the subject of art - necessitated the exclusion of those emotions either intractible to the methods of science or unmoved by the images of technology.

More recently, the projects of Buckminster Fuller - the Dymaxion House and geodesic structures for example - embody a similar indifference to the idiosyncracies of any given architectural context as those of Le Corbusier and the Russian Constructivists. Le Corbusier's projects, and those of his Constructivist contemporaries, paradoxically evoke "an attitude to both form and life that is fundamentally mystical"20 by employing universal and ostensibly value free forms. Fuller's projects, however, display an attitude to life that is fundamentally technological by employing universal and ostensibly value free formulae. But in England,
where Fuller's architecture was readily received, it was the stylistic possibilities of technology that once more became the subject of art:

Archigram's ... commitment to a 'high-tech,' lightweight, infrastructural approach brought them ... to indulge in ironic forms of science fiction ... (but) the greatest sphere of Fuller's ideological impact ... lies in the continuing line of thought from the pure ideology of Archigram to the most recent work of Foster Associates ... and to the designs of the Anglo-Italian partnership of Richard Rogers and Renzo Piano.  

Contemporary architects in their attempts to make technology once more the source of art are no less reductive than their early twentieth century predecessors. Despite all the structural wizardry and maximum flexibility, the Paris "Centre National d'Art et de Culture" stands rather in awe of than image of technology than in awe of its ontological significance. As a cultural institution for both Paris and Parisians, only one third of the daily 30,000 visitors attend the cultural facilities, the other two thirds, we must presume, are only there for the ride. But, as Mumford explains:

All these attempts to assimilate the machine and make the human spirit at home with the machine are in fact efforts to reassert the values of the person, within the very realm from which, in both theory and practice, all but a fragment of the personality, the pure intellect, has been excluded ... But though cubism and constructivism, and all the movements in the other arts that derive from these original
intuitions, have made a step toward integration, they are obviously incapable of effecting a complete synthesis, since, on their own terms, they must suppress emotion, feeling, sentiment, any tendency toward organic richness of form.\textsuperscript{23}

We may apply the same criticism to cybernetic theory\textsuperscript{24} which, despite its emphasis upon user goals and the reciprocal nature of feedback loops, is nevertheless incapable of effecting the synthesis to which Mumford refers. The prospect of architecture programmed for optimum habitability, and with determinate technological mechanisms ready to anticipate and respond to our every need, assumes an isomorphism between a quantifiable human determinism and the requisite architectural soft-ware and hard-ware. Fuller's Dymaxion House - with its masthead containing lenses programmed to utilize the sun's light and heat, bedrooms atmospherically "balanced for human requirements," dishwasher automated to return clean plates to their shelves, doors opened and closed by the wave of a hand across the light beam of a photo-electric cell, and a "Go-Ahead-With-Life-Room" crammed with contraptions for perfunctory education - could if launched into space, sustain a family in their basic requirements. But, on earth, its value would be most appreciated when survival, and survival alone, was the single and essential life sustaining goal. In the
same year that Le Corbusier wrote "The House Is a Machine for living in," Fuller took that axiom to its unadulterated conclusion.

Now let us return to the technological achievements of the second half of the nineteenth century and cast the craftsman as tragic hero, in an alternative operatic scenario, and the engineer as inimical villain. The Gothic Revival, Morris argued, despite its purist structural pretentions, denied the "expression of its social life (which in) the Middle Ages allowed the workman freedom of individual expression, which ... our social life forbids him." So great was the freedom of the mediaeval craftsman that, as Ruskin discovered, carving can be found in places where no human eye could normally appreciate it. It was the denial of this freedom that Morris believed to be at the root cause of the decline of the Gothic Revival:

The enthusiasm of the Gothic revivalists died out when they were confronted by the fact that they form part of a society which will not and cannot have a living style, because it is also an economic necessity for its existence that the ordinary everyday work of its population shall be mechanical drudgery; and because it is the harmony of the ordinary everyday work of the population which produces Gothic, that is, living architectural art, & mechanical drudgery cannot be harmonised into art. The hope of our ignorance has passed away, but it has given place to the hope born of fresh knowledge.
Morris, like Ruskin before him, believed that art and life should be regarded as one, that the pleasure of craftsmanly expression was a necessary prerequisite to all that was both useful and beautiful. Indeed, it was a maxim of the Arts and Crafts Movement to turn "our artists into craftsman and our craftsman into artists."27 Morris's arts and crafts idealism, however, hardly survived into the twentieth century, and it was paradoxically upon the issue that he believed would ensure the survival of gothic architecture that it ultimately declined.

It was the sentiments of Morris's writings, as opposed to the particular merits of the gothic style, that were most influential. A sentiment that in American found expression in the regionalism of Richardson's architecture. By contrast to Thomas Jefferson, "an exponent of the universal order in architecture," Mumford writes, Richardson was "an interpreter of regional characteristics ... Both in his choice of materials and his development of certain parts of the native New England tradition":

He interpreted that New England to itself and gave it a better sense of its own identity; he modified its Puritanic austerities: he gave to its buildings a color that they lacked: a color derived from its native granites and sandstones, from weathered shingles and from the autumnal tints of sumach and red oak ... It was Richardson ... who took the traditional white cottage or farmhouse of New England, with its clapboard or
shingled sides and its shingled roof, and who transformed this early type of house into the wide-windowed cottage, with its ample porch and open rambling rooms that embodied a new feeling for both landscape ... and the requirements of domesticity.28

Stylistically related to the Shingle Style, introduced into Pasadena and Los Angeles by Eastern architects in the 1890s,29 was the architecture of Greene and Greene. An architecture "executed throughout with a craftsmanship in wood rivalling that of the Japanese."30 But, if we are to search further for a counterpoise to the technological imperatives of the "symbolic objectivity" of the early twenties, to bring our alternative operatic scenario up to date, it can be found in Wright's contemporaneous design for the Imperial Hotel in Tokyo:

The dispositions throughout the entire building are so dexterously interwoven that the structure as a whole becomes a humanized fabric ... A notable selection of local building materials has been adopted for the external effects: hand-made brick and hewn lava are chiefly used with a most interesting interspersion of copper for the cornices and the delicately worked copper roofs. The bricks are buff, the lava greenish yellow with deep brown spots, the copper turquoise. Minor color effects are secured in various materials ... The policy of administration of actual construction was based upon the traditional habits of the Japanese skilled labourer and craftsman.31

But Wright was not merely concerned with traditional craftsmanship, local building materials and piquant colour schemes;
architecture as the "creation of individual sensibility."
He was primarily concerned with what he called the "Organic" nature of architecture. This was not a superficial attraction to glib natural forms—mere floral applique—but, rather, it was a concern for the underlying structure of natural phenomena in abstraction of appearances. Twelve years before the completion of the Imperial Hotel, Wright explains:

... it is quite impossible to consider the building as one thing, its furnishings another and its setting and environment still another ... All are to be studiously foreseen and provided for in the nature of the structure. All these should become mere details of the character and completeness of the structure ... surely we have here a higher ideal of unity as a more intimate working out of the expression of one's life in one's environment.32

In presenting Le Corbusier and Wright as the archangels of technology and craftsmanship respectively, we are, therefore, guilty of over-simplification. As Jordy has pointed out, "Le Corbusier's De Mandrot and Errazuris houses of 1931 conspicuously foretell the interest in regional and folkish design, which especially characterized modern architecture in the thirties and fourties."33 And to ignore the considerable technological sophistication of the Imperial Hotel, sufficient to withstand the subsequent earthquake, would be to deny Wright his just desserts. Yet despite these apparent exceptions, it is possible to say with some tenacity
that stylistically while Le Corbusier erred toward the methods of technology so Wright erred toward the methods of craftsmanship.

In the introduction to this chapter on the perspective of technology we referred to the distinction between architecture as "the creation of individual sensibility" and architecture "belonging to the public sphere." This theme we have traced from the international exhibition halls of the late nineteenth century to Fuller's Dymaxion House, and from Morris's arts and crafts idealism to the Imperial Hotel in Tokyo. Subsequently we characterized Wright and Le Corbusier respectively by this distinction. But the distinction is superficial, it refers primarily to the techniques of production, the materials and their subjective associations.

With reference to the perpetual preoccupation of philosophers, G. E. Moore described a common view of the Universe as consisting of "material objects in space, and acts of consciousness of men." 34 Architecture is wrought of material objects by the consciousness of mind, but the nature of matter is the measure of mind. The architect who understood the technological implications of this axiom, more than Wright and more than Le Corbusier, was
Mies van der Rohe. In a speech delivered to the IIT in 1950, Mies says:

"Technology is far more than a method, it is a world in itself ... where it is left to itself, as in gigantic structures of engineering, there technology reveals its true nature. There it is evident that it is not only a useful means, but that it is something, something in itself, something that has meaning and powerful form - so powerful in fact, that it is not easy to name it ... Wherever technology reaches its real fulfilment, it transcends into architecture ... Our real hope is that they will grow together, that some day one will be the expression of the other."

If we are to search for a modern counterpart to the High Gothic pier - from which we can infer "the organization of the whole system" - then its closest equivalent can be found in the architecture of Mies van der Rohe. For, the structural articulation of the piers of Cologne cathedral exhibit the same understanding of materials, the same trace of a larger system, and the same spectacular ratio between reliable strength and visible substance, as the steel columns of Crown Hall.

To conclude, it is important to reinforce that the distinction between architecture as "the creation of individual sensibility" and architecture as "belonging to the public sphere" is a superficial distinction. The two ideas are not mutually exclusive, although their respective proponents may
wish us to believe otherwise. To Le Corbusier's outrageous yet simultaneously potent announcement that the house is a machine to live in, Wright replied some four years later "Consider well that a house is a machine in which to live but architecture begins where that concept of the house ends."

Whether architecture begins or ends with "individual sensibility" or the "public sphere" is in fact a question of personal choice. What ultimately matters, beyond the possibilities of reconciliation, is that debate between individual and public sensibilities should not be confused with the more fundamental issue of what architecture is.
VI  N O T E S

3  Tallis, "History and Description of the Crystal Palace," p. 11.
5  Ibid., p. 231.
7  Ibid., p. 189.
9  Precedent by such architects of Neo-Classicism as Ledoux and Boullee.
12  Otherwise known as "Tatlin's Tower."
16  Ibid., pp. 226-7.
19  For example, such projects would include the Harvard Visual Arts Center and the Paris Salvation Army Hostel.
20 Frampton, op. cit., p. 243.
21 Ibid., pp. 281-4.
22 Ibid., p. 283.
26 Ibid., p. 128.
30 Ibid., p. 452.
33 Jordy, op. cit., p. 186.
PART TWO
In the preceding five chapters an attempt was made to delineate the "perspectives" or dimensions of those theoretical constructs that pertain to the "proper" function of architecture. These perspectives appear to have transcended, to a greater or lesser degree, both time and place, and to have been a perpetual preoccupation of practitioners and polemists. It has also been possible, within the breadth of any single perspective, to discern an internal polarity between objective and subjective dimensions. A polarity between those ideas that transcend the specifics of a particular problem and its context, and those ideas that are bound by the specifics of a particular problem and its context. This we have referred to as the polarity between the "universal" and the "regional"; a polarity that can be shown to have been more or less resolved in any particular architectural solution.

It is now possible with this framework in mind - a framework of perspectives and their internal polarities - to characterize specific theoretical constructs in terms of a greater or lesser inclusiveness; constructs that for the purposes of this thesis shall be called "programmes." In other words, a more inclusive programme recognises a breadth of perspectives
and their internal polarities, while the opposite is true of less inclusive programmes.

Furthermore, the growth of knowledge, both from within and without the architectural profession, subjects the theoretical premises of architectural programmes to verification, refinement and reformulation. We know, for example, that archeological surveys of ancient Rome, undertaken in the fifteenth century, had a profound effect on the development of Renaissance architecture; that profound changes in the social structure of societies have coincided with similar reordering of social priorities in architecture; that the Gestalt School of psychology has taught us much about the nature of perception; that environmentalists and ecologists have reminded us of the precarious balance between man and nature; and that engineers have told us of the structural possibilities of new and conventional building materials and techniques. Such innovations, when placed at the doorstep of architecture, provide the impetus for change. It is by means of a dialogue between internal conventional and external contingent techniques of problem-solving, that advancement in a temporal sense occurs.

The assumption here is that advancement is not, as Hegel would have us believe, "the stages through which human history passes
In its continuous evolution from lower to higher stages. Advancement is, assumed to be the proliferation of variations on timeless themes in response to the growth of problem-solving techniques. It is, therefore, possible to characterize distinct programmes in architectural history, by a selective ordering of both perspectives and their respective polarities into programmes that incorporate both means and ends. This selective ordering assumes an organizing principle governing reality, and the means of representation in concrete fact. Contrary to the positivistic view of history, this organizing element is not necessarily the "key to the spirit of the age" but more an increment in a scale of social plurality.

But is it possible to escape these vague generalities by more precisely describing the process by which knowledge advances, beyond stating the obvious fact that advancement involves a dialogue between convention and contingency? And what, indeed, would be the value of such a model? To the first question; it should be possible to construct a more exact model. To the second question; such a model would not only guide historical studies with greater precision, but also further elucidate the enigma of style itself. Or, as Ernst Gombrich puts it:
... If we are to have a more promising science of the causes and roots of style, we shall have to catch up with the Galileian revolution ... the enigma of style is wrapped in a thrilling mystery. The more I become aware of our profound ignorance in this field, the more exciting do I find it. Even to frame the right questions would seem to me eminently worth while ...³

Our commission, then, is to rationally reconstruct the process by which knowledge advances, or at least to "frame the right question.

But first it is necessary to distinguish between, causal, normative and descriptive models. A causal model assumes a reality determined by law-like underpinnings and explains why an event occurred in terms of preconceived causes. A normative model prescribes what should occur; proceeding from certain attainable and desirable goals it proposes how reality should be altered toward the achievement of those goals. A descriptive model, however, consists of relating an event to the reasons for performing the action. Our model will be descriptive.

One such descriptive model, of the process by which knowledge advances, can be found in studies of how theoretical propositions are incorporated into the body of scientific knowledge. Karl Popper's explanation, not simply for the natural sciences but for "all theoretical or generalizing sciences ... whether they are natural sciences or social
sciences,"4 consists of "offering deductive ... explanations, and in testing them."5 These hypotheses always retain a tentative or provisional character, for while agreement is taken as corroboration it is never taken as proof. In fact, Popper goes so far as to say that a genuinely scientific theory states in advance the conditions by which it could be falsified, "only if we cannot falsify them (hypotheses) in spite of our best efforts can we say they have stood up to severe tests."6

This view of science, as problem-solving by hypothetico-deductive reasoning, is similar in principle to Collingwood's view of history.7 For Collingwood, history is also problem-solving. To explain why Caesar crossed the Rubicon involves a process of offering explanatory hypotheses, and in testing them against what is know of the "outside" and the "inside" of an event:

The historian investigating any event in the past, makes a distinction between what may be called the outside and the inside of an event. By the outside of the event I mean everything belonging to it which can be described in terms of bodies and their movements; the passage of Caesar, accompanied by certain men, across a river called the Rubicon at one date, or the spilling of his blood on the floor of the senate-house at another. By the inside of the event I mean that in it which can only be described in terms of thought: Caesar's defiance of Republican law, or the clash of constitutional policy between himself and his assassins. The historian is never concerned with either of these to the exclusion of the other.8
Collingwood explains that the historian's attention must not be directed solely to an event, but also to "the thought expressed in it." Once the facts, both "internal" and "external," have been ascertained "there is no further process of inquiry into their causes." When the historian knows what happened, Collingwood writes, "he already knows why it happened." The similarities between Collingwood's and Popper's approach, as Peter Skagestad has pointed out, is their shared assumption that historical events should be explained rationally and not causally:

Both ... are deeply committed to the view that there is one and only one common human rationality, and that the presuppositions of alien people, past or present, are always in principle intelligible, given sufficient imagination, patience, and goodwill.

On the question of falsification, Popper's and Collingwood's view are also compatible. For Popper a truly scientific theory states in advance the conditions by which it could be refuted, and is, therefore, only ever tentative. Similarly, a Collingwoodian interpretation of an event may be refuted by the subsequent discovery of new historical facts, and since a historian can never be in possession of all the facts, historical explanations are also only ever tentative. The process of offering theoretical explanations and in rigorously testing those explanations against all the available information is the essence of the Popper-Collingwood approach.
The principle of falsification, however, is the least tenable component of the Popper-Collingwood approach. Architectural programmes do not trade entirely in the disproof of their theoretical propositions, and even if they did, is the criteria of falsification a necessary and sufficient condition for the evolution of knowledge? Programmes become old-fashioned and inadequate, but are hardly ever pronounced emphatically false. And, if we are to believe Imre Lakatos\textsuperscript{11} the principle of falsification is, an unessential component of the process by which knowledge is advanced.

Lakatos presents an alternative rationale or epistemological model in the "Methodology of Scientific Research Programmes."\textsuperscript{12} Here, Lakatos interprets scientific achievement in terms of research programmes or "progressive and degenerating problem shifts."\textsuperscript{13} Scientific advancement or revolution occurs when one research programme supersedes another, rather than as Popper maintains when a single hypothesis or isolated theory is refuted. The difference between a progressive and a degenerating research programme, Lakatos explains, is that a "research programme is said to be progressive as long as its theoretical growth anticipates its empirical growth ... it is stagnating if its theoretical growth lags behind its empirical growth,"\textsuperscript{14} and when a research programme continually explains more than its rival, it supersedes it.
This seems to be a more appropriate account of reality, and certainly explains the fact that despite lunar motion refuting Newton's "Principia," and the physicist Kaufman refuting Einstein's relativity theory within a year of its publication, both theories provided enormous contributions to the body of scientific knowledge. And both these instances, while actually refuting Popper's theory on its own terms, suggest the greater appropriateness of the Lakatos model. But how suitable is the "Methodology of Scientific Research Programmes" to the inclusiveness of the social sciences, or more important here, to the evolution of architectural knowledge? How deep do the surface similarities penetrate both scientific and architectural research programmes?

Although the organic analogy is inappropriate, as we have seen, architectural programmes certainly progress and degenerate, they coexist and compete, and carry more or less influence. While it is impossible to predict which body of ideas, or school of thought, will supersede another, it is possible that both scientific and architectural programmes share a similar criteria of demarcation between progress and degeneration. If of progressive architectural programmes it is said that theory prefigures practice, and of degenerating programmes it is said that practice prefigures theory, then similarities
do exist. In other words, a progressive programme is able to subsume practice within the breadth of its propositions, it is able to provide *anti hoc* theoretical structures by which subsequent events may be interpreted. Conversely, a degenerating programme is able to provide only *post hoc* theoretical structures by which past events or problems can be interpreted. Architectural programmes are progressive and degenerative as are scientific programmes; there is a logic behind the process.

There is, however, a paradox, that by prefiguring the course of events within a given programme, that premonition may subsequently influence the course of events. Popper gives us an example of such a paradox:

> If a man wishes to buy a house, we can safely assume that he does not wish to raise the market price of houses. But the very fact that he appears on the market as a buyer will tend to raise the market price.\(^6\)

It is a phenomenon that does not touch the natural sciences, that Gombrich describes as "the unintended social repercussions of intentional human actions,"\(^7\) and is a factor that the ideologist, like the market maker, exploits to full advantage. If someone predicts that the price of petroleum will rise within a week, or that house prices will double within the year, then the subsequent queues at petrol stations and estate agents, caused by the desire to buy before prices rise,
indicate that the prediction fulfilled its own prophesy.
There is clearly a social dimension.

If we apply the Lakatos model, then the existence of competing programmes is an essential, if not sufficient component of change, indeed it is only through conflict or dialogue that the currency of ideas is forced to radically redefine itself in terms of the shortcomings or weaknesses exposed by an opposing school of thought. Even contemporary critics of the Modern Movement, have contributed to an enrichment of contemporary architectural theory by enlarging, or making explicit, a component of theory that had, at best, only been subliminally recognised and, at worst, blatantly ignored. 18

But to return to the problem of the self-fulfilling prophesy. An epistemological model that may help us overcome this difficulty is Thomas Kuhn's theory outlined in the "Structure of Scientific Revolutions."

Kuhn's argument runs like this: the profession of science assumes two quite distinct forms; "Normal Science" and "Extraordinary Science." Normal Science is governed by some dominant theory implicitly trusted, although not fitting all experimental findings quite perfectly, for there will always be apparent discrepancies. Normal Research largely consists of resolving these anomalies by
making suitable adjustments to the reigning or dominant
theory - leaving it fundamentally intact. If the outcome of
an experiment is negative, it does not compromise the theory,
but rather the skill of the experimenter. According to Kuhn,
it is only at a time of what he calls Extraordinary Science,
when the prevailing theory itself is under attack, that some¬
thing like a genuine testing of theories may occur. Then the
negative outcome of a test may be regarded, not as the personal
failure of the experimenter, but as a failure of the theory.
Or, to use Kuhn's words:

A failure that had previously been personal may then come
to be seen as the failure of a theory under test.\(^{20}\)

For Kuhn, Normal Science is, as the name suggests, the normal
condition of science, and Extraordinary Science is the ab¬
normal condition.

Although Kuhn's model can be shown to characterize some his¬
torical situation, as he has clearly demonstrated,\(^{21}\) the par¬
celling up of history into periods of Normal and periods of
Extraordinary development has certain difficulties. For de¬
spite Kuhn's recognition that "theories can be modified by a
variety of \textit{ad hoc} adjustments without ceasing to be, in their
main lines, the same theories,"\(^{22}\) and that this process is
necessary because "it is often by challenging observations
or adjusting theories that scientific knowledge grows,"\(^{23}\) he
fails to explain the conceptual differences between those adjustments that are merely \textit{ad hoc} and those that are revolutionary. Furthermore, historians when presented with political change of a particularly drastic nature may once have said "and then there was a revolution" - but, as Toulmin has pointed out,\textsuperscript{24} political change never involves such an absolute and outright breach of continuity:

\begin{quote}
Whether one considers the French Revolution, the American Revolution or the Russian Revolution, in each case the continuities in political and administrative structure and practice are quite as important as the changes.\textsuperscript{25}
\end{quote}

\textbf{It is, therefore, Kuhn's observation that Normal Science is characterized by an implicit trust of the dominant theory, and by implication a tenacious defence, that is the more defensible proposition.} Stephen Toulmin has elaborated upon this aspect of Kuhn's model in an essay comparing professional attitudes in the 1950s with those of the 1970s. In the 1950s Toulmin writes:

\begin{quote}
By a masterly feat of abstraction, twentieth-century musical theorists and artists had apparently succeeded in detaching musical composition from orthodox classical tonality, and painting from the naturalistic representation of particular concrete objects; and, by so doing, they had put those arts on the road toward developing their own bodies of general theory and techniques, uncluttered by all the varied and fluctuating demands of human perception and sensibility.\textsuperscript{26}
\end{quote}

However, Toulmin continues:
By 1976, the pursuit of abstract and universal ideas has become curiously out of fashion, as compared with the concrete analysis of particular historiocultural episodes and situations. Mere formalism no longer seems of deep interest, at least when divorced from considerations of function; and the minutae of disciplinary expertise need to be explicated and justified, by being applied to specific instances and cases. Nowadays, we seek to develop not so much timeless theories about the general nature of "social groups" and "social action" as historical insights into the character and experience of this or that human group or collectivity; to grasp not so much the general statics of cultural equilibrium as the dynamics of particular cultural changes; to achieve not so much the formal rigor of axiomatic systems as the practical testability and computability of programs and algorithms.

Within the limits of our professional academic enterprises, we have in this way achieved some kind of "relevance" to the facts of human experience, and we derive a new kind of intellectual satisfaction from the "concreteness" of the resulting discoveries. That satisfaction no longer rests on any formal, Cartesian warranty of deductive necessity: rather it comes from ... (an) assurance that we have succeeded in coming to grips with human actualities. And, if the price of reestablishing this contact with actual experience includes breaking down the fences separating the established academic disciplines so that we can bring their varied techniques and theories to bear on some specific practical problems, so be it. These days, we are all prepared to be interdisciplinary.

The thrust of Toulmin's argument is that the dialogue between formalism, characteristic of the 1950s, and functionalism, characteristic of the 1970s, is an essential component of change. For while recognizing that "certain formalizable techniques and standards may well have their place in the procedures of the natural sciences, "Toulmin also argues that "formal structures ... cannot be entirely self-justifying in
science. They, too, have to be justified, in turn, by their explanatory fruits."

Let us consolidate our observations into a more coherent proposition. Having rejected apodictic causal explanations of either history as "evolution from lower to higher stages or history as analogous to human life, we found an alternative view of history as "rational reconstruction." This alternative, the Popper-Collingwood approach, consists of offering deductive explanations and in testing them against all the available facts; while recognizing that the principle of falsification is the most problematic aspect of this approach. From Lakatos we discovered that competing "research programmes" are conducive to knowledge advancement, and that this competition rather than being consecutive is in fact always copresent. Kuhn's recognition of a necessary tenacious attitude toward dominant theories, and Toulmin's observation of the "formal" and "functional" dialogue or tension, completes our critique of existing epistemological models.

From analysis, let us turn to synthesis, remembering Gombrich's words that "to frame the right questions would seem ... eminently worth while." What are the necessary and sufficient conditions for the advancement of architectural theory? The first condition would seem to be the proliferation of ideas.
Restrained by the intellectual techniques and concrete problems of the social context, the postulation of deductive theoretical explanations, and their subsequent appropriation to solve concrete problems, is a necessary component of change. Architecture, as a critical enterprise, will benefit from this process by becoming exposed to ideas that demand appraisal.

"It is significant," Panofsky writes, "that during the Romanesque period the greatest names in architectural history are those of Benedictine abbeys, in the High Gothic period those of cathedrals, and in the Late Gothic period those of parish churches." The significance is that society places certain concrete problems at the doorstep of architecture, such as the cathedral or the parish church, that subsequently provide the practical means for theoretical advancement. A similar significance can be attributed to the evolution of the palace form during the Renaissance, or more recently to the problem of office accommodation. In either case the volume of innovation, both theoretical and practical, is largely determined by the social context.

The recent proliferation of architectural programmes - Post-Modernism, Rationalism, Empiricism, Post-Modern Classicism, and Eclecticism to name but a few - can be seen in the light of being a critique of Modernism. Whether these programmes sustain themselves, or merely act as a catalyst to a reorien-
tation of Modernism, has yet to be seen. In either case, architects must critically appraise this proliferation in terms of the inclusiveness, or otherwise, of its theoretical underpinnings.

The second condition, the selection criteria by which innovations are appraised, is largely an internal professional matter. This is not a consequence of professional elitism, but rather that the formal language developed within a programme is not accessible to external extra-architectural comprehension. It is not simply that the architect is well equipped to evaluate innovations in terms of the set goals of a programme, it is also a matter of necessity. The specialized languages and procedures make selection a posteriori, as opposed to a priori, the exclusive domain of the profession. The polemicist may be influenced by external phenomena, but ultimately the decision is his. The current interest in historicism has exposed a chink in the armour of the formal canons of Modernism - having previously regarded the overt infiltration of history with some embarrassment - and revealed the precarious basis of its stylistic assumptions. It remains to be seen whether Modernism will subsume this liberal attitude to precedent, or remain tied to the abstract or objective use of history referred to in chapter two.
The third component is tenacity. Toulmin's characterization of the 1950s as a period of "abstract formalism, technical concentration, and professional specialization"\textsuperscript{30} was the consequence of a tendency to develop programmes beyond merely pragmatic techniques for solving specific concrete problems, to more formalized techniques of solving general classes of problems. This focus upon "the development and refinement of general intellectual techniques for their own sake"\textsuperscript{31} is also a characteristic of the development of High Gothic architecture. The logical structure of High Gothic Scholasticism, Panofsky argues,\textsuperscript{32} was reflected in the logical structure of High Gothic architecture; the gradual formalization of the former was concurrent with the gradual formalization of the latter, which suggests that this process involves a complex reciprocity between internal and external phenomenon.

More recently the emergence of competing critical programmes to the Modern Movement has also been concurrent with a development of intellectual techniques, that Toulmin observes occurred between the 1950s and the 1970s. The uncritical commitment to a single and general set of formal cannons, as Toulmin suggests, is perhaps the consequence of "allowing a taste for formal elegance to blind (adherents) ... to the functional demands of their investigations."\textsuperscript{33} It is also an explanation for the emergence of architectural programmes
critical to Modernism. However, when the emergent programme proceeds to build upon a single critique, the chink in the armour of the existing programme, as it were, then it may well be less inclusive than the programme it wishes to supersede. Such is the case with many rival programmes to Modernism. By taking their point of departure, for example an embarrassment with regard to the overt infiltration of history - the blemish of the existing programme - they proceed from the less inclusive, more axiomatic, to a solution that must, by definition, be reductive.

The final component is that of reorientation. The concept of revolution, as we have discussed, is problematic. More specifically it ignores the idea of continuity. Consider, for instance, the American legal system, the Russian practice of escorting tourists or the French code of inheritance. In these cases the effects of political revolution were only marginal. Similar continuities can be found between Neo-Classical and Modern Movement attitudes toward rationality and austere geometric forms. It is, therefore, more appropriate to describe such outwardly radical changes in terms of a reorientation, as opposed to a revolution.

The transition from Neo-Classicism to Modernism appeared
absolute because such changes profoundly and visibly affect the normal component of architecture, namely the day-to-day business of putting together buildings. Transitions are exacerbated when resistance to change is evident and when there are few shared assumptions between an existing programme and its rival. But this schism is artificial, for if there were no shared assumptions a successive programme could not be practically accommodated within the institutions that survive reorientation.

Periods of reorientation occur for many reasons. A degenerating programme may be seduced by "formal elegance" and blind to "functional demands," or unattractive to a younger generation. An influential public figure may switch programmes, or die and fail to leave a strong and self-sustaining school. Economic circumstances may change to the extent that reputations once built upon design achievements, must now rest upon polemical achievements. All of these reasons, to a greater or lesser degree, can explain the emergence of rival programmes to Modernism. There is, however, no principle sufficiently inclusive and specific to account for all such periods of reorientation.

Is the model we have sketched - of proliferation, selection,
tenacity and reorientation - therefore irrational? Yes, because we cannot formulate a single set of rules to guide us through history. No, because the structure of change we have presented is rational in the sense that its components can be explained in terms of reasons either accepted at the time or invented in the course of development. We are, in short, equipped to ask more of the pertinent questions?

For example, what are the developing body of ideas and techniques that comprise the history of architecture? These ideas are continually evolving in a changing intellectual and social environment. To study in an effective manner either the history of architectural ideas or the history of architectural techniques, we must take this evolutionary process seriously. Otherwise, we shall be in danger of concerning ourselves too much with particular discoveries in ignorance of their social significance, with doctrines and personalities, and with anticipations and anecdotes. And, as architects, we may end up by replacing the living art which is our subject of study by a formal abstraction, forgetting to show how the results of these formal enquiries bear on the intellectual and practical business in which working architects are engaged. A purely chronological history of architecture, and a purely formal narrative of
architectural theory thus have the same deficiency; each of them neglects to place the architectural ideas which are in question into their cultural environment, so as to show what, in that particular context, gave these ideas and investigations their merits. In short, any explanation or general description of the process by which knowledge advances must take into account its historical, social and economic, aesthetic, climatic and technological context. The purely formalistic or self-referential aspect of knowledge is not in itself a sufficient condition upon which to build an epistemological model.

The critical aspect of the model is that in attempting to generalize about the merits of rival architectural programmes, it is possible to concentrate upon the selection criteria that determine the respective choices made upon available innovations. By studying a particular choice in architecture against its cultural background, it is possible to appreciate the considerations upon which a decision is predicated, and both its foreseeable and unforeseeable consequences.

If we pursue this argument, then the joint task of both historians and theoreticians of architecture is not so much
to establish and exemplify the formal canons of style or method, as to trace out its historical evolution. Showing how, as we move from one age to another, the evolving perspective structure and the progressive changes in objective and subjective standards have been functional responses to the changing problematics of different architectures in different milieux. Because the intellectual problems facing architects in the twentieth century impose different demands on architectural thought today from those confronting Vitruvius or Palladio, it should be no surprise that contemporary intellectual procedures differ from those that carried authority in first-century Rome or sixteenth-century Italy.

We are characterizing the evolution of architectural thought in terms of the tension between "formal elegance" and "functional demands," and between proliferation and critical selection. That is to say, advancement occurs by a dialogue between periods in which the focus of architectural development and refinement is upon intellectual techniques for their own sake, in abstraction from practical instances or applications, and periods in which the focus shifts to particular concrete problems. Or, as Toulmin puts it:

Just as the fundamental concern within any intellectual discipline may be either exploring the ramifications and uses of a given set of techniques and procedures, or else with seeking to find a way of impro-
ving them, so too the fundamental concern across the boundaries separating intellectual disciplines may be either to foster the autonomy of the various fields in refining their own proper general procedures, or else to find ways of drawing on their pooled resources to attack particular concrete problems and applications. Either concern can ... be pursued in a "rational" manner; but it will be a different aspect, or mode, in either case.

The image that comes to mind is that of a kind of folkdance, which alternates periods of marching and periods of weaving. For a time, the different academic professions march forward separately but in parallel, each in its own special way; then, for a time, they join hands and work together on the general problems arising in the areas where their techniques overlap; only to break away once more into separate lines, and march in new directions until they are ready to join hands again ... this alternation is probably the only way in which we can prevent our scholarly and scientific concerns from either hardening into a permanent professional scholasticism, or softening into a morass of well-meaning imprecision.35

The image that also comes to mind is one whereby both the hedgehog and the fox are inseparately tied to the advancement of knowledge. For whether, as Toulmin suggests, history can be neatly parcelled up into periods of marching and periods of weaving - or periods for hedgehogs and periods for foxes - or that both components of the dance occur simultaneously, is not of great significance. What is at stake here is not a matter of principle, but rather a matter of degree.

Architecture, as we have suggested, has not one aim but many,
and its development has reflected this multifarious nature. It is, therefore, fruitless to look for a single all-embracing "cause" upon which the evolution of architectural ideas depend. The model we have sketched hopefully reinforces this, by emphasizing the inter-dependence of internal and external factors that contribute to the conceptual advancement of architectural programmes.

As for the future: how will architecture develop, and how will its aims change, can no more be foreseen than the biological future of species. Society may come to impose fresh demands on architecture, and may even discard as irrelevant some requirements that we deem sacred. In the nature of architecture, it is possible to predict nothing more than this as a possibility: for, in the sphere of creation, to foresee a possibility is to go half-way to creating it.
NOTES

2. Ibid., p. 152.
5. Ibid., pp. 130-143.
6. Ibid., pp. 130-143.
8. Ibid., pp. 205-231.
10. Ibid., p. 19.
12. Ibid., pp. 8-101.
13. Ibid., p. 110.
14. Ibid., p. 112.
15. Ibid., p. 5.
18. This component may be called the subjective or metaphorical aspect of precedent. See chapter II, "The Perspective of Precedent."
19. Thomas Kuhn, "The Structure of Scientific Revolutions."

21 Thomas Kuhn, "The Copernican Revolution."


23 Ibid., p. 13.


25 Ibid., p. 41

26 Stephen Toulmin, "From Form to Function," p. 144.

27 Ibid., pp. 144-5.


29 This component may be called the subjective or metaphorical aspect of precedent.

30 Stephen Toulmin, op. cit., p. 160.

31 Ibid., p. 157.

32 Panofsky, op. cit., p. 160.


"Criticism," wrote Samuel Johnson, "is a study by which men grow important and formidable at very small expense." In writing this thesis, however, the contrary is true. The subject has grown formidable at very great expense. For, what began as a literature analysis, has become a model of change.

By an largely arbitrary system of classification it was possible to distinguish five functions or perspectives of architecture—precedent, social and economic, perception, physiography and climate, and technology—and their respective objective or universal, and subjective or regional polarities. With this fabrication in mind it was possible to characterize the theoretical assumptions manifested in an architectural object at any given point in history. In other words, an architectural programme may be defined by the structure it superimposes upon this "ideal" and transcendental fabrication. Furthermore, a given structure was shown to be more or less inclusive, and among more inclusive structures were found those buildings that in their breadth provide an inexhaustible and inspirational source of reference. We may, for example, discuss Wright's buildings from many perspectives. As a tool for taking the measure of a thing, the value of
the perspectives has been vindicated.

The model constructed to explain the phenomenon of change was distilled from existing models, especially those concerned with the epistemology of science. The beauty of Popper's theory, in its disregard for the social context and the concrete value of innovation, was the simplicity and universality of its application. At odds with Popper's theory, however, were those of Lakatos, Kuhn and Toulmin, who described change as an incremental as well as gradual process. The strength of these latter models was in the plurality of their descriptions. On the one hand, they embraced advancement by hypothetico-deductive reasoning - acknowledging the principle of falsification to be the least tenable aspect of this approach - and on the other hand, they introduced a second order of advancement; a progressive research programme replacing a degenerative programme, a revolution resulting in absolute discontinuity, or the collapse of abstract formalism. In either case, these latter models presented two scenarios of change.

The conceptual evolution of architectural theory or programmes proceeds in a similar fashion, and therefore requires two accounts of change within the bounds of a single descriptive model. These two accounts we termed formalization and re-
orientation. Formalization was characterized as the tendency to select and refine, from a proliferation of solutions to specific concrete problems, specialized procedures into programmes designed to solve general classed of these problems. When, in that tenacious and canonical process, the pursuit of abstract formal elegance was championed at the expense of determining solutions to concrete problems, as was the case between the 1950s and the 1970s, there occurred, a reorientation. Subsequently, attention was once more directed toward concrete problems, and upon a critique or a revision of the existing programme the process began again.

Furthermore, the proliferation of solutions or innovations was largely determined by the social context, the selection procedure by which they were subsequently appraised and provisionally accepted was largely an internal professional matter. The formal direction in which innovation tended to move involved a complex account of both internal and external influences. Consequently, the history of architecture can neither be viewed as a gradual and continuous evolution from "lower" to "higher" forms, nor as abrupt and discontinuous periods of isolated development. Rather, it must be viewed as a continuous process of refinement and adaptation, where at each stage advancement is contingent
upon either a multifarious theoretical inheritance, or a prolific human tenacity.

What are the didactic implications of this evolutionary scenario? We must be profoundly aware of the breadth of our theoretical inheritance. Traditional schools of philosophy, by distinguishing between the departments of say ethics, metaphysics, linguistics and epistemology - each with their own perspective upon a common issue - retained a sense of the whole of a subject while also clarifying its parts. The emergence of departments teaching the history of philosophy has tended to group these components indistinctly under one canopy. By contrast, schools of architecture have usually distinguished the history of architecture from the practical business of making buildings.

This thesis offers a possibility of a reconciliation between history and practice. If we view the study of architecture in terms of the breadth and distinctness of its component parts or perspectives, each with their own ancestry and diverse structure - much as the traditional schools of philosophy regard their intellectual inheritance - then we will perhaps be able to advance a pervasive and persuasive programme of architectural research sensitive to the exten-
sive achievements of a relevant history and adaptable to
the capricious demands of a changing environment.

But reconciliation is hardly enough. Methodologically it
is a straightforward task to bring into accord our perspec¬
tives and their respective polarities. What is not so
straightforward, though transparently veiled, is the measure
of that reconciliation: the touchstone of architecture. But
such things are better said by older men.
SELECTED BIBLIOGRAPHY

BOOKS


FLETCHER, Banister. A History of Architecture, London:


WORRINGER. Form in Gothic, London: Tiranti, 1957.


YOON, Hong-key. Geomantic Relationships between Culture and Nature in Korea, Taipei: Chinese Association for Folk-Lore, 1976.

ARTICLES IN JOURNALS OR MAGAZINES


TOULMIN, Stephen. "From Form to Function: Philosophy and History of Science in the 1950s and Now," Daedalus (Summer), 1977, p. 143-162.