The Use of Photographic Images for Explorations of Meaning in Architecture

by

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ABSTRACT

In this thesis I am making an array of issues related to my search for an understanding of meaning in architecture. These issues were developed in part from my use of photographic images in architectural research, design and communication. Thus the subject which this essay examines is the use of photographic images for explorations of meaning in architecture.

I have chosen the presentation of the house at Groton designed by Maurice Smith, displayed on pages 24 through 32 of World Architecture 4 (ed. J. Donat, N. Y., Viking, 1967), as an example of how photographic images have been used to depict architectural environments. My examination of this presentation explores (1) its physical actuality as an artifact, (2) the ideology which it and the building were intended to represent, and (3) what one perceives and can actually determine from looking at this series of images.

I explore issues of definition, method, and theory of form to develop the ideology which I would substitute for the ones I criticize.

I describe the implications of this ideology for the use of photographic images for explorations of meaning in architecture. I suggest criteria for constructing photographic presentations and a direction for further research.

Thesis Supervisor: Professor Stanford Anderson
ACKNOWLEDGEMENTS

The content of this thesis draws extensively on exchanges which I have had over the past four years with Professors Henry A. Millon, Maurice K. Smith, Leon B. Groisser and Stanford Anderson. Of course I alone am responsible for the ways in which all observations are stated and interpreted in this study.

I am also indebted to Professor Stanford Anderson for his assistance as faculty advisor for this thesis.

William Southworth first called my attention to The Discovery of Grounded Theory and Ken Kaiser first pointed out to me the influence of Karl Popper's writings on the work of E. H. Gombrich.

Many of my friends and fellow students and particularly my wife, Erica L. Powers, have provided a context of interest and debate which has supported my developing understanding of the issues presented here. Students at the University of Massachusetts at Boston, whom I instructed in the Fall of 1971, also taught me some of what I needed to know for this study.

Kathy Burgess and Pam Bedrosian have typed and retyped the various drafts of these materials.
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INTRODUCTION - Part 1

In this thesis I am making an array of issues related to my search for an understanding of meaning in architecture. These issues were developed in part from my use of photographic images in architectural research, design and communication. Thus the subject which this essay examines is the use of photographic images for explorations of meaning in architecture.

My interest in these issues derives specifically from involvement with the content and processes of architectural education. My recognition of their importance is directly related to my understanding of types, ranges and scales of concerns encountered as problems of research, design and communication in MIT architectural curricula. Thus if meaning in architecture were not seen, in these curricula, as something to be discovered in the interaction of form, space and use, many of these problems might never have arisen and my interest and determination to examine them would not have occurred.

I will argue that meaning in architecture is to be found in the perceptions and responses of individual human beings in their built environments. I must examine carefully and clearly specify the ways in which technological or craft characteristics of the practice of architectural research, design and communication are related to ideological or intentional aspects of that practice, and how both are related to the responses of individual inhabitants to their built environments. Yet this does not mean that the issues examined here should be considered, in relation to the types, ranges and scales of concerns and responsibilities of those involved in this discipline, as being infinitely extendable in scope or infinitely reducible in detail.
The biochemical reactions of the light receptors of the retina, for example, are part of the process of human vision. But an examination of those reactions seems to be beyond the range of explorations which are of immediate importance to this study. Here I am concerned with more gross aspects of human vision. I am therefore willing to assume that the minute aspects of vision will continue to operate as they usually do. If the minute aspects seem to shift in response to gross changes and if those shifts in minute aspects seem to be important to these gross observations, then I will have to refer to people in other disciplines more qualified to examine and explain those shifts.

Similarly in the field of photographic optics, I am more concerned here with the gross aspects of how well-designed camera lenses affect the construction of photographic images than with: the ways the different molecular structures of lead and quartz glass affect different wave lengths of light; how computer programs are used to evaluate different combinations in compound lens design; or what pattern tests can show of the additions and cancellations of chromatic aberrations produced by each element in a compound lens.

Architects are more familiar, of course, with the types, ranges and scales of concerns emphasized by the questions they ask in relation to structural analysis than they are with the types, ranges and scales of concerns emphasized by the questions they might ask in relation to perceptual analysis. Laboratory explorations of molecular structure and tests of different material combinations lead both to the development of new materials and to determinations of the structural strength of materials in current use. But an architect is finally more concerned with how the materials
can be used at the scale of actual building and an engineer's calculations for structural design, at least at present, rely more on gross tests for quality control in production and on traditional practice as developed from field experience, than on the finely developed information of laboratory analysis. (Groisser 1970)

I stress this point neither to discredit laboratory explorations in relation to building practice nor to claim that the calculations developed from these explorations are not useful models for guiding one's attention in understanding particular structural problems. Rather I wish to emphasize the process, often made possible by detailed explorations and calculations, of discriminating between the relative importance of particular observations in relation to the purposes for which those observations are to be used.

Explorations beyond the types, ranges and scales of concerns which are of importance to an architectural discipline, are certainly necessary to that discipline, for without them the process of informed discrimination would not be possible. The preparation of this study has involved me in many such explorations, and my purpose here, beyond that of trying to demonstrate my original thesis, has become one of achieving a competent level of understanding of these issues, to be able to discern which aspects are of importance to an architectural discipline and what is the relative effect of that importance in each instance.

My ultimate concern here is with how architectural issues may best be explored and understood, that is, how they may best be recognized, displayed, tested, weighed and communicated in a meaningful learning context. My more limited concern is with how photographic images may best be used for these purposes.
INTRODUCTION - Part 2

Why do so many of the procedures which architects and architectural historians carry out, such as taking photographs, making drawings and collecting survey data, never discover the meaning which they are looking for and which they hope to find in the resulting graphic displays? This is often the case, I believe, because architects and historians are unclear, in their own minds and in their statements to other people, about (1) what kinds of meaning they are looking for, (2) how the methods they practice and the media they use shape and select the meanings which they can find, and (3) exactly to whom they expect their findings to be meaningful. The lack of clarity about these issues is further complicated by wide acceptance and even encouragement, among many architects and historians, of practices which include affective projection, animism and anthropomorphism,¹ which processes are simply delusive.

¹The following definitions are quoted from the American Heritage Dictionary, 1970.

"anthropomorphism. The attribution of human motivation, characteristics, or behavior to inanimate objects, animals, or natural phenomena."

"animism. 1. Any of various primitive beliefs whereby natural phenomena and things animate and inanimate are held to possess an innate soul. 2. Any theory of psychic concepts or of spiritual beings generally. 3. The hypothesis, first advanced by Pythagoras and Plato, of an immaterial force animating the universe."

"projection. 7. (Psychology) The naive or unconscious attribution of one's own feelings, attitudes, or desires to others."

"affective. (Psychology) Pertaining to or resulting from emotions or feelings."

"affect. (Psychology) A feeling or emotion as distinguished from cognition, thought, or action."
They seem to believe that because those processes are confusing they must therefore be creative and that clear alternatives will be restrictive to the free exercise of their creative imagination. This attitude seems to have to do with the hidden curriculum and the origins, in educational and social attitudes, of individuals' needs for cover and defensive distraction. This issue of why people might wish to delude or be deluded, however, is beyond the scope of this study.

In this thesis I will limit myself to trying to stretch my coherent reach from distinctions of meaning in architecture, at one end, through considerations of methods and media and ideology, to observations about individual human perception of built environments at the other. I have tried further to limit my topic, in this related range of considerations, by examining in specific detail only the use of silent, still, photographic image media in architectural research, design and communication. Such limitations are possible only as a matter of emphasis on some particular considerations rather than as a matter of exclusion of other considerations.

It is obvious that architectural concerns are far more than visual, both in the ranges of aspects which architects have to take into account for the design and construction of buildings, and in the ways in which the people who inhabit buildings use and experience them. Yet there is a long tradition, which derives in part, I believe, from the usual study of buildings within the discipline of Art History, which considers buildings only in terms of their appearance and analyzes their appearance in terms of descriptive abstractions which have been alienated from
possible sources of meaning. This study had its origin, in part, in a critical response to this tradition.

There probably should be more photographic examples included in this study. Comment and debate on the examples which are included, however, have emphasized the need to state clearly the background of the issues which the examples illustrate and to explain why I think it is important to explore these issues—and I have reacted accordingly. I have also included, as Appendix I, a resume of photographic projects, which indicates part of my frames of reference for this study.

The basic understanding, which underlies the observations in this essay, is a recognition of the value and irreducibility of individual experience. Countless examples of this recognition can be found in literature, history, philosophy, psychology, as well as countless examples of its denial in favor of authoritarian and totalitarian tendencies supported by arguments of necessity and helplessness to do otherwise. Some of these examples are discussed by Karl Popper in The Open Society and its Enemies. In the MIT architectural curricula these tendencies are supported by claims that one just can't do any better in developing research observations than is currently being done, arguments to discredit individual perception, and competitions for dominance. I believe it is possible to develop methods for architectural research, design and communication which will both realize grounded criteria and continue to recognize the irreducibility of social interactions and of physical phenomena, and the value of the actuality of individuals' experience of both.
INTRODUCTION - Part 3

Students engaged in the search for an understanding of meaning in architecture, if they intend to be at all rational, will be concerned with determining as accurately as possible:

(1) Physical configurations and characteristics of particular environments, including the particular cycles and systems by which those environments are affected (i.e. what one designs; what is built; what one experiences; what one tries to record; what others experience),

(2) Characteristics of individual human motivations, perceptions, cognition and operational understanding reacting to and acting upon particular environments (i.e. why and how one designs and builds; why and how one experiences what is built; why and how one experiences and can, or cannot, interpret records of what is built; why and how one can, or cannot, interpret other people's experience of what is built),

(3) The ways in which individuals' interaction with particular environments and with other individuals in particular environments can be recorded and explored with various media (i.e. by what means one can record and explore design processes, what is built, how one experiences what is built, how other people experience what is built, how other people experience you and others in the context of what is built; by what means one can structure the making, gathering and assembling of observations to answer the questions posed by one's particular search).
(4) The history, accustomed habitat, age, occupation, social status, and culture of particular individuals and groups in particular environments (i.e. who one designs and builds for; who inhabits what is built; who experiences what is built in ways which one tries to record and interpret).

(5) How individuals in groups react and act toward each other and toward other groups in particular environments compared with how those individuals act and react when not part of a group, both in the same environments and in other environments (i.e. what kinds of social interactions does one design and build for: already exist where something new will be built, or will actually take place in the new built environments which one designs).

(6) How particular biological, chemical and physical processes within and beyond usual human habitations affect and are affected by human activities (i.e. what kinds of ecological interactions does one design and build to sustain: already exist where something new will be built, or will actually survive the construction of new built environments which one designs).

(7) How many particular observations, of what particular kinds, and of what degrees of detail, does one need to judge the relative importance of each observation for the effective scope of design problems and solutions, or to be able correctly to generalize aspects of particular environments (i.e. to what extent is each recorded observation relevant to other observations, to designing and building, to communicating about what is to be or has been designed and built).
Students in architectural design curricula are obviously concerned with what is to be built. They use images, built models, numbers and words to organize their design processes and communicate their design intentions. They should, then, be concerned with how their use of these media can relate their design intentions to full scale built form and with how their use of these media will constrain, and be affected by, their design procedures.

They observe already built environments and gather references for trying to know what their designs might be like if actually built to intended full scale. They should, then, be concerned with how they experience and observe built environments, and how the media they may use and their ways of using them, for recording and communicating their experience and observations, shape their own and other people's understanding of built environments.

If they work on designs for buildings in foreign places to be used by people of foreign cultures, or if they design housing for people within their own culture who have social organization and dwelling needs different from their own, or if they study architectural history in a way which relates built form not just to appearance or just to potential use, but to the actual people who have lived and do live with and within that form, then they should be concerned with how their individual experience of environments and their individual design intentions are similar to and different from the experience and intentions of those outside their own peer group. They should also be concerned with how, that is, to what extent, each of their observations can be generalized and tested for purposes of design.
Without these concerns with "how" and experience in handling them, design students will be able to exercise very little judgement in new or unfamiliar situations. They will be concerned with "how" if they understand architectural education as a self-examining process in which participants initiate and explore processes of learning which will enable them to meet and handle unfamiliar design situations. If students understand architectural education as initiating only the learning of standard architectural design practices and standard building forms, to enable them to copy those practices and forms and continue doing just those kinds of things which architects usually do, then this concern with "how" would be of no importance to them. This second attitude, however, does not seem particularly appropriate in times when what architects usually do is generally believed to be inadequate for solving the problems which they are being commissioned to handle. This second attitude has often been severely criticized in the MIT architectural curricula.

The processes of learning, which will enable students to meet and handle unfamiliar design situations, are based on and continuous with the usual and familiar experience of each individual. Those processes include extensive examination and testing of each individual's experience of built environments. That experience forms the basis for an individual's understanding of what architecture means to him and the beginning of his exploration of what architecture may mean to other people.

How particular ideological uses of particular media affect a student's experience of built environments, is of importance when that student is establishing, in his observations and in his awareness of his experience, his basis for understanding design criteria, that is, when he is involved
in using the media of architectural research, design and communication to collect information, explore his design proposals and communicate those proposals to other people. Exploration of these issues leads to explorations of individuals' usual experience of built environments, on the one hand, and to explorations of individuals' usual experience of media presentations, on the other; to explorations of individuals' motivational, perceptual, cognitive, and operational understanding of built environments compared with, and contrasted to, their understanding of media presentations which refer to built environments; to explorations of the similarities and differences between structured processes of individual coherence when active in response to built environments and those processes when active in response to media presentations which contain information about built environments.

In the recent history of architectural design curricula, it is characteristic for participants to say they are particularly concerned with users and with user needs, that is, with how other people will experience, will respond to, will inhabit, will find useful what they as designers will organize and have built. The meaning in architecture, then, which these people would count of primary importance would be, not its meaning to designers, not its meaning to financiers, not its meaning to politicians, to art historians, or to artists, but its meaning to the particular people who spend their lives in and around particular buildings. This may be a populist ideal essentially at odds with the preferences, occupational training, and peer group interests of most architects. It nonetheless leads to design attitudes which emphasize the motivational, perceptual, cognitive, and operational responses of those other people to
the environments which architects design, as being of primary importance for developing design criteria. The meaning, then, which design students try to understand as the primary reference for their design work, is the meaning of built environments to those other people who are the users.

I am not suggesting that the meanings of built environments to individuals besides the users be ignored, not dealt with or denied. Such other meanings not only must, evidently, be recognized and handled if design projects are to be effectively carried out, but also must be recognized for effective design education as a student's primary means of understanding the issues which he encounters.

As a participant observer in design processes, the strength of his perceptions depends upon his ability to identify his observations with the ranges of his experience, and his critical understanding depends upon his recognition of similarities and differences between his experience and the meaning of built environments to him, and the experience of other people and the meaning of built environments to them. If he does not at all project his feelings in new situations of people and environments which he experiences and examines, then he will have no meaningful understanding of those situations, of information which he collects about those situations, or of information about other situations which he has not experienced at first hand. If he only projects his feelings onto those situations, then he will have no tests for his possible insights and no awareness of distinctions for comparing his own experience and interpretations with those of other people. If he mistakes subjective projections of his feelings onto environments, and onto other people's experience in those environments, for objective information then he will
be deluding himself. Such delusion is a characteristic of the affective projections, of the animism and anthropomorphism, in which architects often indulge when they consider "the meaning" of built environments.

These observations have their origin both in the general issues raised in my experience of architectural education and in my efforts, during that education, to use photographic images in architectural research, design and communication. For if failure to observe the distinctions which I have outlined above leads to delusion about meanings of built environments, such delusions will be compounded when those distinctions are overlooked in observations of interpretive media presentations which refer to built environments. In particular this is the case when photographic images of built environments are assumed to be physically, structurally or perceptually equivalent to those environments, for, as I will try to demonstrate, photographic images are neither physically nor structurally the same as, or even similar to, the environments to which they refer, nor do they correspond to or represent individuals' usual perception of environments or even that fragment of perception called vision.
Section I: Examination of a Particular Photographic Presentation of a Building:

The house at Groton by Smith

"...an architecture that both responds to, and suggests, the interrelationships of built form, space and use. ...underlying principles of the interaction of form, space and use may be seen in the house at Groton by Smith. ...this house is a complex environment -- almost a world -- with architectural implications far beyond its particular use and construction technique. To fully substantiate this claim would demand extensive presentation; we must hope that the photographs will succeed in conveying however incompletely some of the qualities of both the house itself and of the generalizable architectural attitude."

Stanford Anderson

"This is a place that prescribes nothing, an architecture that is intense without imposing itself on you, that has absolute clarity in spite of diversity and complexity, a place full of gentle ambiguities. You are channelled towards the way in...to this in-out, up-down, open-closed, high-low, light-dark place ... No space seems deliberately for anything, each can be used as you please. ...There are instruments and music stands in one of the spaces. This is not just the pseudo-flexibility of anonymous emptiness (universal space!) but a place of real options and opportunities that can be richly interpreted by whoever is living in it.

"You never see it as a thing. There are no one-glimpse, one-shot views inside or out, but the fragments you see at any one time imply and contain the whole. Both inside and outside divide and multiply between the trees. At each end there are insubstantial enclosures and frames -- outdoor spaces -- that suggest that the house could quietly go on growing until it became a village or a town. Light enters from all directions, even in a tiny space that might be a child's bedroom, playroom, study or fort, it comes in four ways. Every hour something new has happened. "A place full of invitations."

John Donat

"The house is presented here without description in related sequences of pictures that lead you from one space to another from the left to the right. What is going on outside is indicated below, what is going on at the upper level is indicated above. Mini-plans show where you are on each page."

World Architecture 4, p. 25.
Section I - Part 1

I have chosen the presentation of the house at Groton designed by Maurice Smith, displayed on pages 24 through 32 of *World Architecture 4* (Donat, 1967), as an example of how photographic images have been used to depict architectural environments. My examination of this presentation will explore (1) its physical actuality as an artifact, (2) the ideology which it and the building were intended to represent, and (3) what one perceives and can actually determine from looking at this series of images.

The presentation of the Groton house is related both to the issues examined in this thesis and to the content, structure and origins of the discussions which led to my understanding a need to explore these issues. I and my contemporaries, in MIT design courses, experimented with the same construction materials and design methods, as were used for this building, in relation to the same ideology. We visited this building, looked at this and another presentation of it, and made presentations of our own projects. Thus the building and its design method, the ideology and its implications, the presentation and how such a presentation can be constructed, have been both within the scope of my first-hand experience and contributory to my present understanding of design issues.
Section I - Part 2: The Photographic Presentation as an Artifact.

The next five pages of photographic images display the book *World Architecture 4* opened to the pages of the presentation of the house at Groton by Smith. These pages are intended for reference and in them the reproduced photographic images of the building have been numbered in the sequence which I have used in this text. In keeping with my arguments I do not consider these photographic prints as an unchanged representation of the book, either in the physical actuality of the artifacts or in the ways those different artifacts may be perceived. For complete and accurate reference a reader of this text will need to have at hand a copy of the actual book.

The quotations excerpted on the first page of this section appear on page 25 of *World Architecture 4* facing the first full page of photographic images (page 24) in a sequence which includes eight full pages of photographic images, one full page of words, and one full page showing a printed drawing of "Upper Level Plan" and a printed drawing of "Lower Level Plan." There are a total of forty black-and-white photographic images printed on coated paper by offset lithography, from half-tone dot plates which have varying numbers of dots to the inch.

With each sequence of images, which are titled "Arriving," "Coming In," "Turning Right," "Turning Left," "Back Again," and "Going Away," there is a corresponding "mini-plan." Part of each "mini-plan" is blacked-in to indicate the plan areas to which each sequence of images refers.

The photo-credits indicate that some of the original photographs were taken by the architect and that the rest were taken by the editor. Some
Very interesting studies of a manner of assembling large precast concrete channels (elements which are themselves three-dimensional, large enough to define small spaces suitable for use, but not closed and self-limiting) have been pursued in the design studios of Maurice Smith, an architect on the faculty of the Massachusetts Institute of Technology. These studies offer possibilities for an architecture that both responds to, and suggests, the interrelationships of built form, space and use. Although we cannot illustrate a building using this system of additive space-defining structural elements, the same underlying principles of the interaction of form, space and use may be seen in the house at Groton by Smith. The word 'house' and the seemingly prosaic constructional system using standard dimensional timber should not be permitted to obscure the fact that this house is a complex environment — almost a world — with architectural implications far beyond its particular use and construction technique. To fully substantiate this claim would demand extensive presentation; we must hope that the photographs will succeed in conveying however incompletely some of the qualities of both the house itself and of the generalisable architectural attitude.

Stanford Anderson

This is a place that prescribes nothing, an architecture that is intense without imposing itself on you, that has absolute clarity in space of diversity and complexity, a place full of gentle ambiguities. You are channelled towards the way in freely but gently — the way is indicated — but even under the structure of the entrance canopy (which is really a space and structure module for the whole building) you are not forced to pass under it but can slip by on the side. Inside (if there is an 'inside' to this in-out, up-down, open-closed, high-low, light-dark place) the gentle ambiguities persist. No space seems deliberately for anything; each can be used as you please. It happens to be used (and to have been built) as a family house, but might just as well be infants' school, hunting lodge, retreat, summer camp or music school. There are instruments and music stands in one of the spaces. This is not just the pseudo-flexibility of anonymous emptiness (universal space!), but a place of real options and opportunities that can be richly interpreted by whoever is living in it.

You never see it as a thing. There are no one-glance, one-shot views inside or out; but the fragments you see at any one time imply and contain the whole. Both inside and outside divide and multiply between the trees. At each end there are insubstantial enclosures and frames — outdoor spaces — that suggest that the house could quietly go on growing until it became a village or a town. Light enters from all directions, even in a tiny space that might be a child's bedroom, playroom, study or fort; it comes in four ways. Every hour something new has happened.

A place full of invitations.

John Donat

The house is presented here without description in related sequences of pictures that lead you from one space to another from the left to the right. What is going on outside is indicated below, what is going on at the upper level is indicated above. Mini plans show where you are on each page.
HOUSE, GROTON, MASS.
Architect
Maurice Smith

Photos: John DeGraz
Maurice Smith

Coming in
Turning right

GROTON, MASS.
Arch: Maurice Smith

Photos: John Donohue
Turning left
Back again

Going away

Photos: John Dowd

Arch. Mies van der Rohe

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of the images are bleed printed (over the cut edge of the page) while others are printed within the white field of the page. The layout was designed for a viewing distance of about one to four feet with the implication that the object of which the images are a part, that is, the book, will be viewed while it is resting on a table or held in someone's hands or lap, etc.

Experience, both general and in particular that kind of experience called observation, is the reference for testing the concepts which make up an ideology. By comparisons of experienced actualities with conceptual formulations it is possible to determine whether such formulations correspond to actualities or are derived either from the misinformation of illusions or from the delusions of affective projection. I therefore wish to emphasize the physical actuality of this photographic presentation, the physical actuality of the building to which it refers, the evident differences between those two actualities and the not so evident differences between the ways those two actualities may be perceived and understood.

No one would consciously mistake the object of which this presentation is a part, this book, for the building shown in the presentation. Yet many people would unconsciously confuse or consciously equate their perception of, response to, and understanding of the meaning of these images and that building. This is demonstrated in part of Donat's statement

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1The arrangement of this presentation is, in some aspects, very carefully contrived. Smith has told me that he designed the layouts of the photographic images and that Donat and his assistants replaced some images and added the "mini-plans."
quoted on the first page of this section.

You never see it as a thing. There are no one-glimpse, one-shot views inside or out, ...

Donat is here confusing or equating photographic process with the process of vision and interpreting the meaning of the building on that basis. There are many aspects, however, of the construction of this artifact which would have to be ignored by anyone claiming such an equivalency.

The book is made up of a hardboard binding, and dust cover and pages of three different weights, finishes and colors of paper. The two-dimensional page surfaces have been printed with half-tone black ink in lines, half-tone dots and type of varying size, shape and density. The pages were assembled and cut to approximately 8 3/4" by 11 1/8" before binding. This cutting established the cropped edge of those images which had been bleed printed. The original layout, from which the printing plates were made, was constructed by carefully fitting photographic images into a constructivist arrangement, the main structural elements of which are approximately 3/16" white bands.

Each of the above mentioned aspects of this artifact represents selections by people choosing what emphasis and what meaning they wished to communicate with this book. Yet these selection processes were preceded by the photographic selection which determined the images from which those people could choose.

Each negative of a single size and sensitivity to light, was exposed in a single direction, from a single camera position, for a single exposure time, at a single aperture setting, through a single lens. This selection determined what was recorded on each negative: the angle subtended by the field of what was recorded, what was included within the
frame and what was excluded, how what was included was composed by changes of camera position, and what was the depth of field, detail and contrast of what was recorded. Each of these choices was further modified and selected in the photographic printing process by choice of photographic paper, enlargement and cropping.

How extensive this selection process is could be understood by comparing the number of photographic images and the field, contrast and detail of each image in the presentation with the number of eye locations and directions, and the number of iris adaptations, which a person experienced on a journey through the actual building.

But even this comparison would only begin to differentiate a person's experience of this presentation from his experience of the actual building. In that this presentation was assembled and reassembled by various people it cannot be understood to represent one person's attitudes, intentions or coherent point of view. Nor, because of the specific quality of the selection process, can it be understood to represent everyone's point of view. It can be understood as an artifact shaped by the people who put it together and by the media processes they used. To understand it in terms of concepts one would need to know the conceptual references, attitudes, intentions and effects of each person who worked on it. By contrast, a person's experience of the actual building does involve that person's desires, attitudes, intentions and effects from that person's coherent point of view. This would be demonstrated by that person's presence at the building and his ability to get in, through and out of it.
Section I - Part 3: Ideology.

In a critical examination of these photographic images I must inevitably consider not only what they show, but also what they were intended to show. I must consider those issues of ideology, those desires, attitudes, intentions and effects which have informed both the presentation of the images and the design, construction and habitation of the building to which the images refer.

Recognition of both the positive and negative relationships, in actuality, between desires and attitudes, attitudes and intentions, and intentions and effects, is of fundamental importance to an understanding of those issues. Searching examination and testing of first-hand experience and observations of built environments, over time, may be needed, for instance, to discover how the effects of a particular built environment on its inhabitants are in keeping with and how in conflict with the intentions of those who commissioned it or of the architects who designed it. This is an area of great uncertainty today in the ideology of architects who claim to be designing for users and to accommodate user needs. With this in mind, then, I will examine the ideology contained in the verbal statements quoted at the beginning of this section and consider some of their implications to explore what the photographic images were, or were not, intended to show.

A difference in the statements should be recognized from the start. Anderson writes, as do I, from extensive first-hand experience, over time, of the architect, his studio classes, his criticism, his expository presentations and his other design work. Donat seems to be writing from a much briefer experience. He has evidently visited the house since he
is credited with taking some of the photographs. He has collected, restated quite literally and apparently accepted much of what Smith has said about his design, with the implication that we, his readers, should also accept it. His strategy of presentation is sympathetic, enthusiastic, uncritical, and apparently not meant to be searchingly examined or tested.

Anderson is more cautious, though still fundamentally accepting of Smith's attitudes and intentions. He has shaped his own careful statement out of his experience of the complexities and pitfalls of those ideas. In the time since these statements were published, he and others have tried to broaden the scope of attitudes and intentions considered in architectural design, to include human desires or motives, at the one end, and the observable effects of buildings on their inhabitants, at the other. This range of considerations must again be expanded, if it is to be considered at all inclusive, with regard to the extent of scientific information today, and will probably have to be continually expanded, and revised, in the future. For example, it has seemed useful, recently, to consider architectural criteria in the context of the biosphere and man's impact on his environment.

This expansion process is one which takes place both in an individual's education and in the history of ideas, though differently in each. Individuals in one generation may form their own ideology, through a critical examination of themselves, of their own experience, of the available information which relates to their experience and to the experience of

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2 Smith has told me that Donat made two trips to gather material for this presentation. On one visit he spent a day at the house photographing it and talking to Smith and the owners. During the other, he talked with Smith about the presentation.
others, and of the best of the ideology of their generation and of the
generations preceding them. I would like to examine and understand
Anderson's statements in this context.

His statement about "the interaction of form, space and use" indicates
the key issues, at the time of his writing, of the ideology which forms
the background of this discussion of the communicative possibilities of
photographic images. Form is built form; the additive and subtractive
configurations of ground, wall, frame and infill.

The logic behind this description of built form has often been taught
in terms of abstractions which are anthropomorphic; in terms of "growth-
form", "what a wall wants to be", and of directional pieces, such as beams,
"slamming" ("Ouch!") into other stationary and inanimate objects. Such
teaching seems to have to do with the meaning of form only in relation to
the affective projections of architects so trained. By contrast, it is
possible to collect evidence of clear practical considerations, such as
the need for retaining walls and the amounts of material and nature of
enclosure required by increased height of such retaining walls, combined
with an understanding of historical developments, such as the development
of industrially produced structural steel and the development of reinforced
concrete frame construction, to explain a logic behind the development of
this generalized description of built form. Such explanation makes this
description understandable in terms of an individual's experience and
historical context where it has otherwise been obscure and unrelated to
individuals except in terms of their belief in an anthropomorphic
mystique. I shall try to determine what one may and may not know about
this form, from photographs, from experience, and from a combination of
both. My discussion will rely heavily on other people's examinations of differences and similarities in perceptual and cognitive reconstructive operations, in response to the different actualities of this form and of its image on a photographic emulsion. (Wald 1950, Neisser 1968, Pirenne 1967, Pirenne 1970)

Space is the second component of the interaction to which Anderson's statement refers. If form is what is built, then space is what is not built. Architects' drawings and photographic images which record aspects of buildings refer particularly to built form. Form defines space. Form defines the spaces and makes up use-surfaces which people inhabit. Since living beings are of greater ideal importance than inanimate materials, the space, what is not built, is ideally more important than the form, which is built, and which is the defining configuration of the built environments which people inhabit. An architect, according to this reasoning, should be concerned with form insofar as it provides useful surfaces, enclosures and continuities, and otherwise has meaning for those people who inhabit the spaces which it defines.

This ideal is derived from the simple premise that architectural environments are for people: for the people who inhabit them, for the people who visit them, for the people who neighbor them. They are for these people in the present as well as in the future and they retain records of these people in the past. Most of all, architectural environments should be useful, should, as far as possible, meet the needs of all of these people. But such needs have never been accurately defined.

The third component of the interaction indicated in Anderson's statement is "use." "Use" is an ill-defined collective. Historically
it is intended to supercede the term "function." By implication it is meant to refer to a wider range of considerations than did the term "function" and to signal a break with the schools of so-called functional design. Where "function" implied an emphasis on products, on the material objects which were the results of the process of production, "use" is meant to imply an emphasis on process, on living, on being in process.

This emphasis on process rather than on material object is indicated by the caption words among each group of photographic images of the house at Groton by Smith. For example, the first caption is "Arriving." This is the intended "use," the living process which people experience in the space defined by the form which is shown in that group of images. Thus the form is often referred to as "use-form." A more usual caption would be one which merely named the physical built form as "entrance," calling attention to its object qualities. It is in keeping with Smith's ideology that the "entrance" to this building cannot be identified with a particular object, such as a "front door," but is designed so that someone who is "arriving" will progress through a series of spaces intended to give that person an experience of continuously increased involvement with and penetration into the building.

It is important to understand this ideal of "use" in order to be able to see how the "underlying principles of the interaction of form, space and use" give rise to the design of places-to-be and to the ideal concept of use based on attitudes and intentions of the architect, who may wishfully emphasize possible and potential use rather than evident or actual use. I say "wishfully" in this comparison because one procedure which architects almost never carry out is that of making observations of the
effects of their own works on the people who inhabit them, to see if there is any correspondence between their intentions and those effects. Photographic images could be used, in combination with other recording media, to make such observations.

It is significant that Anderson's statements here, reflecting attitudes about architecture at the time when he was writing, leave out all references to meaning. Many theorists now recognize that issues of meaning are fundamental to all other issues in architectural theory. Yet long traditions of borrowed culture and imitated forms have reinforced social and intellectual attitudes which exclude or obscure any recognition of the key questions of meaning in architecture, viz.: To whom does a particular built environment have meaning? What is the cultural, social, occupational, chronological context of that person to whom it has meaning? What is the nature of that meaning to that person in that context? How are different meanings to different people related to those people's individual contexts?

Recognition that a person's cultural, social, occupational, chronological context is of fundamental importance to that person's understanding of meaning in built environments has been further obscured by the animistic beliefs which support the traditions of borrowed culture and imitated form. Such beliefs, as for instance in the existence of universal forms from which all particular forms are derived, allow their advocates to take forms out of their meaningful context and fit them, by any method of permutation and combination, to any universals. This seems generally to be an excuse for a person projecting and imposing his own context, attitudes and intentions upon other people and upon their
physical environments. Such projection is consistent with the anthropomorphisms by means of which an individual may try to gain credibility for the objectivity of his projected feelings about an environment by ascribing those feelings to the inanimate materials and configurations of the environment to which he responds.

Anderson's statements suggest a belief in the primacy of concepts, of independent ideas such as "the interrelationships" and "underlying principles of the interaction of." They also suggest "an architecture" which is animate in that it "responds" and "suggests" and is made up of "interrelationships of built form, space and use" and "interaction of form, space and use." In fact it is people such as the architect, inhabitants and visitors who respond. The architect may suggest his intentions by arrangements of form and space and other people may or may not understand his intentions depending on how they respond to those arrangements.

Not form and space but people have the meaningful relationships and interactions which determine how form and space are understood by them. Concepts of universal meaning of form and space have yet to make sense out of the complexities and contradictions of archeological and historical information relating to different cultures, beyond opting for meaninglessness as a norm. The mistake here, I believe, is in the way of thinking about, the way of asking questions about that information, whereby people look for meaning in terms of universals which have been developed within the contexts of a modern culture and projected upon a culture of the past.
Both Anderson and Smith judge configurations of form and space, in part at least, according to "use" criteria. Yet those "use" criteria are attributive rather than developed from evidence. They are derived from their individual experience and projective intuition rather than from systematic records of responses of actual users to actual built environments. I would argue that it is possible to record such information, photographically and otherwise, more systematically than has usually been done, not as substitute for, but as supplement and guide to insight and experience such as theirs.
Section I - Part 4: Perception and Reconstruction

Form can be indicated on planar photographic images according to the same conventions as are used to indicate form on planar perspective drawings. An observer's experience of perspective drawings or of photographic images is different, however, from that same person's experience of form while he is in the actual environment to which those drawings or images may refer. An observer of a photographic image, or of a perspective drawing, experiences the physical actualities of paper, ink or pencil or silver, light, and two-dimensional configuration—in other words, the physical actuality which is before that person. That the optics of the human eye may be similar to the optics of a camera and that both may render form in ways similar to ways form is rendered in perspective drawings, does not negate this fact. One's experience of a photograph or drawing is of the physical actuality before one, which is a different physical actuality from that to which the drawing or photograph refers. To deny this is to indulge in self-deception.3

People know where they are and know how they live, in some respects, at least, in response to the physical definitions in their surrounding

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3 Indulgence in this kind of self-deception seems to be necessary for people to become imaginatively involved in such media presentations as fiction films, novels and poetry. Although one may become "lost" in a fiction which is carefully contrived to encourage one to "make believe" and although one may "believe what one sees," at some remove, through different media, as accurately representing some other events, evidence of discrepancies are always present and awareness of one's surroundings is never totally lost. This kind of imaginative involvement may be stimulating to and even have beneficial effects on an individual's psyche. It would be misapplied, however, as a means for gaining accurate information about an environment from photographic images. It might not be misapplied, on the other hand, as a means for understanding some aspects of environments which one may experience at first hand.
environments. This assumption allows the search for meaning in architecture to proceed, in part, by an examination of form. Photographic images record aspects of form and therefore may be particularly useful for examinations of form, particularly for examinations of details of form to which individuals in an environment may in some way respond, even though they may or may not consciously notice and/or remember them.

It is difficult, however, systematically to reconstruct the actualities of form from photographic images and drawings without having access to the actual forms to which they refer. Because of the difficulties of this kind of mental reconstruction, the building of scale models is emphasized in studio design classes and in some aspects of research in architectural history. But the processes by which form can be systematically reconstructed are also psychological ones. I would argue that the psychological processes by which form may be reconstructed from photographic and drawn information are different in kind and differently oriented than those psychological processes by which the form, to which that information refers, is experienced at first hand. (Neisser 1968) If this may be demonstrated as true, then how are we to regard our understanding of the space defined by the form indicated by the photographic image and drawing?

Photographic images, of course, contain no space. They and drawings are recorded on two-dimensional surfaces. Confronted with them, an observer's primary experience will be of a drawing or photographic image, the physical actuality of which is made up of lines or dots or grains, of varying size, density and color, arranged on a two-dimensional surface and displayed by means of various colors of light.
An observer of photographic images and perspective drawings may be able to distinguish in those images monocular visual information regarding relative size of form and relative depth of space. (Mueller 1965; Krech, Crutchfield & Livson 1969) He may be able to locate approximate observation points in successive images, to identify some continuity between observation points and to identify some continuity between the form and space shown in different images, if he is presented with a sequence of images with overlapping content which he can identify. Such ability to identify architectural content of images often requires first hand experience of the particular environment shown in the images. But for an observer to know any of the above aspects accurately enough to make a correct model he needs accurate, scaled plan and elevation information accurately marked with the observation point for each image.

A cursory look at the forty images of the house at Groton by Smith reveals that there are no human beings in any of them. Even the secondary evidence of human habitation is sparse. Images 1 and 2 include three cars and a pumpkin. Images 5 and 38 each show a dog. Image 8, its repeated (though differently cropped) version as image 37, and image 10, each show an indoor garden which must have someone caring for it. Images 16, 17 and 31 show built-in sofas with cushions which someone has plumped up, although they show no signs of otherwise being used. There is a closed cello case next to a chair shown in image 17. The living inhabitants of this house are conspicuously absent from these photographic images, as is any evidence of their actual use of the use-surfaces and of the spaces defined by the use-form.
Another obvious absence, which is particularly important to this discussion, is the absence from these images, and from most photographs, of the person taking the photograph. On first consideration, this might seem trivial, and unavoidable, except by including a reflective surface within the photographic image. But understanding what you see has to do with knowing where you are standing in relation to what you are seeing and knowing how you got there: that is, both with your sense of orientation in an environment at a particular time, and with your sense of continuity of journey to and through that environment. A partial recognition of this is clearly demonstrated by the sequential presentation of photographic images here with captions to suggest a journey into, through, and back out of the house at Groton by Smith. But an actual sense of orientation and of continuity of journey in a particular environment can only be gained by actually being in and actually traveling through that environment.

The visual information alone⁴, that is, the reflected light information received by a person's eye, can be partially reconstructed if, along with the photographic images, one has an accurate plan, drawn to scale and showing the surrounding context, which has recorded on it the location from which the direction toward which each photograph was taken;

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⁴ Such visual information is, in important aspects, different from an individual's usual visual perception, of a particular environment when that person is in it. An individual's visual perception of an environment which that person is in will also constitute only part of that person's perception of that environment—a part which is inseparable from other modes of perception, which both affects and is affected by other modes of perception, all of which together interact to make up an individual's operational experience and understanding of that environment.
a record with each photograph of what combination of film size and lens focal-length it was taken with; an indication whether each photograph was taken from close to eye level, from waist level, or from some other height; an indication of how the image was printed and cropped from the original full-frame negative; a record of the film used, the f-stop and speed at which it was exposed, the grade of paper used for printing, and the kinds of corrections used during printing and developing; finally, information indicating the offset printing process, the kinds of plates, the kinds of ink, and the kinds of paper.

These kinds of detailed information are rarely included with published photographic images. The statement at the beginning of this section, quoted from the bottom of page 25 of World Architecture 4, indicates an awareness of a need for some such information but it is so superficial and contradictory that it succeeds only in being confusing and ultimately misleading to anyone who would accept it uncritically. It claims that the house is presented "without description," yet the passages appearing above it on page 25 are clearly, and inevitably, descriptive as well as interpretive. It claims that the house is presented "in related sequences of pictures that lead you from one space to another from the left to the right."

This must mean from left to the right reading the pages, rather than reading the sequence of spaces indicated in the "mini-plans," since the "mini-plans" sequence is from right to left, from "Arriving," leftward to "Coming In," from "Turning Right" to "Turning Left," to "Back Again" and "Going Away."5

5This last might be considered as progress, or egress, from left to right, if one were backing up.
Images 1, 3 and 4 might be said to "lead you from one space to another." But the photographer of images 2, 5, and 6 moved out of the sequence of the journey indicated in the "mini-plan" to photograph that sequence from outside and moved back again for image 7. Therefore the images cannot be said to "lead you from one space to another," since their sequence, in this instance, includes images taken from locations along the "Arriving" journey mixed with images taken from locations apart from the "Arriving" journey.

The part of the "Arriving" journey which image 5 indicates is the part of that image which is too dark for someone looking at it to determine anything about either forms or space.

These images correspond neither to what a person's usual vision would be while making that "Arriving" journey, nor does their sequence correspond to what a person's usual cognitive reconstructive processes would be, derived from that vision. The construction of these images and their sequence are distinctly photographic, and should not be confused with first-hand experience of the environment to which they refer.

Images 1, 3 and 4 show what could be considered a partial sequence taken from positions on the journey of someone "Arriving" and depicting forms which that person might see. But there is far more in these images than a person would probably look at while there and certainly more than that person could later reconstruct from memory. Image 1, moreover, is a so-called panoramic view, a lateral splicing of three images. Their combination shows a considerably wider field than usual vision would include and should probably be viewed as three planar panels rather than as one planar surface. The framing of images 3 and 4, on the other hand,
shows, in each case, a field more limited than the form and space of which one would be aware while standing in the positions from which the photographs for these images seem to have been taken.

Image 2 seems to have been taken from the embankment behind a retaining wall shown in image 1. It seems, therefore, to correspond to looking at the uninhabited arriving path, rather than to looking out from that path, with the apparent implication that I, the observer of the image, am meant to put myself into the picture, there where no-one is. But the transition in the arriving journey between what is depicted in image 4 and what is depicted in image 7, is one that, after careful inspection of all of the images and plans in this presentation, I still find difficult to figure out. From what location has the photograph for image 7 been taken? The transition from 7 to 8 and the orientation of the camera for image 9 must be even more mysterious for someone who has not actually been to the house.

The statement from the bottom of page 25 claims that "mini-plans show where you are on each page." This statement is indicative of the confusion inherent in this presentation. Although I may have an emotional response (often called aesthetic) to these photographic images, which response seems to draw my attention, my awareness, and me "into" the photographic images, when I look at images printed on a page I am in fact neither on the page nor "in" the images.

There is a small projection of the stair landing, which is shown on the "Lower Level Plan" but is not shown by images 4, 38 or 39. Image 6 is too dark in the area where one would see the projection. Image 7 seems to have been taken from this projection. But at what level?
The "mini-plans" have blacked-in areas which indicate the plan regions to which the images on each page refer. They do not show "where you are on each page" nor do they show what might be construed as "where you are" in the building, that is, from what position and in what direction each photograph was taken.

I would argue that an emotional response to this presentation relates specifically to the actualities of the photographic images. In such response one may have the illusion of reacting to the actual space and the actual form of the environment to which the images refer, but one would be deluded if one accepted this illusion as a representation of what one's experience would be in the actual environment to which the images refer.

The statement from the bottom of page 25 also claims that "What is going on outside is indicated below, what is going on at the upper level is indicated above." "What is going on" evidently refers to built form. If so, this format holds true only for the thirteen images of the two-page layout on pages 28 and 29, captioned "Turning Right." The other six pages, with twenty-seven images, do not conform to this format.

Few more observations of this kind are needed to demonstrate that this presentation is organized in ways which make it misleading and confusing. Image 20 depicts exterior built form which is not blacked in on the accompanying "mini-plan." The "Turning Right" sequence shows, in part, images taken from positions which progress to the right from "Coming In," but the "Turning Left" sequence also shows, in part, images taken from positions which progress to the right, from the left-hand end of the building, that is, to be read in the opposite order from that in
which they would be encountered if one were actually "Turning Left" from "Coming In." Here the concept (logic) behind the caption seems to be at odds with the conceptualization (logic) of the layout. If one notices in the whole presentation the white bands between images and the rest of the white ground surrounding them, one may recognize the constructivist principles which have guided its design. Although this may give a satisfying visually structured coherence to the images and suggest a coherence between image content and layout, it does not insure that they can be more easily understood or that the building to which they refer can be comprehended by someone who has not actually been there. The constructivist arrangement calls attention to visual links between images where such links exist, such as the fireplace shown in images 30 and 31, which are lined up on either side of a white post. But where no such link exists, as between images 31 and 32, the same juxtaposition is confusing since it indicates a continuity which cannot be understood from the images.

Anderson states that "this house is a complex environment." The photographic images in this presentation seem to demonstrate that this is true. Yet the presentation makes the form of the building more obscure than it need be. The building was designed from a particular accumulation of considerations and criteria. These might be demonstrated, to some extent, by careful presentation of the form of parts of the building in clearly related (plan, section and axonometric) drawings, photographic images, and words. The actual space of the building and the actual experience of being in and going through it can only be known by going there and being in it. Such experience is markedly different from
experience of the drawings, photographic images, and words which refer to the building. This observation can be tested with other environments and media references besides those of this particular example. The questions of the use of the space and the form, and of documentation of use by means of photographic images, must be explored further in other contexts, because, although there is much evidence of form designed for potential use, there is little evidence, in this building and this presentation, of any person actually using that form or the space which it defines.

John Donat's statement is far more poetic than that of Stanford Anderson. I think that anyone reading it can sense its imaginative, allusive qualities. It invites one to participate in, to sympathize with, to experience the good feeling of, the imaginative experience to which it refers. It demands "that willing suspension of disbelief for the moment, which constitutes poetic faith." This may be very creative, imaginative, and inventive, but to the skeptic it presents, not only "almost a world," but almost a closed world, a world which is almost unapproachable from the point of view of someone looking for evidence which he and others can test rather than having to take it on poetic faith. It requires an element of self-deception, which may be appropriate to some kinds of imaginative and inventive excursions but which can only be debilitating to efforts to determine the actualities of an environment.

Donat describes the house as "a place that prescribes nothing." This is his feeling about it. I can empathize with his feeling and try

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7 S. T. Coleridge, *Biographia Literaria*, Ch. XIV.
to put myself into the photographic images to try to know what it must be like to be there at/in/around the house and to feel that way. In fact, however, I can only actually test his feeling about the house if I am or have been in/at/around the house, where I could be aware of my actual responses to the actual place and could then compare my feelings about it with what Donat tells me are his feelings about it. Without actually having been there, this kind of presentation of words, photographs, and drawings, is, for an observer, merely poetic: that is, metaphoric and subject only to vague and affective interpretation. It contains information which an observer can associate with his previous experience, but which obviously cannot be first-hand or actually testable to that person, unless that person has actual first-hand experience of the place to which the presentation refers.

The presentation invites an observer to understand the house by accepting, on faith, that the words, and drawings, and photographs, can and do accurately represent the building to which they refer, the concept of the building, or both. This is wishful thinking on the part of those who put the presentation together. It is their hope and Anderson states it as such.

...we must hope that the photographs will succeed in conveying however incompletely some of the qualities of both the house itself and of the generalizable architectural attitude.

Each person with whom I have discussed this presentation has said that they find it confusing. This has been true of people with architectural training as well as of people trained in other fields. My experience of the building leads me to doubt many of the assumptions and theories which have been attached to it.
From my four years' experience debating and trying to test the ideology and the "architectural implications far beyond its particular use and construction technique" which this building is said to exemplify, I am not able to accept the statement that it "is a place that prescribes nothing." Studies in anthropology, of the physical context of different cultures, and in sociology and psychology, of the reading of cues contained in different social and psychological aspects of physical environments, would also indicate that such a statement could only be regarded as nonsense.
Section II: Considerations of Definition, Method, and Theory of Form.

An individual's work in a particular discipline may be defined by the questions he asks in that discipline, how he asks those questions and what he asks them about. Such questions in architecture are:
How may buildings be made today? and, How have buildings been made in the past? There are a great variety of specific answers to these questions ranging from the logical formulations of structural engineering (trabiated, arcuated, bearing wall, frame structures) through progressive considerations of animal comfort (heating, ventilating, air conditioning, acoustics, lighting) and through the maximal and minimal demands of economics (minimum cost, maximum return, minimum materials, maximum speed of construction) to the affective criteria of aesthetic evaluations (beauty, ugliness, mass, proportion, dynamic balance). Yet none of this information has answered what are to me more fundamental questions: How should I design? and, How have people designed in the past? or, in other words, What have been and what should be now the criteria for effective architectural design?

There are people who believe that answers to these questions are essentially mysterious and unapproachable. They seem to believe that effective design processes are the workings of unfathomable genius and that systematic development of design criteria will render that genius ineffective. My experience leads me to believe that it is possible coherently to explore much more of human inventive and creative processes than has been explored up to now and to include with an understanding of those processes a better understanding of the processes for which architects design.
Definition of an individual's work in a discipline in terms of the questions he asks, how he asks them, and what he asks them about, should prove not only workable, that is, a possible and productive working procedure; it should be also an optimal working procedure, since it would relate directly to the actual working operations, the actual questioning processes, with which he is involved while developing his work in that discipline. Such definition should be generally workable, changeable, susceptible to reformulation, to redefinition as the work of a discipline progresses and as its contexts, its social-physical, its historical contexts change. Such definition would formulate the work of the present, explain the orientation of work in the past, and still admit to modification in the future, as a result of the findings and the reformulations, to which present work will lead.

An individual's work in a particular discipline may also be defined, besides by the questions he asks, by the ways in which he proceeds to question, by the methods he employs and by the media he uses as part of those methods. But if his methods are found to be useful, are actually productive of the information for which he is looking, then they will be those methods which are appropriate to, and the specific form and use of which will derive from, the questions he asks, the ways in which he asks them, and what he asks them about. The methods will be given their particular configurations by the questions which formulate his work in that discipline. The methods he employs will give particular shape and emphasis to the media he uses in that discipline. The ultimate reference for both media and methods will be in the formulations of what he wants to know. What he wants to know will shape both how he goes about finding out and
how he will record his findings for future re-examination and communication.

From this it should be clear, at this stage of my argument on a theoretical basis at least, that methods and media transferred whole from one discipline to another, without regard to the different questioning processes in the different disciplines, could be metaphorical, poetic, and allusive, and would be inappropriate, mismatched, and confusing rather than clarifying in the work of the discipline to which they were transferred. This would also hold true for transfer of whole methods and media from one subject to another within a particular discipline, without regard for the differences in the questioning processes in different social-physical, historical contexts.

An individual's work in a particular discipline has often been defined by what that person did in the context of what that discipline was traditionally concerned with. This approach has led to the absurd situation of someone defining what architecture is and then proceeding to judge whether particular buildings are or are not architecture according to the definition. (Pevsner 1968) In the physical sciences this approach led to the necessity of defining the new disciplines of biophysics, physical chemistry, and biochemistry because of the limits of the traditional definitions of physics, chemistry, and biology. This kind of definition will always be awkwardly anachronistic and will rarely include in an integrated way why something is what it is defined to be, that is, to what questions the answers of that discipline are responses.

If, however, the traditional scope of a discipline is defined in terms of the questions its practitioners have asked, in terms of the questions implied by the information it has accumulated, and if its findings,
its results, are examined in terms of the ways in which those practitioners answered the implied questions, then what (the results), why (the questions) and how (the media and methods) may be integrally understood. In the study of past examples, the questions which include aspects of why, how, and what, which are derived from particular solutions or sets of solutions, will reveal both the processes by which the solutions were reached and the humanly oriented meanings which those solutions represent.

In architecture of the past the results are what has been built; the questions may be discovered in the demands of patrons and the criteria of architects; the media are the words, drawings, etc.; and the methods are the evident processes in which the use of those media has shaped the solutions which, in response to the questions, make up the results.

This sequence, however, leaves out any reference to users, to the inhabitants of an environment, when those people are not the same as the patron. It also leaves out any reference to those people who make observations of users and environments, to whom the formulation of this sequence is of particular importance.

My recognition of the importance of these omissions, of the possibility of including users and observers in this sequence, and thus of the importance of this kind of sequence, has developed over the past few years. Users and user needs have been emphasized in my studies in the MIT design curriculum. In those studies I have become aware of problems of trying to observe users and document user needs, of the absence of evidence of users in the assumptions made about them, and of the absence of any recognizable meaning to me of the attitudes which were ascribed to users and of the meanings which were ascribed to form.
In one course I used tape-recorded interviews to try to gather evidence of the meaning of a particular environment to its users. Then, when I had the opportunity to teach a course in architectural history at the University of Massachusetts at Boston, I found myself confronted by twenty-five students, most of whom were native to Boston and its surrounding towns, who expected me to tell them the meaning of architecture. I thought this would not be at all possible unless I could get them to recognize and tell me the meaning to them of some Boston environments of which they were users. If together we could recognize the ways they and other people used particular environments to which we had access then we could continue to explore uses, meaning and physical configuration of those environments and use our developing understanding to explore evidence of foreign environments to which we did not have access.

For one exercise based on these assumptions I asked those students to state where they lived, to describe their route to and away from that class, and to choose some building or buildings which particularly interested them along that route. I asked them to use 5" x 8" cards, which would be easy to carry and use along their routes, but otherwise tried to be non-directive about what media they would use and how extensive their descriptions would be.

As I tried to figure out how to use the drawings, words, numbers and photographs which they gave me, I realized that their descriptions not only included meanings to them of what they experienced but also gave their response as answers to implied questions. Since I had not asked them questions and since they were not accustomed to that kind of project, I thought that the implied questions might have something to do with the
meaning. I therefore tried to develop the questions to which their descriptions seemed to have been responses.

Their responses, and the implied questions, obviously had to do with journeys and with how they understood where they were, where they were going, and where they had been on those journeys. The following list of questions, then, were derived from the responses of about twenty of those students.

**Environmental Orientation:** How do you know where you are?

1. Where did you come from? (Place)
2. How did you get here? (Mode)
3. From which direction did you arrive? (Direction)
4. How do you know what direction you came from? (Continuity)
5. How do you know where you came from? (?)
6. How do you know how you got here? (Perceptions)
7. What way did you take to get here? (Description of route)
8. Where are you now? (Place)
9. How are you now arranged? (Mode)
10. What direction are you facing? (Direction)
11. How do you know which way you are facing? (Continuity)
12. How do you know where you are? (?)
13. How do you know how you are arranged? (Perceptions)
14. What is this place like? (Description of location)
15. Where are you going from here? (Place)
16. How will you get there? (Mode)
17. In what direction will you go? (Direction)
18. How do you know in what direction you will be going? (Continuity)
19. How do you know where you are going? (?)
20. How do you know how you will get there? (Perceptions)
21. What way will you take to get there? (Description of route)
22. What did you think/feel about your journey here?
23. What do you think/feel about it now?
24. What do you think/feel about this place?
25. What do you think/feel about your journey away from here?

My next procedure was to find out which of these questions were, or were not, answered in a classroom examination of a foreign building. Such classroom examinations make use of projected slide images, and it soon became obvious that no one knew where they were in relation to what was shown in slide images of foreign buildings. They also could not tell
where they were in relation to what was shown, nor could they identify what was shown, in single slide images of interiors of buildings with which many of them were familiar and which they had discussed in that class.

As we continued to explore these problems the following assumptions appeared to be correct: that meaning of a built environment to a person has to do with that person's orientation, particularly with regard to that person's experience of his immediate surroundings; that a person's orientation in a built environment has to do with that person knowing where he is standing or sitting, in relation to what of that environment he experiences, and with his knowing how he got to where he is standing or sitting and where he is going from there; that a single, still, photographic image of a built environment contains no information about where an observer would be standing or sitting in an environment to see what the image shows, nor any information about where that observer should be located in relation to the image surface; that a single, still, photographic image of a built environment contains no information about continuity of journey to or away from the location from which the original image was taken; that a person's experience of a built environment is far more than visual; that photographic images of a built environment do not correspond to a person's experience of that environment or even to that part of his experience which, when alienated from its meaningful context, is called vision; that a photographic image of a built environment contains information so selected and so arranged, and a person's response to that information is so different from his experience of the actual built environment, that the meaning of the image artifact to an observer must be
recognized as being distinctly different from the meaning to that person of the actual built environment which makes up part of the subject matter of the image.

The method by means of which I developed these observations was intended to result in recognition rather than to produce data from which the observations could be proved. Similarly the evidence against which these observations may be tested refers finally not to logical argument and arrangement of concepts but to direct comparison with experience. Such evidence may be developed by anyone looking at a photographic image and asking himself such questions as: "How do I know where I'm standing in relation to what I see?" "How did I get there?" "How do I know what's behind me?" and then asking himself the same questions in relation to the actual environment in which he is then located.
Section III: Criteria for Photographic Presentations.

In what ways could one construct a photographic presentation to be understandable and communicative and thereby effective?

One should first realize that the perceptual and cognitive reconstructive processes by which people understand the form of a building from photographic images, descriptions, and drawings, are different from the perceptual and cognitive reconstructive processes by which people understand the form of a building from their first-hand experience of it. Understanding this, one could then design a consistent presentation according to the logic of those first processes and avoid confusing them with the processes of photographic reconstruction and with the processes of first-hand experience.

What do I mean by "the perceptual and cognitive processes by which people understand..."?

In the simplest and broadest terms, I mean what is called "experience." I mean to say that I am keenly aware of the differences between my experience of the photographic images in the presentation which refers to the house at Groton by Smith and my experience of the actual building and its environs. In broad terms this observation is substantiated by the frequent statements of other people, including those who have studied architecture and architectural history, with reference to many buildings besides this one. They say that when they have visited a building they have discovered it was entirely different from what they expected it to be, after studying it with the aid of photographic images, and that one can't appreciate what the building really is without actually visiting it. In a more careful and detailed examination of this kind of awareness
of experience, however, I will have to consider "the perceptual and
cognitive processes by which people understand."

Why do I say these processes are "different" with regard to photo-
graphic images, from what they are with regard to first-hand experience
of environments?

An individual's understanding of his surrounding environment seems
to be the result of actively searching perceptual processes combined
with various cognitive modes. Although a particular perceptual mode,
such as visual perception, may be said to be dominant in some experiences
of environment, a person's usual understanding of environment exists in
many perceptual processes operating at once. Yet photographic images re-
cord only visual information about environments. Although a particular
cognitive mode, such as cognitive modeling, may be said to be dominant
in response to some experiences of environment, a person's usual under-
standing of environment exists in many cognitive processes operative at
once. Yet the cognitive processes by which form may be understood from
photographic images seem to depend more heavily on models and recon-
struction than is the case with usual first-hand experience.

The information available from photographic images is visual infor-
mation. That visual information is more limited from photographic images
of environments than it is from usual first-hand experience of environ-
ments, first, because it is not augmented and directed by information
available through other perceptual modes in such ways as first-hand visual
experience of environments is usually augmented and directed; and second,
because it is not subject to various visual searching and testing processes
which usually are available to first-hand visual experience of environments.
That visual information is also far more extensive in photographic images than it is in first-hand experience of environments because images record whole fields where the eye fixes on successive small areas in such fields. This is demonstrated often by people seeing things on photographic images which they had not noticed during first-hand experience of the environments to which those images refer, even when they themselves had composed and taken the photographic images.

To realize that other modes of perception are important to one's understanding of an environment, the reader may ask about the environment in which he is now located: How do I know what is behind me? How do I know how climate or climate-control affect my perception of this place? How do I know what I'm sitting, standing or leaning on? How do I know where I am?

The information usually available through other perceptual modes, which usually augments and directs first-hand visual experience of environments, is of the kind that allows one to know: where and how one is located (sitting, standing, etc.) with respect to what one is looking at; by what path and what means one arrived there; what is the nature of the surfaces with which one comes in contact; what kind of atmosphere a place has; what a place is like beyond one's visual field; what reflected sound may indicate about the space one is in and the forms which one sees; how one's perceptions change with respect to how and where one moves. None of this kind of information is available to someone looking at a photographic image. Some of this kind of information can be partially restructured in a cognitive form, different from first-hand experience, if enough supplementary information is provided with a photographic image or series of images.
The accuracy of the reconstruction will depend on the accuracy of the supplementary information. However accurate that information may be, if the observer has not actually experienced the environment to which that information refers, the reconstruction will depend heavily on cognitive recollection of aspects of other environments which that observer has experienced at first hand. Those aspects will be projected onto the images and incorporated in an individual's interpretation of them. If the environment to which the images refer is unlike the environments which an observer has experienced before, as is often the case with the study of environments which are remote from the observer, then this process may be misapplied. It often and inevitably creates a false impression of what the various identifiable aspects of an environment are like as an assembled totality.

Vision is a process which actively searches out the specific source and appearance of sound, taste, smell, touch and motion experiences. Each perceptual mode operates in conjunction both with each of the others and with an individual's desire to know. The physical forms of the contexts in which photographic images may be presented provide an individual with information which may be perceived through coordination of all of these perceptual modes. The appearance, sound, taste, smell, touch and changing location in relation to an individual observer, of image contrast, of paper texture or screen surface, of climate of the place of observation, of changed shape of image in relation to angle of view, of detail, of distance, of size of image, etc. may all be coordinately perceived and tested by an observer. Of all of this, however, the only information which relates to the environment shown in a photographic image is visual
information. Information accessible through other perceptual modes relates to the physical characteristics of the form and context in which an image is presented. An individual's experience, then, of that part of a photographic image which refers to an absent environment may be understood to be peculiarly fragmentary, artificial and insusceptible to perceptual testing, when it is compared to an individual's first-hand experience of that environment, which experience, in terms of the meaning of that environment to an individual, is understood to be actual and accurate.

Within the visual mode itself, however, there are striking differences between the information available from first-hand experience of environments and the information available from photographic images of those environments. These differences are related to specific operations and physical characteristics of photographic images in contrast to their responses to particular physical characteristics of environments.

The responsive processes of human vision include: changes in shape of the lens in each eye to focus, on the retina, images of objects which are at various distances from each eye, and which reflect various wave lengths (colors) of light; continuous coordinated rotations of both eyes, with short directed fixations focussing on successive small fields on and around objects which are at various distances from each eye, and which reflect various wave lengths of light; changes in size of the pupil in each eye, as the iris expands or contracts, in response to different intensities of light reflected from objects which are various distances from each eye, and which reflect various wave lengths of light. Each of these processes, of lens, eyeball, and iris, is directed by an individual's
coordinated operations of active searching and testing. Each allows visual information to be perceived on the retina. Each is altered and directed as that visual information is understood in terms of the total particular searching and testing process in which an individual is engaged. Each gives information to and responds to information from each of the others. (Gibson 1966, Pirenne 1967)

Each of these responsive processes of human vision go through different operations and give different information in response to the different physical actualities of photographic images and of the environments to which the images refer. The lens in each eye, for example, along with the coordinated, directed movement of each eyeball, focuses when both eyes are fixing on an object in a three-dimensional environment and gives information about the distance at which that object is located in relation to the observer. In the case of a two-dimensional photographic image, however, an observer's two eyes and their lenses make coordinated, directed, focussed fixations only on the single planar surface on which the image is recorded. These fixations, being limited to a two-dimensional surface, are unlike usual fixations in three-dimensional environments, which range over objects at many different distances from an observer. Since the lens in each eye does not change shape to focus at different distances and since the coordinated direction of the two eyeballs does not change with respect to depth of visual field, these fixations find none of the information about distance of objects from an observer, usually available to an observer through changes in lens shape and eye direction in a three-dimensional environment.
A two-dimensional photographic image which one inspects may contain distance cues related to linear perspective, relative size, gradient of texture, superposition, relative height, relative clearness, and light and shadow and color. (Mueller 1965, pp. 24-28, and Krech and Crutchfield 1969, p. 194) The depth of field of sharp focus indicated on a photographic image is the result of a single set focus position of a camera lens combined with a single set aperture opening to expose a particular photographic emulsion for a specific length of time.

There is one and only one location from which a photographic image or a central projection perspective drawing can be viewed with one eye, in such a way that the image corresponds geometrically to what a person would see if he looked at the original scene from a corresponding position using only one eye. This location is the center of rotation of the viewer's eye for the original scene, which center must correspond to the center of projection for the perspective drawing and to the optical center of the lens used for making a photographic image. This location can be determined by a constant size—distance relationship in which the distance from this location to a particular object is stated in terms of multiples of the size of that object, in actuality and in the image. This size-distance relationship will hold true for all enlargements and reductions of images and for all photographic images made with wide angle, normal or telephoto lenses. (Pirenne 1967, 1970)

When a photographic image is viewed with one eye, the center of rotation of which is located at that central projection point, recognition of the apparent and actual geometric correspondence between the image and the original can be quite startling. (Pirenne 1970, p. 101) On the other
hand, if a person has not had this experience he probably will not understand the distortion of images when viewed from other locations, will mentally compensate for or ignore such distortions when they are apparently small, and will discredit as being inaccurate images in which such distortions appear to be large.

For a photographic presentation, then, it would be useful to have a record of this size-distance relationship for each image. With this information a viewer could, if he wished, view each image from its central projection point. With this information a person could design a layout for a particular viewing distance. Yet this information would not be sufficient if an observer wished accurately to reconstruct what he saw in a photographic image.

A statement of the size-distance relationship contains relative information of size and distance, which holds true for any enlargement or reduction of image, but contains no information about actual size or actual distance in the actual environment from which an image was taken. To be able accurately to reconstruct photographic information, then, it is necessary to have accurate scaled plan and section information marked with the locations from which each image was taken.

If the designer of a photographic presentation of a built environment wished an observer to identify what he saw in that presentation with what his usual visual experience of that environment might be, then he should establish the base line and the locations along it, from which images were taken, on his scaled plans and sections.

If he wished an observer to be able partially to reconstruct, in a cognitive mode, aspects of that environment then he might juxtapose
images taken from disparate locations on that journey. Yet he should clearly differentiate those images taken along a particular segment of a journey and those taken outside of it.

Finally I would suggest that such a presentation be made up of separate photographic images, made from single negatives, rather than of photographic reconstructions. An observer's ability cognitively to reconstruct aspects of an environment will be much enhanced if such single images are presented in sequence and contain overlapping content.
Conclusion

In this study I have tried to make an array of ranges, types and scales of concerns related to a discipline of architectural research, design and communication. Such an array, although coherently begun here, still remains, in this study, far more implicit and unexplored than explicit and demonstrated. The process of putting this study together has made understandable to me a collection of published works to which I did not previously have intelligent access. Yet the question, "Where to from here?" is still to be answered.

Assuming that those effects, which various uses of recording media have on information collected in field research, can be accurately accounted for, a conceptual framework, based on previous experience and problems and susceptible to being continually modified by new findings, will be needed to clarify what kinds and extents of information can be found and should be looked for by means of field research.

I believe that my insights can be more fully demonstrated with respect to the situations and issues from which they derive. They can then be compared fully with the literature in this field and be modified or reinforced as a result. But I understand the basic issues, which will still need extensive field research, to be those of developing architectural design criteria.
APPENDIX I

RESUME OF PHOTOGRAPHIC PROJECTS & PRESENTATIONS

Studies of: Existing Buildings.
Sites for Proposed Buildings.
Natural Phenomena.
People, in Social & Physical Contexts.

Neville A. Powers
### RESUME OF PHOTOGRAPHIC PROJECTS & PRESENTATIONS

(Including travel to sites, photographing, research)

<table>
<thead>
<tr>
<th>Date</th>
<th>Course or Project</th>
<th>Film Used</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td></td>
<td>(70) Color prints, Ektacolor, Type S,</td>
<td>Kingston Environs, Jamaica: People &amp; land forms, flora &amp; fauna, on the</td>
</tr>
<tr>
<td>1972</td>
<td></td>
<td>Kodacolor</td>
<td>shore, in the Blue Mountains &amp; in botanical &amp; zoological gardens.</td>
</tr>
<tr>
<td>Fall</td>
<td>Film Project</td>
<td>(2 min.) 16 mm ECO (cut to music track)</td>
<td>Plum Island, Mass.: interactive edge of sand &amp; water at low tide.</td>
</tr>
<tr>
<td>1971</td>
<td>(MIT #4.093)</td>
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<tr>
<td>&quot; &quot; &quot;</td>
<td>&quot; &quot; &quot;</td>
<td>(6 min.) 16 mm Tri-X (cut to music track)</td>
<td>Cats: action &amp; attention of 3 black &amp; white cats, using black &amp; white film &amp; directed natural &amp; artificial lighting.</td>
</tr>
<tr>
<td>Fall</td>
<td>Design Project</td>
<td>(30) Slides, Kodachrome-X</td>
<td>O'Neill Theater Center, Waterford, Conn.: images from which to make</td>
</tr>
<tr>
<td>1971</td>
<td></td>
<td></td>
<td>drawings showing existing buildings &amp; proposed additions.</td>
</tr>
<tr>
<td>Fall</td>
<td>For Report of</td>
<td>(25) B &amp; W prints, Plus-X (4&quot; x 5&quot;)</td>
<td>Proposed High-Rise Site, next to Faneuil Hall, Boston: plan-positioned &amp;</td>
</tr>
<tr>
<td>1971</td>
<td>Boston Landmarks</td>
<td></td>
<td>perspective-corrected images; for super-position of drawings of proposed building, to show, from several points of view, its visual impact on surroundings.</td>
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<td></td>
<td>Commission,</td>
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<td></td>
<td>60 State St.,</td>
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<td></td>
<td>Boston</td>
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### RESUME OF PHOTOGRAPHIC PROJECTS  p. 2  

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<tbody>
<tr>
<td>Summer 1971</td>
<td></td>
<td>(120) Slides, Kodachrome II, (80) B &amp; W prints, Plus-X (2 1/2&quot; x 2 3/4&quot;)</td>
<td>Aprilia, Pomezia, Sabaudia, Pontinia, Italy: new towns south of Rome: study of town plans; comparison of present-day photographs with those published in 1930's when these towns were planned &amp; built.</td>
</tr>
<tr>
<td>Summer 1971</td>
<td></td>
<td>(80) Slides, Kodachrome-X</td>
<td>Buildings by B. A. Vittone, near Turin, Italy: San Luigi, Corteranzo, San Bernardino, Chieri, Albergo di Carita, Carignano, Santa Croce, Villanova, Mondovi, Municipio, Chieri</td>
</tr>
<tr>
<td>&quot;  &quot;</td>
<td></td>
<td>(70) Color prints, Ektacolor, Type S</td>
<td>Barga &amp; Carrara, Italy: hilltown, mountains &amp; quarries.</td>
</tr>
<tr>
<td>&quot;  &quot;</td>
<td></td>
<td>(20) B &amp; W prints</td>
<td>Statuary in Capitoline Museum, Rome: Egyptian, Greek &amp; Roman; human &amp; animal figures.</td>
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<tr>
<td>Time Period</td>
<td>Slides or Prints</td>
<td>Description</td>
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<tr>
<td>&quot;</td>
<td>(25) Slides, Kodachrome-X</td>
<td>Royal Crescent, Bath, England: the Crescent from its road approaches &amp; from the Green; details of both rebuilt &amp; unrestored ends; the prospect from the Crescent.</td>
<td></td>
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<tr>
<td>&quot;</td>
<td>(50) Color prints, Ektacolor, Type S, Kodacolor</td>
<td>2 Children in Chernex, Gruyere, &amp; Gstaad, Switzerland: use of long focus (200 mm) lens, on 35 mm camera, to take unobtrusive portraits while visiting these towns.</td>
<td></td>
</tr>
<tr>
<td>Spring 1971</td>
<td>(20) Color prints, Ektacolor, Type S</td>
<td>Plum Island, Mass.: Perception, feeling &amp; picture: wide angle, telephoto, close-up to show the experience of a late afternoon in early spring, going to the wildlife sanctuary beach.</td>
<td></td>
</tr>
<tr>
<td>Fall - Spring 1970-1971</td>
<td>Research Project (MIT #4.65 Theory of Form)</td>
<td>Library, Lobby &amp; Architecture Headquarters Office, MIT, Bldg. 7: study of the use of furniture &amp; architectural space by students, faculty members, &amp; staff to develop criteria for redesigning these places.</td>
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<td>RESUME OF PHOTOGRAPHIC PROJECTS</td>
<td>p. 4</td>
<td>Neville A. Powers</td>
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<tr>
<td><strong>Fall 1970</strong></td>
<td>S.A.H. Tour</td>
<td>(300) Slides, Kodachrome-X</td>
<td>Adobe, Concrete, Desert &amp; Mountains: Spanish, Indian &amp; contemporary architecture in the environs of Santa Fe &amp; Taos, New Mexico.</td>
</tr>
<tr>
<td><strong>Summer - Fall 1970 Project</strong></td>
<td>Research</td>
<td>(5) Slides to internegs, including 3-color separations, Kodachrome-X, Ektachrome, Type C, Unicolor</td>
<td>Color Graphics: research to develop direct method for making color printing plates; use of silk-screen printing, large size half-tone dots, &amp; four-color separation.</td>
</tr>
<tr>
<td><strong>Spring 1970</strong></td>
<td>(Research Assistant: History of Urban Form)</td>
<td>(100) Slides, Kodachrome II</td>
<td>Edgartown, Martha's Vineyard, Mass.: winter study of public-private street-yard space in this summer colony; public buildings, private houses, public-private shore &amp; docks, X &amp; T street intersections, Main St. &amp; other axes; history &amp; development of town plan.</td>
</tr>
<tr>
<td><strong>Spring 1970</strong></td>
<td>(Research Assistant: History of Urban Form)</td>
<td>Presentation using (60) B &amp; W slides (3 1/4&quot; x 4&quot;) from &amp; requisitioned for MIT collections</td>
<td>St. Peter's Piazza, Rome: to examine the design of an urban space, remote from the students, from aggregated published materials (texts, drawings, photographs).</td>
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<tr>
<td>Season</td>
<td>Course Description</td>
<td>Slides Details</td>
<td>Location</td>
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<tr>
<td>Spring 1970</td>
<td>(Research Assistant: History of Urban Form)</td>
<td>Presentation using (40) B &amp; W Slides (3 1/4&quot; x 4&quot;) from &amp; requisitioned for MIT collections</td>
<td>North End, Boston, Mass: to study its early history: farms, road &amp; house building, landfill, urbanization; to study relation of location (near axis or shore) &amp; kind of street intersection (X or T) to evolution of local activities.</td>
</tr>
<tr>
<td>Fall 1969</td>
<td>(MIT #4.143 Architectural Design)</td>
<td>(20) Slides, Kodachrome II</td>
<td>Street &amp; Lot, Mass. Ave., Cambridge, at Bay St.: study of site for multi-use building design, to include parking, street level shops, film study center &amp; offices or apartments.</td>
</tr>
<tr>
<td>Summer &amp; Fall 1969</td>
<td>(MIT #4.61 Architecture in the Ancient World)</td>
<td>(150) Slides, Kodachrome-X</td>
<td>Villa Adriana, Tivoli, Italy: record of ruins, site &amp; reconstructions, to try to understand scale, design, use, &amp; meaning of original complex of buildings, water &amp; gardens.</td>
</tr>
<tr>
<td>Summer 1969</td>
<td>(70) Slides, Kodachrome-X</td>
<td></td>
<td>Villa d'Este, Tivoli, Italy: study of built forms, growing forms &amp; water forms.</td>
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Villa d'Este, Tivoli, Italy: study of built forms, growing forms & water forms.

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<thead>
<tr>
<th>Year</th>
<th>Slides/Type</th>
<th>Location/Details</th>
</tr>
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<tbody>
<tr>
<td>Summer 1969</td>
<td>(500) Slides,</td>
<td>Rome: Buildings &amp; Sculpture:</td>
</tr>
<tr>
<td></td>
<td>Kodachrome-X HS Ektachrome</td>
<td>Teatro di Marcello, Campidoglio, Pantheon, Cancelleria, St. Peter's</td>
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<tr>
<td></td>
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<td>Piazza, Lungotevere Tebaldi, Palazzo</td>
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<td>Falconieri, Via Giulia, Villa Giulia, Academia</td>
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<td>S. Luca, Trevi Fountains, Piazza Navona, Bernini</td>
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<td></td>
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<td>Sculpture, S. Agnese, Sant'Andrea della Valle, Sant'Andrea delle Fratte,</td>
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<td>Largo Argentina, Palazzo Mattei, Colosseum, Baths of Diocletian &amp; sculpture,</td>
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<td></td>
<td></td>
<td>Villa Borghese &amp; sculpture, Forum, Basilica of Maxentius, Palatine ruins,</td>
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<td>Porta Pia, Foro Italico.</td>
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<td>(100) Slides,</td>
<td>Florence: Buildings &amp; Sculpture: sculpture in</td>
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<td></td>
<td>Kodachrome-X HS Ektachrome</td>
<td>Bargello, Michaelangelo sculpture, Foundling Hospital, Uffizzi, Ponte Vecchio,</td>
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<td>San Lorenzo, Villa I Tatti.</td>
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<td>(20) Slides,</td>
<td>Milan Airport: interior multi-level connector for lounges &amp; shops.</td>
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<td>HS Ektachrome</td>
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<td>(50) Slides,</td>
<td>Penshurst Place, Kent, England: Elizabethan manor-house &amp; farm: additions from</td>
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<td></td>
<td>Kodachrome-II</td>
<td>different periods among courtyards, gardens &amp; grounds.</td>
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<td>Period</td>
<td>Project Details</td>
<td>Slides &amp; Prints</td>
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<td>Fall 1968</td>
<td>(MIT #4.62 Architecture 1400-1750)</td>
<td>50 Slides, Kodachrome-X</td>
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<td>York, Maine: to study history &amp; development of town center; its plan; its public, commercial &amp; private buildings.</td>
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<td>Summer 1968</td>
<td>(50 Slides, Ektachrome)</td>
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<td>Palazzo Barberini, Rome: to study the history of the designs for the building &amp; changes during construction.</td>
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<td>Summer 1968</td>
<td>(50 Slides, HS Ektachrome)</td>
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<td>Italian Garden, Drummond Castle, Perthshire, Scotland.</td>
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<tr>
<td>Summer 1968</td>
<td>(200 Slides, HS Ektachrome, Kodachrome-X)</td>
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<tr>
<td>Fall 1967</td>
<td>(MIT #4.121 Architectural Design)</td>
<td>25 B &amp; W prints, Tri-X</td>
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<td>Record of Wooded Site, Harvard, Mass.: detail &amp; panorama study, to use for building design.</td>
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BIBLIOGRAPHY


