EMERGENT PEDAGOGIES IN DESIGN RESEARCH EDUCATION

BY

JOSEPH PRESS

BACHELOR OF SCIENCE
CARNEGIE MELLON UNIVERSITY, 1988

SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE IN ARCHITECTURE STUDIES AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
FEBRUARY 1997

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ABSTRACT

Recent demand for applied knowledge within architectural practice has resulted in the proliferation of university based research groups. Given the role advanced degree programs play in educating architectural researchers, an opportunity exists to educate architects towards bridging the traditional gap between practice and academia, as well as addressing the dichotomy of research and teaching within the university.

Traditionally, research methods from other disciplines are taught in an attempt to redress the research deficiencies of a professional education. This investigation begins with a different premise: the operations of design, central to an architect's intellectual and operational repertoire, should be the catalyst for developing research methods specific to architecture. Further, these methods should be accompanied by a knowledge base which expresses the operations of design.

A modified educational paradigm consisting of methods, knowledge, and the building of abilities through 'thoughtful performances', structures an experimental curriculum. Each attribute becomes a dimension for substantiation and assessment. Student engagement and entanglement within this locus reveals the potential directions of design research education.

The subsequent analyses of the student work indicates four major trends: *Intersubjectivity*- the need for common understanding; *Transparency*- the effortless application of methods, *Emergence*- acknowledgment of form's evolution; and *Apprentissage*- French for learning which occurs from within apprenticeship. Given these attributes, and the subsequent imperative to redefine architectural research, we formulate a paradigmatic architectural researcher, the *'Architect Scholar'* and speculate on an educational program designed to foster these characteristics within students.

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ACKNOWLEDGMENTS

Ø. KNOWLEDGE IN ARCHITECTURE

"Developing architectural knowledge, freely and voluntarily shared, is what the profession is for. The test of the validity of a profession is not how well we defend our boundaries, but how fast we can expand our knowledge base."[1]

Frank Duffy of Great Britain lucidly depicts the dramatic shift occurring within the practice of architecture: acknowledgment of the necessity to build a professional knowledge base. This is a significant change given that architecture is the last renaissance field to cling to a notion of holism. Medicine and law began to specialize years ago, in deference to the modern era of complexity, knowledge, and diversity. Releasing ourselves from a concept of the profession valid during a time where complexity was comparatively minimal, has the potential to be a liberating and invigorating force.

Duffy's description also reflects a growing trend in the United States. The AIA's current "Redefinition of the Profession" states that today's culture implies:

"... an architecture geared to...exploit the seemingly endless surge of electronically available information that our skills enable us to transform into knowledge, knowledge that is useful to a changing and already changed profession, a changing and already changed clientele, and a changing and already changed world."[2]

Further, the new 'Goal Statement' of the AIA states:

"The redefinition of the profession requires a cultural/attitudinal shift that moves from product-driven through service-driven to a knowledge/technology-driven strategy..."[3]

As the professional community initiates a reorientation of priorities, architectural education is also being asked asked to perform a similar task. Less than one year ago, the Carnegie Foundation for the Advancement of Teaching touted *knowledge* as the panacea for architectural education's problems. The report, entitled "Building Community: A New Future for Architecture Education and Practice", proposes changing the banal NAAB standards of *'Fundamental Knowledge'*, *'Design'*, *'Communication'*, and *'Practice'* to *'Discovery of Knowledge'*, *'Integration of Knowledge'*, *'Application of Knowledge'*, and *'Sharing of Knowledge'*.[4]

Ø.1 RESEARCH

The task of generating a knowledge base has traditionally been fulfilled by research, and the profession of architecture has followed suit. In January of 1995, the AIA, in cooperation with the Association of Collegiate Schools of Architecture established the American Institute for Architectural Research. Currently, there are over 65 research groups, with a combined budget of over $10 million dollars.[5] Within the profession, two other noteworthy developments have occurred: The development of in-house consultants, like the programming division of Frank Duffy's international offices, and of independent consultants, such as Bill Hillier's Spatial Syntax Group and the Process Architecture group at MIT.

Not surprisingly, the majority of these groups have a strong university connection. Both Bill Hiller's Spatial Syntax Group and the Process Architecture group are based within a university, as well as over 80% of the research groups listed by the AIA. Further, Gunther Henn of Munich has recently enlisted MIT to develop a computational model of his innovative design tool, the 'Card Wall'.

Given the new demands of the profession, and the obvious potential of universities to generate knowledge, research would seem to be a logical starting point for bridging the gap between education and practice[6]. The generation and transfer of knowledge should ideally require both the educational establishment and the profession to determine what is the best way of educating architectural researchers[7]. This exchange has the potential to develop an educational approach to train researchers to cross the traditional boundaries, engaging in research meaningful for both the discipline and the profession. In a broad sense, this thesis investigates these potentials.

Ø.2 DESIGN RESEARCH

Why is it so important to begin our investigation with design research? The research currently being conducted in the profession and in academia is aimed at developing specific bodies of knowledge[8]. This is typically related to specific domains, such as building technology, programming, or diagnostic evaluation. These investigations obviously occur within architecture, and therefore relate in some way to the primary process of making architecture, design. Donald Schön views design as an indelible aspect of practice, stating that "... an epistemology of practice must be an epistemology of designing."[9] In spite of the lack of design time within practice, it remains the principle service an architect offers.[10] Further, architecture schools are infamously centered on the act of design.

Hence, an implicit and essential component to perform research within architecture an acknowledgment of design; architecture's *modus operandi*. This is certainly appropriate in the initial stages of architectural research, and even in the later stages, as the inclusion of applied knowledge implicitly becomes a function of the design process. Knowledge's relevance is only due to the designer's ability to incorporate it into an operative method, as Frank Duffy states "*Design must be informed by research*".[11]

Ø.2.1 Design Research Education

Advanced degree programs were initially conceived of to fulfill this imperative. In 1964, the Committee on Graduate Study and Research of the Association of Collegiate Schools of Architecture organized a conference since:

> "...schools of architecture had little experience with programs primarily concerned
> with scholarship and research, and less with those leading to the PhD degree..."[12]

The timing of this meeting, and the identification of a major issue to be addressed, coincided with the growing development of PhD programs in the US.[13] Since then 15 doctoral programs have been established and accredited.[14] Typically within each of these schools, a program referred to as a 'post-professional Master's program' is a common entry point for professionals interested in continuing their post-professional education without committing to the time and expense of a PhD.

For example, the SMArchS program at MIT is a post-professional degree program which:

> "...responds not only to the need for new and specialized knowledge, but also the changing scope of architectural practice...This program is designed to provide a climate of research and inquiry that stresses the investigative component of understanding the built environment...The program has a strong interest in the methods of inquiry, development and testing of knowledge, and the building and application of theory as it pertains to the build environment."[15]

Ø.2.2 Problems[16]

The initial difficulty identified at the conference was rectified in part by the nascent program's use of research methods developed in other domains. Not only was this a result of architecture's lack of experience with research programs, but of the inherently illdefined nature of design. Another difficulty, not explicitly addressed at the conference, was the lack of exposure architects have to research within a their professional education. Architects do not concentrate on performing pure research as part of their professional education.

Both problem have surfaced in the formulation and implementation of advanced degree programs. The majority of which incorporate a research methods course into their program designed to redress the difficulties.[17] For example, the advanced degree program at Michigan has an introductory course entitled 'Research Design and Methods in Architecture' designed to "...impart the knowledge and skills in research design and research methods that are often missing from undergraduate and graduate architectural education." However, based on my experiences[18] most students still have difficulties formulating topics and methodologies necessary for embarking upon research. At UCLA, the problem is explicitly dealt with through a Ph.D. Program Committee which:

> "...conducts a formal first-year evaluation of each student to assure adequacy of research skills. In order to undergo the evaluation students must have made up any background deficiencies as identified by the student's primary advisor. Students who do not satisfy the Committee of the adequacy of their research skills will either be given specific advice on how to make up remaining deficiencies and be reevaluated at a later date, or else be advised to leave the program. Students who do not satisfy the committee by the end of the sixth term are subject to termination from the program." [19]

1. PROPOSITION

Given the inherent difficulties of design research education, and the lack of a thorough investigation into the pedagogies of design research education,[20] Professor William Porter[21] and I utilized the course "Introduction to Design Inquiry"[22] as an opportunity to understand how architects engage in research. This course is an introductory methods course for new SMArchS students which Bill Porter has been teaching for the past few years. I was fortunate enough to work closely with Bill during the Fall semester of 1996 as a 'Graduate Student Instructor', jointly 'tinkering 'with his course to investigate the following questions:

> "How do we prepare professional students to embark on a career of architectural research?"
>
> "How can these skills be clarified to be meaningfully imparted to students?"
>
> "What types of research practice should we encourage?

The final question, we believe, is essential to adequately address the first two. In an attempt to understand what types of research practice architects exhibit, we propose an educational experiment, based on a classic pedagogical paradigm, utilizing methods and knowledge specific to design. The experiment is engaged by the student's coursework, revealing the trends symptomatic of how professional architects engage research. These trends should describe some of the fundamental issues to be considered in articulating a pedagogy for architectural researchers. Based on this model, a potential curriculum will be postulated to further address and investigate the initial questions.

1.1 EDUCATIONAL PARADIGM

If we consider education at all, we must begin with a basic, yet powerful pedagogic paradigm. The paradigm of skills and knowledge, institutionalized in 1954,[23] was recently sharpened by Harvard educator David Perkins. Perkins contends that skills are "... the single most helpful move may be to redescribe educational objectives in terms of performances rather than knowledge possessed."[24] In regard to knowledge, he asks: "What body of knowledge do we want students to learn?". Answering this question is educationally critical: "Our most important choice is what we try to teach".[25]

Perkins has also developed the concept of 'thoughtful practice'.[26] He employs this concept towards defining the skills we want students to demonstrate. However, our interest in defining what practices we would like architectural researchers to demonstrate necessitates creating an arena within which students can operate freely. Student attempts at synthesizing design oriented research methods (skills), and a design oriented knowledge base (knowledge), should provide insight into the question "What abilities do we want students to develop?".

The following chapter, and the subsequent investigation, is based on this educational model and is organized in the following manner:

METHODS

The research methods we would like to impart to students are rooted in conceptions of design:
DIALECTIC– based on John Habraken's distinction between idea and object, and the underlying duality of Donald Schön's 'Reflective Practitioner' and the 'interactive conversation with materials'
CYCLICAL INQUIRY–employs the use of conjecture, evaluation, and testing as design methodology
GAMES– informed by the notion of design as a social activity, embodying a variety of actors and a set of undeterminable complexities.
PROCESSARCHITECTURE– the 'Process Architect' facilitates and assists collective designing through 'collaborative inquiry'.

DOMAIN SPECIFIC KNOWLEDGE

Design specific knowledge is organized in the following manner.
RADICAL SUBJECTIVISM– an introduction to the notion of subjective and objective understanding, reading, and meaning. Also, preliminary engagement with the 'FormLanguage' concept.
FORMLANGUAGE1 – the intersection of self and architecture which initiates, and ultimately guides design.
FORMLANGUAGE2 – the rules, regularities, and violations characterizing form, binding design to a larger body of knowledge.
FORMLANGUAGE3 – the underlying situational and locational maxims which bear on each phase of form's gradual emergence.

THOUGHTFUL PRACTICE

Domain specificity necessitates not only different skills and knowledge, but specific performances as well. Although we are interested in providing the student's enough flexibility to inform the character of what the thoughtful practice of research is, we have some expectations as well. This frames the structure of the course:

MODULE Ø– Dialectic/Radical Subjectivism

Expectation- *Dialectic method may induce synthesis of subjective and objective experience.*

MODULE 1 – Method of Inquiry/FormLanguage1

Expectation- *Redefinition of personal experience and meaning from within the artifact.*

MODULE 2 – Games/FormLanguage2

Expectation- *Representation of the rules and regularities implicit in form and design.*

MODULE 3 – Process Architecture/FormLanguage3

Expectation- *A method to understand form through the circumstances from which it arose.*

1.2 METHODS
1.2.ø DIALECTIC

If we begin our development of methods, we should start with the most basic approach, that of the polarity of design. In John Habraken's "The Appearance of Form",[27] the design process is initiated by the movement between idea (or image in mind) and the physical manifestations of these intuitive ill-defined ideas, objects.
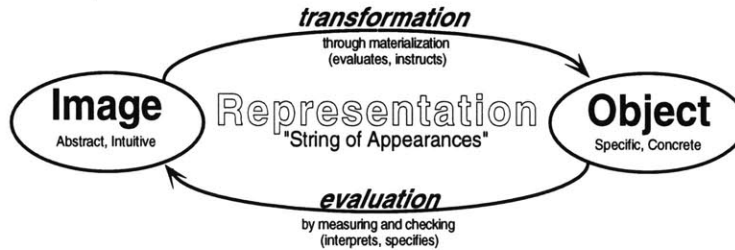
Illustration by author

The object calls forth the image in operations of transformation, primarily through materialization. The image calls the object back by evaluation, affirming or denying what the object reflects. In the process, appearances, or representations, arise. The rightward action is also described using the words *"instructs"* and *"evaluates"*, exploring the possibilities of an unbounded "solution space". The leftward action is described as *"interprets"* and *"specifies"*, measuring and checking the forms available from the right. The concept of the "string of appearances" refers to this constant bipolar activity which yields different *"representations"*, to be synthesized in the second stage of design.

Habraken's bifurcation has deep philosophical roots, of which Hegel's[28] is the most relevant for developing a method of research into design. Hegel, building upon Kant, describes the process of building a dialectic as first building, with conviction, an axiomatic thesis. Next, an antitheses is created, setting the stage for conflict which ideally necessitates resolution.

This underlying need for resolution of seemingly intransigent positions is a disposition we would like to instill in architectural researchers. It underlies our conception of the entire course by delineating an intellectual arena to be explored in a variety of ways. Within this course, however, we have selected to further investigate only a few:

DIALECTICS

SUBJECTIVE	← →	OBJECTIVE
ATTITUDES specific conceptions of the world	←——THEORY——→ context and attitudes coalesce into applied terminology	CONTEXT an assessment of the current climate in regards to any context
MEMORY reconstructions of an event	←——DREAMS——→ memory and event synthesize to recreate experiences.	EVENTS the actual contents of our experience
CAPABILITIES the limitations of comprehension and manipulative capabilities	←——FORMALIZATION——→ rarification to create schemata	COMPLEXITY character in totality
MANIFESTATIONS for each building type, there exists a variety of formal expressions	←——TYPOLOGY——→ system to reconcile an ideal form and its manifestations	ARCHETYPES the possibility of one type embodying or containing all essential elements

INTERPRETATION a personal account of an artifact	<——————READING——————> attempts to describe physical realities	ARTIFACT the actual qualities of the artifact
MULTIPLEUSE the variety of uses an object	<——————AFFORDANCES——————> assessment of what objects provide	INHERENTQUALITIES qualities embedded in the form
HYPOTHESIS conjectures	<——EMPIRICAL METHODS——> experiments to asses hypotheses	PHENOMENA assessment of event
PRIORITIES a priori design priorities	<——————REFLECTION——————> dynamics of dialectical conversation	MATERIAL manifestations of design intentions
CONCEPTS an apriori concept of the process	<——————GAMES——————> modeling design process dynamics	PROCESS the unfolding of the event
ACCESS means for accessing knowledge	<——————TOOLS——————> develop utensils for understanding	INFORMATION within artifact or event
INTENTIONS apriori design intentions	<——————EVALUATION——————> realization assessment	IMPLICATIONS ramifications of moves

Primary interest is in students engaging the inherent motion of a dialectic. The work they do should exhibit a dynamic movement along a continuum; moving along each axis, expressing different points along the continuum. This mechanism[29] should contain the following attributes:

METHOD OF "DIALECTIC"

Initial Response– Definition of the thesis, in terms of one's own subjective response

Other Positions– Development of a potential antithesis, or simply a different viewpoint.

Synthesis and Development– Reconciliation of the two as a means to account for the validity of both positions. This is similar to the Hegelian dialectic process in the sense that it initiates a cycle of thesis/anti-thesis. However, our use of the concept differs in the Hegelian objective of maintaining one position. We attempt to maintain both the thesis and anti-thesis.

1.2.1 CYCLICAL INQUIRY

Habraken's model contains elements from a model first proposed in 1972 by Bill Hillier, John Musgrove, and Patrick O'Sullivan. They rejected the analysis-synthesis model of design underlying design theory and education since the 1960's, and turned instead to a model based on the concepts of the philosopher of science Karl Popper.[30] In their conception, similar to Habraken's, the designer begins with a conjecture about a possible form which the designer evaluates, or tests , against the problem's technical, social, economic and aesthetic requirements.[31]

Continuing in this tradition, in 1981 John Ziesel proposed a more refined version which explicitly included the notions of objective and subjective knowledge. "Design by Inquiry"[32] presents design as a cyclical, converging spiral, consisting of 3 elementary activities:

"**1. Imaging**– the generation of mental representations, which may be visual pictures, analogies, or abstract ideas that provide visions of a solution in principle or implications for physical form.
objective-requiring the ability to draw from an inner store of memories and associations.
subjective- consciousness of one's inner world of ideas and emotions.

2. Presenting- the commitment of mental images to physical form, such as drawings or models, which enable the designer to see them, to manipulate them, and to communicate them to others.
objective- demands a commitment to one's own ideas and beliefs so that they can be transformed from imagination to realty.
*subjective-*a sense of confidence in ones personal interpretation of the problem

3. Testing- the evaluation of the presented design ideas.
objective -uses the openness that allows the designer to stand back from the work and be critical of it. It demands an intellectual curiosity as will as a familiarity with relevant knowledge,
*subjective-*an attitude of inquiry, and a habit of being observant in the world around."[33]

Essential to his design conception is its cyclical nature: Since the improvement of a design never ends, the stopping point is not absolute, but simply represents a decision *"to live with potential and as yet unseen side effects of the design."*.[34]

PROBLÉMATIQUE

In order to build a research method from this approach to design, one must delve deeper into Popper's philosophy. The forerunner of scientific thought, Cartesian, relied on the premise of objectifiable knowledge as determinable through the intuition and intellectual prowess of the human mind. This was first challenged by the Pragmatists and their conception of *fallibilistic* knowledge, where knowledge acquisition is at best a gradual process of discovery, never resulting in absolute understanding.[35]

Charles Pierce, one of the founding fathers of Pragmatism, raised the concept of inquiry as a means to reconcile his predecessor, Alexander Bain, distinction between 'belief' and 'doubt'. Belief is *"...a serene, satisfying, and happy tone of mind."*[36] and 'doubt' is *"...one of discomfort in most cases, and sometimes of the most aggravated human wretchedness."*.[37] For the pragmatists, inquiry's fundamental goal is the attainment of a stable belief.[38] Israel Scheffler expands this notion by stating that not all thinking originates from a question, problem, or 'doubt'. *"Imagination, recollection, perception, composition are all counter examples."*[39]

To account for a broader notion of inquiry and thinking, I employ the French concept of the *problématique*: a lived experience which makes a problem meaningful. Pragmatists might say it relates to something one would like to come about, or change in life. Inevitably, postulation, and not problem identification, is the irreducible and defining feature of the problématique. Formulating a question based on and investigated within ,an awareness of a situation, encourages numerous ruptures and anomalies, eventually leading to revisiting the original formulation.

This process of defining the situation in more explicit terms is a fundamental part of the process of the *problématique*. It occurs through the search for details, resulting from the process of comprehension. This search is the active part of the process, and can be understood in terms of the pragmatist's view of experimentation: The actions one engages in informs the process itself. Collecting details and attributes, is the primary source for learning about the event or object under investigation, and shapes what I refer to as 'Cyclical Inquiry'.

METHOD OF "CYCLICAL INQUIRY"

1) Establishment of a problem or issue to be investigated

–the instructor defines a topic within a larger architectural issue; including background material on the topic, as well as the issues to be addressed.

The first stage reflects the *problématique:* Setting up a question within an architectural situation for the student to investigate serves two functions, it acts as a guide for the search and it establishes the existence of an 'issue' as being a necessary condition for beginning any investigation. This latter aspect is essentially a pedagogic one; a 'gut' or intuitive feeling sparks an investigation. Providing an intellectual arena for evoking such a response is the educator's most difficult task: It should be done in a 'gestalt' like manner, defining enough to promote guide independent thinking, yet not clearly defining the problem which may inhibit potential reactions and insights.

2) Creation of a setting to explore the issue

–setting a specific instance to explore the problem, including suggestions how to initiate the investigation through readings highlighting a potential "tool" of inquiry.

Continuing with the *problématique,* instructors create a setting to illicit a response and to provide a venue for its further investigation. The setting should include the possibility of investigating a body of material. The purpose of this phase is to bring to the surface preconceptions, preconditions and assumptions within the intellectual arena. In identifying larger questions or anomalies, students can ground intellectual intuition in architectural form. For example, in the case of the 'Infinite Corridor' assignment, the stated question is: 'Why do people interpret the corridor differently?' However, this is actually a sub-question of 'How do we ascribe meaning to experiences?' Eventually, both the initial question and setting should be revisited and refined as a consequence of fulfilling 'Cyclical Inquiry'.

3) Identification and utilization of initial response

–method is developed to harness the potential of initial response

Resembling Zeisel's 'Design by Inquiry', students now encounter and engage the inquiry method by formulating a method to operationalize their intuitive response. The ability of the student to utilize their own responses, regardless of its origin, as the catalyst for a tool of inquiry, is the essential aspect of a student's inquiry. We employ this initial response as a means to achieve a more rigorous and robust investigation into the artifact itself.

4) Perceive and group regularities

-modifications in the course of inquiry

The method, perhaps initially vague, now must attain clarity as a means to arrive at something comprehendible. This operation is an integral part of design understanding and the making of an artifact. It helps to elucidate the fundamental properties of the experience, and guides development and implementation of the method. Ideally, it should organize insights in a manner that enables discussion and communication to a wider audience.

5) Redefine initial experience

-a return to the intuitive response

Through framing and organizing, the initial response should now be reconceptualized to incorporate new insights or knowledge gained from developing and implementing the method. This is dif-

ferent from reflection since emphasis is on the capability to redefine and alter the original experience. Reflection, on the other hand, occurs over time, eventually to reconstruct the entire experience.[40]

6) Engage and facilitate developmental process
-reevaluating the original issue and its setting tests the validity of the method
The philosophers and designers previously cited are unanimous in the continual need for redefinition through continual questioning. Returning to the original experience should lead the inquirer to pose a new, more informed or focused question, and perhaps postulate other possible settings for its exploration. 'Cyclical Inquiry' primarily excavates students understanding of a certain body of knowledge in an attempt to synthesize it with revealed observations. By redressing the artificiality of the initial problem and setting-employed by the instructors to induce a method- students have the opportunity to participate in establishing the issue and setting. This can be construed as demonstrating understanding of "Cyclical Inquiry".

1.2.2 CONCEPT DESIGN GAMES[41]

The third design conception is derived from John Habraken's research into the designing of buildings and urban environments. Intentionally not limited to what a single designer does to a static artifact, two important observations where recorded:

> 1. *There are always many designers. The artifact to be made is designed in a process of cooperation and negotiated among many actors.*

> 2. *The artifact changes continuously.*[42]

Corresponding to these two principles, Habraken introduced two new issues in thinking about design theory and methods:

> 1. *Designing is a social activity that takes place among people who negotiate, make proposals, set rules for their conduct and for the work to be done, and follow such rules. In short, designing involves agreement-making and rule-making.*

> 2. *Designing is about morphological change. Designers must understand the transformations of complex physical organizations.*[43]

One of the most difficult aspects of understanding designing has always been the multitude of divergent acts which occur simultaneously, defying simple descriptions. In an attempt to isolate and focus on a single aspect of design, 'Concept Design Games' were developed as research tools intended to better understand designing through modeling the concepts designers implicitly use. In addition, 'Concept Design Games' provide insight into the act of designing which go beyond abstract modeling by investigating the complexities of the artifacts designers manipulate.

For example, the Concept Design Game called 'The Silent Game" focuses on the rules players invoke in the process of designing. The pieces utilized have representational status based on rules the players ascribe to their use. The analogy to design is that the representations generated in the process of designing are not initially quantifiable, rather they express a description of intentions. Further, the representations are manipulated by criteria established in the process of designing. These rules may come from any number of sources, but their impact guides the decisions and choices we make.[44]

In the 'Silent Game', rules become the means of communication since the players focus on the way the design unfolds. This is an essential distinction in the way this game is played: If the players did not have the opportunity to focus on the process of building, then they can only interpret final form. Further, when rules are not understood, the object typically becomes the source for extrapolation.[45] The 'Silent Game' then is ostensibly an attempt at circumventing focus on final form towards understanding how it was created. In this case, rules become the embodiment of action through their physical manifestation, and eventually as a vehicle for possible communication.

A PHILOSOPHICAL DILEMMA(written by bill porter and myself)

Contemporary philosophers view the activity of mind can be pictured as the manipulation of symbolic objects based on rules. Chomsky goes on to assert that the nature of the world is revealed through this organized activity of mind. This correspondence can be supported by mapping the mental state onto conditions in the real world that, then, become known through this mapping. This philosophical position leaves unanswered questions about the existence and independence of an external reality, or the correspondence of that reality to the state of the mind. On the other hand does it matter as long as that reality behaves in ways corresponding to the mind's view? But it also leaves unanswerable the relation between the activity of mind and experience. Is it really the case that the mind consists only of symbolic objects? Isn't the encounter with the world, a place where the objects of our experience emerge from irreducible depth, intensity and complexity? And aren't the objects of our experience somehow accountable to an ideal set of properties, attributes, or even types? This struggle is made clear, for example, in the contrast between Simon's "Sciences of the Artificial" and Heidegger's "The Origin of a Work of Art". Simon's conception hinges on a computational analogy, while Heidegger's resides within raw experience. Although we do not expect to resolve this ontological conflict, we can draw strength from it in our efforts both to attend to the nature of architectural experience and to the properties of an architectural intelligence. Within this philosophical arena, we struggle to make our way toward architectural understanding, either in appreciation of architectural works or in their design. Thus, with these caveats, we suggest that formal manipulation of symbolic objects can be a productive means to inquire into architectural intelligence.

METHOD– NOTATIONAL SYSTEM[46]

Notational systems, as posited by Nelson Goodman, are similar to representational schemes in that they each fall under the general category of symbol systems. Goodman use the terms "syntactic" and "semantic"–traditionally associated with a cognitivist's definition of the symbol system par excellence, linguistics– perhaps to provides a sense of scientific legitimacy to his concept. Yet his intention is to articulate the basic structures of a generative, or inquisitive, symbol system, in contradistinction to a symbol system comprised of predefined rather than replicating or repeating system itself. Through syntactic and semantic clarity, its primary concern is the generation of new states rather than teleological modeling.

The notational system opens up the possibility to investigate and demonstrate form's emergence from rules, while concurrently developing clarity of form. It is an attempt to merge both rules and form through syntactic and semantic density. Goodman, based on Suzanne Langer's book "Philosophy in a New Key", sees music as a notational system; the semantic nature of the notes indicate

what they represent within the context of sounds. Syntax describes the rules by which we assemble the elements. With clarity of both these, we are able to generate a work which reflects both these attributes while simultaneously transcends them. Transcendence occurs through the ability of communicate the system to another player, hence clarity, or density becomes essential. Transference inherently contains enough material to remain faithful to the system, yet engenders dramatically different implementations.

1.2.3 PROCESS ARCHITECTURE

In the game and notational system, we defined the significance and meaning of the pieces through rules. As the complexity of the design situation grows, we begin to view these acts from an anthropological point of view. We begin to investigate how the objects themselves behave, in order to account for their implications on the design process.

Ethnography provides the initial point of departure for introducing a series of loosely defined methods to observe the operation of complex activities. These methods range from interviewing, observations, development of field relations, and of document collection; all in an effort to unearth the subtle patterns underlying behavior. These behaviors can be described as the tacit agreements which guide the actors. In attempting to define what is happening, ethnography also tries to determine the significance of their manifestations

Edgar Schein proposes a modified ethnographer in his book "The Clinical Perspective in Fieldwork"[47]. The 'clinician', as opposed to the ethnographer, is hired specifically to perform investigations that will in the end benefit the initiator. Amidst this backdrop, Donald Schön and others have proposed an architectural clinician designed to intervene into a design situation in order to facilitate a collaborative design process. Developed in the context of engaging the redesign of workplaces, the Process Architect *"...is concerned with design and work as collaborative activities, and with action research as a means of intervention and organizational learning."*[48] In attempting to become part of the situation within which designing will occur, the 'Process Architect' must attempt to have the players of the situation realize the real issues of the situation; issues underlying the dynamics in the environment. As Donald Schön has said in conversation *"It is an attempt to make the players themselves ethnographers."*[49] Once cognizant, the players can then become active participants in designing. The ability to devise methods that *"...generate situational awareness."* is the essential catalyst for Process Architecture's ability to engage in

> *"...collaborative design inquiry...[defined as]...intelligent human beings, engaged in transaction with their environment, create a new or modified artifact through collective thought and action...[Ideally], if the process works well, [the stakeholders] develop a shared understanding of the problems to be resolved and the mandate for the project."*[50]

METHOD – PROCESS ARCHITECTURE

In the final analysis, the ability of the Process Architect to determine these issues is dependent on his/her's flexibility and sensitivity in his application of the tools. Each situation has unique circumstances, which must be accounted for when initiating process architecture. Each design situation is unique, and the task of the Process Architect is to unearth the underlying situational maxims

particular to the situation . For our purposes, this provides a means to understand form an a manifestation of the context from which it arose. Process Architecture provides a number of 'tools' to determine what are the salient issues of the design problem, and the agendas of the players involved. Field methods such as observation, walkthrough, and 'workbooks' are used to investigate a circumstance of working, and begin to speculate on how it may be changed and altered.

1.3 FORM LANGUAGE

In an attempt to organize a body of architectural knowledge specific to the domain of architectural design, Bill Porter has developed the notion of 'FormLanguage', which contends :

> "...developing the language is in fact developing the design, is in fact the reality with which you deal.."

Underpinning this construct is Wittgenstein's notion of the emergence of language, that language is a development of the reality from which it arises. The clearest example Wittgenstein provides is of the carpenter who speaks to his assistant,[51] where the words used contain both the objects and actions for the assistant. 'Bring a board, bring a brick' has highly contingent or situational meanings. The words are only external manifestations of internal needs, thoughts or feelings evoked by the situation . Further, in order to understand the language that is spoken, we must actively partake in the situation which informs its meaning. If the carpenter and his assistant were in another situation, the words would not have the same meaning. Hence, language in its entirety emerges from social agreement; merging language, thought, and reality

Designing can also be seen as contingent upon the situation one works with, and form eventually emerging from it. A sketch can be viewed as a schematic external representation of something even more abstract, an 'idea' which is 'internal'. This necessitates the active construction of understanding by all involved parties. In other words, form comes into being as it emerges from the active process of mutual comprehension. The mechanism of societal interaction substantiates the analogy of language to form as both emerge from joint participation and construction.

The concept of 'FormLanguage'[52] attempts to define the *personal, cultural,* and *locational* issues whose influence bears on the emergence of form. FormLanguage is introduced by Michael Reddy's model of communication through 'Radical Subjectivism', and is further developed in 3 FormLanguage concepts.[53]

1.3.∅ RADICAL SUBJECTIVISM[54]

In the fictitious world of 'Radical Subjectivism', Michael Reddy proposes that each of us are not only existing within subjective understanding, but in addition are physically alone. In order to compensate, we engage 'conduits' which transmit these subjective understandings-the representations we make of the 'world' we inhabit. Radical Subjectivism as an introduction to the concept of FormLanguage, and is akin to the subjective/objective bifurcation of the dialectic method of inquiry. The subjectivist nature of experience, of constructing 'worlds' as Nelson Goodman[55] describes explicitly addresses a relativistic view form-making. This is an essential point of departure since it is the starting point for all artistic endeavors. By investigating our understanding of the world, student see how it impacts on constructing representations of observed phenomena since representations emanate from our own subjective understanding of the world.

1.3.2 FORMLANGUAGE 1

Here, architecture is a product of the interaction between an experiential phenomena of the mind, an individual or shared past history, and cultural artifact. It is not something that lies outside experience, rather by addressing the subtlety of experience, it resonates with past typologies, raising epistemic and ontological questions . It acts as a core or datum providing primal information towards how we construct meaning in architecture. This construction occurs on an individual and societal level. Both imply different meanings that are brought to an artifact, built or unbuilt. Any manifestation which embodies the genuine qualities of experience, form's most primal aspect, is therefore a candidate for FormLanguage1.[56]

'Cyclical Inquiry' is one insightful approach into the experience of individuals and groups when acting within, and experiencing, phenomenological realities. It attempts to utilize these primal reactions and convert them into tools for rigorous investigation. These reactions are most obvious when interacting with physical form, and thus these methods are apt to approximating the experience of form.

1.3.3 FORMLANGUAGE 2

Architectural form reflects and invents rules and regularities. Commonly, it is the more traditional ways of talking about form and its ordering. It is the body of knowledge commonly talked about under architectural structure; not physical structure but rather geometric, organizational and spatial structure. It also has to do with the internal structure of the design and its relation to the internal structure of form. In general, we are referring to the rules and regularities of architectural thought and experience. Such regularities that reference externally, such as precedents, and have an internal logic, such as the manipulation of expectations.

Many areas of traditional architectural knowledge reflect this search for consistency in built form. The proportional systems applied throughout architectural history reflect this yearning as is the quest for pure form. During the past twenty years, environment design has attempted to define the regularities of spatial territories.[57] This trend is growing stronger with the help of computational models to perform rigorous testing, as is the case of Bill Hillier's concept of 'space syntax'.[58] Currently, 'shape grammars' attempts to define the underlying rules which govern form making. *"... these attempt to articulate elements and rules for their combination that underlie particular built works or groups of such works."*[59]

However, rules cannot survive on their own, although attempting to do so can be a fruitful investigation.[60] Herein lies a significant distinction between language and architecture; the existence of an *a priori* grammar. In architecture, rules are also constructed as well as existing a priori. Analyzing the governing principles of design is a means to delve into these underlying structures. FormLanguage2 emphasizes the clarification of the rules themselves as a source of creation, variation, and violation. How these trends arise from within the process, and their ultimate influence on form, provides the grist for a capable designer to skillfully manipulate them. If we judiciously push the language metaphor further, this skill is analogous to an author who manipulates the "tropes of language" to achieve astonishing literary affects.

1.3.4 FORMLANGUAGE 3

FormLanguage3 metaphorically reflects the pragmatics of both verbal and representational communication, articulating and addressing the underlying protocols of both speaker and listener. In the context of design, these actors are the creators and players who ultimately reflect the situation which guides and shapes their interaction. By acknowledging the locational contingencies of a design situation we understand how form's ontology reflects its origins. For perceivers of form, the imperative is to delve into the artifact itself, and the circumstances of its creation, in order to bear witness to formal manifestations of both.

These are different than the rules governing every situation, and the subjective nature of meaning. It is what exists primarily out of the context within which the problem is found. It is the unique aspects of the situation and the players which drive these underlying pragmatic issues which are typically not addressed in formal way, nor are they necessarily observable by the players themselves. Determining the underlying situational maxims is the primary goal of any methodology in FormLanguage3 as a means to understand how form emerged from a situation. Therefore, we view aspects of the artifact itself in an effort to obtain insight into the issues embossed onto form itself.

1.4 AN EXPERIMENT

THE SYLLABUS- *nexus of methods and knowledge, generating research abilities*

DATE	TOPIC	READINGS	ASSIGNMENT

Module ø-Dialectic/Radical Subjectivism-*synthesis of subjective/objective knowledge*

DATE	TOPIC	READINGS	ASSIGNMENT
9/9 Mon	Introduction	Reddy, M. "The Conduit Metaphor" Goodman,N. "Ways of Worldmaking" Heidegger, M"The origin of the work of art."	Describe the Infinite Corridor through the eyes of an author and others
9/16 Mon	Infinite Corridor Presentations	Infinite Corridor Presentations	Infinite Corridor Presentations

Module 1-Method of Inquiry/FormLanguage1-*redefinition of initial problem and setting*

DATE	TOPIC	READINGS	ASSIGNMENT
9/19 Thurs	Introduction to Type Introduction to WWW	Jung, C. Archetypes Argan, G. "On the typology of architecture" Moneo, R. "On typology"	Analyze design protocols through types
9/ 26 Thurs	Type/Protocol Presentations	Infinite Corridor Presentations	Infinite Corridor Presentations
9/30 Mon	Introduction to Affordances	Bachelard, G. "The poetics of Space" Norman, D. "The design of everyday things" Winograd and Flores on Heidegger Kundera , M. "The Structure of Appearance"	Explore the Affordances of an object by conducting an experiment
10/ 3 Thurs	Discussion: pacing, privacy, web...		
10/6 Sun	Visit Exeter Library	Anderson,S. "Kahn's Volume Zero", Plans and section of Exeter library Bachelard, G. "The poetics of Space" Heidegger, M."The origin of the work of art."	Visit Exeter library, record the ways you inquired into the build-ing.
10/10 Thurs	Affordance Presentations		
10/14 Mon	Discussion of observations		
10/17 Thurs	Exeter Library Presentations		
10/24 Thurs	Exeter Library Presentations (con't) Introduction to FormLanguage1		

Module 2-Games/FormLanguage2-*represent the implicit rules of design activities*

DATE	TOPIC	READINGS	ASSIGNMENT
10/28 Mon	Playing & Discussion of Silent Game	Habraken, J. "Concept Design Games" Sim City Article	Play and document the Silent game
10/ 31 Thurs	Lecture on Rules and working session	Stiny, G. "What designers ought to do" Simon, H. "The Science of the Artificial" Mitchell, W. "Logic of Architecture"	Create a modified version of the Silent game
11/4 Mon	Play & Discuss Redesigned Game	Porter, W. "FormLanguage"	
11/ 7 Thurs	Discussion:Games as Representation		
11/11 Mon	Introduction to FormLanguage2 Notational Systems	Goodman, N. "Languages of Art" Tufte, E. "Envisioning Information"	Create a Notational system which reflects the revised game play
11/14 Thurs	working session		
11/18 Mon	Lecture on Rules		
11/ 21 Thurs	Notational System Presentations		

Module3-Process Architecture/FormLanguage3-*form and the circumstances it arose from*

DATE	TOPIC	READINGS	ASSIGNMENT
11/ 24 Sun	Visit Holocaust Museum	James Indigo Freed	Observations focusing on objects
11/25 Mon	Introduction to Process Architecture	Process Architecture Chapters. 2&3	.
11/28Thurs	Thanksgiving Holiday	.	.
12/2 Mon	Working Session Introduction to FormLanguage3		Create workbook in groups
12/5 Thurs	Workbook Presentations	.	Synthesize team reports
12/9 Mon	Evaluatory Exam Reflections and Directions		

2.Ø MODULE Ø

Dialectic/Radical Subjectivism-*Synthesis of subjective and objective experience*

DATE	TOPIC	READINGS	ASSIGNMENT
Sep. 9 Monday	Introduction to Radical Subjectivism	Reddy, M. "The Conduit Metaphor" Goodman,N. "Ways of Worldmaking" Heidegger, M"The Origin of the Work of Art."	Describe the Infinite Corridor through the eyes of an author and others
Sep. 16 Monday	Infinite Corridor Presentations		

2.Ø.1 ASSIGNMENT-THE INFINITE CORRIDOR

Objectives

Students are assigned to visit and observe the 'Infinite Corridor' at MIT. Interpretations from themselves, others, and an author were generated. The implicit objective of the assignment is to encourage students to develop a method to synthesize or account for these different positions. The assignment, as written by Bill Porter, engages the dialectic method in the following manner:

> **Initial Response-***"Describe the Infinite Corridor at MIT. What do you see? What is going on? Put this description aside."*
>
> **Other Positions-** *"Interview at least one other person and faithfully record their description of the Infinite Corridor. Ask them the same questions you ask of yourself. ...Choose one of the three authors' essays: Lyford, Jacobs, or Durrell. Take the author's viewpoint and, faithful to that, describe the Infinite Corridor once again."*
>
> **Synthesis and Development-***"What are the similarities and differences between the two descriptions?... Based on each description, what would be the most needed or appropriate improvements to be made?"*

Readings

The readings introduce the concept of 'Radical Subjectivism' (individual construction of meaning and its implication for communication). Nelson Goodman strikes a similar tone with his post-modernist concept of 'world-making', or how each individual constructs 'world-views'. Heidegger, on the other hand, attempts to speak in more 'objective' terms, describing aspects of place which evoke and constitute the responses both Reddy and Goodman construe as being subjectively constructed.

2.Ø.2 STUDENT WORK

Sabrina Berthelot – Christina Caloghirou

Their approach is rooted in the personal relationship each observer has with the 'Infinite Corridor' and the subsequent influence on the meaning they construct. The stranger, having no relationship states: *"The infinite corridor does not exist."* The student description at the right relates to the corridor as a student in the university. As a visitor, the author Lyford writes about the corridor in purely descriptive terms: *"The feeling of rush and movement, as well as the constant bombardment of people is quite exhilarating."* A consequence of strictly personal views is the difficulty of synthesis, which was not attempted.

> *"My first impression of the infinite corridor was that of a very strainful, hectic crossing ... I felt it was an endless barrier one must overcome to reach a destination, a passage constantly infiltration movement, activities, and fragments of the faculty's everyday life...If the time is taken to note this presence, one actually feels very privileged to be part of such a space, and in those few moments, can absorb all of this magnificence for oneself."*

Kevin Fellingham

Kevin literally constructs a method for fulfilling the *'construct of infinity'*. The construction attempts to understand what the notion of the corridor is about, rather than basing it on the corridor itself. The semantic nature of the term "Infinite Corridor" is explored, rather than the spatial qualities contained within it. The strength of this model is that it acts to collect and generate different interpretations. The potential for synthesis exists through enabling subjective interpretations. We arrive not only at an understanding of what 'infinity' means, but a way to engage its creation. By employing the spirit and content of a design oriented towards metaphorically constructing a variety of interpretations of the same object, the act of construction is emblematic not only of a design process, but the way understanding is constructed.

1. Access the MIT Homepage
2. Locate the plans of the "infinite corridor" and its immediate context, including its vertically parallel siblings, slightly less developed in their strivings for infinity...
5. Construct a frame around all plan segments representing the real world....
6. Penetrate the frame from end to end, a threaded rod, representing the main corridor and its connections to the outside world. This rod will support the plexiglass "shelf" of the first floor...A small, vertical blade of glass placed between the plexiglass and threaded rod, at tight angles to the long axis...will represent the almost invisible axis that attempts to cut across the composition.
8. Locate all points of vertical circulation. Drill fine holes through the plexiglass ensuring perfect vertical alignment
9. On the level representing the second floor, a small part of mirrors placed back to back on the axis above the glass blade will serve as analogies for the spatial mirroring about the void experienced in the actual space.
10. Glue a coin, a piece of chocolate a computer chip and a receipt to the ground floor level in positions...
11. Step back and admire your work
12. Follow as many possible paths of connection...This process will become almost infinitely boring...

Twig Gallemore

"... how might we approach a description of a place
to someone unfamiliar with the place."

Twig raises a basic issue of communication, and he investigates this by formulating questions . These attempt to unearth qualities of the corridor, both physical and emotional, to bridge the inherent difficulties of communication. Outlining such a method has potential for understanding the variety of interpretations contained within the corridor. However, the difficulty in answering these questions, and the ability to account for the responses, is the essential component of this approach, which is not fully explored.

What defines it?
What are its boundaries?
What do you remember most about it?
What are its parts/nodes?
Describe the hierarchy, if any?
What is its relationship to the rest of campus?
How does it change at different times of the day?
How does you physical state effect your perception of it?
How does your emotional/mental state affect your perception of it?
How do you give directions or specify locations to others?

Darren Brathwaite

The professional perspective of both Darren and Jane Jacobs frames their respective descriptions of the corridor. As an architect, Darren finds the corridor a disappointment: *"I would have expected a more celebrated circulation space....with more places and spaces described along its length."*. Zones and views accompany the corridor, but *"..this does little to add life to the space."*. As social scientist, Jane Jacobs sees the corridor as *"... not only a means of circulation, but a means of structure for life at MIT."* Reconciling the different views is inevitably difficult due to the highly personal agendas of the observers.

Verlé Harrop

Verlé's project contained two methods. First, shown to the right, a mechanism is developed to ground her observations through location and time. By describing the corridor as a synthesis of place and persona, the 'infinite corridor' derives its meaning rooted in experience.

The second approach is her personal attitude towards the term 'Infinite Corridor'. As expressed in the assignment, and class discussions, Verlé felt the corridor to part of the 'virtual world', (i.e. nonexistent). She supports this by having William, 7 years old, serve as an 'innocent eye' confronting the construct of an 'adult world'. *"So its a big Hallway."* concludes William after witnessing the the movement and actions that occur within the corridor. In Verlé's view, Jane Jacob concurs with this sentiment; both William, and Jane *"... were happy to place the Infinite Corridor in the Virtual World.".* This conclusion, focusing on personal views, is in stark contrast to the initial method which yielded much insight into the corridor itself.

Mapping Reference: M.I.T. Building and Facilities Map A Service of the Graduate Student Council

Vantage Points/mode of Transportation: (B) The seat of a 1996, Peugeot Bicycle (F) On foot

96 9 10 Physical Sighting (B) aL in front of Building 7 IC sidewalk Metaphysical (F) "To get to the print shop downstairs you go down the Infinite Corridor".

96 9 11 Physical Sighting (B) aL in front of Building 7 IC sidewalk/road (F) fK w20 Student Union Building IC sidewalk/road Metaphysical reference in MIT newspaper

96 9 12 Physical Sighting (F) fM bldg 3, lost Metaphysical spare

96 9 13 Physical Sighting (B) aL in front of Building 7 IC sidewalk/road Metaphysical International Student Literature

96 9 14 Physical Sighting (B) aL in front of Building 7 IC sidewalk/road Metaphysical students referencing it at Toscanini's

96 9 15 Physical Sighting (B) aL in front of Building 7 IC sidewalk/road (B) fQ in front of building E15 IC sidewalk/road Metaphysical discussion with DI classmates

Sung Ho

Through the 3 assigned observers, and the objects within the corridor, Sung generates equations which indicate the duality of both observers and observed. This is primarily brought to life by the paradoxical relationship that exists between public versus private: *"ATHENA=all(public)= each station (private)"*. The result is an invigorating view of the corridor; the objects themselves contain paradoxical meaning. Synthesis occurs not through resolution, but through object as paradox.

YOU:consistent path,rush hour tunnel,no sense of awareness,too much repetition.

ME:aligned path,undergraduate,rush hour,junctions,events and spaces,interlocking of structures,closure,layering,transitory movements.

JACOBS:neighborhood,attractions,crisscrossing paths,private and public spaces,surveillance.

ME(undergraduate)+JACOBS(neighborhood)=STRANGERS

STRANGERS=ATTRACTIONS=MIT:athena,bathrooms,atm,circ ulations,boards=CRISSCROSSING PATHS>

ATHENA=all(public)=each station(private)

BATHROOMS=men/women(public)=each toilet(private)

ATM=all(public)=each account(private)

CIRCULATION=all(public)=disable/well bodied(private)

BOARDS=all(public)=each group(private)

Drew Miller

In the spirit of Durell's detailed descriptive letters, Drew's project employs fiction to reconstruct memories of the corridor. Memories are evoked by the corridor, but are given meaning through a fictitious return to Cambridge rather than the corridor itself. The resulting insights into the corridor are therefore a function of the memories; we come to witness details through the memories evoked. Fictional representation does have the potential for synthesizing or even generating different interpretations. However, it must be able to transcend the boundaries it contains in order to reveal more about the artifact under observation. It would seem that fictional representation must contain a level of flexibility or adaptability in order to fulfill this potential.

As I passed into the corridor a second wave of nostalgia flooded my head. The sight was no different than our 25 years before, nor the 25 before that, but more so it was the smell that took me, told me I was back here, then, now. The pungent mixture of electricity, old and new text, chemicals, heat, question and answer, prioritized stress, absence of sleep, rushed through me, picking up my pace, as I joined the procession forward. Looking around the space, it was all as it had been. Door upon door, identified only by number, telling its purpose or contents only to those who knew its code, its language, as foreign as any tongue, created by madmen but adopted by all the natives, out of necessity. I was a former citizen returning home, having forgotten the language, unable to identify which way was up, surrounded by fluents. As we the herd progressed down the hall, my disorientation combined with a resurfacing dread that these must-be-giants around me, not only knew where they were going, but where they were really going.

2.Ø.3 ANALYSIS

Acknowledgment of different positions was readily accessible to the students, indicating a level of facility. By postulating at least one dialectic–with the possibility for infinitely more–the assignment can be viewed as an attempt to bridge the positions which represent the polarity of subjective and objective knowledge.

However, it is difficult to determine the significance of this given that synthesis, or the demonstration of fluency with subjective/objective knowledge, was a much harder task. This would indicate that the major difficulty of the dialectic approach is the way to maintain some level of synthesis, while enabling variety or growth. Certainly one problem resides with the formulation of the assignment. Although it is articulated to view other's interpretations, it does not specify the need to synthesis these views. Another problem may also lie in having students deal with the inherent ambiguity of synthesis. Although the students could generate different opinions, the mechanism to bring them together and redress the inherent difficulty of synthesis, was not explicitly defined. Clearly students are able to partake in 'Worldmaking', but can they accomplish the more difficult task of reconciling the worlds they create?

The students who were able to achieve a level of synthesis employed a method which supported, rather than limited further development. The methods that exhibited this, an actual construction, utilization of found objects, and a clearly delineated method for observation, afforded new insights into the corridor's ontology. In these cases, the method also sustained ambiguity: Ambiguity of the objects through the objects themselves, rather than requiring the reader to mentally reconstruct ambiguity by simply presenting different positions.

2.Ø.4 EMERGENT QUALITIES

1. Method parameters– A clear, objective method, devoid of personal interpretations, generated data that was easily understood. These methods were not self-contained or self-referential, rather contained a translatable, even mechanistic quality. This can be seen in Sung Ho's and Verlé's projects where data specific to the corridor could be understood without the method. This is distinct from the majority of projects which employed a more personal and inevitably self-contained approach.

2. Operational qualities– In an attempt to organize the direction of the intervention, certain methods afforded further investigation. Engaging in a personal investigation, data can only be procured using another perspective, whereas the methods which had a common approach, such as Verlé's initial method, could be used to procure different data. In these cases the method's structure remains in the background, not hindering the flow of data. Further, in some cases the organizational scheme did not allow for synthesis. This was most evident in the use of personal observations, where synthesis was not attempted.

3. Content– The information procured was not surprisingly induced by the artifact itself. All the investigations exhibited a variety of interpretation from within the artifact. Yet the more successful schemes where able to account for these within one cohesive frame.

4. New information– The most interesting aspect of all the projects was the wealth of information gathered. Each method raised new insights into the corridor; aromas, linearity, and 'virtualness'. Although an obvious objective of research, the variety of new information procured should nonetheless be emphasized.

2.Ø.5 MODULE EVALUATION

1. Acknowledgement of different positions– Radical subjectivism is employed to enhance understanding of a dialectic by redefining the world in an extreme subjectivist view. It sets up the opportunity to become aware of the variety of ways the world can be read, and the validity of such positions.

2. Generation of different positions– The dialectic method opens up the possibility of generating different positions which introduces students to the legitimacy of multitudinal knowledge construction. Through the requisite development of positions, students should begin to understand the necessity to take such propositions as a heuristic: by formulating two positions, we have a vehicle towards insight into the object or event itself which inevitably transcends original hypotheses

3. Intrinsic Dialectics– Embedded within each artifact is a variety of interpretations. Through the dialectic, students are introduced to the multitudinal nature of physical objects and space. This is an essential beginning towards a more robust view of architecture since this initial 'reading' is primal, and thus influences subsequent observations. By grounding this within the artifact, we have the opportunity to see the physical manifestations of anomaly or conflict.

4. Insight– By engaging the dialectic, students exposed themselves to aspects of objects which lie outside themselves and their initial understandings. The ability to handle the wealth of data should be emphasized as a skill to be learned. Nevertheless, it was utilized to foster the activities articulated in this module.

2.1 MODULE 1

Cyclical Inquiry/FormLanguage1-*Redefinition of personal experience from within the artifact.*

DATE	TOPIC	READINGS	ASSIGNMENT
Sep. 19 Thursday	Introduction to Type Introduction to WWW	Jung, C. Archetypes Argan, G. "On the typology of architecture" Moneo, R. "On typology"	Analyze design protocols through types
Sep. 26 Thursday	Type/Protocol Presentations		
Sep. 30 Monday	Introduction to Affordances	Bachelard, G. "The poetics of Space" Norman, D. "The design of everyday things" Kundera , M. "The Structure of Appearance"	Explore the affordances of an object by conducting an experiment
Oct. 6 Sunday	Visit Exeter Library	Anderson,S. "Kahn's Volume Zero", Plans and section of Exeter library Heidegger, M. "The origin of the work of art."	Visit Exeter library, record the ways you inquired into the building.
Oct. 10 Thursday	Affordance Presentations		
Oct. 17 Thursday	Exeter Library Presentations		
Oct. 24 Thursday	Exeter Library Presentations Introduction to FormLanguage1		

2.1.1 ASSIGNMENTS

Type

The first assignment in Module 2 addresses a concept that has coursed through the history of architectural theory, and represents the social aspect of FormLanguage1. Since type can legitimize an individual work by connecting it to a much larger set of ideas, both architecturally and culturally, it contains an inherent danger: Design exploration may be withheld, yielding an artifact hardly representative of the shell it embodies. The ability to understand subjective meanings through the applications of type acts as an introduction to the way we ascribe meaning to artifacts in general. Towards this end, a protocol from Bill Porter's 'library entrance' experiment–designed to articulate the working methods of architects–was investigated. This provided the stage for using "... *the idea of Type as a tool for analyzing the protocol and shedding light on what is actually going on*". Above, Kevin Fellingham analyzes how type influences a key move in the protocol.
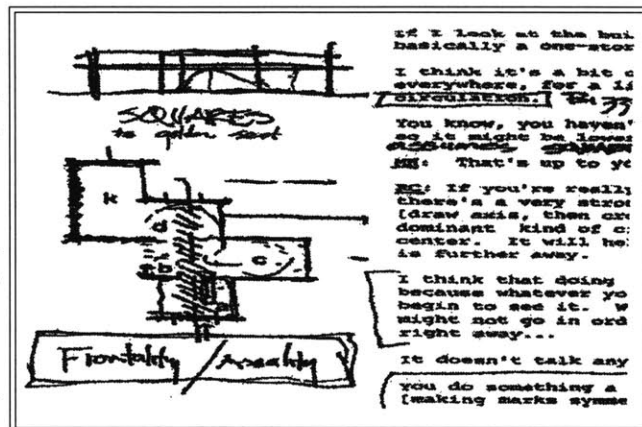
Affordances & Dreams (written by Bill Porter)

"*This assignment extends the domain of experiencing artifacts to include how they engage you directly. It deals both with the autonomy of the artifact as well as its profound human relatedness. It takes a different path to underlying and archetypal images and, not surprisingly, arrives at different points of view. It engages the body with the understanding of artifacts in ways that defy easy verbalization.*"

After focusing on collective meanings, the students were asked to investigate individual meaning and experience. Describing a living place in a way that illuminates how it engages the occupant and their various activities enabled students to explore the individual dimensions of FormLanguage1. In some cases, it generated imaginative excursions of fantasy. At the right, Twig and his group utilized objects within the space to personify observers. This resulted in some fascinating insights into the space itself, and how we construct definitions of spatial meaning. Twig, a hanging clock, comments: *"I know space has limits, I am looking into it, so where am I?"*

What do you mean I'm slow? How can you tell?
Of course, check your watch. But whose watching anyway??
Sure, the only time you ever pay any attention to me is when you're late or expecti

So now that I've got your attention, how about some face to face, hands on experi

You would think I would have developed a complex by now. I tell you when to go, w
relax, even hypnotic (if you listen to me long enough). What power.....

Theres a pattern to it all, recurring rituals. I'm always watching, counting. (LIGHT
beginning to think I had power over (LIGHT), but I notice it is responding to you.
your rituals but I'll be counting, and so is Boston Edison.

What is between you and (RACK). Now thats entertainment. I don't mind the ligh
hear myself hum. And I should tell you, I don't think (RACK) appreciates having i
we all have our place, and like to feel at home.

I find it rather interesting that my relationship with (FLOOR) was established by y
view up here, and I can sense what the world might look like from your perspective
only a dream. I wonder what you think of me when I am dreaming. By the way, the
from up here, just ask (FLOOR).

Do you remember the time when we all first got together...
Where were we?
Here we are.

What do you mean what time is it?
Its time to go?

EXETER LIBRARY ASSIGNMENT

Objectives

The experience of the Exeter Library is the focal point of this assignment. To raise this issue, readings where given to expand these abstract notions. Heidegger speaks directly to the experiential qualities of place by defining what aspects of place imbue it with those specific experiences. Bachelard, on the other hand, epitomizes the operation of 'reading' form, or referencing form as a datum for interpretation.

The investigation had students focus on aspects of the building which seemed problematic. It asked them to address the experience of discovering these aspects, and the processes involved with clarifying them. Developing a method to achieve this was to be the vehicle to further develop understanding of FormLanguage1. As formulated by Bill Porter, the assignment necessitated the development of a method to perform these activities within the process of 'Cyclical Inquiry':

1) Establishment of a problem or issue to be investigated
"Investigating your dialectical relationship with the artifact is the primary objective of our trip to Exeter Library...it is the understanding of you own state of mind in relation to the often surprising and unsettling relationships between the material and the metaphysical implications of form."

2) Creation of a setting to explore the issue
Exeter Library in Andover, New Hampshire

3) Identification and utilization of initial response.
"...please keep track of the questions, puzzles and surprises the building evokes in you."

4) Perceive and group regularities
"...a codification of your experiences...Record the ways in which you answer, solve, or resolve all these as you observe more and more of the and about the building"

5) Reflect and redefine experience
*"Let your interpretations evolve, and convey that evolution if you can."*

6) Engage and facilitate developmental process
"You should be ready to present your ideas on a board that can serve as a guide for your discussion."

2.1.2 STUDENT WORK

Twig Gallemore

Twig initiates his investigation by asking about the essence of the building: *"What is it?...Is it a library if I do not read books?"*. His ability to group the irregularities comes through reference points that are personal. Mind, body and self all point to the inherent ambiguities of the building. Correspondingly, material, form and space remain in tension: *"It is a dialogue between space and form; between mind and body; between perception and reality."*
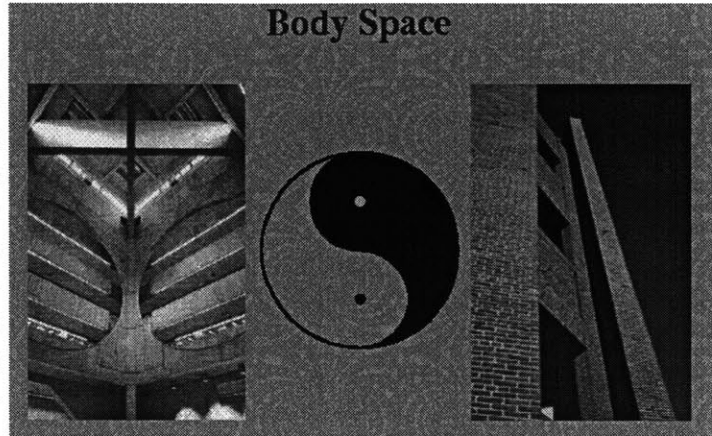
This approach is driven by a personal agenda, as indicated by Twig's quotations from the 'Tao Te Ching 'Ku No Maki' (The Book of Emptiness). This generates a method which results in a redefinition of the problem: *"The answer is the question!"*. Arrival to this point indicates the strength a methodology has on a given outcome; the philosophy of questions logically results in questions. But more interestingly, the method may illuminate the need for personal motivation as source of insight and inspiration. However, difficulties remain due to an explicit grounding in the building itself. The specificity of personal agendas can be dominating, and may eventually inhibit understanding for a larger audience.
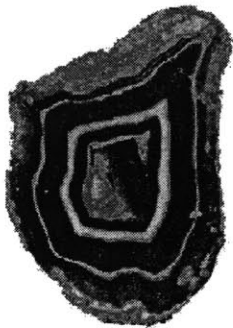
Sabrina Berthelot

Observation through analogy guides Sabrina's poetic journey into the building. *"It seems a rock-shell of some sort to me, hiding the beauty of a yet unknown interior space."* Producing queries into the material composition and contents of the central space is the analogy's initial role. Later, it acts to organize the experience of the building, providing a rich investigation of the library's compositional elements. The inherent limitations of analogy provide for poetic inspiration and afford a redefinition of the initial experience. Eventually, however, Sabrina recognizes their constraint on the investigation itself, as she reflectively states :

"Thinking that maybe some other who walks past on this ground such as I may find a bit of joy in the beauty of this amazing feat of nature, I decide to put the geode back in the grass where I found it. I think, perhaps, it belongs here in this place even more than the grass on which it rests. "
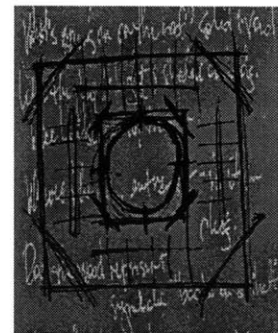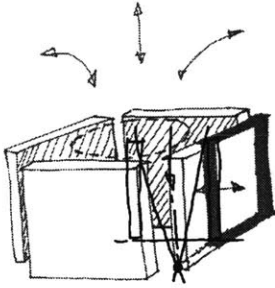
Christina Caloghirou

A detailed analysis of the building itself, rather than seen through oneself or an object, is initiated by describing the building in terms of the architectural construct *'layering'* (image at left). This generates the different aspects which comprise the building: *"...a contour of walls, a warm refuge, and a membrane."* The investigation into the library is rigorous, resulting in a redefinition of the problem with a new metaphor, the spiral (at right).

Drew Miller

Application of abstract theoretical concept (described at right) to an analysis of the formal ordering of the building serves to substantiates both constructs. Drew's ability to write is the essential component towards developing a rich investigation: *"Pixels dance, telling their tale, free from the constraints of the airwaves, and are happy. Never satisfied, we return to continue our swim in the ether."* Redefinition occurs in the form of an observation, rather than pursued in a more rigorous investigation of the building itself:

"only through the pursuit, collection, interpretation, and examination of many different viewpoints, can a truly collective construct be formed."

"In this reading, the building (or translational process) is broken into three zones or stages as defined by material or non-material characteristics. The first zone is the spherical-negative space (the ether, airwaves), spatially defined by the second or middle, structural concrete zone (collection and definition), which also supports the third, the exterior brick zone (display and reexamination)."
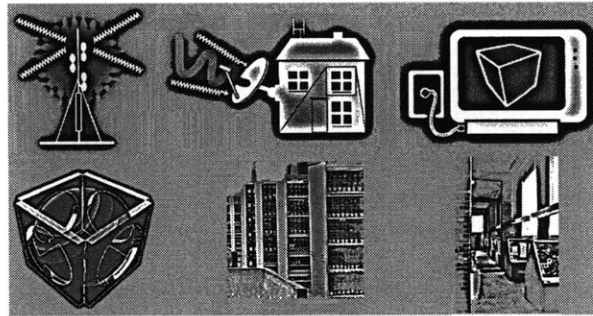
Darren Brathwaite – Chris Genter – Sung Ho – Verlé Harrop

The method and material- imprinted parchment- used in constructing this analysis would indicate a different approach to the problem: One acknowledging the tactile qualities of the library as means towards discovering its essence. Two anomalies are cited: The relationship between sphere and cube in the internal space, and the seemingly fragrant violations of expectations in the facade. To embark on an investigation, *"...she wanted to hold his sections and floor pans up to the light and discover the 'anthropo-cosmic tissue of life'"* and *"...she wanted to hold one of those bricks in her hand and feel the weight of the human heart"*. Implementation of these proposals, and their subsequent representation, certainly have the potential to reassess the initial observations.
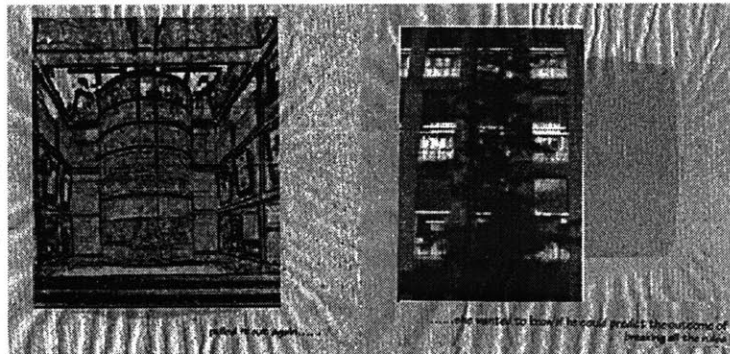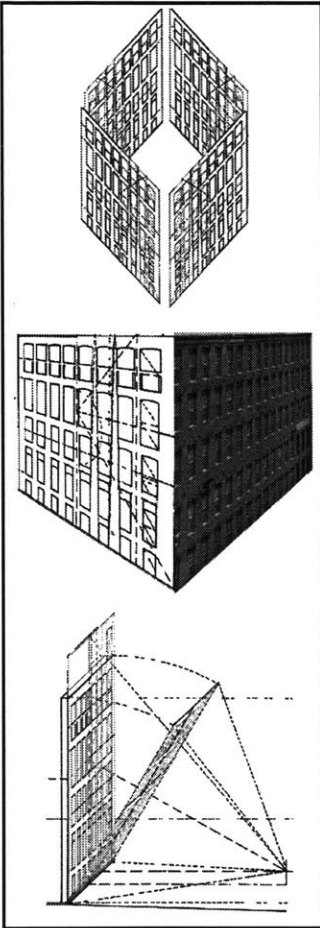
Kevin Fellingham

Kevin embarks on a rigorous analysis of the facade through attempting to comprehend its architectural composition. By invoking plans, sections, adjacent buildings and construction methods, the final composition reflects the underlying architectural features of the building. The initial reaction, addressing the irregularities of the facade, is an opening to discovering the library's entire composition. The setting is redefined in a manner that implicitly states an underlying logic does exist. Although this may defy initial observations, it is a potential derivative of engaging the structure.

2.1.3 ANALYSIS

The methods chosen to investigate the Exeter Library were typically very personal, reflecting not only the essence of FormLanguage1, but the designer's disposition for creative interpretations. As was witnessed in Module ø, concepts are necessary for inquiry to be initiated, yet students must be wary of the methods potentiality to limit observations. In this module, the relationship between the type of data generated and the method chosen to procure it became more evident. The methods articulated, the primary objective of the 'Cyclical Inquiry', generated variations which originated from the form itself, to application of concepts perhaps evoked by the building, but not arising out of the building's specificity. Clearly there is a need to delve further into the building in order provide the grist for a rigorous evaluation, and the method must accommodate that. The students that spent more time delving into the building generated a more robust investigation, revealing more about the FormLanguage1 aspects of the building. However, the tendency to guide observation with larger, external issues, was indicated by the majority of projects which did not rigorously investigate the library. These projects remained content with broader issues, perhaps revealing the inherent difficulties of problem-framing and solving.

This problem may also indicate something else regarding Module 1. If understanding FormLanguage1 is rooted in the experience of the place, a method of inquiry must be developed to encourage investigation of the source. The need of a mechanism to test students of the inquiry method is essential for assessing the ability of students to apply this to other realms. Further, FormLanguage1 was seen as readily accessible as a means for personal experience to become cogent. However, the relationship between the subjective experience, and attributes of the artifact itself, is illdefined and difficult for students to grasp. This is indicated by the tendency towards subjective readings, which is the inherent pitfall of FormLanguage1

In this module, in comparison to the preceding one, acknowledgment of unresolvable observations did yield a rich investigation. However, the point of conclusion or termination remained elusive. Projects where terminated based on the limitations of the method, rather than a conscious decision by the investigator. A similar phenomena was the penchant for ambiguity. Granted resolution can incorporate and contain ambiguity, but it cannot remain wholly within it.

Overall, there was a tendency towards illusiveness, which may reflect the designers penchant for constant designing. Research, on the other hand, must come to resolutions or hypotheses to begin delving deeper into the subject under consideration. The relationship between the modes of research, and the act of design, may potentially contain contradictory and complementary imperatives. This relationship however, must be studied in a more vigorous investigation. It may be that the guiding principles of research, and the designer's need for open-ended problem framing, are potentially contradictory, making research a difficult endeavor for designers.

2.1.4 EMERGENT QUALITIES

1. *Method parameters*– The methods grounded in the building itself proved to be the most robust, leading towards redefining the initial problem. This was evident in Christina's project which began with an architectural concept, employed this as an investigatory tool, and eventually generated a new metaphor.

2. *Operational qualities*– Through rigorously engaging the building, the method encouraged further investigation. For example, Kevin defined a number of different possibilities for investigating the nuances of the facade.

3. *Content*– In the cases where the investigation transcended the trappings of a methodology, the building was revealed to be multi-faceted. Sabrina avoided the limitations of analogy revealing the building's multifacetness.

4. *Information generation*– The amount of information about the building was enhanced by methods employing an opened-ended analysis. Both Twig and Verlé set out an agenda to begin such generation.

2.1.5 MODULE EVALUATION

1. *Setting*– The building acted as a catalyst not only for the students to explore their own understandings, but to test them in a physical reality. The building was also common ground for the group work, and the projects in general.

2. *Redefinition*– Achieved when the reflective process of reevaluation, fundamental to any type of inquiry, is engaged. By beginning with an initial subjective stance, then moving towards integration with external sources, students came to redefine the experiences and meanings the place through deeper understanding.

3. *Reflection*– This central component of the cycle was typically the result of seeing the artifact in a variety of ways. Aspects of built form which evoke different experiences are the most powerful when grounded in artifact itself. Students come to understand what the experience is, and where it comes from, by active investigation.

4. *New information*– An inherent result of engaging inquiry process, new information provides the impetus and grist for empowering the process. As students unearth FormLanguage1, the process of representing it must be clear enough to codify and convey their insights in ways which encourage, rather than inhibit, acknowledgment of learning.

2.2 MODULE 2

Games/FormLanguage2- *Representation of the rules and regularities implicit in design activities.*

DATE	TOPIC	READINGS	ASSIGNMENT
Oct. 28 Monday	Playing & Discussion of Silent Game	Habraken, J. "Concept Design Games" Sim City Article	Play and document the Silent game
Oct. 31 Thursday	Lecture on Rules working session	Stiny, G. "What designers ought to do" Simon, H. "The Science of the Artificial" Mitchell, W. "Logic of Architecture"	Create a modified version of the Silent game
Nov. 4 Monday	Play & Discuss Redesigned Silent Game	Porter, W. "FormLanguage"	
Nov. 11 Monday	Introduction to FormLanguage 2 Notational Systems	Goodman, N. "Languages of Art", Tufte, E. "Envisioning Information" Norman, D. "Things That Make Us Smart"	Create a Notational system which reflects the way the revised game was played
Nov. 18 Monday	Lecture on Rules		
Nov. 21 Thursday	Notational System Presentations		

2.2.1 ASSIGNMENTS

The Silent Game

> *"Our intention is to discover how people go about designing, how people go about appreciating designed artifacts, and try to understand the relationship between those two. Crucial to this discovery is how these processes occur: The Silent Game provides an opportunity to model these two phenomena and witness their interactions, thereby enlightening the mechanics of creation and recognition."*

This version of the 'Silent Game', redesigned by Bill Porter and Edith Ackerman, uses LEGOs to investigate the implicit rules of design interaction. Player A initiates game play by building something Player B must continue faithfully. Rules are formulated to assist Player B's ability to continue implementing the construction as Player A intended. These rules become necessary for communication since Player B is only able to watch game play and not speak. If the game where to be modified so that Player B would not see how Player A constructed, the final form would be the point of departure for Player B's reconstruction. On the right, Player B chose to "... *follow some of the rules and change the others.*" based on what Player B termed the *'invited transformation'* implicit in Player A's composition. The result was an exploration into the fragility of communication, and in particular intentions.

Player A

Player B
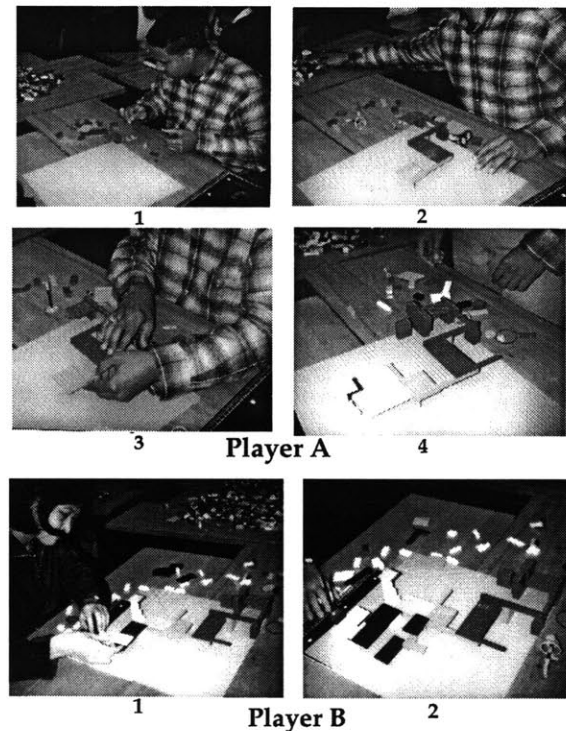
Redesigned Silent Game

The redesign of the 'Silent Game' attempts to turn the game into a tool for research by attempting to isolate and investigate particular aspects of the design process. Clarity of the instance to be investigated is crucial, towards developing a representational corollary. Although this is the critical component for successful mapping, definition does not guarantee generation of an accurate representation– the educational objective of the Redesigned Game.

The Images to the left are of a redesigned game intended to illustrate collaboration. The primary rule intended to achieve this was that the final composition had to be satisfactory for all the players. However, this rule did not result in collaboration, rather competition. This was the result of another rule which stipulated simultaneous play:"... *everyone played at once...it became chaotic and there wasn't any way to follow what was going on so it became an individual conquest thing.*" This development enabled players to understand the distinction between intention and application through modeling abstract concepts. The opportunity to investigate manipulating representations towards specific ends also raises the necessity of representations to incorporate their meaning explicitly.

NOTATIONAL SYSTEM

The 'Silent Game' introduces the concepts of representation and rules through emergent form. The 'Redesigned Silent Game' provides students the opportunity to manipulate these characteristics. The final assignment in the module, based on Nelson Goodman's concept of the "Notational System", explores aspects which played a significant role in both games. It attempts to take rules and their communicative potential a step further by transferring them into the generative and conjectural arena of 'Notational Systems'.

Rules and regularities, the essence of FormLanguage2, are expressed in two fundamentally different ways: they are manifest in form itself and they emerge from within the process of form-making. These both correspond directly onto Goodman's concepts of semantic and syntactic density: The system must represent the rules that inevitably shaped the final form, imbuing elements with specific meanings, or 'semantic density'. Second, the system must describe rules and their effect on the event's unfolding, the logic of the elements interaction, or 'syntactic density'.

Objectives

The assignment centered on the development of a 'Notational System' to embody the play of the redesigned game. The system should be a representation that facilitates deeper understanding and inevitably enables reinterpretations of the game play. To afford the conjecture of potential game outcomes., the system must encode the event through 'syntactic and semantic density'. Ultimately, students must synthesize the ideally objective nature of symbols, and the subtleties and nuances of individual experience.

System evaluation will center on the clarity of depiction, as evidenced by an outsider's ability to create another game play. Towards this end, the readings were designed to introduce students to the semantic and syntactic density of a "Notational System'. In addition, the readings raised aspects regarding the cognitive implications of representation schemes.

2.2.2 STUDENT WORK

Darren Brathwaite – Christina Caloghirou

This system attempts to represent the discrepancy between the developer's intentions and the actual game play. The original game's intentions, represented in the top row of the notational system, was for players to create 'T' like objects towards developing connections between individual pieces. The bottom row represents the game as it was actually played, initially similar, but blocks developed rather than "T" shaped forms. Each system uses the same elements, but attempts to represent the shifts and contortions between them. Darren summarized the interplay between the systems as "...playing on the themes of reversal, interpretations, and misinterpretation."
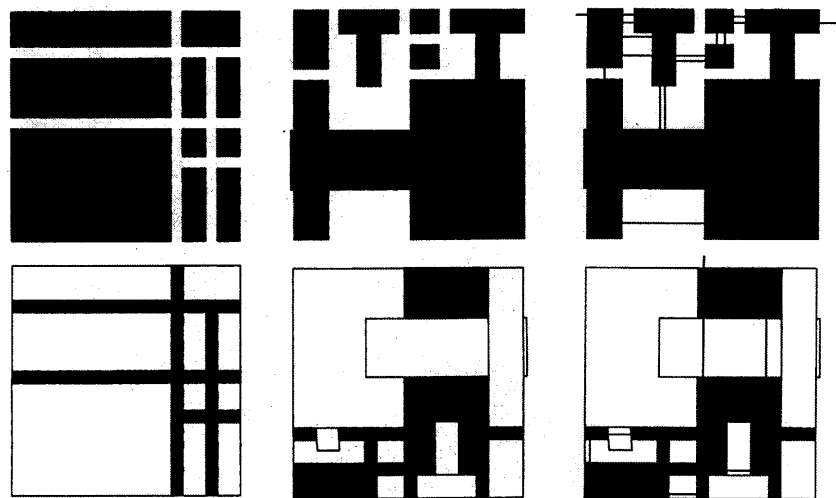
Intentions versus outcomes enabled this system to be developed, rather than the rigorous development of elements with syntactic and semantic clarity. Due to the lack of a means to translate the images into a coherent set of rules, the observer must construct the notion of process and development. This methodological base required each phase of game play to be represented in its final form, rather than being generated from individual elements.

While not fulfilling the defined attributes of a notational system, the concept of modeling both intention and actualization revealed the potential for understanding there interplay. As Christina stated at the end of her presentation "...as many rules as you may put into a design, you may never get the same thing." This insight was achieved by attempting to represent the essential aspects of game play within the vocabulary of the game itself. In this sense it is truly representational scheme; it represents the substance from which it emerged.

Verlé Harrop –Twig Gallemore – Sabrina Berthelot

"In the process of constructing this notational system we abstracted both our objectives as well as player behavior. Our primary objective was to explore collaboration in the process of design. We simplified the types of moves based on three possibilities one of which must occur in any collaborative decision making process: 'Block Disagreement', 'Joint Collaboration', or 'Disjoint Isolation'.

THE MOVES		
Block Disagreement	Join Collaboration	Disjoint Isolation
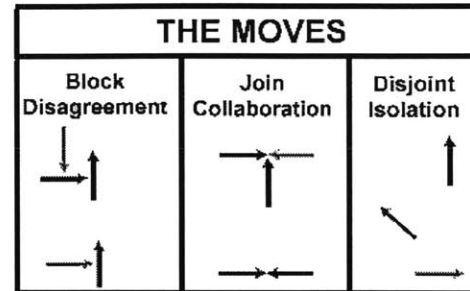
This notational system investigates the version of the 'Redesigned Silent Game' discussed previously. The game was designed to explore collaboration, and three possible outcomes were articulated, as described above. The system framed the 'collaborative interaction' with a continuum, consisting of a 'flow' to indicate development over time. The first game play by the originators eventually resulted in 'joint collaboration', as seen in the progress from left to right below:
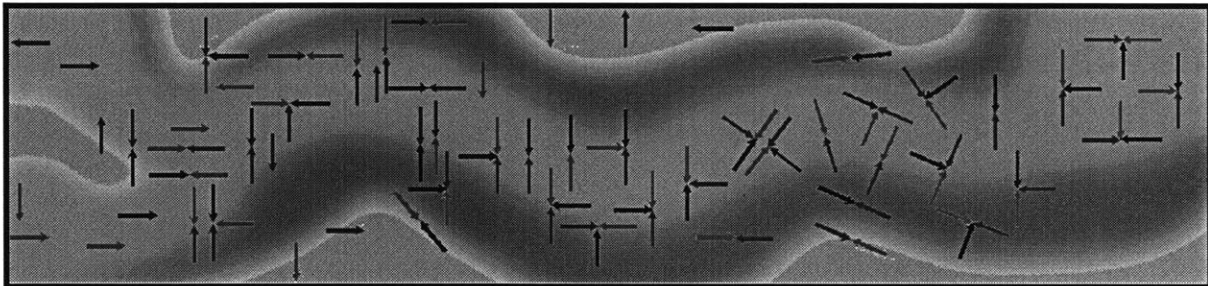
However, as was noted earlier, when the game was given to another group, the play consisted primarily of isolation, a period of chaotic maneuvers, and eventually disjoint isolation:
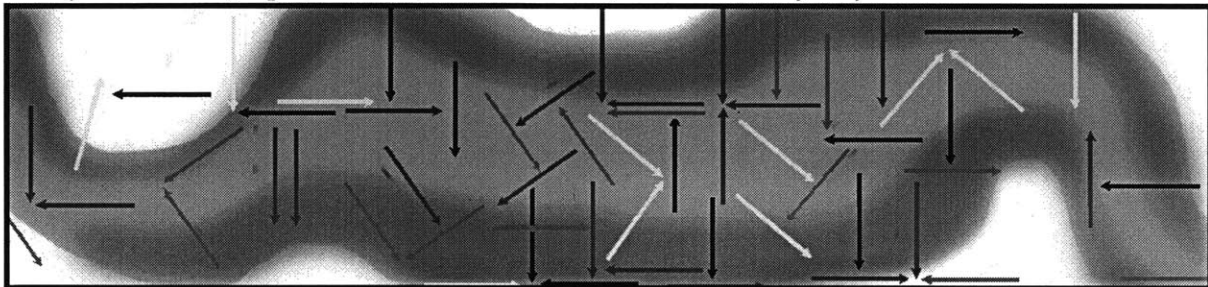
The modeling of both games was generated by the actions exhibited in the game, rather than referencing the game pieces. The simple use of arrows was supplemented by the creation of a set of contextual rules to imbue the arrows with meaning. Further, an overall graphic underlay connects the arrows, setting a context for understanding. Both the elements and the context fulfill the syntactic and semantic structure needed for the system to sustain and facilitate communication.

In developing a system not physically related to the game play, this system taps into the subjectivity of representation. Without semantic definitions (this system's description of the notation), an abstract system can reference itself only, and not an external event. The relationship between an inherently abstract system and its referent, is a theme of representations obliquely addressed in this notational system, and deserves further exploration.

Sung Ho – Kevin Fellingham– Helal Alwaz

This project devised three 'flip books' designed to simulate the actual movement of a redesigned game which revolved around contradiction and interpretation. The intent was not only to mimic the game's unfolding, but to articulate in precise terms the pieces' ontological development. Distinct from the other approaches, the rules of this game evolved through the course of game play. Individual moves originated from the players themselves, paired moves originated through the interaction of the individual moves, and finally the composition evolved as a function of these two developments:

Tableau of Individual Moves: This attempts to 'denote' the elements individually, while also expressing their emergent quality.
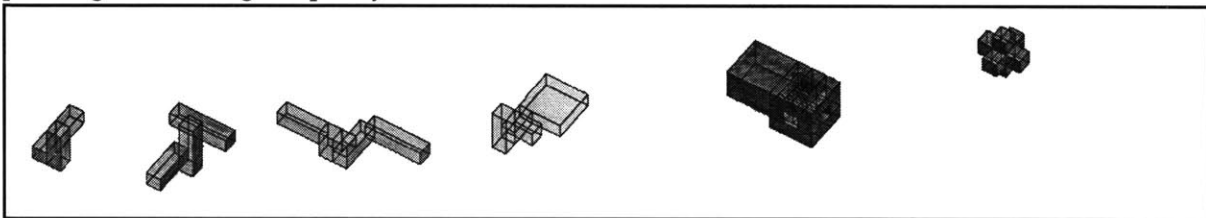
Tableau of Paired Moves: The second system shows how the individual moves combined to form new rules which in turn created larger structures.
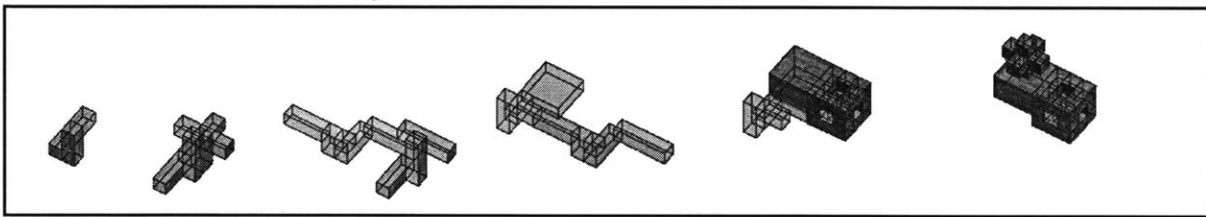
Tableau of Additive Moves: The third system shows the composition as it unfolded
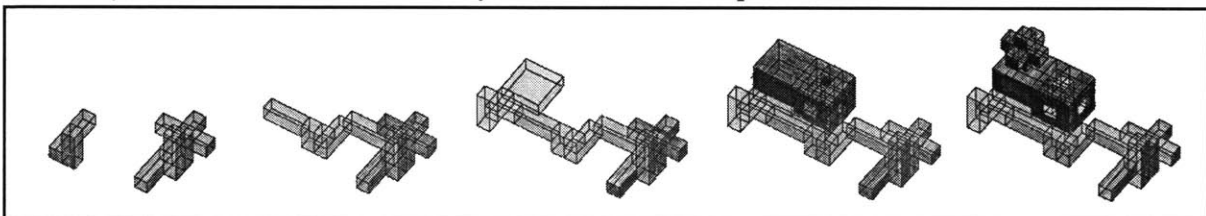
One would assume that the tableaux of additive moves is the only logical way to represent a game's unfolding. But this superficial logic belies the richness of the events which occurred simultaneously, and implicitly, throughout the actual implementation. These facets comprise the fundamentals of FormLanguage2. The underlying coherence of interaction, a result of the pieces' interplay, informed three different representations of the same game. These could be recombined again to show something slightly different, thus fulfilling one of the objectives of the assignment. As Kevin stated during the presentation:

> "Something as simple as possible, because of the way you represent it, is precisely where the richness comes in."

2.2.3 ANALYSIS

The notational system was specifically designed to act as a summary of these rules and their inter-action, eventually to address the emergent logical structure that could be interpreted or assessed. Rather than attempting to represent the game as it was played, the projects reduced game dynamicism to facilitate re-representation. Within this process, the projects codified certain elements and rules which where exhibited during game play.

However, this had to be based on semantic and syntactic density, which seemed to be the most difficult aspect to grasp. Therefore, it was difficult to merge these elements with the actual dynamics of the experience itself, an issue critical to the successful completion of the assignment. Only one project made semantic and syntactic density clear. In this project, students witnessed the regularity of form from within the game itself, and were subsequently able to determine the life cycle of both emergent and intentional rules.

An unforeseen consequence of the 'Notational System' was its ability to 'track' the evolution of play. In the schemas, this was typically assisted by an element indicating time. The ways of modeling time proved to be quite varied: a static graphic representation of the game-board's evolution, a stationary background and the notation's movement, and the actual game movement exhibited in the case of the 'flip books', all enabled a deeper understanding of game play.

2.2.4 EMERGENT QUALITIES

1. *Semantic and Syntactic density*– Clarity of both meaning of compositional elements and the rules guiding game dynamics was the most difficult feature of developing a 'Notational System'. In the projects, the second system had these characteristics, and provided another game play demonstrating this clarity. The first and last projects used the elements' relationship to other pieces , the syntactic structure of the system, to inform the meaning imbued to individual pieces and moves. This exemplified the dynamic relationship between semantic and syntactic density. By avoiding reductionism , these projects could be construed as approximating the essence of game play in a more vibrant manner, consistent with the actual play.

2. *Organizational schemes*– Two of the projects created a context to contain and structure the elements. In the first project, use of the board itself provided the organizational scheme. Verlé's group developed a continuum to gauge game development over time.

3. *Actual elements versus abstractions*– Darren's notational scheme attempted to model the actual play rather than abstracting from it. The other projects utilized an abstraction modeled after a specific game dynamic, implicitly reducing the dynamics of game play.

4. *Overall trends*– Each system depicted the game in a manner which conveyed the overall trends. It is possible to witness the discrepancy between intentions and actualization, and the eventual resolution or chaos which characterized the game. Sung's group modeled the evolution of the pieces as a way to understand how each developed to inform the final composition.

2.2.5 MODULE EVALUATION

1. Communication– Games are a way to explore the way rules enable or disable communication. In the case of the 'Silent Game' and its redesign, students were able to see how their intentions are not necessarily communicated with precision. The notational assignment documented the difficulties inherent in transmitting experiences. an activity in a manner that can transcend the individual. In some sense, development of a system can be seen as an attempt to make intentions explicit, structuring experiences in a manner that can be engaged by others. This potential application of FormLanguage2 is perhaps its most potent.

2. Dynamics– On a basic level, games are a means to investigate the dynamics of a situation. The modeling characteristic of games enables this through the ability to represent complexities in more manageable and comprehendible manner. However, a more sophisticated tool emerged from employing games, and in particular the rules of the game, as a design research tool, 'tracking.'

*3. Tracking –*By tracking the adaptation and manipulation of rules , process dynamics are brought to a level of clarity. As iterations are modeled, using rules and elements as a datum to gauge development ultimately facilitates comprehension and subsequently encourages reflection.

4. Description– Throughout the games, descriptions of design dynamics were articulated. Either through the interactions with other players, or the representing of an event, students were able to observe emerging descriptions of the events as they unfold. Awareness of these phenomena were critical to assessing the games' relevance to actual designing.

2.3 MODULE 3

Process Architecture/FormLanguage3- *Generation of a method to understand form through investigating the circumstances it arose from.*

DATE	TOPIC	READINGS	ASSIGNMENT
Nov. 24 Sunday	Visit Holocaust Museum	James Indigo Freed article in *Assemblage 9*, July 1989	Observations focusing on designated objects
Nov. 25 Monday	Introduction to Process Architecture	Process Architecture Chapter. 2&3	
Dec. 2 Monday	Working Session Introduction to FormLanguage3		Create workbook in groups
Dec. 5 Thursday	Workbook Presentations		Synthesize team reports
Dec. 9 Monday	Evaluatory Exam Reflections and Directions		

2.3.1 ASSIGNMENT

(The Holocaust assignment was developed by Bill Porter, Edith Ackermann, Turid Horgen, and myself)

" We have reshaped the last assignment to integrate our visit to the Holocaust Museum and introduce some methods of 'Process Architecture'. Process Architecture at its best inquires into and clarifies the nature of the architectural problem. It does so in a way that articulates legitimate interests and enables them to have an appropriate voice in the reshaping of the environment for work. The Process Architect is in some sense a proactive ethnographer in that she goes through making latent behaviors manifest, enabling participants to partake in the design process in an informed way. They become informed through recognizing the issues that are relevant to their situation. It is important to keep in mind that Process Architecture's emphasis on the situation and the people that populate it may come at the expense of failing to account for aspects of architectural knowledge.

A scenario: we have been informed upon leaving the Museum that various 'Elements' are under serious consideration for redesign. We have been asked by the Museum to inquire into and reconceptualize each in preparation for possible redesign. To initiate the inquiry, use the following preliminary method:

1. *Interview with the architect (through the Assemblage article)*
2. *Walkthrough and observation including photography, drawing etc.*
3. *Bring photos that have special personal significance.*
4. *Choose one for each assigned element and create a workbook page.*
5. *Compare your work and consolidate into a single page representing the synthesis of the group's views.*
6. *Reconceptualize the architectural intent for both elements as a design directive to the prospective architect.*
7. *Having arrived at these conclusions, design a method of inquiry to facilitate reaching a deeper understanding of these two elements."*

Objectives

Engage a method of 'Process Architecture' in an attempt to define the issues underlying certain 'Elements' in the Museum. The Holocaust Museum provides a rich and sensitive situation, both philosophically and physically, to investigate how form is a manifestation of these issues. The readings for this assignment familiarize the students with the architect, James Freed, and the concepts of Process Architecture.

2.3.2 STUDENT WORK

Helal Alwaz – Chris Genter – Sung Ho

The Village Photo-Tower

photograph from official Museum publication

The relationship between the content of the space-photographs of a destroyed village, and the space itself-a long, chimney like space- became the focal point of this investigation. Helal's photo at the right, emphasizes the space as representative of a dialectic. He feels safety on the bridge, while simultaneously looking down at photos of those who were murdered. In this case we are an observer, and the bridge is a means for observation, yet the photos demand you to become a part of the the place *"... if you weren't' on the path of the bridge, you wouldn't be able to see the shock of the pictures, it would certainly not be as strong."* This observation implicitly reflects the complexities embedded within this element.
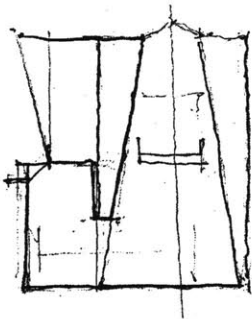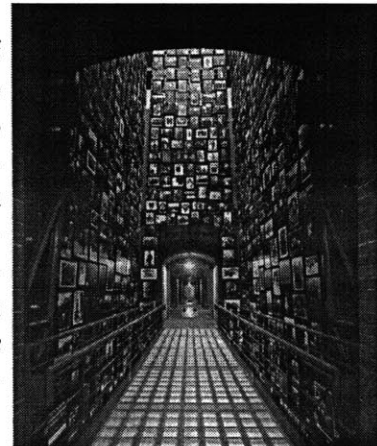
Rather than employing photographs, Chris' analyzes the physical aspects of the space in an attempt to ground his feeling of *"...claustrophobia..."* This is best evidenced by his sectional drawing to the left. The sense of entrapment occurs from under the bridge since, in section, i t can be seen to define a smaller, more confined space. Although the other projects also raise feelings of entrapment, Chris deploys his skills as an architect to clarify and define the architectural dimensions of his emotional response.

photograph from official Museum publication

Sung uses the photograph on the right to further investigate the emotional impact of Chris' architectural impact. The relationship between space and photographs is what brings about feelings of *"...entrapment and collapse."*. This tenuous relationship between the space and the exhibit is explicitly addressed in the photograph on the right. His investigation, similar to Helal's, is rooted in an emotional response to the place rather than being initiated by the physical aspects of the space itself. In general, these methods unearth the issues raised by the elements. Since these are symptomatic of the museum's larger issues, they also act as a point of departure towards these more substantive issues.

Darren Brathwaite – Sabrina Berthelot –Christina Caloghirou

The Glass Roof

photographs from official Museum publication

For both Sabrina and Christina, the roof expresses *"...freedom through light and sky."*, and yet the overabundance of steel elements expresses *"...entrapment."*. The intuitive feelings of freedom and entrapment are substantiated through materials and their appropriate symbols: Materials act to support symbolic metaphors, and vice versa. The exact character of this synergistic relationship may be difficult to determine, but its existence bears heavily on the types of descriptions and insights articulated.

Darren acknowledges similar emotions, yet attempts to describe them architecturally. His drawing on the left investigates why these feelings exist. He holds an implicit concept of ordering which the path of the roof violates. By cutting across the space, resulting in 'tension'. His photograph to the right represents the dichotomy of elements and materials: Brick and light yield a *"...a conflict of elements..."*. In the end, both analyses are used to investigate his initial reaction to the space, *"...a dungeon..."*. However, in his case, architectural tools enabled him to avoid the entrapments of metaphors.

Verlé Harrop – Kevin Fellingham – Twig Gallemore

Hall of Remembrance (Hexagon)

For both Verlé and Kevin, the issue of the memory played a significant role in their investigations. The hexagon reflected the need to memorialize, yet the shape seemed to trivialize its ability to fulfill this task. For Verlé, memory can only arise from the people, not a physical artifact. Her workbook page, shown at the right, reflects this sentiment by a symbolic tear between the building and the victim's names.

Similarly, Kevin superimposed the names onto an architectural analysis of the building. He reflects upon the paradoxical influences of the form: a Polish synagogue and the surrounding federal buildings. Form and content remain Kevin's primary dialectic, rather than the ontological conflict Verlé expressed. His architectural approach enabled him to transcend his initial reaction to the museum (*"..a shopping mall"*) and initiate a thorough investigation.

Twig focuses on the building's exterior in relation to the other memorials and traditional forms located in Washington. The results in the building being symbolic of *"...the oppressors."*, which subsequently characterizes the internal spaces as *"the victim"*, (specifically, a gas chamber): a direct result of the exterior analysis. This relationship is illustrated in his workbook page at the right.

In Twig's analysis, objects are ascribed meanings and concepts substantiated by the architectural observations of the building's context. Use of professional knowledge can invigorate investigation, as Twig demonstrates by his skillful montage. However, it must be used judiciously given the self-fulling nature of concepts and metaphors.
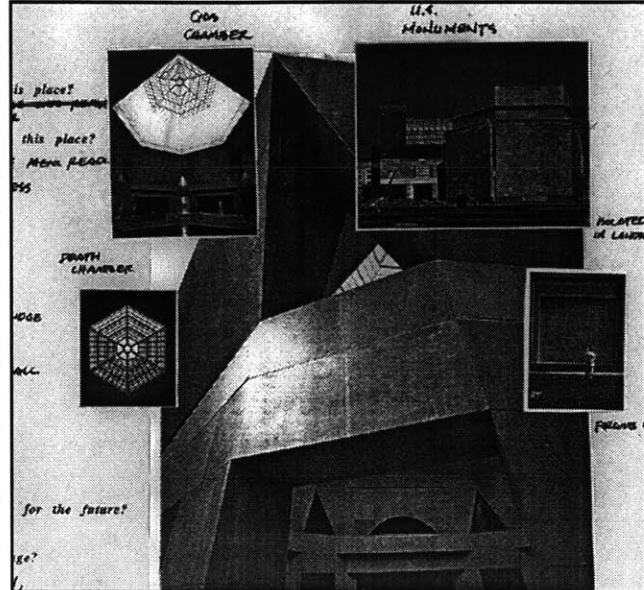
photographs from official Museum publication

2.3.3 ANALYSIS

The application of Process Architecture enabled students to go through an ethnographic process of inquiry. Beginning with observation, and continuing with the workbook, issues crucial to the Museum emerged in the form of paradoxical relationships: control/escape—bridges; light/heavy—glassroof; power/freedom—staircase; oppressor/victim—village phototower; uncertainty/knowledge—waiting area; shame/pride—hexagon. The pairs, and the workbook itself, consolidates and enables reflection of the investigation. Describing the fundamental issues of the museum, as manifest in physical form, students were able to arrive at some of the issues which played a large role in formulation and conceptualization of the Museum. Articulating the paradoxes inherent to FormLanguage3 begins to recreate the design situation from which the Museum arose. However, the elements themselves remain an indeterminable reality; their spatial and formal aspects reveal without disclosing. Therefore, the approach and method of investigation is crucial. Methods must penetrate external character in an attempt to access internal significance.

The final stage of the assignment, to formulate a different method and then to speculate upon the results of such a process, was not attained. When this task was posed directly to the students, their response was limited. One possible explanation for this is perhaps their understanding of the given method was not robust enough to begin reflecting upon it. By not allowing students to actively participate in the construction of the method– a feature so prominent in the previous assignments– students either did not have the incentive or the awareness to reevaluate the method itself. Perhaps the inclusion of predetermined questions on the workbook page, designed to stimulate student thought, actually acted to inhibit a deeper understanding of the method. This is evidenced by the inconsistent responses on the workbook pages. Given their potency in facilitating the dialectical pairs, sensitivity in their formulation is therefore crucial.

2.3.4 EMERGENT QUALITIES

1. Common experiences– The workbook pages provided a forum for collecting reactions . It attempted to synthesize them through group work, and the representational clarity needed to participate in it. The primary impetus for encouraging this process was the expectation of communication within the group, and ultimately to a larger audience. Although collective pages were not done, relationships between the individual pages indicates the character and depth of communication.

2. Metaphors– In many cases metaphors were used to describe the impressions and reactions to the place. Two approaches were used to arrive at the metaphors: A thorough investigation of the building, and an initial reaction legitimized by citing building features. In the former, architecturally based methods of representation were utilized, or concepts from within architectural thought were used as operational methods.

3. Grounded observation– Observations rooted in the artifact itself yielded insights into the paradoxical qualities of the building. Darren's workbook page best exemplified this by articulating details of the building which hypothetically interacted to generate certain impressions.

4. Emergence of dialectical pairs– The analysis codified the inherent tensions of the building into 'dialectical pairs'. Each group, in their attempt to consolidate divergent reactions, created concepts to capture this variety.

2.3.5 MODULE EVALUATION

1. Common understanding– The aim of Process Architecture is to arrive at a common understanding of the situation to facilitate a collective process of inquiry and development. This is based upon the existence of drawings or photographs which afford an interactive discussion by illustrating common experiences.

2. Field methods– Using field methods to navigate a circumstance of working, and begin to speculate on how it may be changed and altered, is the primary method and purpose of Process Architecture. The workbook, as well as observations, act as a way of establishing an interaction with the world out of which the form might arise, or has already arisen. The underlying situational maxims as unearthed by such a pointed investigation, yield insights into the artifact.

3. Dichotomies/Paradoxes– By investigating the problematic or provocative aspects of the 'Elements', the locational contingencies of the situation from which form surfaced came to light. These issues are salient precisely because they bear heavily on form's evolution. Therefore, they provide perhaps the most appropriate means to engage rigorous study of the form.

4. Interaction– The process of interacting with the situation, and the groups to synthesize views, necessitates clarity in thought and representation. The ability to manage the fluctuations of this process, and be sensitive to new developments, is the behavior students of Process Architecture must develop.

3. EMERGENT PEDAGOGIES

The coursework performed by the students demonstrated the following trends:

1. Intersubjectivity– Intersubjectivity is any understanding that is shared; the methods which displayed a level of objectivity potentially enabled the method to be transferred to another researcher, or to another situation. The challenge to researchers is the ability to attain intersubjectivity by transcending personal interpretations or concepts.

2. Transparency– Concepts or frames should not predetermine the outcome of the analysis. Typically however, methods dictated the character of the information generated. The challenge to researchers is to avoid conceptual entrapment,

3. Emergence– The dynamics of form's origins must be reflected in the information procured, establishing the artifact as an *'emergent cultural artifact'*. Researchers tend to concentrate on a singular feature which does not acknowledge take into account the variety of issues and influences on form. A symptom of these traditional methodologies is information which is singular in nature.

4. Apprentissage– French denoting the learning that occurs in an apprenticeship. This reflects the active and reflective learning researchers engage in, focusing on a clear question "What am I learning here?" It is the ability to discern emergent trends, the willingness to reflect upon resultant information, and to question one's understanding of the method's operation in order to determine what is being learned.

It is important to acknowledge the dependency of the attributes upon each other. In describing each quality, implicit is the need for all the attributes to work together in a research project.

3.1 INTERSUBJECTIVITY

3.1.1 Emergent Qualities

A clear, objective method, devoid of personal interpretations, generated data that was easily understood. The methods with a 'translatable' of 'transferable' quality, such as Sung Ho's and Verlé's projects in Module ø, contained insights which could be interpreted or generated by others. This is distinct from the majority of projects which employed a more personal, self-contained approach. The methods that were self contained or self referential (like a narrative) generated data in and of itself.

In Module 1, methods grounded in the building itself proved to be the most robust, leading towards redefining the initial problem. In these cases the building acted as an objective reference point. Similarly, Process Architecture depended on the existence of drawings or photographs to enable an interactive discussion regarding a common experience.

Module 2 emphasized the need for semantic and syntactic density to attain representational clarity. Verlé's group explored this explicitly, succeeding in depicting overall trends. In the other projects, the elements themselves did not provide meaning, rather their relationship to other pieces did, thus determining their application method. Although an insightful approach, it inhibited clear comprehension.

3.1.2 Imperatives

If intersubjectivity is any shared understanding, researcher's must be able to transcend their own subjectivity. The problem of subjectivity limits the scope, audience, and overall strength of research, preventing the researcher from engaging others in a meaningful way. Ideally, intersubjectivity acts to broaden initial understanding by allowing concepts to evolve and be informed, rather than fortifying positions with selective 'empirical evidence'.

In addition, Bill Porter contends that *"...as an architect, the first hurdle for people to get over for them to be effective designers in a responsible society is the hurdle of subjectivity."*. It is here that the problem goes beyond research and into the architect's ability to play a productive and integrative role not only the rest of the profession, but to the community at large. The definition of "culture"-architectural culture- results from

> *"...intersubjective understanding that we parent through the ages, that is continually reinterpreted and reinvented. Bearing testament to the phenomena of cultural depends upon one's ability to project intersubjective understanding."*

John Habraken, in a paper presented in 1988 to the Asian Congress of Architects echoes this sentiment in his understanding of type as a manifestation of social agreement.

> *"The challenge to our profession is no longer to be avant-garde and to refuse the past, but to connect to it and transform it, in a continuous and sophisticated process, to suit today's culture."*[61]

3.1.3 Challenges

Subjectivity typically manifests itself in the natural tendency to remain with judgments. Premature judgment may not lead to testing and developing new hypotheses, rather research designed substantiation. The inherent difficult is the researcher's ability to state "I don't understand this phenomena, my knowledge base doesn't allow me to account for all the anomalies." It is here where we must begin our effort to create intersubjective understanding. Through exploring and evolving ones own subjectivity, we begin to unlock the potentials of intersubjective activity

3.1.4 Students (the following are student evaluations of the course)

> *"An attribute of a good researcher is the ability to suspend disbelief."*

> *"I think one of the greatest challenges to Process Architecture is how do we engage larger groups in deeper, more meaningful levels of collaboration"*

> *"I view each of my classmates to be as valuable a resource as each member of the faculty, and they don't get paid for it."*

> *"Over and over we were witness to the fact that there was no one way to interpret the data/the assignment. This was very liberating and resulted in our group pursuing some very interesting but seemingly completely unrelated tangents. In the end this did inform our process if not the appreciation of that process. Working in pairs/groups afforded exposure to others strengths and styles. I really enjoyed it."*

"... problems with group dynamics- also , the group work focused on who could do things ... delegating roles according to abilities."

"...each way is valid-don't judge, see the patterns rather than judging".

"...recognition of others abilities and utilizing this for joint projects."

3.1.5 Research as Communication

Through my numerous discussions with the students, communication played a prominent role in their class experience. The significance of 'communication' is its potential to understand, investigate, and practice attainment of intersubjective understanding. It provides a pedagogical frame to place the notion of intersubjectivity.

This potential is embedded within the act of communicating itself. For example the group work, part of each assignment, became the primary way to develop intersubjectivity. Engaging in, and exploring the dynamics of communication opens the possibility to arrive at intersubjective understanding. It also presents possibilities toward circumventing subjectivity. As was witnessed in the assignments, each one encouraged the use of a method designed to raise the issue of subjectivity, and then attempt to expand it towards intersubjective understanding.

3.2 TRANSPARENCY

3.2.1 Emergent Qualities

Certain projects afforded further investigation by not dictating the parameters of the investigation. In the case of the narrative, the data generated cannot be replaced by another set. It is specific to the method, and therefore limiting in regard to the range of observations possible. In the case of Sung's and Verlé's Infinite Corridor assignments, the structure remains in the background, not dictating the terms of what is generated. Both these projects generated and contained ambiguity, initiating synthesis.

In the games module, two of the projects created a context to contain the elements, and to give them structure. In the first project, use of the board itself provided the organizational structure, and in the last project a continuum was set up to approximate development over time. Process Architecture generated metaphors to describe reactions to the Holocaust Museum. They were inspired by a thorough investigation of the building, and to guide legitimization of initial reactions.

3.2.2 Imperatives

"Research has to be opportunistic because you don't know what you are going to discover. The things you discover may not be what you set out to do."[62]

The need for the researcher to develop methods of investigation that are flexible enough to allow for data to be generated is clear enough. Yet more significantly is the ability of the methods itself to adapt and change during the course of investigation. This can occur when the method is informed by the artifact itself, rather than allowing the method to dictate the attributes of the artifact which are allowed to rise.

3.2.3 Challenges

The challenge to researchers is to avoid conceptual entrapment. In applying concepts –necessary to initiate investigation– students often did not let the artifact inform their data collection. In these cases, the construct constrained the ability to perform a rigorous investigation of the artifact.

3.2.4 Students (the following are student evaluations of the course)

> "My methods of inquiry into form and design problems have been refined and further developed. The issues and concepts presented give me new ammunition, and a better language to design with."

> "The manner in which they were written not only affords many interpretation, they also engage a high level of inquiry into the subject matter."

> "We started with preconceptions and saw how far we could take it due to the rewards for new directions. Without this flexibility, there would have been no desire to do anything."

> "Over and over the process of personal experience and abstraction was reinforced. It is a process that isn't always easy or obvious."

> "...needed to figure out what the problem is"

> "investigation of the problem as a way to figure out the assignment."

> "I was sick of "I think" which wasn't balanced with more objective approaches."

> "...subjective understanding of rules in an attempt to try and figure out what a person is thinking."

> "...talk about design lost grounding in the artifact."

> "...analysis of a problem due to ambiguity and the nature of questions

> "...criticism, testing, and evaluation–we missed this."

> "...testing out ideas rather than talking about 'fluffy' ones."

3.2.5 Research as Inquiry

The processes inherent to inquiry, as the students referred to, is the potential realm to develop an understanding of transparency. If research is viewed in its broadest sense as inquiry, then the methods implicit in this formulation –testing, evaluation, hypothesis formulation– are explored explicitly. In order to engage these operations, transparency must become an operative part of student's research repertoire.

3.3 EMERGENCE

3.3.1 Emergent Qualities

The data generated typically reflected the multitudinal nature of the artifact, implying the dynamic nature of form's origin and as an emergent cultural artifact. Both the 'Infinite Corridor' and the Exeter Library exemplified the variety of meanings induced by the artifact. In the Games Module, actual elements and abstractions of the game pieces served to model the games dynamics. In particular, Sung's group focused on that specific aspect of play, while Verlé's group approximated emergence as a function of time. The observations of the Holocaust Museum generated insights into the paradoxical qualities of the building. Although seemingly obvious, the building was the greatest source of inspiration and provocation.

3.3.2 Imperatives

What impact does the conceptualization of architecture as a social art, or as an event from which form emerges have for the architectural researcher? First, if architecture is not viewed as a constructed assemblage, it is almost impossible to accurately understand form. The aspects which inevitably bare on form's development is essential to beginning any architectural research since architecture is a result of such processes.

Secondly, it is impossible to witness all the nuances of design due to its dynamic nature. Researchers therefore, must acknowledge the dynamics of form-making to see beyond the static image or artifact under observation, reaching into a hidden life not revealed unless unearthed.

3.3.3 Challenges

The challenge to researchers is the tendency to concentrate on a singular aspect of form. This may be the result of exposure to scientific oriented research methods. This possesses an inherent difficulty, namely the inability to acknowledge the variety of issues and influences on form. The resultant information remains singular in nature. For example, fictional narrative remains within one bandwidth, not acknowledging artifact's role as nexus.

3.3.4 Students (the following are student evaluations of the course)

"The most positive aspect of all the assignments was that they completely open to interpretation by the individuals, pairs or groups carrying them out."

"...the most difficult task was to determine what was the point of the assignment and then how do you represent it."

"...a moment of insight would occur and the problem of representation came up."

"...the problem with the Holocaust Museum museum was that it was too explicit."

"why was there flexibility? Due to the confidence of the instructors, and that the instructors valued different points of view."

"...without flexibility there is no desire to do anything other than what is expected."

"What was the best part of the class? The abstract nature."

3. EMERGENT PEDAGOGIES

3.3.5 Research as Representation

The most prominent sentiment expressed from the students was 'flexibility'. The significance of flexibility is, in my opinion, rooted in the architect's penchant for design. The act of production, the act of interpreting, all these refer back to the *modus operandi* of the architect, active designing. For abstractions to go beyond a purely creative endeavor, and into a potential research methodology, architectural research must address its representational qualities. It is within this realm that students can thoroughly investigate the emergent aspects of form. This necessity, coupled with the continual investigation of form's emergent qualities, may facilitate the transition from creativity to research method not explicitly addressed in this course.

3.4 APPRENTISSAGE

3.4.1 Emergent Qualities

The most interesting aspect of all the projects was the amount of information gathered. Each method raised new insights into the corridor, library, game and museum. In the better projects, we can see a level of knowledge which stands apart from the method. The amount of information was primarily a function of the open-ended quality of the method.

Resultant trends were directly explored in the final two modules. In Verlé's group the notational system tracked the eventual resolution of a game, and the chaos which characterized another. Sung's group showed the interactions between the pieces as a way to understand the final composition. Process Architecture revealed the emergence of dialectical pairs in the process of articulating tensions inherent to the museum.

3.4.3 Imperatives

The necessity to learn from research is crucial towards engaging rigorous research. An implicit, and facilitating aspect of learning is the concept of teaching, or demonstration of a firm grasp on the information to convey it to others.

In some sense, this is only the first step in developing a disposition for learning and teaching, the pinnacle of achievement for a researcher. It requires not only the ability to demonstrate fluency with the previous emergent qualities of research, but to synthesize them as well. Further, education is typically taken for granted, yet it is the most essential and must therefore be carefully nurtured.

3.4.3 Challenges

The willingness to see emergent trends and asses a methods productive capabilities in mid-stream is the most difficult research act. Displaying such behavior is essential for maintaining the opportunities for learning which arise from the process of research. The difficulty is not only in building the disposition towards such questioning, but admittance undiscovered or overlooked issues. The willingness to admit ignorance ostensibly engenders dedicated research.

3.4.4 Students (the following are student evaluations of the course)

"One thing that I felt was not fully developed was the process of analysis"

"There was an investment on the part of both the instructors and the participants and most importantly, everyone who leapt forward took risks. Risks that all of us recognized. This was very exciting."

"Reading, presenting concepts in progress, working with a group in developing a creative end product. Confidence in my ability to enter into the process."

"...this was a very powerful and important lesson about research. SLOW DOWN, BE THOROUGH."

"... total commitment/engagement would be a good start... Being able to think about whether or not the material in front of you is material worth researching is so important; being able to choose not to discard it because it doesn't fit into a formula for analysis."

"...when working with other people with different agendas, we were forced to clearly articulate and engage other ways of thinking."

"...if I don't make sense, and if no one tells me so, then I cannot develop a critical eye."

"...w/o criticism it cannot move."

"...an informed critique."

"...tension is good"

"...made me more in touch with what I wanted to do and enjoy."

"...it was my fault that I did not seek out the questions in other students projects."

"What is a thesis about? Research doesn't have to be significant, rather something I feel is worthy."

"...emphasis on presentations and criticism skills."

"...cannot define the tools and concepts but they exist in some form, but I am more sensitive to the use of different tools."

3.4.5 Research as Education

Students overwhelming reaction to the course also centered on the interactions between themselves, the instructors, and the work. Within this nexus, learning occurred as a significant part of the class. In instances where it was not prominent enough (Process Architecture, for example), students expressed their disappointment. Perhaps obvious, research viewed as education is a critical approach towards developing the abilities of criticism and judgment. By defining research as education, we intend to raise the issue of learning to the prominence it should receive.

4. THE ARCHITECT SCHOLAR

In an attempt to apply the emergent pedagogies to an educational program, we must first place them within a broader context, namely, *"What is our conception of an architect who performs research?" "What attributes do we want our researchers to display?"* In short, we can ask the question *"What is our conception of an architect who engages in research?"* Developing a paradigmatic 'Architect Scholar' is necessary to guide our curriculum development in a consistent, thoughtful, and enlightened manner.

This question was first raised in 1990, in the context of a reevaluation of the professoriate. Ernest Boyer's report on Higher Education addressed the question of educational priorities by asking the question *"What does it mean to be a scholar."*[63] Boyer defines the concept of scholarship primarily to avoid the tired academic dichotomy of 'Teaching versus Research':

> *"Surely, scholarship means engaging in original research. But the work of the scholar also means stepping back from one's investigation, looking for connections, building bridges between theory and practice, and communicating one's knowledge effectively to students. Specifically, we conclude that the work of the professorate might be thought of as having four separate, yet overlapping, functions,; the scholarship of integration, the scholarship of discovery,the scholarship of application–the scholarship of teaching."*[64]

4.1 RESEARCH AS COMMUNICATION
4.1.1 The Scholarship of Integration

> *"...including efforts by faculty to explore the connectedness of knowledge within and across disciplines, and thereby bringing new insight to original research."*[65]

In order to engage integration, research should be viewed as communication, with an explicit emphasis on attaining intersubjectivity. Throughout the modules, we witnessed a variety of communication efforts facilitating students ability to integrate disparate bodies of knowledge and ideas. The real thrust of radical subjectivism was to enhance the subjectivist/objectivist dialectic by redefining the world in an extreme subjectivist view. It postulated the position that knowledge can be constructed in fundamentally different ways, yet of equal validity. Since people read the environment in radically different ways, radical subjectivism is perhaps a more plausible account of the world. Thus we can only remain in awe that communication exists at all. In the end, intersubjectivity emerges out of discussions between the polarity of naive subjectivism (or naive solophism) and naive objectivism (or realism). The most important outcome is the ability to create and understand intersubjectivity, as it is the only viable means for exchange.

Inquiry achieves intersubjectivity when engaging the reflective process of reevaluation. In a sense, we can view the objective of inquiry as intersubjectivity, or the process of making an event or artifact more comprehendible. This occurs by beginning with a subjective stance, then integrating it with external sources, constantly moving towards building intelligible composition.

The game sequence examined how rules enable or disable communication. Intentions were not necessarily transmitted with precision; as was the case of the 'Silent Game'. The difficulties of transmitting experience was investigated in the notational system. Ideally, by making the system

independent, we highlight the power of regularity and rules as an opportunity to attain intersubjective understanding. In some sense, the purpose of the notational system was to document an activity in a manner that could transcend the individual. This may have great potential for researching interconnections, such as rule-like behavior within physical form.

Process Architecture attempted to build a common understanding of the situation. By embarking on a collective process of inquiry, intersubjectivity is achieved through developing the underlying situational maxims of the situation which determine the artifact's final form. We assume that their existence affords communication, eventually guiding a process of collaborative inquiry. Photographs from the common experience where the primary vehicle for initiating this process. Potentially, the model could be applied to integrate the traditions of applied and pure knowledge underlying most research methodologies.

4.2 RESEARCH AS INQUIRY
4.2.1 The Scholarship of Discovery

> "...research that increase the storehouse of new knowledge within the discipline"[66]

The focal point of discovery is the methods by which we conduct research. Only in our attempt to redefining these methods can a new type of scholarship within architecture begin. In the end, the methods utilized can either lead to, or suppress, our ability to engage vigorously all the facets of scholarship.

> "Scholarly investigation, in all the disciplines, is at the very heart of academic life, and the pursuit of knowledge must be assiduously cultivated and defended. The intellectual excitement fueled by this quest enlivens faculty and invigorates higher leaning institutions, and in our complicated, vulnerable world, the discovery of new knowledge is absolutely crucial."[67]

The dialectic method generated different positions which induced students towards accounting for these variation. Seen as a heuristic for developing positions, we have a initiated a process towards insight into the object which inevitably transcends singular hypotheses.

Cyclical Inquiry engaged a reflective process of reevaluation fundamental to all inquiry. Beginning with an initial stance, then moving towards integrating it with external sources, students come to understand the richness of experience and place. Games were the most straightforward method of investigation: Modeling enabled reflection by the mere ability to represent complexity in manageable form.

Using field methods to navigate a circumstance and then to speculate on how it may be altered was the imperative of Process Architecture. The workbook established an interaction with the world from which form emerged. By defining what and who the players are, and implement specific methods to investigate their environment, we can reveal tacit behaviors informing physical qualities. In sum, discovery is facilitated by methods, and for architects they must be formulated in a manner sensitive to the operative methodologies of a mature designer.

4.3 RESEARCH AS REPRESENTATION
4.3.1 The Scholarship of Application

> *"..leads faculty to explore how knowledge can be applied to consequential problems in service to the community and society."*[68]

Acknowledging architecture as a cultural artifact necessitates understanding how architecture is represented. This can be viewed as architecture representing more accurately the way it is created, and thus revealing potential applications and opportunities. This attempt to delineate a setting for exploring knowledge applicable to the consequential problems of community and society.

Our initial attempts at defining such a body of knowledge, the 'FormLanguage' concept, is an attempt at representing architectural experience. Certainly it must be further developed and researched, yet it remains singular in its attempt to redefine the traditional modes of codifying architectural discourse. A new paradigm should be considered defining architectural research.

Towards understanding representation, each artifact must reflect the variety of interpretations and significance embedded within it. Through the dialectic, students where introduced to the variety of readings one can have from a physical object or space. This is an essential beginning towards a more robust understanding of architecture's emergent qualities because this initial 'reading' acts to influence subsequent observations and decisions. By grounding representation within the artifact, we have the opportunity to see the manifestations of divergent positions.

The central component of the cyclical inquiry, reflection, typically emerges from struggling with an artifact in numerous ways. Aspects of built form which evoke paradoxical or puzzling experiences were thoroughly investigated when grounded within artifact itself. In this process students came to understand what the experience is, and the difficulties inherent in representing it.

In the final two modules, the dynamics of the process are brought to a level of unforeseen clarity. By tracking the adaptation and manipulation of rules, iterations were modeled in a way which enabled reflection . The paradoxes raised in Process Architecture model revealed the problematic nature of defining form due to form's emergence from situational complexity.

4.4 RESEARCH AS EDUCATION
4.4.1 The Scholarship of Teaching

> *"... the view teaching not as a routine task, but as perhaps the highest form of scholarly enterprise, involving the constant interplay of teaching and learning."* [69]

Throughout the modules, new information was generated and acknowledged By engaging the dialectic, students exposed themselves to aspects of objects beyond their initial readings. Inquiry was the most obvious, yet subtle type of educational process, comprising both learning and teaching. Students unearthed information, and in the process of representation, imparted their learned knowledge to others. Game dynamics, yielded descriptions which emerged from the game's unfolding. Process Architecture initiated situational interaction, and the imperative for the groups was to synthesize views. Both features necessitated clarity in thought and representation of that thought. Further, the ability to manage the fluctuations of the process, and be sensitive to new developments is the behavior students of Process architecture must develop. Primarily, the role of

the Process Architect is essentially designer as educator, intervening in an attempt to engage a teaching and learning role with the players involved.

The ability to learn from an investigation, and to consider the potential ways to impart such a body of knowledge, is a vital source of practicing the scholarship of teaching. I view the scholarship of teaching as embodying all modes of scholarship: the ability to communicate ideas clearly through written and verbal form, the ability to engage robust investigation, and the ability to articulate the many facets impinging on form's emergence. Further, judgment and the ability to think critically can be seen as the crowning achievement of this scholarship. The AIA concurs with this sentiment, stating in the 1987 Code of Ethics and Professional Conduct

> *"...learned and uncompromised professional judgment should take precedence over any other motivation in the pursuit of the art and science of architecture."*[70]

4.5 ADVANCED DEGREE PROGRAMS

> *"The last thing schools of architecture need to do is to go down the same path of conformity that much of higher education has taken in recent years."*[71]

How can advanced degree programs encourage the variety of scholarship? Clearly the abilities must be trained over time; consisting of further investigation into method and knowledge. In addressing the characteristics of graduate study that would most appropriately prepare tomorrow's 'Architect Scholars', we now consider some hypothetical characteristics of a such a curriculum

4.5.1 An Educational Agenda

Year One:

Inducting researchers towards perceiving architecture in a rich enough way through developing the dispositions for intersubjectivity, transparency, acknowledgement of form's emergence, and *apprentissage*. This could be achieved by articulating and understanding a set of methods within the domain itself, while simultaneously becoming more domain specific. Broadly speaking, these where the goals of the course 'Introduction to Design Inquiry'. These general goals were intended to develop more specific attributes of research and scholarship. For educators, this pedagogic mechanism works in the opposite direction: Modes of research frame the methods and content of courses, allowing the students to discover the four essential pedagogies, and perhaps developing new ones.

Year Two:

Year two applies the attributes explored in year one to a specific project, and perhaps eventually resulting in a publishable paper. This would be guided by developing the ability to recognize legitimacy through critical thought. It would attempt to incorporate research as communication, inquiry, representation as were explicitly explored in the first year, being explored through the scholarship of teaching, as demonstrated in a final piece of research.

Objectives: (based on a discussion with Bill Porter)

The curriculum's overall objective should be to complement specific architectural domains. One aim is to enable students to engage in architectural discourse by developing the ability to recognize

legitimacy through the artifact itself. However, the program should in some discernible way alter the nature of the architectural experience. Through investigating architecture as grounded in the past, grounded in individual experience, grounded in the making, and grounded in the nature of the elements, the program will have accomplished a great deal. This may be tested by analyzing the approaches taken when students go to build a tool, or go to look at a particular building. or to make a design project, that they somehow acknowledge these fundamental issues. Monitoring how these students develop as researchers should also be an integral part of the curriculum, making feedback a necessary and immediate reality of their training as 'Architect Scholars'.

4.5.2 Knowledge

In the end, the Architect Scholar's stance towards knowledge is critical. Karl Popper's fallibilistic approach provides a a paradigm of a scholar we must try to reach attain. He quotes Newton who speaks in a similar vein:

> "I do not know what I may appear to the world, but to myself I seem to have been only a boy playing on the seashore, and diverting myself in now and the finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me'.[72]

Yet with the knowledge Newton, Popper, and others developed, the course of mankind was drastically altered. The disposition to engage a search, while constantly knowing the limitations of the search, requires a unique personality. Engaging a process, in spite of the fact of our lack of ability to arrive at a true understanding, is the indication of a true scholar. This personality synthesizes the acuity of a scientific mind, and the awareness, understanding, and compassion of the humanist traditions. The architect as scholar must be able to navigate through these waters, as Goethe's Faust describes:

> "I have studied philosophy many a night,
> eager and earnest, and hopeful of light;
> Also medicine and law, which were mainly a grind,
> and it all conspired to close up my mind.
> Thereafter I turned to theology.
> But this subject, by God! was sheer blasphemy.
> And now I stand here, a poor foolish bore,
> knowing no more than ever before.
> They call me a master, and a doctor to boot,
> But in teaching my students I can do no good.
> I have longed to find the great powers that bind together the world.
> Now I see we are blind, for I see that true knowledge cannot be achieved.
> And my heart breaks, I am deeply aggrieved."[73]

[1]Duffy, Francis "Agenda for Change: Twenty-first Century Professionalism in the U.K."

[2]American Institute of America Online: The AIA Internet HomePage. Practice and Prosperity Task Force's findings, Redefinition of the Profession

[3]ibid.

[4] Boyer, Ernest L. "Building Community : A New Future for Architecture Education and Practice : A Special Report". Princeton, NJ : Carnegie Foundation for the Advancement of Teaching, 1996, pages 56-57.

[5] American Institute of America Online: The AIA Internet HomePage. Practice and Prosperity Task Force's findings, Redefinition of the Profession

[6] see Boyer, op. cit. Goal Six: A Unified Profession pages 109-127

[7] this stands in contradiction to the typical professional pronouncements which maintain the status quo. see Crasbie, Michael. "The Schools: How they're Failing the Profession (and What We Can Do About It)" Progressive Architecture, Sept 95

[8] In 1982, Michael Joroff wrote"An Agenda for Architectural Research" which listed over 100 potential areas of research. see Joroff, Michael L. "An agenda for architectural research" Washington, D.C. The Consortium, 1982 also see Architectural and building research needs and opportunities in the 1990s : symposium proceedings, AIA/ACSA Council on
Architectural Research, Washington, DC., October 4, 1992 Washington, DC : The Consortium

[9] Schön, Donald A., "The Theory of Inquiry: Dewey's Legacy to Education" in Curriculum Inquiry, Volume 22, Number 2, Summer 1992

[10] Frank Duffy lecture at MIT, March 5, 1996 entitled "Accommodating Change"

[11] ibid

[12] Association of Collegiate Schools of Architecture. Committee on Graduate Study and Research:Preparatory study toward the improvement of education in collegiate schools of architecture" The Association, 1968, page 2

[13]Moore, G. and Templer, J. "Doctoral education for architectural research : questions of theory, method, and implementation Washington, D.C. : Architectural Research Centers Consortium: National Technical Information Service [distributor], c1984., page 4

[14] Alsayyad, N. and Brown, G. "Ph.D. Programs in architecture and the Academic-Professional Linkage: A Reassessment" 80th ACSA Annual Meeting, 1992, they conducted an informal survey of all the schools of Architecture with doctoral programs page 175

[15] MIT bulletin, page 117

[16] I believe that one potential source for the difficulties of these programs and their students is the principles underlying research in general: The dichotomy between applied and pure knowledge, which typifies the paradigm of university based research. If both the scientists and philosophers seek knowledge, and the profession of architecture actively pursues it, what are the connections between each of their ventures? The differences are perhaps easier to state than the similarities. Clearly the philosopher's knowledge is pure, and the knowledge the profession seeks is applied. Use of these terms, however, mask the similar utilization of a method to acquire knowledge.
Omer Akin acknowledges this distinction (see Akin, Omer "Methods for Research and Practice in Architecture" in Moore, G. and Templer, J. "Doctoral education for architectural research : questions of theory, method, and implementation Washington, D.C.: Architectural Research Centers Consortium: National Technical Information Service [distributor], c1984., page 59-69) by referring to prescriptive knowledge as knowledge about the application of substantive knowledge, as typically associated with the advancement of what Stanford Anderson refers to as the 'discipline of architecture'. The profession, on the other hand, pursues the development and codification of descriptive knowledge, knowledge which describes phenomena. This type of knowledge, does not necessarily advance the 'discipline of architecture'. Reflecting the variety of definitions and understandings, each type of knowledge contains specific methods for procuring it. Within architecture, prescriptive knowledge has traditionally been generated by applying the methods of historical and philosophical investigations. The most recent trend utilized linguistics for the definition of its prescriptive theory of deconstructivism. Descriptive knowledge, on the other hand, has traditionally utilized the methods of other fields, in particular the methods of scientific inquiry and experimentation. This is best embodied by the research of environmental designers, and building technology.

[17] This is based on a search I conducted of all advanced degree programs which have pages. The variety of methods courses was nonexistent. In some cases there was an acknowledgment of a course, but no specifics were given. The following are example course descriptions:

Michigan:

Research Design and Methods in Architecture

In this course, students are required to investigate systematically alternative approaches to research design and become knowledgeable about a broad range of research methods and techniques used frequently in architectural research. The objective of this course is to impart the knowledge and skills in research design and research methods that are often missing from undergraduate and graduate architectural education. Upon completion of this course, students will have an enhanced understanding of methodological issues in architectural research and will be better able to select subsequent courses related to their research interest(s). Examples of topics included in this course are: gaming/simulation, survey research, historiography, participant observation, etc.

Ball State

451 Architectural Research. (3)

Experience in architectural inquiry: the contexts, definitions, and processes of design creativity; relationships to scientific and environmental design and behavior research; technology-related research; strategies in building and testing, concepts, assumptions, hypotheses, empirical evaluation; methods and procedures.

[18] during the past semester, I was Bill Porter's teaching assistant for a pre-thesis course for 2nd year SMArchS students. It was during this time did I realize the difficulty most students have in formulating coherent research topics, and methods to go about investigating them.

[19] UCLA School of architecture web page: http://www.gsaup.ucla.edu/acad/phd.htm

[20] A general perusal of the material regarding the content of architectural research reveals only conjectures and recommendations, such as what can be found in:

Groat, Linda Ed. "Post-professional and doctoral education in architecture" Ann Arbor, Mich. : Architecture and Planning Research

Laboratories, College of Architecture and Urban Planning, 1991

see The Harvard architecture review, Cambridge, Mass., MIT Press. Vol. 9 1993. in particular pages 75-81

[21] This was a unique opportunity for a number of reasons. Primarily, it was an opportunity to work closely with someone who had been involved in architectural education for more that 25 years. Professor Porter is the Norman B. and Muriel Leventhal Professor of Architecture and Planning at MIT. He was Dean of the School of Architecture from 1971 to 1981 and Special Assistant to the President of MIT for the Arts until 1988. He co-directed a major study on architectural education in the late 70's financed by the Andrew Mellon Foundation, and was President of the National Architectural Accrediting Board. He was also responsible for initiating the Aga Khan Program for Islamic Architecture to MIT and its initial leadership. He co-founded and co-edited Places, a journal of environmental design. Porter continues as Professor in the Department of Architecture, teaching design, methods, and theory. His research currently focuses on the design of the new workplace and the processes of intervention that can effectively bring them about. He is a Fellow of the American Institute of Architects and is active as a consultant in architecture and urban design.

[22] "This subject is focused on the nature and exercise of architectural intelligence. It aims to open avenues for further research and, along them, to open vistas on the teaching or architectural design and on a more reflective professional practice. It seeks understanding of how design occurs: design as processes located in individuals and in groups. It seeks to understand design as argument, as claims for which reasons can be adduced and to which purposes can be connected, as logic in which there are explicit sets of elements and relations among them, and as experiment in which design and its results are themselves used to inform future designs or simply to inquire." from the course description "Introduction to Design Inquiry", Professor William L. Porter

[23] Bloom et al. " Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain." New York, Longman, 27th printing 1984 see appendix for condensed version. pages 201-207

[24] Perkins, D.N. 1992) Smart Schools. New York: The Free Press. p 27

[25] ibid p26

[26] ibid p52

[27] Habraken, N. J. The appearance of the form : four essays on the position designing takes between people and things /Cambridge, Mass. (5 Clement Circle, Cambridge, Mass. 02138) :Awater Press, 1985

[28] Hegel, George Wilhelm Friedrich, 1770-1831.The philosophy of history New York : Dover Publications, c1956.

[29] I refer to the term mechanism specifically to refer to Michael Reddy's mechanism 'The Hub' found in the Tool Maker's Paradigm which enables communication between the 'worlds'.
Reddy, M. (1979) The Conduit Metaphor, in A. Ortony (Ed.) Metaphor and Thought. Cambridge: Cambridge University Press, pages 164-201.
The Toolmaker's Paradigm is a model for understanding how, without the existence of a conduit, our processes of communication would occur. wed can imagine a world where individuals live in total isolation, except for a machine which transfer objects back and forth amongst the inhabitants. when one inhabitant creates something, that he would like to share with others, he places a drawing of it into the machine. The recipient embarks on an active, process to decipher the plan, including testing out the drawing, making modifications, and eventually sending a revised plan back. eventually, understanding occurs through this active , constructivist process

[30] for a concise explanation of Popper's theories, see Magee, Bryan. "Modern Masters: Karl Popper" The Viking Press, New York

[31] Bill Hillier, John Musgrove, Patrick O'Sullivan, "Knowledge and Design", EDRA (1972), pp. 29/3/1-29/3/14

[32] Zeisel, John. Inquiry by Design.: Tools for enviromental-behavior research Brooks/Cole Publishing Company, Monterey, CA 1981

[33] ibid, pages 5-10

[34] Ledowitz's Critique is found in Stefani Ledewitz, Discovery, Creativity, and Play in "Proceedings of the 75th Annual Meeting of the Association of Collegiate Schools of Architecture 1987: Architecture and Urbanism" Thomas H. Beeby and Alan J. Plattus, Program Chairmen. Association Collegiate Schools of Architecture, 1988,pp 529-539
"Short-circuiting in the design process occurs during equivocation of the subjective-objective scheme. The inherent dialogue is lost. Peter Stringer points this out in "The Myths of Architectural Creativity" (Architectural Design vol. XLV, October 1975. He pointed out that both objective knowledge, in the form of "hypothesis verification", and subjective knowledge as "fictional justification" have a legitimate role in design education, but that justification, too often takes the place of verification of design hypotheses, thereby confusing objective and subjective knowledge. Predictions, analogies and metaphors lead to knowledge when they are verified. "It is a process that, once started, feeds itself both by drawing on outside information and by generating additional information from within." Zeisel pp. 16. If the imaging and presenting deal with objective information (hypotheses), rational testing (verification) is appropriate and objective knowledge (observations) is fed back into the process. If, on the other hand, the designer is dealing with subjective ideas such as fictions, intuitive testing (justification) is appropriate and leads to subjective knowledge (beliefs). The basic dynamic of the model has not changed, but the structure is bifurcated to recognize two sources of input, two kinks of testing , and two kinds of knowledge. Design is a process of interaction between the external objective worlds and the internal subjective world. The designer must become very familiar with the constraints of a problem and must explore his own goals, aspirations, and intuitions. Out of the interaction between the inner world and the outer world, a synthesis is discovered that becomes a solution to the problem. Out of this same interaction, insights are discovered that become part of the designer's experience and understanding of the world. Designing is thus a process that contributes not only to the designer's problem-solving ability, but to his growth as a person."

[35] Scheffler, Israel. "Four pragmatists; a critical introduction to Peirce, James, Mead, and Dewey" .New York, Humanities Press [1974], page 8

[36] Alexander Bain, The Emotions and the Will (1859); quoted in Max H. Fisch, 'Alexander Bain and the Genealogy of Pragmatism', Journal of the History of Ideas XV (June 1954); also quoted in Murray G. Murphy, The Development of Pierce's Philosophy (Cambridge, MA: Harvard University Press, 1961), 160-161

[37] ibid

[38] Murphy p163

[39] Scheffler, op cit. 68

[40] The subsequent process of reevaluation can be viewed as a more detailed and defined process of reflection. Lack of such explicitness plagues the general notion of the reflective practitioners and of the operation of 'reflection' in general. a prerequisite knowledge base provides the frame for a question. Implicit is a two part process: first, a body of knowledge is referenced to analyze the data, or personal knowledge/experience which would provide a base for a 'gut' reaction to a particular event Eventually, it is this frame which sets up an investigation, yielding new knowledge which should set up another question, initiating a new investigation. Once a question or problem has been formulated, the process of looking at the details is a result of the question- one must go back into the artifact and look for signs to understand the nature of the questions

[41] Concept design games: a report submitted to the National Science Foundation Engineering Directorate, Design Methodology Program Cambridge, Mass. : Dept. of Architecture, Massachusetts Institute of Technology, 1987.

[42] ibid. page 1-1

[43] ibid. page 1-2

[44] "The pieces, analogous to the pieces 'pushed' around in a design, only have meaning through the players use, or through the meaning they assign to them within a game. In other words, the same pieces have different uses according to the rules of the game." ibid. page 1-2

[45] see Donald Schön "Design as a reflective conversation with the materials" Design Studies, Vol 5. No 1 March 1992

[46] Goodman, Nelson."Languages of art; an approach to a theory of symbols."Indianapolis, Bobbs-Merrill [1968]

[47] Schein, Edgar H."The clinical perspective in fieldwork" Newbury Park, Calif. : Sage Publications, c1987.

[48] Process Architecture, unpublished draft

[49] this was said during the lecture Professor Schön gave in the class "Introduction to Design Inquiry" November 25, 1996

[50] ibid, page 23

[51] Wittgenstein, Ludwig, Preliminary studies for the "Philosophical investigations" generally known as The Blue and Brown books.Oxford, B. Blackwell, 1958.

also see :Kripke, Saul A.,"Wittgenstein on rules and private language: an elementary exposition" Cambridge, Mass. : Harvard University Press, 1982.

[52] It is important to note that in employing the metaphor of language in describing the act of architectural form-making, I am not using it as a means to generate investigative tools. Its primary function is not to active research, rather to generate it. In this manner I am attempting to avoid the problems encountered when architectural research was driven by linguistic and in some cases semiotic analyses. This line of research resulted in what Jorge Silvetti calls an "iconographic line of thinking and a philosophical line of producing architecture".

see *The Harvard architecture review*, Cambridge, Mass., MIT Press. Vol. 9 1993. in particular pages 75-81

In order to rectify the weaknesses of these humanity based methods, we employ the metaphor of language as a means to ground architecture in its reality and not its metaphysical state. this formulation is an attempt to "...locate ourselves inside architecture as we know it." (p119) It is primarily rooted in the experience of place, the regularities it displays, and the locational contingencies it invariably reflects. These formulations, which bring new light to the design operations which inevitably played themselves out. In other words, it is used an an organizational device. Wittgenstein and in this sense can be manipulated-it retains a level of flexibility in its lack of precision and its organizing capabilities, rather than concentrating on specificity and defining features. rather ways of structuring student thought and acknowledging/incorporating the corpus of architectural knowledge in a way that is most relevant to design researchers.

[53] "...there may be 18 FL for all I know, but these 3 account for a great deal of what I consider to be important about architectural form...these 3 levels are important as a way of keeping track of the aspects of form that in the end bear on the ultimate experience of that form." Bill Porter, class lecture introducing the FormLanguage concept October 24, 1996

[54] Reddy, op. cit.

Emphasis here should be placed on the "world" in which the tool is created. Not only because this shapes the language of communication, but more fundamentally it shapes the tool itself. Therefore, it seems that focus should also concentrate on creation of the world This entails defining the world's: specificity, attributes, operative devices etc. etc (even these types of parameters must be articulated). Certainly the purpose of creating a tool can bring to bear all of these issues, but defining them is a difficult process in an of itself, and hence our beginning with the concept of subjectivity understandings rather than the means to convey those understandings.

To begin with, we may ask: "What enables person A to engage person B?" An answer may be: They have a common language. Reddy himself states this, but in such a nonchalant way we brush over its significance: "The environment all have much in common with one another- water, trees, small plants, rocks, and the like-yet no two are exactly alike" (page 292). The the Toolmaker's Paradigm operates through the common language (in this case the attributes of the environments-rocks, water etc.) which enables "communicative designing". This dependency on a common frame can be further explored: suppose that each world did not have these common elements. The drawings received in the hub would be totally untranslatable, making communication extremely difficult, if at all possible. So on the level of interaction between the persons, I contend it is dependent on a common language: if the language and a protocol of collective designing (the desire to understand/work together) exists, then "communicative designing" will occur, as it does in practice today! Certainly in this case the most fascinating question is: Can a new language be developed? and can it be developed through the process itself? (could the interactions generate the language?) Answering these questions is the heart of the question I posed earlier: How is this common language developed? In order to better understand this, we can focus on the processes the person goes through within his environment (analogous to the process the designer goes through in your scheme from the debate) At this point you would remind me that even in my revised the Toolmaker's Paradigm (the one in which no common points exist) the fact remains that the person makes tools to work with. Further, you would say (and I would agree) they would do this utilizing a "constructivist" or "empirical" method. The tool becomes the nexus of learning about their environment. But this too belies a major assumption: a body of knowledge providing the raw materials for constructing the tool. This assumption is embedded in Reddy's statement that "Dwelling in each sector is one person who must survive in his own special environment" . In other words the person is vary familiar with his environment, since he must survive in it. Analogous is your comment referring to representations embodying the "...idea that each expert domain had...". (from your last response) In both cases, a body of knowledge is assumed to be the generator of the tool or representation. Now suppose we could exchange person A and person B in my revised the Toolmaker's Paradigm. How would they survive in their new world? I would propose that he would, utilizing past experiences and intuition, begin to explore the contents of the new environment. Now he does this admittedly with the intention of surviving: he has a purpose in learning about the environment's contents. But the clarity of purpose is also based on a body of knowledge, in this case past experiences and intuition. Simultaneously there exists a clarity of the domain; the environment is assumed to be finite. The dialogue between them results in "constructivist" learning. Each informs the other which results in the creation of a tool. The tool now partakes in the ongoing dialogue between purpose and environment. One could even say from the beginning that an old tool (from the previous environment) was part of the dialogue. But in an empirical environment, there exists purpose and knowledge before a physical artifact can be conceived. The operative methodology of "communicative design" (or as Schön says "reflective designing"). But it is just as essential to articulate the environment within which such designing takes place. I feel that by addressing both these aspects, new paradigms for designing and educating designers can be developed.

[55] Goodman, Nelson."Ways of worldmaking" Indianapolis, : Hackett Pub. Co., c1978.

[56] This could also be construed has having a strong relationship to the patterns of language, the patterns of possible grammars. The notion that a pattern exists is accepted, but how the individual uses that pattern is idiosyncratic, primarily motivated by the individual's emotional or psychological association. One prime example of such a system, reflecting the necessary dialectic between subjective and objective is Alexander's pattern language. This example has two relevant points. First, it exemplified semantic thinking, or frame like thinking which is hierarchical in nature. one frame yields to another in a process of imbuing meaning. the second relevant point is attempting to identify the larger social pattern, through investigating the idiosyncratic details. these detail analyses were a pattern in their own right, thus acknowledging some level of subjectivity, yet their true significance was relegated by the pattern within which it resided.. If we think about pursing semantics in isolation, the results of Alexander's attempts to design using only his patterns provides an indication of its limitations

[57] see Hall, E.T.,"The Hidden Dimension", London, Bodley Head, 1969, pp117-125.

[58] see Hillier, Bill "Specifically Architectural Theory: A Partial Account of the Ascent from Building as Cultural Transmission to Architecture as Theoretical Concretion." Harvard Architecture Review. Vol. 9, 1993 pages 8-27

[59] Porter, Bill. "What relation does knowledge of form and knowledge of the nexus of form, language, and computation have to do with professional practice?"

[60] see John Habraken's most recent work with Aaron Fleischer on rules in the building of Amsterdam

[61] page 18 of the citation

[62] (NYTimes, January 9, 1984. Dr. Joshua Lederberg, a distinguished biomedical scientist and president of Rockefeller University) Quoted from William Foote Whyte "Learning for the Field: A guide form Experience" Sage Publications, Beverly Hills, CA, 1984, p.20

[63] Boyer, Ernest L. "Scholarship reconsidered: Priorities of the Professoriate". Princeton, N.J. : The Carnegie Foundation for the Advancement of Teaching, c1990.page 2

[64] ibid. page 16

[65] Mitgang, op. cit. page 571

[66] ibid, page 56

[67] Boyer, op. cit.. page 18

[68] Mitgang, op. cit. page 57

[69] ibid, page 57

[70] The AIA 1987 Code of Ethics and Professional Conduct

[71] ibid, page 55

[72] Brewster's Memoirs of Newton, vol. II, ch. 27

[73] Quotation from Popper, op cit. page 30-31

"*Translator's note:* In my very free translation of Faust's monologues (lines 354-65, with an adaptation of lines 382-3 inserted in place of 362-3)...I have gone beyond Goethe's one short line (356), because I felt it impossible otherwise to translate the utter condemnation and contempt compressed and hidden in the two harmless sounding German words '*leider auch*'."

5. BIBLIOGRAPHY

Akin, Omer. "Methods for Research and Practice in Architecture" in Moore, G. and Templer, J. "Doctoral education for architectural research : questions of theory, method, and implementation Washington, D.C. : Architectural Research Centers Consortium : National Technical Information Service [distributor], 1984.

Alsayyad, N. and Brown, G. "Ph.D. Programs in architecture and the Academic-Professional Linkage: A Reassessment" 80th ACSA Annual Meeting, 1992.

Architectural and Building Research Needs and Opportunities in the 1990's : Symposium proceedings, AIA/ACSA Council on Architectural Research, Washington, DC., October 4, 1992 Washington, DC : The Consortium.

Association of Collegiate Schools of Architecture. Committee on Graduate Study and Research: "Preparatory study toward the improvement of education in collegiate schools of architecture" The Association, 1968.

Bain, Alexander, The Emotions and the Will (1859); quoted in Max H. Fisch, 'Alexander Bain and the Genealogy of Pragmatism', Journal of the History of Ideas XV (June 1954);

Bloom et al. " Taxonomy of Educational Objectives, Handbook 1: Cognitive Domain."New York, Longman, 27th printing 1984 .

Boyer, Ernest L., Mitgang, L. "Scholarship reconsidered: Priorities of the Professoriate". Princeton, N.J.: The Carnegie Foundation for the Advancement of Teaching, 1990.

Boyer, Ernest L. "Building Community : A New Future for Architecture Education and Practice : A Special Report". Princeton, NJ : Carnegie Foundation for the Advancement of Teaching, 1996

Crasbie, Michael. "The Schools: How they're Failing the Profession (and What We Can Do About It)" *Progressive Architecture,* Sept 95.

Duffy, Francis. "Agenda for Change: Twenty-first Century Professionalism in the U.K." RIBA publication, 1994.

Goodman, Nelson. "Languages of Art". Indianapolis: Hackett Pub. Co., 1976.

Goodman, Nelson. "Ways of Worldmaking" Indianapolis: Hackett Pub. Co., 1978.

Groat, Linda Ed. "Post-professional and doctoral education in architecture"Ann Arbor, Michigan. : Architecture and Planning Research Laboratories, College of Architecture and Urban Planning, 1991.

Habraken, N. J. "The Appearance of the Form : four essays on the position designing takes between people and things" Cambridge, Mass: Awater Press, 1985.

Habraken, et al. "Concept design games : a report submitted to the National Science Foundation Engineering Directorate", Design Methodology Program Cambridge, Mass. : Dept. of Architecture, Massachusetts Institute of Technology, 1987.

Habraken, N.J. "Type as a Social Agreement" A Paper presented at the Asian Congress of Architects, Seoul 1988.

Hall, E.T.,"The Hidden Dimension", London, Bodley Head, 1969.

The Harvard Architecture Review, Cambridge, Mass., MIT Press. Vol. 9, 1993.

Hegel, George Wilhelm Friedrich, 1770-1831.The philosophy of history New York : Dover Publications, 1956.

Hillier, B., Musgrove, J., O'Sullivan, P. "Knowledge and Design", EDRA (1972)

Hillier, Bill "Specifically Architectural Theory: A Partial Account of the Ascent from Building as Cultural Transmission to Architecture as Theoretical Concretion." Harvard Architecture Review. Vol. 9, 1993

Joroff, Michael L. "An agenda for architectural research" Washington, D.C. The Consortium, 1982

Kripke, Saul A.,"Wittgenstein on rules and private language : an elementary exposition" Cambridge, Mass. : Harvard University Press, 1982.

Ledowitz, Stefani, "Discovery, Creativity, and Play" in *"Proceedings of the 75th Annual Meeting of the Association of Collegiate Schools of Architecture 1987: Architecture and Urbanism"* Thomas H. Beeby and Alan J. Plattus, Program Chairmen. Association Collegiate Schools of Architecture, 1988

Magee, Bryan. "Modern Masters: Karl Popper" The Viking Press, New York

Moore, G. and Templer, J. "Doctoral education for architectural research : questions of theory, method, and implementation Washington, D.C. : Architectural Research Centers Consortium : National Technical Information Service [distributor], 1984.

Murphy, Murray G. "The Development of Pierce's Philosophy. Cambridge, MA: Harvard University Press, 1961.

Perkins, D.N. "Smart Schools". New York: The Free Press.1992.

Reddy, M. " The Conduit Metaphor", in A. Ortony (Ed.) *Metaphor and Thought.* Cambridge: Cambridge University Press, 1979.

Scheffler, Israel. "Four pragmatists; a critical introduction to Peirce, James, Mead, and Dewey" New York, Humanities Press, 1974.

Schein, Edgar H."The clinical perspective in fieldwork" Newbury Park, Calif. : Sage Publications, 1987.

Schön, Donald. "Design as a reflective conversation with the materials" Design Studies, Vol. 5. No 1 March 1992.

Schön, Donald A., "The Theory of Inquiry: Dewey's Legacy to Education" in *Curriculum Inquiry*, Volume 22, Number 2, Summer 1992.

Whyte, William Foote "Learning for the Field: A guide form Experience" Sage Publications, Beverly Hills, CA, 1984.

Wittgenstein, Ludwig, Preliminary studies for the "Philosophical Investigations" generally known as *The Blue and Brown books.*Oxford, B. Blackwell, 1958.

Zeisel, John. "Inquiry by Design: Tools for Enviromental Behavior Research" Brooks/Cole Publishing Company, Monterey, CA 1981.