THE ARCHITECTURAL DESIGN STUDIO AS A METHOD OF INQUIRY: A Pedagogical Model for the Development of Architectural Knowledge

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In memory of my Father
for whom Architecture
was but an unrealized dream

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ABSTRACT

This thesis is concerned with the systematic investigation and application of knowledge within the architectural design studio.

The thesis takes, as a point of departure in the development of architectural epistemology, a model of knowledge developed by Yehuda Elkana, in A Programmative Attempt at an Anthropology of Knowledge, Science and Cultures, Sociology of the Sciences, Everett Mendelson and Yehuda Elkana (eds.) (D. Reidel Publishing Co., 1981).

It is generally accepted that the design process can be characterized in a variety of ways with respect to the development and implementation of architectural knowledge. However, it is my contention that the design process, particularly [but not exclusively] within an academic setting, is best characterized as a form of critical inquiry about architecture, leading to the development of a form of architectural knowledge--contextually dependant and conventional in nature--which can be examined, tested and modified.

Therefore, the goal of the design studio is two-fold. It is to help students develop a body of architectural knowledge that they can take with them beyond the individual studio. Additionally, it is to help students develop a working method to examine new material, as well as re-examine old.

If we assume this position about the design studio, namely that of a method of inquiry, is correct, then it should hold true for the instructor as well. With this position in mind, the design studio becomes an investigation into such questions as "what is architectural knowledge?" and "how should it be taught?"; which can be examined, tested, and modified in the design studio process.

THESIS SUPERVISOR: Francesco Passanti, Advisor 
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I would like to thank all those who have helped make this possible; those who have encouraged me, taught me, advised and supported me in my hours of anguish.

I am especially grateful to my mother and brother for continued moral support and encouragement; and to my grandmother and uncle Joel, without whose moral and financial support I would have been lost.

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"If you are not teaching facts, what are you teaching?" ¹

This question—what are you teaching—forms the central preoccupation of this thesis. However, I do not offer a particular body of knowledge or facts to be transmitted and reproduced by a group of students.

Rather, the focus of my thesis is on a method of inquiry. In this case, the architectural design studio functions as a context in which architectural problems are investigated.

The problems investigated are not limited to the resolution of specific building programs. They constitute the range of issues and theories which form both the body of architectural knowledge and the normative positions about that knowledge upon which architectural decisions are made. Therefore, the architectural design studio is the context in which this body of knowledge and its norms are investigated, leading to the growth of the knowledge by way of critical investigation and dialogue.

Implicit in the question of content is the search for legitimization within both the professional and the academic activities. In the initial question, legitimization rests on the overtones of the word "facts", evoking "scientific facts"; in other words,

¹Maurice Smith; from a discussion about my initial thesis proposal, late October, 1988.
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certainty and truth. The source of that legitimization stems from the demonstrated control of a body of knowledge. Knowledge forms either a currency for exchange in the marketplace, or the boundaries of an academic discipline in the university.

Contemporary architectural discourse has focused on making connections to that most valuable form of western knowledge: science. Although this connection is not recent, the nature of the connection has changed. In the early part of the 20th century architectural knowledge was associated with positivism, which was seen as central to the modern epoch. Modern architecture, to be considered so, had to respond.

However, in recent discourse association has given way to justification. Architecture has been increasingly portrayed as a "soft science", not unlike psychology, sociology or behavioral studies. Architectural knowledge has been characterized as "science-like". Program and spacial decisions are justified with material drawn from behavioral studies; aesthetic decisions of order and proportion are justified with mathematics.

Although I am in no way suggesting that there should be an autonomous body of architectural knowledge, and that knowledge developed outside of the architectural activity should not be used, I am questioning both the reason behind its appropriation and its application as
unique and determinate. I suggest that all too often this borrowing has little to do with any particular quality inherent or internal to the production or content of scientific knowledge, or a belief that "...other studies of rational thought and practices may serve as the basis, or as models, for the understanding of design."\(^2\) Instead, I suggest that it has to do with how that production and content is regarded within culture. In these cases, science is used to imply authority or cultural respectability. In the university, this can extend so far as to rename the studio "laboratory".

"The naming of some claim or line of reasoning or piece of research "scientific" is done in a way that is intended to imply some kind of merit of special kind of reliability....The high regard for science is not restricted to everyday life and the popular media. It is evident in the scholarly and academic world and in all parts of the knowledge industry. Many areas of study are described as sciences by their supporters, presumably in an effort to imply that the method used are as firmly based and as potentially fruitful as a traditional science such as physics."\(^3\)

However, the images of science used in these connections might be characterized by the terms "naive inductivist"\(^4\). In this case science is reduced to the


\(^3\)A. F. Chalmers, *What is this Thing Called Science?*, (St. Lucia, Queensland: University of Queensland Press, 1976), p. xiii.

\(^4\)Ibid., p. 2.
abstraction of universal rules from a large number of observational experiences. This presupposes two things: first, the existence of universal rules which can be abstracted from experience [science begins from observation]; second, the assumption that the observer is in a neutral position [the condition of his/her observing does not effect the authority of the observation].

These primary assumptions waver if we question what experiences are observed or ignored, and how the universal rules are abstracted. In both cases, the role of the observer as an active participant is crucial. In neither case is the observer neutral or passive.

The recent history of the philosophy of science is filled with responses to these problems, including Karl Popper's falsificationism, Imre Lakatos's theory of competing research programmes and of internal and external discourse, Thomas Kuhn's theory of paradigm shifts and even Paul Feyerabend's scientific anarchy. In researching this thesis I have examined these positions and others ones, in an effort to define the boundaries of the concept of knowledge within which I wish to place architecture.

The decision to begin this thesis with an examination of science stems from a desire to challenge the myth of naive induction, and to define in clear terms the concept
of "knowledge" which will be used. The decision to focus on *A Programmatic Attempt at an Anthropology of Knowledge*, by Yehuda Elkana, rather than on works by Popper, Lakatos, Kuhn or Feyerabend, stems at least in part from Elkana’s critique of the myth of the autonomous authority of scientific knowledge. Elkana suggests that scientific knowledge, like art, religion, ideology or common sense, is culturally embedded. Its apparent authority, with respect to other forms of knowledge, is not a function of the knowledge itself. It is a function of culturally embedded assumptions about the knowledge, which vary from one culture to the next.

The goal in the first part of this thesis is not to develop a theory of architecture that is "science-like". It is to show how knowledge, be it scientific or any other, is produced within a cultural framework.

It made sense to focus on science for two reasons. First, the simple availability of the material. Second, the existence of Elkana’s challenge to the culturally embedded authority of science.

The structure of Part One is based on Elkana’s essay, though certain sections have been omitted as only tangentially important.

The second part of this thesis focuses on the primary goal, as stated in the title. Specifically, the goal of this thesis is to demonstrate how the architectural
design studio can be seen as a method of inquiry about architecture, and how the pedagogical model proposed here leads to the production of architectural knowledge. In order to put forward this argument, architecture must be defined in terms of a body of knowledge, rather than a body of works. It is this definition, and accompanying examples, which form the first portion of this section.

The second portion and final portion uses several examples to develop the pedagogical model, and suggest its implementation and potential for the development of architectural knowledge.

The development of the pedagogical model is dependent on several primary assumptions drawn from the examination of Elkana's work in the first part.

First, the production of knowledge, as Elkana has argued, is a cultural activity. The body of knowledge produced is dependant on culturally embedded assumptions, and does not exist autonomously from culture; the same body of knowledge can and will be interpreted differently by different cultures.

Second, the body of knowledge does grow, but not by either the accumulation of facts or by its approach to an absolute truth. It grows by way of a critical public dialogue in which the amount of growth is measured in terms of the degree of precision of the dialogue. The conclusion of the dialogue is caused not by reaching an
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absolute truth but by reaching a cultural consensus: the problems being investigated are no longer interesting or significant to that particular culture, though they might be important to others.

Third, the goal of research or inquiry is the participation in the growth of knowledge, as described above. It is not the production of commodities. In architectural terms, this means that no matter how thoughtful the design process, the mere production of a building does not constitute research. It does constitute valued practice, which is important to the architectural debate, and is a legitimate activity in its own right. But it is not research, for it fails to directly participate in the critical public dialogue, even though knowledge was produced in order for the building to be built.

Fourth, the concept of thick description, as outlined by Geertz and developed by Elkana, constitutes a valid method for modeling the complexity of the interactions between the layers of significance in cultural situations.

Finally, the studio investigation is as much of an investigation for the instructor as it is for the students, though not necessarily the same investigation. The instructors participation can and should extend beyond the confines of the immediate studio; the studio
work should become, through the instructor's application and intervention, part of a larger public discourse.

Of these five assumptions, the most difficult one is thick description. It is also the most critical. All of the other assumptions about the nature of knowledge, its production and its growth, depend on the use of thick descriptions. Without them, everything else falls apart, including the proposed pedagogical model.

Because of its central role, I think it is important to begin to define thick description here, even though I will define it further in this thesis.

Thick Description is an interpretive activity. Its goal is not the production of certainty or truth, but the production of increasingly precise understanding.

Producing thick descriptions is like slicing an apple, and examining its meat. This metaphor of an apple is one which we will return to several times throughout this thesis.

For the time being, imagine that you have an apple and a knife. The apple can be sliced in many different ways; the actual number of different slices possible is both finite and large. The apple represents the subject of a particular investigation. The most common ways of slicing the apple, the ones which are most often repeated, represent the various disciplines, issues or concerns which are most commonly brought to bear on a particular
problem or investigation. Let us also imagine that each of these more common ways of cutting the apple leave remnants of their particular path through the meat of the apple, which appear as ghost lines in the meat. The different paths, or at least their points of intersection, can be viewed with respect to another cut. The ghost lines, or at least the points of intersection with the plane of the cut, are visible within the meat.

Therefore, a thick description is a way of understanding the meat of the apple, with respect to a particular cut through it. It is also a way of understanding the relationships and effects caused by the intersection of different cuts.

In pedagogical terms, a thick description is a method of examining or unfolding the interplay of different and often competing concerns, which have led to the resolution of a particular problem or investigation. A thick description is also a way of examining the ramifications of a particular action or "cut of the apple" with respect to other possible actions and concerns. In the first instance, thick description is historical; it examines how something has come to into being. In the second instance, thick description is operative; it examines, through a dialectic between action and reflection, the implications of the decisions made as things are brought into being.
1. INTRODUCTION

In Part One, I will sketch out a scientific methodology for the production of knowledge, developed by Yehuda Elkana in an essay entitled *A Programmatic Attempt at an Anthropology of Knowledge*\(^5\). The structure of Part One is based on the structure of Elkana’s essay. Certain sections have been omitted or combined with others when they were only tangentially important. In the next chapter I will examine the implications of Elkana’s anthropological model of knowledge on the development of my pedagogical model.

Elkana asserts that...

“traditionally, the main preoccupations of the philosophy of science were the justification or refutation of the conclusions of science; critical study of the methodology; the pursuit of truth presupposing the quest for certainty; the search for absolutes and universals;...reason in the philosophy of science was epistemic reason...the history of science... was mainly preoccupied with the history of Western Science, and especially...its successes;...”\(^6\)

Science was regarded autonomously and its evaluation or historical reconstruction was largely internal to the discipline.

External examinations, through the lenses of the Sociology of Science, Cognitive Psychology, or


\(^{6}\)Elkana, pp.1-2.
Anthropology, have come up short, according to Elkana. The Sociology of Science has focused on the culture of scientific production while paying little attention to what exactly scientists were doing; Cognitive Psychology and to some extent Anthropology have worked to abstract the scientist from the culture in which he is working.

Elkana concludes that although there is apparent success in both internal and external research, in the end all fail to question four essential a priori assumptions about the nature of scientific knowledge. The failure to do so "...necessarily prevents any [real or meaningful] breakthrough..."\(^7\) in this area. These four assumptions are as follows\(^8\):

1) a choice between Realism and Relativism is unavoidable;
2) human universals, once found can be abstracted from cultural "noise";
3) all reason is epistemic;
4) once sociological influences on the history of ideas are admitted, we must give up the hope for a rational explanation of great historical changes;

Elkana counters with four alternative positions. Each responds to inherent limitations Elkana sees in these assumptions about knowledge.

First, realism and relativism are not mutually exclusive. Rather, they are inclusive. In most situations, most people select a framework in which to

\(^7\)Elkana, p.3.

\(^8\)Ibid.
operate; this framework is treated as a "real" and "provable" context. However, that initial selection, by in large, was a relativistic choice and could have been different. In fact, limitations within the chosen framework can lead someone to make another choice. This capacity to make "real" and "relative" choices simultaneously—to move back and forth—is called "two--tier--thinking."

Second is the question of the existence of human universals. The search for such human universals is both suspect and "...meaningless." Suspect, in that as pointed out in our discussion of two--tier--thinking, the "real" and universal framework is dependant on "relative" and context-dependent choices; the ability to distinguish universal phenomena is dependant on the ability to differentiate between various local phenomena. The search for human relevance is meaningless, unless supported by a culturally independent system to assign value or symbolic "sense".

Third, the assumption that all reason is epistemic is dependent on an objectivist or positivist view of scientific activity. "Classical rhetoric or the legal

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9Ibid., p.4.
10Ibid., p.3.
process of convincing the other partner are replaced by
the presupposition that truth is manifest."\textsuperscript{11}

"...Since it is quite clear that we do not know
exactly how discoveries are made, the distinction between
the context of discovery and the context of justification
is introduced. The context of justification is being
conducted in the language of epistemic reason; the
context of discovery has been given up as irrational and
is declared an issue for psychology but not for logic or
history. Yet we know from historical studies in Greek
literature and from the Classical and Renaissance studies
of Rhetoric that there is \textit{moric} \[or cunning\] reason too:
a reason which considers the views or presuppositions and
individual history of the listener/reader and chooses its
arguments so as to convince him. It is this kind of
reason that is at work in legal proceedings and in
science during the process of discovery."\textsuperscript{12}

Finally, Elkana takes great exception to what
ultimately could be characterized as a largely
determinist view of history. Given this view of history,
the question to be answered by historical investigation
would be "how [or why] did things happen the way they
happen?". Implicit in this question is the assumption
that there are a unique set of circumstances from which
history has developed. Elkana equates this view of
history with Greek drama; "an unfolding of the
inevitable.\textsuperscript{13} Elkana offers an alternative theatrical
model for the unfolding of history, namely that of Epic
theatre. Given this model of history, the implicit

\textsuperscript{11}Ibid.,p.5.

\textsuperscript{12}Ibid.,p.5.

\textsuperscript{13}Ibid.,p.5.
question becomes "how [or why] did things happen this way, although they could have happened differently?".

Within these four counter-proposals lie the seeds of Elkana's anthropology of knowledge. Our task, in the remainder of this chapter, is to review the cultivated fruits of these seeds.

2. SCIENCE AS A CULTURAL SYSTEM

Elkana asserts that "...any interpretive approach must start by selecting a focus, a vantage point from which it views the totality of a culture." The history or philosophy of science is one such interpretive approach. Elkana points out that science, art, religion, ideology, and common sense are related; they are all cultural systems. Each system represents, if you will, a slice through the "apple" of culture. This holistic view of culture--the whole is in each of the parts or slices--is offered in contrast to another, more widely accepted view of culture. According to this other view, culture is the sum of various activities; art, science, religion, ideology and common sense are autonomous pieces which add up to a complete model of culture.

Although neither model offers a "true" or complete picture of culture, the capacity for varied, overlapping

\[^{14}\text{Ibid., p.6.}\]
and even contradictory views inherent in the view of culture advocated by Elkana results in a richer and, in the end, more complete model of culture, especially when compared to our own experience of culture.

This is in no small part due to the capacity of Elkana's model to demonstrate how apparently different cultural activities affect one another. We need only think of the impact of scientific and mechanical methods of image production and reproduction [photography and printing] on artistic production, discussed by Walter Benjamin in *The Work of Art in the Age of Mechanical Reproduction*\(^\text{15}\), to understand how three apparently autonomous activities--science, industry and art--affect one another within a larger cultural framework.

Elkana comes to this model of "cultural systems" through the writings of Clifford Geertz.

According to Geertz, this concept of culture is...

"...essentially a semiotic one. Believing with Max Weber that man is an animal suspended in webs of significance he himself has spun, ...[we must take] ...culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law, but an interpretive one in search of meaning."\(^\text{16}\)


\(^{16}\)Clifford Geertz, *Thick Description: Toward an Interpretive Theory of Culture* Chapter 1 of *The Interpretation of Cultures* (New York: Basic Books, 1973) p.5. The essays referred to by Geertz are: *Ideology as a Cultural System* (1964, here up pp.193-233) and *Religion*
In this case, the term "semiotic" should be taken in its widest sense; neither Geertz nor Elkana are referring to it in the narrow sense of literary theory or criticism. Rather, the term "semiotic" has the sense of "meanings or values which transcend individual understanding or textual value"; in this case Geertz refers to the meaning of the portion of the "webs", not the meaning located within a textual interpretation.

It is this model of a "cultural system" that Elkana brings to bear on science. For...

"...if common sense is as much an interpretation of the immediacies of experience, a gloss on them, as are myths, painting, epistemology or whatever, then it is like them historically constructed, and like them subjected to historically defined standards of judgement. It can be questioned, disputed, affirmed, developed, formalized contemplated, even taught, and it can vary dramatically from one people to the next. It is, in short, a cultural system..."17

Whether we adopt a broad view of science--the sum total of views on the world--or a narrow view--organized knowledge--science fits Geertz's broad definition of a "culture system".18

Elkana's assertion is controversial, to say the least. Elkana points out that not only positivist thinkers, but

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as a Cultural System (pp. 78-125), and the more recent CommonSense as a Cultural System, Antioch Review, 1972; as reprinted in Elkana, p.7.

17Ibid.

18Elkana, p.8.
even the most anti-positivist thinkers—Durkheim, Levy-Strauss, and Geertz—tended to hold science in a privileged position\(^{19}\) and exempt it from much of the analysis brought to bear on other aspects or slices of the cultural "apple".

The greatest fear, and the greatest point of criticism of this model of science, is that science might become a relativist discourse and lose its capacity for rules and facts. This is not so.

Science, subjected to two-tier—thinking is capable of a clear and rational realism within a given framework of scientific activity; within a given framework a form of progress indeed occurs. However, this activity occurs within a culturally dependent relative context; science does not occur "...somewhere in a context independent all-embracing context of all contexts with criteria which are true forever."\(^{20}\) Likewise, the knowledge produced by scientific activity is not context independent and forever true. The key concept which Elkana uses to tie this alternative model of scientific activity and knowledge, which we will discuss in further detail, is called "images of knowledge".

\(^{19}\)Elkana, p.9.

\(^{20}\)Ibid., p. 9.
3. THICK DESCRIPTION

If we continue with the metaphor of the cultural "apple", then for Elkana, the concept of "thick description" is the skin, the core and the knife. The skin, in that thick description is the thing that holds Elkana's model together. The core, in that thick description is, for Elkana, central to most cultural activity. The knife, in that thick description is the tool Elkana uses to understand a particular cultural activity as a part of the totality of a culture. In short, Elkana's entire anthropological model of knowledge is built upon this concept. It is because of its central role that this concept requires scrutiny.

It is important to note that Elkana did not invent the term nor the concept of "thick description". It was introduced by Gilbert Ryle and further developed by his contemporary, Clifford Geertz. It was from Geertz that Elkana acquired it.

It is also important to note that the concept of "thick description" plays the same central role within Geertz's interpretive anthropology. In many ways Elkana's anthropology of knowledge is an instance of Geertz's interpretive anthropology, brought to bear on science. This is somewhat ironic, in that Geertz's development of the concept of "thick description" was an attempt to frame anthropological problems and methods in such a way
as to make them more acceptable or "fitting within the
canon of scientific appraisal"; Elkana has turned
Geertz's interpretive anthropology against the only form
of knowledge which Geertz himself had held as at least
partially privileged.\textsuperscript{21}

Having pointed out the importance of the concept of
"thick description", the question remains, what is it?

"'Thick description' is the most fundamental everyday
activity of the ethnographer: he is interviewing
informants, observing rituals, eliciting kin terms, tracing
property lines, censoring households and writing
in his journals. For Ryle 'thick description' is a way
of describing the complexity of thinking: he starts from
the most elementary one-layer activity like, for example,
counting the number of cars on the street. Describing
this activity involves a very 'thin description'. Then
layer by layer (or step-by-step on a ladder) the activity
becomes more complex and its description thicker. Thus,
the kind of description we have to give when describing
what a person is doing is somewhere on a continuum
between the very thin to the very thick, and the
thickness depends on the kind of activity we are
describing. In ethnography the problem is always one of
translation, so whatever the ethnographer is describing
can no longer be a thin description."\textsuperscript{22}

From this quote we can discern that a "thick
description" is an interpretive activity; it results in
explanations or descriptions of an activity rather than
laws or rules which explain a phenomenon. This is seen
as the weak link in an anthropology of knowledge, when
subjected to positivist scrutiny. According to the

\textsuperscript{21}Geertz, \textit{Thick Description: Toward an Interpretive
Theory of Culture}, Chapter 1. Additionally, Elkana, p.9.

\textsuperscript{22}Elkana, p.10.
positivists, if we accept the idea that science is an interpretive activity rather than delineating activity, we reduce science to an inescapable relativism.

This need not be so, if we accept the existence of two additional overlaid frameworks. The first, which we have already discussed, is two-tier-thinking. Within this idea of thinking, explanations behave as laws within a particular frame of reference.

The second, which is the subject of the next section, introduces a related theory of growth of knowledge.

But in conclusion, let's return to another aspect of "thick description". In an effort to explain "thick description", we are, in fact, employing a thick description. It is a hermeneutic activity. Or as Geertz put it,

"Hopping back and forth between the whole conceived through the parts which actualize it and the parts conceived through the whole which motivates them we seek to turn them by a sort of intellectual perpetual motion into explications of one another."\(^{23}\)

It is, in part, because of this hermeneutic property that I could refer to "thick description" as the skin, core and knife of the apple. Scientists, producing knowledge, are not outside of science, no more than ". . . anthropologists don't study villages (tribes, towns,

neighborhoods...); they study in villages."²⁴ The job of the scientist, according to Elkana, is not the production of "true" knowledge which is the world, but the increased clarification of "interpretive frameworks" which explain or model the complexity of the world we experience.

4. TOWARDS A THEORY OF GROWTH OF KNOWLEDGE

A) Critical Dialogue

If, as we have just suggested, the production of scientific knowledge is really the production of interpretive frameworks, then how does knowledge grow? Additionally, what criteria are used to explain, evaluate or counter a particular interpretive framework with an alternative one?

Or to put it another way, one of science's most valued qualities, as understood within popular culture, is its rigorous provability. Science produces facts which can be proven or disproved. Although this statement is highly reductive, grounded in the concept of a "naive induction" which we have previously discussed, nevertheless, it points towards a perceived property of science which becomes increasingly difficult to understand or explain when science is seen to shift from more "absolute" facts to more "relative" interpretations.

²⁴Geertz, The Interpretation of Cultures, p.22.
Elkana suggests that all knowledge, and scientific knowledge in particular, grows by way of a critical dialogue. This echoes Geertz’s conclusions about interpretive anthropology, which "...is a science whose progress is marked less by a perfection of consensus than by a refinement of debate. What gets better is the precision with which we vex each other." 25

This critical dialogue can range in scope from competing total world-views, to competing frameworks within a particular world-view, to competing research programmes or clarifications of interpretive frameworks or programs.

Elkana suggests that knowledge "...grows by the interaction of three factors which can be distinguished only if time is stopped and a socio-cultural situation is, so to speak, photographed." 26 These three factors are the body of knowledge, the socially determined images of knowledge, and values and norms included in ideologies which do not directly depend on the images of knowledge.

For Elkana, the body of knowledge is a series of "...disembodied ideas" 27, which forms the content and focus of critical dialogue. However, these disembodied

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25 Geertz, The Interpretation of Cultures, p.29.


ideas are either the product of a consensus between individuals or groups who share "...a [common] state of knowledge, with its methods, solutions, open problems, nets of theories and, at its core, scientific metaphysics"\(^{28}\), or, it is the product of a consensus between competing states. What is essential to consensus building is not only the specific knowledge itself, but a series of agreements on what there will be agreement and disagreement on. The establishment of these agreements and disagreements depend more on the socio-culturaly determined images of knowledge than on the body of knowledge itself.

The socially determined images of knowledge, as we will see, are more important to Elkana's theory of the growth of knowledge than even the body of knowledge itself. This is in no small part due to the fact that without images of knowledge, the body of knowledge itself is meaningless; the images constitute the cultural context within which the body of knowledge can become meaningful.

Elkana points out that images of knowledge range from "...beliefs held about the task of science,...the nature of truth,...[the] sources of knowledge,"\(^{29}\) to how

\(^{28}\)Ibid., p.14.

problems are chosen from the large number of possible problems, and the importance of various problems and scientific activities. In short, without an image of knowledge, we would be unable to identify knowledge as knowledge.

Values and norms included in ideologies, which do not directly depend on the images of knowledge do, none the less, affect the body of knowledge in two significant ways. First, "...ideologies, political considerations, social pressures, values and norms strongly influence the support given to institutions,... research programmes,"\(^{30}\) intuitive frameworks or scientific metaphysics. Second, "...ideologies influence the emergence of the dominant images of knowledge. It is only via these images that such considerations have an impact on the body of knowledge."\(^{31}\)

Therefore, critical dialogue, according to Elkana, must then proceed something like this...

"...ideologies and the socio-political constraints heavily influence the consciously held views on knowledge, on its sources, on what is considered legitimate or acceptable--in short, on the images of knowledge. The images of knowledge are the criteria for selecting from the infinity of available problems in the body of knowledge those on which research will concentrate. On the other hand, this very problem-choice influences scientific metaphysics; these them, no less

\(^{30}\)Ibid., p.14.

\(^{31}\)Ibid., p.14.
than the socio-political interests, influence a person's view on society and political ideologies."\textsuperscript{32}

B) Images of Knowledge

The concept of "images of knowledge" requires further clarification, in part because of its central role in elkana's theory of growth of knowledge.

As we have previously discussed, the images of knowledge form the point of translation and identification of knowledge. Ideology affects a body of knowledge indirectly by modifying images of knowledge. The body of knowledge, as well as the open problems within it are only identifiable as such through the lenses provided by the images of knowledge.

According to elkana, "...images of knowledge are socially determined views on knowledge (as against views on nature or on society...ie., body of knowledge)"\textsuperscript{33} Images of knowledge establish the criteria for a given culture or subculture in each of the following issues\textsuperscript{34}:

Sources of knowledge. They can be sense-experience, ratiocination, revelation, authority, tradition, analogy, competence, originality, novelty, beauty,...etc.

\textsuperscript{32}Ibid., p. 15.

\textsuperscript{33}Ibid., p.15.

\textsuperscript{34}However, I should point out that this is not a finite list, and is offered as an example.
Legitimizations of knowledge. These are the which allow us to discern valuable from worthless forms of knowledge, as well as to establish the hierarchical order of various forms of knowledge.

Audience or public. Images of knowledge help determine who is the audience or public for a particular piece of knowledge. The audience can range from the public at large, at one extreme, to a small group working collectively on one project, within a subgroup or research interest at the other. It can be located anywhere in between.

Sacred/secular. Images of knowledge can locate a particular piece of knowledge on a sacred/secular continuum. In this case the value or legitimacy of the knowledge can, at one extreme, depend on a theological model, or on a scientific one, at the other.

Time scale. Images of knowledge determine how long other images, as well as knowledge itself, are relevant or even useful. As we know, some images as well as certain pieces of knowledge are relevant for quite some time, on the order of centuries, while others are only relevant for years or less.

Degrees of consciousness. Images of knowledge are effected by degrees of consciousness. Some images are relevant only if fully conscious and articulated. For others, the level of clarity or articulation is
irrelevant. For still others, any clarity or explicit articulation is only detrimental.

*Social norms of behavior, values, or ideologies.* As we have previously discussed, some images of knowledge can be determined by social norms of behavior, values, or ideologies, while other images remain immune to such influences.

*Ease of translation into statements.* Some images of knowledge are more easily translated into statements about nature; likewise some scientific metaphysics are more easily translated into images.

Another way to answer the question of "what are images of knowledge", according to Elkana, might be to place them in a hierarchical structure. However, this too runs into contradictory conditions. In fact, the establishment of the hierarchy requires an imposition of certain images of knowledge on other images in order to assess their relative worth. This assessment might by conducted in terms of age (tradition), professional competence, originality, or beauty, for example. The assessment might also be based on an ideological position, interpretive framework, or scientific metaphysics.

In attempting to define images of knowledge, we have, if nothing else, shown the relative instability of this concept. This is in no small part due to the fact that the ground upon which a particular definition is
constructed is dependent on another image of knowledge. It is like trying to build on sand with sand [but without water, mortar, or binder]; it is hard to distinguish structure from surface because both keep shifting.

This is not necessarily a negative comment. It just points to the relative instability of our knowledge, both of the world around us, and of the qualities or properties of that knowledge as a framework of explanation. As Elkana points out,

"...the central concepts in any theory of knowledge and of change are relative to cultural frameworks and are the result of social consensus. Images of knowledge are sociology of knowledge, as is 'thick description'."\(^3\)

The real problem is that the "...modern philosoph[ers] of science...refuse to consider epistemology in sociological terms..."\(^4\), because the apparent instability it brings to scientific activities conflicts with their images of scientific knowledge.

The apparent uniqueness of certain forms of knowledge associated with certain activities is less a product of the actual activity than of a certain scholarly reductiveness which holds clarity and simplicity as important images of knowledge. Slogans such as "theory from observation", or "form follows function", are less assertions of activity than products of scholarly

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\(^3\)Ibid., p.19.

\(^4\)Ibid., p.19.
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reduction; the actual description of what occurs in the act of scientific theory-making is far "thicker".

"...science does not rest its case on any one source of knowledge, but experience and experimental evidence, clear and distinct ideas, aesthetic considerations, and analogy are all legitimate sources of knowledge. So is authority, actually,..."^{37}

5. SCIENCE AND OTHER CULTURES

A) The Issues

Elkan begins this chapter with an essential question; one we must also ask and answer in a different way, if we are to adapt Elkan's anthropology as a basis for the production of a model of architectural knowledge.

"Is there a basic difference in modes of thought--both in content and more especially in logic and formation--between western and non-western societies? or between 'traditional' and 'modern', 'pre-scientific' and 'science oriented', literate and non-literate, industrial and non-industrial, developed and developing..."^{38}

A corollary to these questions would be: "is there a basic difference in modes of thought--both in content and especially in logic and formation--between science and other forms of culturally produced knowledge?"

In the end, the answer to all of these questions is both no and yes. There are apparent differences between western and non-western knowledge, or between western scientific knowledge and other forms of western

^{37}Ibid., p.20.

^{38}Ibid., p.27.
knowledge, be they common sense, art, religion, ideology, etc. However these differences, by and large, are not function of the knowledge itself, but of our images of knowledge within western culture. Thus, a positivist would counter that science is better than say, art, because it is more objective and rational. But, objectivity and rationality are socially constructed images of knowledge. Likewise, their superiority to subjectivity and irrationality is also a function of socially determined images of knowledge.

B) The Great Divide

Much of the claim of a "great divide" between western and non-western thought, or between "western science" and other forms of "western" knowledge--art, religion, ideology, common sense, etc.--is the "scientificness" of that thought. What properties or traits of western "scientificness" are distinctly western?

Elkana observes that both sides of the apparent "great divide" rely on similar cogitative activities. Both use language. Both have the capacity for common sense thinking--practical judgments about experience. Both try to explain everyday occurrences in terms of observable events and unseen powers--be they divine intervention or gravity. Both establish causal relationships between
theoretical entities and everyday occurrences to explain those everyday occurrences.

All cultures, be they western or non-western, explain various everyday phenomena in terms thought to be stable and regular. This is equally true for a culture whose world view is based on cosmology, polytheism, monotheism, Newtonian mechanics or quantum mechanics.

Western science claims to explain the world in the most stable and simple manner. This assertion is grounded in widely accepted images of knowledge—rationality, predictability, objectivity—within western scientific culture. In other words, the superiority of western science is based on the a-priori assumption, in western culture, that science is superior.

Elkana points out that another way to establish the existence of a "great divide" might be in terms of a culture's literacy.

Clearly, the existence of a written textual tradition, as opposed to an oral tradition, allows for different images of knowledge. The most significant of these being the concepts of "verbal accuracy" and, to paraphrase Martin Luther, the notion of a "naked text". However, just because a tradition is orally transmitted, it is not necessarily "...all newly created interpretation."

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39Ibid., p.33.
Likewise, the written text is not necessarily objective and fixed in meaning. Both the writing of the text and its reading are interpretive acts; both are dependent on the subjective selection of various words with a variety of socially constituted meanings, in the case of writing, or the selection of a meaning from the multitude possible which correspond to a given word or phrase, in the case of reading.

In addition to the aforementioned images of knowledge, the existence of written texts has two other important effects. First, the text fixes a range of possible meanings—in so far as the language remains stable or accessible through ethnographic research—subject to further investigation or interpretation.

The second effect is a function of its mere physicality. The text is transportable and transmittable; it can be used at great distances from, and without direct contact with, its author or producer. The reader is free, within the limitations imposed by language and culture, to make new interpretations free from the immediate control or direction of the author.

In addition to the idea of literacy, Elkana notes that a reliance on the singular clarity of the text, the stability of textual meaning, forms yet another way to establish a "great divide" between western and non-
western cultures, and between science, and other aspects of western culture.

"This view is closely connected with the theory that scientific knowledge accumulates over diverse epochs and in various places and that the increments contain nothing of their environing culture, past and present, except what is contained in the scientific text. Thus science is said to be different in kind from all other realms of culture." 40

While it might be argued that science is less interpretive than art or religion, by virtue of its limited and highly specialized language, the scientific text is still subject to interpretation both in its writing and in its reading. More importantly, this ambiguity or capacity for interpretation is essential to our theory of growth of scientific knowledge.

New ideas can only be found in texts, when subjected to critical analysis, if there are openings in the meanings of and relationships between words. Without these openings,...

"...the text is closed to additional interpretation...the text becomes dead. The theory, and the branch of science which it represents ceases to grow because 'nothing new' can be found within the text [theory; branch of science]..." 41

Still another attempt to establish a cultural "great divide", explored by Elkana, assumes exclusiveness of science within western culture. This theory of the "great

40 Ibid., p.34.
41 Ibid., p. 37.
divide" asserts that a culturally embedded common sense --which exists in both western and non-western culture --is the antithesis of science.

In this case, common sense is seen as "unstructured knowledge", while science is seen as "structured knowledge". But common sense is simply less structured than science; there is just no sharp disjunction, in terms of structure, between science and other forms of knowledge.

Geertz points out that "...common sense is a relatively organized body of considered thought, characterized by its own disclaimer to be so..."42 He continues that "...religion rests its case on revelation, science on method, ideology on moral passion, [and] that common sense rests on the assertion that it is not a case at all."43

Elkana observes that while it might be true that religion rests its case primarily on revelation, it would be wrong to assume that religion rests its case solely on revelation. It also rests on any number of other sources, including experience and tradition.

42 Clifford Geertz, Common Sense as a Cultural System, op. cit., in Elkana, p.38.

43 Ibid.
"Science, too, relies on different sources of knowledge, among which method is not even *primus inter pares*".⁴⁴

As Elkana points out, common sense grows in the course of its own history and its content varies from one culture to another, just like other spheres of culture, such as science, religion, art, myth, or epistemology. Additionally, as a cultural system, common sense can be "questioned, disputed, affirmed, developed, formalized, contemplated, and even taught,"⁴⁵ just like any other cultural system. Likewise, common sense can be as dogmatic or rigid as any other form of knowledge; to assert that common sense is the theoretical or unstructured counterpoint to untheoretical scientific knowledge is, upon closer examination, an unsupportable assertion. At best, one might claim that common sense is less structured and theoretical than science.

Elkana points out that common sense, like science, is a body of knowledge about "the world"—"the world of nature, the world of society, the world of the individual."⁴⁶ Although Elkana suggests that this similarity does not hold true for other cultural systems, such as art or religion—he may be correct in the

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⁴⁴Elkana, p.38.

⁴⁵Ibid, p.38.

⁴⁶Ibid., p.39.
strictest sense—we will want to argue that both art and religion are more about "the world" and our condition in it, than is immediately suggested by Elkana’s exclusion. As we will see, this connection between art and "the world" will be necessary to make the leap from science to architecture.

The difference between a common sense description of the world and the description offered by science is its "of-courseness" or "naturalness", the thinness or immediacy of the descriptions, in contrast to the thickness of scientific descriptions, grounded in methodology and specialized language. Another way to distinguish between common sense and science might through Geertz’s distinction of "close to experience" and "distant from experience":

"An experience-near concept is, roughly, one which someone—a patient, a subject, in our case an informant—might himself naturally and effortlessly use to define what he or his fellows see, feel, think, imagine, and so on, and which he would readily understand when similarly applied by others. An experience-distant concept is one which specialists of one sort or another—an analyst, an experimenter, an ethnographer, even a priest or an ideologist—employ to forward their scientific, philosophical or practical aims."47

It seems clear that we might speak of common sense knowledge as "near experience", and theoretical knowledge

as being "distant from experience". Yet both forms of knowledge--near and distant--occur in both science and common sense, in amounts that are different but not sufficiently so to establish a "great divide".

Elkana claims that it is incorrect to think of the world of knowledge as classified into two discontinuous patterns, be they structured or unstructured, distant or near, logical or illogical, rational or irrational, modern or savage, open or closed. When each set of polar opposites is brought to bear on the world of knowledge, properties of one pole can be found in its apparent opposite. Neither exists in its purest form. Science is not structured, "distant", logical, rational, modern and open, no more than common sense is unstructured, "near", illogical, irrational, savage, and closed.

Furthermore, each set of assertions about an apparent disjunction between science and other forms of western and non-western knowledge--science is better or different from other forms of knowledge, or is superior because it is written, or because the meaning is in the text, or because its descriptions of the world are "distant form experience"--is solely the result of our culturally embedded images of knowledge.

C) What is Left of the "Great Divide"?
What then, is left of the great divide? In the end, really not much. The notion of a sharp disjunction between western scientific knowledge and other western or non-western forms of knowledge, western or non-western, seems largely untenable. With each case, we have tried to support the claim that there is an absolutely unique quality or set of qualities which differentiate western science from other forms of knowledge. Yet in each case, the difference do not represent a sharp disjunction, either in terms of logic, content, structure, rationality or openness. Rather, the differences are in orders of magnitudes; science might be more rational or organized than other forms of western or non-western knowledge, but within science there is an order of irrationality or disorganization. What we are left with is a sliding scale in differentiating between two apparent polar opposites. The value which we place on a particular piece of knowledge, relative to its location on the sliding scale, is a function of our culturally produced images of knowledge.

What is different, and there are real differences, stems from the way each culture constructs knowledge; the influences of each culture’s images of knowledge have on the inclusion or exclusion of certain images and of certain forms of knowledge from certain activities or disciplines. In western scientific culture, science, art,
religion, philosophy, ideology and common sense all explain the world and/or our condition within it, within apparently autonomous disciplines. In other cultures, these activities often occur together. Although this represents a real difference between two bodies of culturally produced knowledge, it does not demonstrate a qualitative difference in the knowledge itself.

In short, the apparent "great divide" is just that, apparent. It is a function of the socio-cultural images of knowledge of one cultural framework imposed on another culture's knowledge. The disjunction is the result of competing and contradictory images of knowledge and is not the result of inherent inadequacies in the knowledge itself.

6. CUNNING REASON VS. EPISTEMIC REASON

A) The Context of Justification and the Context of Discovery

In an effort to preserve the privileged or universal properties of scientific knowledge, much of the recent scholarship in the areas of the history and philosophy of science has focused on another set of polar opposites which function as insulation, protecting scientific knowledge from other forms of knowledge. These are the two arenas in which scientific knowledge--theories, facts formulas--are produced. They are referred to as "The
Context of Justification" and "The Context of Discovery".

One group of historians and philosophers, including the Reichenbach Circle and the Logical Positivists, argue that "The Context of Discovery" has no epistemological relevance in the study of history and philosophy or, for that matter, in the practice of science. Rather, it is in the finished products, or, in Popperian/Lakatosian terms, in the rational reconstructions of theories, that we will find relevance. These finished products and rational reconstructions occur in "The Context of Justification".

Another group, including Wittgenstein and others, focus their attention on "The Context of Discovery". This approach focuses on the factors which direct the discovery, development and acceptance or rejection of theories. The task of the history and philosophy of science, within this context, is to study the characteristics of science when located within a larger cultural Weltanschauung [world intuition] or Lebenswelt [lifes world]48.

As Elkana points out, the relevant question remains, as before, the following: is there a sharp disjunction or distinction, either in the body of knowledge or in the

contexts in which knowledge operates or is developed, between the context of justification and the context of discovery? In the strictest sense, the answer depends on our definition of science.

Elkana observes that if we define science by its products, employing methods similar to those used by positivists, who claim that science is a body of rules, formulas and laws produced by various disciplines and sub-disciplines, and who regard open problems or areas of investigation as independent from the rules, formulas and laws with which they conduct these new investigations, then justification is not discovery. If the rejection or acceptance of any part of a specific theory is independent of other parts of the theory, then the context of justification is not that of discovery. And if the reasons for the rejection or acceptance are found only within the body of knowledge, and not within our views about knowledge then the context of justification is not that of discovery. In all of these cases, science is represented as a body of knowledge divorced from both the context of its production and its producers or users.

If, on the other hand, we wish [as Elkana has] to depict science as a cultural activity which grows by way of a continuous critical dialogue, focusing on the one hand on open problems, and on the other hand the
knowledge, scientific metaphysics and images of knowledge needed to frame the open problems, then the distinction between justification and discovery is not at all clear. Within this model, science is in a state of flux, there are no finished products, no elimination of the unknown, no isolation of open problems—in short, there is no real distinction, in the strictest sense.

That is not to say that a distinction cannot be artificially created, if the purpose of such a distinction is understood not to be truth but fruitfulness. It might in fact be useful, in the development of a thick description of a particular time, discovery or framework, to differentiate between observational, theoretical, traditional, ratiocinational, etc... developments. The decision to assign each of these apparently real and different developments to either contexts, justification and discovery, is a relativist choice [two--tier--thinking again], based on culturally grounded images of knowledge, the purpose of which is the development of thicker descriptive understandings of the production of knowledge within a particular cultural framework.

The artificial distinction between justification and discovery, in a specific context, might aid in the development of critical dialogue, increasing the precision of the critical discourse, thereby assisting
in the growth of knowledge. Yet we must remember that this distinction only offers an analogy of the actual complexity of scientific inquiry. In the practice of science, the contexts of justification and discovery as well as the images of knowledge brought to bear in both cases, do not function in a stable dualism; they remain in a state of flux.

B) Modes of Reasoning

Not unlike the distinction between science and non-science, the distinction between discovery and justification attempts to protect the privileged status of scientific knowledge.

The need for this distinction, as a form of protection, was pointed out in Karl Popper's essay *The Logic of Scientific Discovery*, published in 1935, which points out that there is no logic of scientific discovery. Popper observes that the act of discovery cannot be adequately explained, described, or reconstructed with any degree of historical accuracy. For Popper we must abandon any hope of rationally accounting for man's creative genius.

At the center of this exclusion is the belief that science is, in its ideal state, based on a form of reason known as epistemic. This form of reason is logically coherent, deductive, and rational in nature. This form
of reason also entails the rejection of social and psychological factors in the development of knowledge. The decision to base science on this form of knowledge, as Elkana observes, predates the Logical Positivists by more than two thousand years.

It should be apparent by this point that this is contrary to the model of knowledge we have been developing thus far. The lack of rationality and logic lamented by the positivists need not preclude the study and careful reconstruction of the thoughts and events which led to a particular scientific discovery.

Yet rather than following the positivist lead, and abandoning the context of discovery, what is needed in order to address the problems presented by the context of discovery is an additional mode of reasoning capable of working in conjunction with epistemic reasoning. Together they provide a context for the development of a theory-laden thick description of the process of discovery, permitting a back and forth movement between "total objectivity" and "complete relativism"; together they should permit two-tier-thinking.

Elkana refers to this additional form of reasoning as "cunning reasoning", which he claims originates with the Greek "metis" reasoning.

"[Metis]...implies a complex but very coherent body of mental attitudes and intellectual behavior which combines flair, wisdom, forethought, subtlety of mind, deception, resourcefulness, vigilance, opportunism, various skills
acquired over the years. It is applied to situations which are transient, shifting, disconcerting and ambiguous, situations which do not lend themselves to precise measurements, exact calculations or vigorous logic."  

He goes on to observe thatmetis reasoning can be seen working in conjunction with epistemic reasoning in early Greek texts on science. Only later is it dismissed as only practical and lacking any rigor.

What prevents the logical positivists from considering the ideas behind two-tier-thinking—a back and forth between realism and relativism—is the belief that scientific knowledge is both privileged and unique. Or to restate it in our terms, certain images of knowledge essential to a logical positivist view preclude relativist indeterminacy or the influence of cultural factors with respect to the production of scientific knowledge. Rather than reconsider their images of knowledge, the logical positivists abandon the context of discovery, and with it cunning reason, as an integral of scientific enterprise.

7. SOME SOCIOLOGICAL PROBLEMS OF SCIENCE
A) The Switch to Sociology

Throughout the development of his theory of knowledge, Elkana concentrates on exposing the false distinctions

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49Elkana, p. 48.
and demarcations between science and other forms of knowledge. In place of these distinctions Elkana develops a series of analytical tools, some of his own design, others borrowed from different sources with which to control the immense range of possible open problems in science. They include two-tier-thinking, thick description, and the tripartite system of a body of knowledge, culturally determined images of knowledge, and ideology. These tools are brought to bear on a view of science as a cultural system, "...a view that best suits...[an] understanding of ourselves and of other cultures in an age where our own culture has become the culture of science."\(^{50}\)

Elkana argues that all decisions relating to science should be considered "...in terms of images of knowledge, or on the interdependence between these and the body of knowledge."\(^{51}\) The assertion that the body of knowledge plays a small role stems not from a belief that it has too little to offer, but that it has too much to offer. There are too many choices, too many open problems, too many possibilities; discrimination between the overwhelming potentials present within the body of

\(^{50}\)Ibid., p.48.

\(^{51}\)Ibid., p.48.
knowledge occurs through the socially determined images of knowledge.

Ideologies, interest theories and economic factors affect decisions relating to science in indirect way only. They are brought to bear not on the body of knowledge in any direct sense, but on the images of knowledge.\textsuperscript{52}

Under this sociological model of scientific knowledge the whole enterprise—the history of science, institutional studies, comparative science, cognitive studies, the philosophy of science, the justification for political science policy—is subsumed in the historical sociology of scientific knowledge. The inclusion of these apparently unrelated activities is not the result of unanimity or consensus within the culture of science. Actually, the opposite is true. The illusion of consensus on facts is replaced by an articulated critical dialogue in which contradictory frameworks, and with them contradictory images and facts, are made explicit and accessible, not only to a limited sub-group within the culture of science, but to all those interested and concerned with the scientific enterprise.

B) Post-mature and Premature Discoveries

\textsuperscript{52}Ibid., p. 48.
It makes sense that Elkana, having focused much of his attention on the history of science, chooses one its more interesting and unique problems to continue the development of his argument. This is the issue of a postmature and a premature discovery employed within current historiographic practices.

A post-mature discovery is one which appears, from a historical perspective, to be late; whatever was necessary or important for a particular discovery to be made was available, in the scientific realm of the discovery, long before the discovery takes place.

A premature discovery is one which appears, from a historical perspective, to be early: whatever was necessary or important for a particular discovery to be made was not yet available, within the scientific realm of the discovery, before the discovery occurred. Often premature discoveries are at least partially—if not totally—forgotten, only to be rediscovered after the material necessary and important to support the discovery becomes available. In almost every instance, premature discoveries are considered to be the work of individual geniuses able to work independently or in advance of their cultural and scientific context. Additionally, a premature discovery is one that, without the intervention of a genius, would have been made by someone else eventually.
In an effort to protect science from relativist "chance", be it illogical social pressures or the necessary intervention by individual genius, the definition of a premature discovery includes a clause which claims that, without the intervention of a genius the same discovery will be made by someone else eventually. Clearly implicit here is the belief in the inevitability of the growth of science along predetermined and singularly unique lines.

But if the progress of science is predetermined, the notion of a post-mature discovery is questionable. If a discovery was not made, it could not have been made. Although everything necessary for the discovery appears to be in place, from a historical perspective, something must be missing because the discovery hadn't happened yet. Likewise, are premature discoveries indeed premature? Or are we, in both cases, just not seeing clearly from our historical perspective?

The ability to differentiate between open and closed problems, the relative importance of each open problem when compared to others, the range of possible interpretations and the relative rank of each; all are functions of the culturally dependent images of knowledge, and all are capable of varying from culture to culture, as well as over time.
A discovery might appear post-mature, when the culture surrounding the body of knowledge is ignored; but the images of knowledge necessary to recognize or frame the open problem might not have developed yet within the culture or subculture of science. Or alternatively, the images necessary might have been obscured or contradicted by other images of knowledge believed to be more important.

Likewise, a discovery might appear to be premature because it appears, when viewed from a knowledge based perspective, that whatever was necessary or important for a particular discovery to be made was not yet available, or because it was forgotten and later rediscovered. In the first case, although all of the "necessary"--from our current perspective on history, focusing on the body of knowledge--knowledge might not have been available, the discovery might have been visible within the knowledge available, its visibility a function not of the body of knowledge but of the images of knowledge present within the culture. In the second case, the discovery might have been forgotten and later rediscovered not because of changes in the body of knowledge, but due to changes in the images of knowledge. When the discovery was first made, though possible, it might have conflicted with other images of knowledge held in higher esteem, and therefore abandoned. Later, when the images of knowledge
changed, the discovery might have been taken up again. Sometimes this change corresponds to changes in the body of knowledge, thought not always. However, as in the case of post-mature discoveries, it is in the areas of images of knowledge, not in the addition of new knowledge, that the change must take place.

It is clear that we operate across several orders of discourse and in several theoretical frameworks, some of which can partially contradict or refute one another, as in the explanation of premature discoveries just discussed. This movement, which occurs while we learn, teach, innovate, discover or justify, in which ambiguity and vagueness are the rule rather than the exception, is not logical.

"Logic is expected to hold only in a totally static situation, when we make an attempt to check a theoretical network for internal coherence and we introduce only concepts and theories of the given domain. When we do that, we can eliminate vagueness and inconsistencies, but we have then to limit our domain to a subsystem of the whole theoretical network and to cut out all the open problems even from that subsystem. That is exactly what we do in textbooks. The tragedy [is that] instead of using textbooks for the purpose of logical stock-taking, we use them for teaching."\(^{53}\)

C) Some Other Examples

Elkana points to other problems which are regarded, within a Logical Positivist framework, as more

\(^{53}\)Ibid., p.54.
sociological than epistemological in nature. These too can be framed and discussed applying our analytical tools brought to bear on epistemological problems.

Elkana discusses four areas important to support his theory of scientific progress. Each of these will be relevant to our later discussions on architecture.

The first question upon which Elkana focuses is that of "multiplets"; that is the apparently simultaneous discovery by several isolated researchers.

Though made more plausible by the recent explosion of information in the course of the last 50 or so years, the question is whether these discoveries are indeed simultaneous. Did these discoveries happen at the same time?; and are these discoveries really the same?

The answer to the first question, though apparently simple, is a function of many things ranging from the accuracy or existence of the historical record, to the intentions or hidden agenda of the historian—we need only think of Giedion or Hitchcock and Johnson. The concept of accuracy; the importance of record-keeping, the authority of the author; all are functions of a conceptual framework and its corresponding images of knowledge, and as such are subject to change and distortion in hindsight.

Are the discoveries the same, or are they merely sufficiently similar to be subsumed in a new theory which
treats them as the same? Which facts are the same, how similar do two or more facts need to be in order to be considered the same, what is new, what is a fact; all are functions of a conceptual framework and its corresponding images of knowledge. Often the decision that two facts are the same is made in hindsight, when the original images of knowledge are no longer relevant, or when new images of knowledge, which change the meaning, are brought to bear on old discoveries. The point here is neither to confirm or refute the possibility of multiple simultaneous discoveries. It is only to demonstrate some of the ways in which two discoveries can appear to be identical and simultaneous, and why the appearance of multiplets, in hindsight, is often inevitable.

The second question Elkana focuses on is education. He notes that because science has been considered to be fact oriented—that is, independent of its cultural context—the teaching of science has been reduced to the teaching of facts. What is missing in the traditional model of scientific education is the complexity of the decision-making process which underlies the production of the facts.

In a well-meaning alternative to this traditional model, students are permitted to "discover" the laws of science themselves. The problem with this alternative model is, as Karl Popper observed, that there just is no
singular logic of discovery with which each student will unavoidably be led to the law in question. And we have pointed out on more than one occasion in this section that several overlapping and contradictory frameworks, each with its own associated images of knowledge, are brought to bear in the process of discovery; which frameworks, and to what degree each is imposed vary from person to person and situation to situation. In an effort to control this real and necessary diversity, a kind of intellectual, methodological and experimental straight-jacket is imposed on the context of the mock-discovery, insuring that all students will arrive at the same conclusion.

In place of these two models Elkana offers a third. Rather than avoid the complexity of discovery, or create a simplified and hollow caricature, we should teach science, and the act of discovery, with detailed case studies of earlier discoveries. These studies should focus not only on the body of knowledge, but on the relevant frameworks and images of knowledge as well. In this way a thick description of the discovery, including the various contexts relevant to its production, can be developed and explored in the classroom with active student participation, much in the way other culturally dependent disciplines--art history and literature, for example--are taught.
The third question to which Elkana addresses himself pertains to the relative health of science. In particular, Elkana is concerned with the use of scientific criteria to measure the health of science -- often measured in terms of its improvement to our "quality of life"--and to establish political science policy.

Any attempt to evaluate the health of science presupposes the existence of a unified theory of science; one in which the images of knowledge used to evaluate scientific production--quality progress, decline, growth, stagnation, success, failure, etc.--are both explicit and either universal or at least universally agreed upon. Yet as we have repeatedly seen, these images of knowledge vary with respect to time, culture and discipline, sometimes with contradictory meanings for the same terms.

If one used the conventional model of science as an objective body of knowledge, the questions before us would be relatively easy. The health of science would be measured in terms of new theories, publications, discoveries, inventions and patents and its effect on the quality of life in terms of social benefits and harmful consequences.

"This is not the view of science we are advocating. We would like to view science as a conjoined social and cognitive enterprise, problem-oriented rather than result-oriented, well rooted in the problematics of the culture and the society of the people who are involved
in creating, using, admiring or condemning it, or supporting it.\textsuperscript{54}

Viewing science in this way, the two questions before us become more difficult. In this context, science is evaluated not in terms of its products but in terms of its coherence and participation with other preoccupations of the culture. The health of science is not the number of new theories, it is at least in part the degree to which it contributes to the openness, innovativeness and speculative breath of other areas of creativity within culture. This implies, as Elkana points out, that a total cognitive context need be considered, in which no image of knowledge can be seen as progressive, reactionary, et.al., in of itself.

Likewise, the question of science's effect on quality of life cannot be limited to its benefits and consequences. We must engage in thick descriptions, investigating the degree to which science, as a cultural system, participates with other cultural systems. We need to examine the implication of whatever participation does occur, and how that participation is viewed by cultural constituencies, each representing various conceptual frameworks and related images of knowledge.

The final question examined by Elkana is whether science can be redirected. The answer depends on the

\textsuperscript{54}Ibid., p.54.
model of scientific knowledge we adopt. If we retreat to a model of scientific knowledge in which the body of knowledge is primary, universal and context independent, than the answer is "no".

However, if we adopt the culturally based model of scientific knowledge, the answer is a qualified yes. Science, the body of knowledge itself, is largely protected from redirection. Yet all decisions leading up to, evaluating, defining, demarking or differentiating knowledge and selecting open problems are functions of culturally embedded images of knowledge. These images are constantly changing, and can be redirected in so far as the culture can be redirected.

8. SCIENCE, THE EPIC THEATRE

Implicit in the two models of scientific knowledge which we have been examining--one concerned with science as a body of knowledge, the other with science as a cultural system--are two models of history. Using theatre as an analogy--good theatre functioning as a mirror of life--Elkana characterizes these two models of history as Greek drama on the one hand, and Epic theatre on the other.
"Greek drama is a depiction of the inevitable."\textsuperscript{55} In this view of history, the future is inevitable; man may effect the smallest of details, the big picture is beyond his control. The future unfolds according to pre-established rules; once it has happened, it is clear that it couldn’t have happened any other way.

It is this view of history—the unfolding of the inevitable—which underlies western cultural views of the growth of knowledge and particularly of the discipline of science.

This view of science, we have seen, leads us to believe that there is only one science, ours, which is uniquely capable of stating the great truths of nature.

The growth of knowledge is inevitable; the actions of individual geniuses, though interesting, are ultimately irrelevant to the growth of scientific knowledge. If there had not been a Newton or Einstein, someone else would have made the same discoveries, and science would have continued down its predetermined path. Likewise, there is no other body of knowledge, in this culture or any other, capable of discussing the truths of nature with equal authority; the notion of a "comparative science" between cultures is meaningless.

\textsuperscript{55}Ibid., p.66.
This is not the case with a model of history based on the concept of "epic theatre". This model, developed independently by Walter Benjamin and Bertold Brecht, asks not "how did this [discovery, law, theory, etc.,] happen", reflecting a belief in the unique and inevitable. Rather, the question is "how did this [discovery, law, theory, etc.,] happen this way, although it could have happened otherwise".

Science, in this case, is neither unique nor predetermined. It might have grown differently; with different laws of nature, different discoveries, different frameworks with different corresponding images of knowledge. Had Newton or Einstein not existed, science might indeed be different.

Given this potential for difference, a "comparative science", one which examines different cultures and different time periods within the same culture, is both meaningful and relevant.

"All idealistic attitudes, whether reductionism, positivism, or behaviorism, share the Greek Drama view of science. I, on the other hand, fully identify with the historic attitude of Epic Theatre and it is this world-view which underlies the work before the readers." 

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57Elkana, p.69.
1. INTRODUCTION

Although it would be wonderful, in this age of modern science, computers and word processing, to merely substitute the word "architecture" for "science", the task before us is much more complex. The primary problem to which we must address ourselves, even before turning our attention to Elkana, is centered around the apparent differences between science and architecture. Specifically, we need to justify framing the architectural problem in terms of knowledge, something taken for granted in the case of science.

Science, as we have defined it in the previous section, is a body of knowledge with its associated culturally bound images of knowledge and ideologies, which function as model "explanations" of phenomena. Although many things are produced based on science, and for the most part these are not made by scientists. In the narrowest sense, avoiding questions of existentialism and co-making, scientists do not produce the world, its physical condition, they make theories about it; biologists do not make the biological world they theorize about [though some might argue that with the advent of DNA research, they might], likewise physicists are not responsible for the forces of gravity nor the concept of time, though many theories exist which attempt to model their activities. In short, science is a system within
western culture which tries to explain the complexity of phenomena in terms acceptable and consistent with western culturally bound images of knowledge.

Although this is close to where we would like to get in our definition of architecture, the path is less direct. First, architects are involved, at least indirectly, in the production of something physical and tangible; their theories are operative. Actually, only some architects indirectly make physical things. Others only produce theories or imaginary projects, while still others produce histories and critical investigations of the near and distant past.

It should be pointed out that this broad description of what architects do is not universally agreed upon. There are those architects and non-architects within the sub-culture of architecture who believe that architects only produce physical objects. Even some of the more important work in the area of design thinking, including the work by Don Schon and Roger Simmons, begins with the operational definition that "architecture is what architects do", in fact limiting "what architects do" to designing buildings.

This rule--an architect is someone who builds-- has led to such absurd corollaries as "those who can't build, teach". Implicit here is the assumption that those who do not build can't; it is a matter of competence. This
means that those who are incapable of meeting the measured standard to be considered architects today—those who build—are then responsible for training those who will meet that standard—those who will build—tomorrow. That would make architecture the only discipline I know of interested not in perpetuating its growth but in insuring its decay and death.

Implicit in my broad description of architectural activities—including the production of buildings, theories, history and criticisms—is a rejection of this narrow view of architecture as building. Additionally, I suggest that a definition of architecture might be developed, at least in part, in terms of a body of knowledge: what is constant within these various activities—including the production of buildings, theories, history and criticisms—is the investigation and application of knowledge about buildings and environments. The concern here, in developing our definition of architecture, will be to avoid the pitfalls of idealistic science examined by Elkana, in developing our theory of architecture.

2. ARCHITECTURE AS A FORM OF KNOWLEDGE

While the connection between architecture and building is undeniable, it is in the nature of the connection
that we might find an opening for a definition of architecture.

The idea which equates architecture with built works imposes unnecessary and arbitrary constraints on the definition of architect and architectural production. It results in impossible ironies which undermine any belief in the program of the discipline. It reduces the architectural activity to a collection of artifacts whose sole relevant connection to one another, and to the culture and society in which they are produced, is a function of who produced them.

But more than any of these shortcomings, the major point avoided by those advocating this position is that in modern times, for the most part, architects do not produce buildings, any more than composers produce music. Both are collaborative works. The architect produces a score, in the form of drawings, specifications and contracts, which are used in association with his orchestra, the contractors and subcontractors, organized by his conductor, the construction manager and general contractor. In both cases, composer and architect, the collaborators don't work for the creator. Like the composer or architect, they work for the client who has commissioned the work. Sometimes—more often in the case of architects, whose works are rarely executed more than once—the creator participates in the production of his
work. But he does not build it. The architect produces knowledge and information, which are then used to direct others who build. Those advocating the position "an architect is someone who builds", considering all of the steps and relationships just considered, are really saying that an architect is someone who produces knowledge directly related to the production of buildings. The difficulty with this position is in drawing the line as to what forms of knowledge directly relate to the production of building, and what forms are secondary. There is wide agreement that the knowledge necessary to size a floor joist or window header is directly related. But what about the placement of the windows on the facade, or the size and proportion of the windows? And what of the placement of the rooms, and their relationships one to another? What of other houses, the history of family dwellings, examples of other houses which deal with similar issues, sites, economics, climates, etc? And what of the use of technologies; is that joist, which we have sized, made of wood or steel, hidden or exposed? These are the kind of questions which fall into the grey area, between primary and secondary. These questions are the concern of those who build, but they are also the concern of those who write theories, histories, or criticism, as well as those who design unbuilt or unbuildable projects. And most importantly,
all who are concerned, whether builder, writer or theorist, participate in the production of this knowledge on an equal footing; the one who builds is not privileged.

We see here that, even beginning with what is apparently the most anti-knowledge position from which to define the architect and his product [what he does], we are inescapably led back toward an architecture defined in terms of a body of knowledge. We are left then with a definition of architecture framed by a body of knowledge pertaining to the production of buildings.

"A bicycle shed is a building; Lincoln Cathedral is a piece of architecture. Nearly everything that encloses space on a scale sufficient for a human being to move in is a building; the term architecture applies only to buildings designed with a view to aesthetic appeal." 58

In this famous quote by Nikolaus Pevsner, architecture is differentiated from mere building by the imposition of a body of knowledge known as aesthetics. Aesthetics is not a function of the "building-ness" of the building --its materiality. It is a function of a body of knowledge imposed on the activity of producing buildings.

Whereas before we were willing to define the architect as one who produces knowledge and information necessary or related to the production of buildings, and architecture as merely the products of architects,

Pevsner introduces a new twist. Architecture becomes the product of architects who employ a specific body of knowledge, aesthetics, to the task of creating knowledge related to the production of buildings which conform to the aesthetic body of knowledge. I realize that this definition is, at best, circular. But permit me to let it stand long enough to examine the point around which it is drawn. That point is aesthetics.

In presenting this definition, aesthetics is offered as a given. But what does Pevsner mean by the term?

In its strictest sense, the dictionary definition of aesthetics is "...the theory of the fine arts and of people's responses to them; the science or branch of philosophy which deals with the beautiful;..."59 I think that it would be fair to presume that this definition is on the order of what Pevsner means, at least initially, by the term aesthetics.

Therefore, architecture is differentiated from building by a theory or science of the fine arts, in which architecture is implicitly included, and peoples responses to them. Architecture, unlike simple building, conforms to the science or philosophy of the beautiful.

Aesthetics, in its characterization as a "science", is perceived as a body of universal truths; the science

being referred to is positive science. Earlier in history, the aesthetic rules were believed to be divine inspiration, in unity with the world, cosmos, and the eternal. Rules of order and proportion or symmetry and balance, for example, were used to place the works in harmony with the universal and the divine. Then as now the aesthetic laws are seen as a universal body of knowledge which explains the beautiful, and people's response to it.

Although I am not advocating the aesthetic position championed by Nikolaus Pevsner, with its reliance on a universal, and therefore culturally independent body of knowledge, we are interested in his position for at least two reasons. First, Pevsner frames the architectural problem with respect to a body of knowledge, without which architecture would not be identifiable as such. Second, the body of knowledge focuses not on the activity of building, but on a system of relationships between the object and its producers and users. Whether science or divine inspiration, the aesthetic theory implicitly embodies a series of relationships about the nature, use and role of the built environment. Different assumptions, though similar in their direction, underlie decisions made by people in other cultures and at other times about their built environment.
Let us consider, for example, the investigations of the Dogon villages of East Africa conducted by Aldo van Eyck\textsuperscript{60} and others.

Van Eyck observes that the arrangement of the Dogon dwelling, its placement in the village, and the village's location in the landscape are based on a cosmological model which describes the Dogon's position in the universe. Specifically, Dogon settlement patterns establish physical relationships between an individual and the members of his family, his neighbors, his natural environment, and his god. These physical markings on the ground mark out in tangible terms the culturally imbedded relationships which form the physical and social context in which the Dogon make their lives.

Other researchers, working on questions similar to those explored by Van Eyck, focusing on indigenous settlement patterns and their cultures, including the Dogon and the Hopi, as well as the ancient cities of Beijing and Mexico City\textsuperscript{61}, support the connection of physical and formal relationships and metaphysical

\textsuperscript{60}Van Eyck published several articles in which he discussed his research of the Dogon, including \textit{The Universe in a Basket, The Dogon}, published in 1967 in Dutch Forum.

\textsuperscript{61}Julian Beinart, \textit{Theory of City Form}, lecture course at M.I.T., Spring 1988.
beliefs. This connection is believed to be structural in nature.

This basic research, conducted by both architects and non-architects, is employed as justification for new theories, developed by members of Team Ten and others, to produce new architectural works. Common to all of these theories is a belief that there should be a direct and structural relationship between modern architectural forms and modern society.

Or, let us consider the application of Heidegger's metaphysics to the problems of architecture, developed by Christian Norberg-Schulz. In specific, Norberg-Schulz develops his theories, at least in part, around Heidegger's collection of essays entitled *Poetry, Language, Thought*[^62], focusing much of his attention on the architectural references found in *The Origin of the Work of Art*[^63] and *Building Dwelling Thinking*[^64]. Although there are many references in Norberg-Schulz's writings to the Phenomenology of Husserl and Heidegger, necessary to develop Norberg-Schulz's architectural ontology, the


[^63]: Ibid.

[^64]: Ibid.
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connection to Heidegger is made most explicit in an essay entitled *Heidegger's Thinking on Architecture*.

Although it is not clear in my reading of Heidegger that he is the least bit interested in developing an operative theory for the production of architecture, something in which Norberg-Schulz is very interested, Heidegger nevertheless regards building, even in its most primitive and elemental form, as an essential act of man. By way of etymological investigation, Heidegger connects the act of building with our condition of being. The act of making the world of building, establishes our place in the world relative to "...earth and sky, divinities and mortals"—a series of parallel dualities Heidegger refers to as "the four-fold". The act of building, according to Heidegger, establishes a metaphysical relationship as a physical one [to our environment and our universe].

I am not claiming here that any of these theories--aesthetics, structural anthropology, or phenomenology--is correct. Nor am I interested in offering a competing alternative theory. I am looking for a way to define architecture in terms of a body of knowledge, in which

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66 Ibid.
each of these theories can operate in critical dialogue, participating in the growth of architectural knowledge.

In each of the four definitions or descriptions we have examined—architecture as building, architecture as aesthetics, architecture as structural anthropology, architecture as an essential activity—architecture is defined or described, either implicitly or explicitly, in terms of or in relation to a body of knowledge. That body of knowledge contains information necessary to produce architecture—information about techniques, rules, methods, systems, etc. In most cases, it also contains explicit or implicit metaphysical direction; the knowledge is not limited to mere technique. Given these two observations, for the purposes of this thesis, I would like to propose the following defining metatheory.

*Architecture constitutes an operative body of knowledge, separated from but pertaining to the built environment, which describes our system of relationships in the world, be they productive, physical, communal, sociocultural or metaphysical.*

3. ARCHITECTURE AS A CULTURAL ACTIVITY

Although this definition forms a useful first step, we run the immediate risk of falling into a quagmire of positive knowledge which, with respect to science, Elkana worked so hard to remove us from. Once architecture is defined or described in terms of a body of knowledge, we might be inclined to discuss architecture as a science.
Architecture might be considered, for example, as the science of aesthetically governed three dimensional space, or as the science of building, in the way that psychology, sociology or behavioral studies have become science. Then, is the history of architecture, like the history of science, as argued by the scientific positivists, the development of one body of knowledge, progressing toward a universal body of knowledge?

As we have discussed, when people frame architecture as "scientific" they start not from some property of architectural knowledge, but from how science is regarded within western scientific culture. Their decision to frame architecture as "scientific" is an attempt to reinforce or legitimize architectural knowledge--to empower it through inference--by asserting that it is "science-like", in a positivist sense.

I do not wish to claim that architecture is a science, especially in a positivist sense; never-the-less, it is "science-like" to a certain extent. By that I mean that, like Elkana's science, architecture is also a cultural activity.

In the following paragraphs we will consider several examples in which the importance of interpretation in the development of architectural knowledge should become clear. In each example, the same body of knowledge will be subjected to different culturally embedded frameworks,
each with its own associated images of knowledge and ideologies; the result will be a different theory of architecture. If architecture were a positive science, the change in cultural framework should not effect the theory of architecture; they are not related.

Let us return to the study of the Dogon. The approximate size and shape of the Dogon dwellings are not mere functions of the available technologies and skills necessary to build, although the techniques employed do impose certain limitations as to what can be built. However, it is doubtful if these limits are ever tested in actual building. It is quite likely that these limits have been implicitly incorporated over time into the totality of rules and myths which governs the built environment.

Additionally, the approximate size, shape and layout of the Dogon dwellings are functions of culturally bound norms.

"Among the Dogon...of Mali every object and social event has a symbolic as well as a unitarian function. Houses, household objects, and chairs all have this symbolic quality, and the Dogon civilization, otherwise relatively poor, has several thousand symbolic elements. The farm plots and whole landscape of the Dogon reflect this cosmic order. Their villages are built in pairs to represent heaven and earth, and fields are cleared in spirals because the world has been created spirally. The villages are laid out in the way parts of the body lie with respect to each other, while the house of the Dogon, or paramount chief, is a model of the universe at a smaller scale. Multi-storied houses are the prerogative of the highest religious and political leaders and are symbols of power, representations of them being used for
many purposes; for example, as masks to frighten away the souls of the dead.\textsuperscript{87}

This inquiry by architects and others into the cultural roles of Dogon settlement patterns, in addition to increasing our understanding of the Dogon, becomes the support for new architectural theories. The Team Ten, in reaction to the perceived shortcomings of the functionally determinist model of city planning developed by the CIAM in the Charter of Athens, uses the culturally bound model of architectural form implicit in the Dogon research as justification for an alternative theory of city form. Whereas CIAM divided the city into four functional categories--living, working, transportation and recreation--the Team Ten proposed framing the problems of the city in terms of human associations. These were described in physical terms as the house, street, district and city.\textsuperscript{88}

In this example, the same body of knowledge--how the Dogon build--is applied in two different cultural frameworks. In the first case, the Dogon explicitly apply the body of knowledge because, when viewed through their culturally embedded framework and associated images of knowledge, it functions as "real" direction for building.


\textsuperscript{88}Alison Smithson, ed. \textit{The Team Ten Primer},(Cambridge:MIT Press, 1968)p. 76.
In this case the body of knowledge, with its culturally embedded frameworks, associated images of knowledge and ideologies, separated from but pertaining to the built environment, describes the Dogon's system of relationships in the world, be they productive, physical, communal, sociocultural or metaphysical.

In the second case, the same body of knowledge—how the Dogon build—is put to a very different use. The body of knowledge, with its culturally embedded frameworks and associated images of knowledge and ideologies, which we call Dogon Architecture, forms one of many case studies which support a theoretical speculation that a more appropriate operative theory of architecture would begin from a study of human associations at various scales. These would range from interpersonal, to small groups of interpersonal groups, to groups of small groups, and finally to groups of these larger aggregates of the smaller groups. In physical terms, these are the aforementioned house, street, district and city. In order to build them, we need to study these relationships within our own culture, just as we have with the Dogon. In this second case, the body of knowledge which we have called Dogon Architecture, with its culturally embedded frameworks, associated images of knowledge, and ideologies is incorporated within a different body of knowledge, frameworks, images and ideologies, which we
will call Team Ten Architecture; there it constitutes an operative system, separated from but pertaining to the built environment, and attempting to describe modern man's system of relationships in the world, be they productive, physical, communal, sociocultural or metaphysical.

In architecture, the probability of competing forms of architectural knowledge, with competing cultural frameworks, images of knowledge and ideologies, is more the norm than the exception; in science, instead qualities like uniqueness and universality, whether correct or incorrect, are often taken for granted. As demonstrated with the Dogon example, the same body of knowledge, within different cultural frameworks, images and ideologies, results in fundamentally different theories of architecture, and architectural forms.

The Dogon theory of architecture is cosmological. The knowledge upon which architectural decisions, if might be permitted to call them such, are based is intertwined within the Dogon's culturally embedded frameworks, images of knowledge and ideologies which locate the Dogon, physically and metaphysically, in the world.

The theory of architecture of Team Ten is also intertwined within their culturally embedded frameworks, images of knowledge and ideologies. However, instead of cosmology, their theory of knowledge, like that of the
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CIAM before them, is based on a belief in positive science. The challenge to the CIAM from Team Ten did not question the belief in a positive science, prevalent within the culture of the time; they questioned which science to rely on. Specifically, while the members of CIAM focused their attention on Functionalism, the members of Team Ten turned their attention to the areas of Psychology, Sociology, Behavioral Studies, and Structural Anthropology.

As we have seen in this re-examination of the Dogon example, the same body of knowledge, when subjected to the frameworks, images of knowledge and ideologies of different cultures, results in different systems for the production of architecture. Similar comparative investigations are possible for Pevsner's aesthetic model of architecture. We might consider how the application of the same portions of the body of knowledge produce very different buildings when applied within different cultures or at different periods in history. Consider, for example, Colin Rowe's investigations of Michelangelo, Palladio, and Le Corbusier in several essays found in the Mathematics of the Ideal Villa and Other Essays. Here we see similar rules about order, proportion and

transparency applied in different cultures and at different times in history with markedly different results.

However what has remained constant in all of these examples is our underlying metatheory of architecture. It is with this metatheory that we will begin to build our pedagogical model.

4. THICK DESCRIPTION: A PEDAGOGICAL MODEL

In our effort to demonstrate that architecture is a cultural activity we have employed a series of thick descriptions, as we will see.

If we reflect on the "apple" metaphor presented in the introduction, we see that we have been examining the relationships and effects caused by the intersection of different cuts within two different "apples". One "apple" we called "Dogon Architecture"; the other we called "Team Ten Architecture". In each case, we examined or unfolded the interplay of different and often competing concerns, which led to the resolution of the particular investigation.

I would like to take one more look at Team Ten's use of Dogon architecture and culture, in an effort to make the layers of thick description explicit. To refer to our metaphor, we will look once more at the Team Ten Apple.
One cut through the Team Ten apple is "Dogon Architecture" and culture. In this cut the many layers of description, which had Rapoport employed, have been compressed. The reason for this compression is simple enough. The members of Team Ten have little or no interest in reproducing the complexity of the Dogon's culturally bound architectural system, they merely wish to use it as an example of a socio-culturally integrated theory or system of architectural forms. As an example, it only needs to be clear and complex enough to be believable; the description does not have to be complex enough to be reproduced. The decisions which surround this simplification of Dogon architecture and culture form additional layers of description.

Other layers of description through Team Ten's apple include Team Ten's belief in positive science; their rejection of the Functionalist system of decision-making advocated by the members of CIAM; their belief in Modern Architecture--its physical forms, methods of construction and production represented to no small part by the work of Le Corbusier70--; their belief in the ability of psychological, sociological, cultural and behavioral studies to abstract patterns of behavior; the differences of countries, locations and clients with

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which each Team Ten member worked; the emerging importance of the question of "meaning" within architectural debate. None of these descriptive layers, by itself, offers an adequate explanation for the various architectural theories and systems developed by the members of Team Ten. The explanation or justification for these theories is to be found in the intersection and interplay of these descriptive layers.

As Elkana observed, knowledge grows by way of this interplay, or critical dialogue between layers, as well as between positions established within each layer. We can see an example of this critical dialogue in action by examining the works produced and inspired by two members of Team Ten. In this case I am referring to projects by Alison and Peter Smithson and Aldo van Eyck.

Both the Smithsons and Van Eyck were concerned with the role of the "street", not only as a means of functional circulation, but as a public space in which both interpersonal relationships are developed and small groups find common identity.

Van Eyck, and his protege Hertzberger, usually focus on a single public street, at or near grade, with many identifiable pauses, based on Van Eyck's notion of "place and occasion". Examples of this can be seen in Van Eyck's Orphanage, the Mother's House, and several infill schemes in Amsterdam, as well as in Hertzberger's Music Center
in Utrecht and in several housing and elderly housing projects.

The Smithsons, particularly in Golden Lane and related projects, multiply the number of streets, by constructing streets in the air. This system is reinterpreted by Lynn and Smith at Park Hill in Sheffield, at Pruitt-Igo, and to a lesser extent, by De Carlo at the Matteotti Village at Terni.

The street, for Van Eyck and Hertzberger, is an opportunity to emphasize people's sense of place—marked physical space—and occasion—the attachment of significance to marked physical space. It is the ability to recognize and attach significance to a space and the people with whom you share it, which makes the street an important physical descriptive category of human association, according to Van Eyck.

While we cannot say that the Smithsons and Lynn and Smith disagree with Van Eyck, they have taken the position that if one street is good, two is better, and three or more might be better still, rather than focus on developing the "street-ness" of a particular street. At Sheffield, because of the number of streets, the lack of activity on each street, among other things, weakens the street as a physical setting of human association. At Pruitt-Igo, other social problems, not considered by
the architects, planners or housing administration further undermined the identity of the street.

Though De Carlo's Matteotti village at Terni also employs "streets" in the air, he has had the benefit of observing the dialogue between Van Eyck and the Smithsons, as well as other architectural dialogues. De Carlo has been able to incorporate some of Van Eyck's concerns in an effort to overcome some of the shortcomings of the Smithson's initial proposals.

Although this example is simplified, functioning only as an illustration, an implicit pattern of growth, via critical dialogue, begins to emerge. The "thinness" or superficiality of my cultural and historical descriptions, employed in this illustration, are functions of my simplification. I have chosen to focus on a very few layers, in an effort to make the interplay between these layers more explicit. What has been omitted, for the sake of this simplicity and clarity, forms other layers of description.

This idea of producing thick descriptions of historical events has come into increasing favor within historiographic debates. The goal is to produce a description of a particular time, event, or work, which models the complexity the actual events investigated. Such work has been in the areas of Cultural History, Feminist History, and Marxist/Materialist History, by
such people as E. P. Thompson, Thomas Dublin and Manfredo Tafuri.

None of these authors, nor any of the historiographic positions mentioned, claim total accuracy in explaining the actual complexity of the historical situation. Neither do they claim to be even-handed. All readily acknowledge a slant which they bring to the historical investigation, which clouds the "purity" of the investigation. At best, even a summary of all the different slants on a particular event, time, or work, would not explain what really happened; the summary would illustrate what all positions held in common. Each slant uses the historical investigation to support or justify its present position. Each attempt to reinforce a particular position increases the precision of the debate and the total body of commonly held knowledge, without ever approaching an absolute "truth".

Although this use of thick description is becoming an increasingly accepted system for the production of architectural knowledge in the sphere of history, it is not readily thought of as a system to produce architectural knowledge, in the sphere of design. However, this is exactly what I wish to propose, with respect to both professional activity and teaching.

Specifically, The goal of this thesis is to propose a pedagogical model for the development of architectural
knowledge, in the sphere of design, based on the concepts of thick description and critical dialogue developed by Elkana.

As we have discussed thus far, architecture can be characterized in a variety of ways with respect to the development and implementation of a body of architectural knowledge. However, it is my contention that the design process—the activity of making designs on the basis of a body of architectural knowledge and ideologies—particularly [but not exclusively] within an academic setting, is best characterized as a form of critical inquiry and dialogue about architecture.

In this case, architecture is seen as an operative body of knowledge, frameworks, images and ideologies. Though it is separated from the built environment, it pertains to it. Its purpose is to describe our system of relationships in the world, be they productive, physical, communal, sociocultural or metaphysical.

This inquiry leads to the development of a form of architectural knowledge—contextually dependent and conventional in nature—which can be examined, tested and modified, both in a current designing episode, such as in a design studio, and in future episodes. This inquiry occurs in a series of critical dialogues between the individual designer and other individuals—professors and other students—the "discipline" of architecture in
total, and with the work at hand, in reflective or dialectic practice.

Therefore, the goal of the design studio is twofold. At one level, the goal is to assist students in the development of a body of architectural knowledge and culturally embedded frameworks, each with its own associated images of knowledge and ideologies, which they can take with them beyond the individual studio. This includes exploring and testing various architectural theories, frameworks, images and ideologies prevalent within the student’s experiences. These can include those prevalent to a particular instructor, studio project, or school, region, outlook, or ideological position. These also include any number of issues which the student wishes to bring to the problem at hand, as well as preconditions, a priori assumptions or cultural values which the student may or may not be unaware of.

At another level, the goal of the design studio is to help students develop a critical working method, in order to examine new material as well as re-examine old. This method focuses around the notion of thick description.

In short, the goals of the design studio are to engage a body of architectural knowledge, frameworks, images and ideologies and develop the tools or methods necessary to make that engagement possible and useful.
The goals do not, in any way, preclude or undermine the importance of form-making in the design studio. Quite the contrary. But these goals do preclude a kind of unconscious form-making, or form-making for its own sake removed from its cultural or social meaning.

In applying a critical working method to the process of form-making, we attempt to examine the roots and meanings associated with particular forms or formal activities. What these forms mean; where did they come from; what critical debates surrounded these forms—all are relevant questions in the process critical form-making.

Additionally, we examine, or at least speculate on, the implications of particular forms or formal activities in the present and in the future. Some of this speculation can be made by extrapolating meanings attached to certain formal moves within a particular culture or time. These investigations pre-suppose a belief that the knowledge necessary to make these architectural designs is embedded within culture, and as such, affects and is affected by culture.

Let us consider, for a moment, an apparently simple formal exercise which often occurs in design studios: the translation or rotation of a grid. This formal move evokes a great number of questions which might be subjected to a thorough critical investigation.
Is this translation or rotation a function of site constraints? Or is it a function of the program? Or is it a function of a larger architectural debate? Or is it merely a formal consideration?

All of these questions, and they are but a small sample, stem from an apparently simple design decision. These questions demark the possible territories within the body of knowledge, frameworks, images, ideologies from which the decision might emanate. Additionally, they suggest new directions for further investigation.

The translation or rotation of a grid is a fairly insignificant decision, if we can consider it in isolation. It has very little to say about our system of relationships in the world, be they productive, physical, communal, sociocultural or metaphysical.

The point within this pedagogical model, is that such a condition of isolation does not exist. The design decision is made within a cultural and project context. The simple design decision forces many other decisions; it ripples like a stone in a pond. It has implications for site considerations, for program considerations, for social considerations, for productive considerations; all are inexplicably linked. The simple design decision places the work within a series of architectural dialogues, about site use, program integration, social responsibility, form-making; it forces the designer, by
action or inaction, to take a stance within each of these areas of concern. Each represents a series of open architectural problems; each must be addressed by the designer in one form or another.

It would be absurd to assume that all of these questions could be addressed with an equal degree of depth. Additionally, other decisions add to or subtract from the total number of issues which need to be examined.

Each of these issues forms one or more layers of the thick description of the problem at hand. The design solution is to be found through the critical investigation of the interplay between the layers. In this case, thick description is operative; with it we examine, through a dialectic between action and reflection, the implications of the decisions made as things are brought into being.

The student develops knowledge in various layers or around various issues. The student also learns how to develop these critical tools of investigation. The project which results from the inquiry is largely polemical or discoursive. It represents a contribution to the critical architectural dialogue. But as a student project, it is not a building; as in the case of most student work, it ignores most of the layers of architectural knowledge necessary to translate the
knowledge produced in the studio into a building. The project focuses on other problems within the architectural discourse which are more relevant to the academic environment.

An easy response to discredit this approach to design education centers around the questions of practicality and professionalism. The argument goes something like this: architectural education, and the design studio in particular, needs to teach students the things they need to know in order to go into practice, or to get jobs. That is a primary goal here.

Architects, well into the twenty-first century\textsuperscript{71}, will be hired to produce the knowledge and information necessary to produce buildings. What architects need to know, more than any single piece of information or knowledge, is how to understand and evaluate a large body of knowledge and information. The architect needs to understand the interplay between the layers of knowledge and information competing for importance in any project, and to work his/her way through the webs of significance. In short, the architect needs to develop thick descriptions of the situations at hand, finding solutions in the interplay between the layers of description.

Those advocating a pragmatic approach to architectural education will, no doubt, scoff at this analysis of professional activity as abstract and theoretical. Nevertheless, I would like to use a professional example to demonstrate how accurate this supposedly abstract and theoretical system models real professional activity.

The illustration involves a project in which I was the project designer, in the summer of 1987. The project was the renovation of an existing two-family house, into transitional housing for de-institutionalized mental patients. The house is located in a predominantly residential district, with mixed single family and multi-family dwellings.

The existing units consisted of a multi-storied main house and a small mother-in-law apartment located in a basement addition.

The program called for minor changes to the interior layout of existing main house. A three story addition would be built, atop the basement addition, increasing the number of bedrooms for residents, as well as almost doubling the building square footage.

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72 The project was known as 151 - 153 Kent Street. The licensed architect, for whom I worked, was P. Nicholas Elton, principle of Elton and Associates.
The program also called for the renovation and enlargement of the basement mother-in-law apartment, converting it into a handicap accessible, "independent living" apartment. It was an example of the kind of apartment that the people upstairs would later move into.

The program suggested that the main house maintain as much as possible its "home-like" quality; it was not to feel like an institution. As in most projects of this type, the budget was restricted.

The questions which I would like to analyze through thick description is that of the occupancy designation of the traditional housing, according to the Massachusetts Building Code. Technically, this is an institutional use, in that it is run by a Town Mental Health Agency, because it functions as transitional housing for de-institutionalized mental patients. However, this technical determination would have placed sufficient restrictions on the project, in terms of its construction, to kill it financially and programmatically. In order to comply with the fire egress requirements, the program goal of a "home-like" living environment would have been lost.

However, the occupancy and use designation could also be interpreted as a single room occupancy residence, or as a two-family dwelling. Both of these have less stringent requirements, making the project viable again.
The final interpretation of the code is the responsibility of the plans examiner, or the zoning board of appeals.

In order to make our case for the less stringent classification, we developed a thick description of the problems at hand. We examined the Code requirements to understand both the letter and spirit of the Code. We developed alternative responses to the letter requirements which conformed to the intended spirit of the Code. Some of these alternatives were more stringent than those that would have been required by the less stringent use classifications.

The purpose in developing the alternative responses was to offer the plans examiner a legitimate course of compromise. But these alternatives would not, on their own, convince the plans examiner to permit us to conform to the less stringent requirement we suggested.

Other layers of this thick description included political considerations. With the exception of a few of the immediate neighbors, who were concerned with the project's effect on their property values, the community was in support of the project. The State government, who was funding the project, also was in strong support of the project. Even the governor, who lived within a five minutes' walk from the project, supported it.
It was a combination of these social and political concerns, as well as our ability to demonstrate reasonable compliance with the spirit of the more stringent use requirements, which lead to our classification as the less stringent occupancy use.

In this case, our ability to develop a thick description of all of the issues involved permitted us to find an appropriate path through the webs of significance connecting the various layers of description, and to convince the plans examiner that this was reasonable response to the complex and conflicting layers of the problem. It was not our mastery of the Building Code, or of comparable construction assemblies, or even our political savvy which made this project come together. Rather, it was our ability to critically examine all of the necessary knowledge and information, and to find a path through it acceptable to the parties involved.

And, I would argue, this is the same system of reasoning which is applied to other "professional" activities, be it program analysis, design, construction documentation or supervision. Each activity draws on a body of knowledge which, in most academic situations, forms the subject of individual and discrete courses.

Often the argument is put forth that these courses should be integrated into the design studio. Although I
am not fundamentally opposed to this suggestion, I find it a simplistic response to the problems of integration. Rather, I would like the integration to occur in both directions, particularly with respect to the use of thick descriptions as a tool of investigation and knowledge production. The goal is not to downplay the importance of any portion of the body of architectural knowledge, be it structural, mechanical, material, construction or design related. Rather, it is to demonstrate the importance of the interplay of the various forms of knowledge within a common system of analysis and investigation.

For example, structures might be taught as more than statics, strength of materials and sizing of arbitrary members out of tables. All of these techniques might be brought to bear on a specific built example, where the interplay of static requirements, available materials and construction methods, possible sizes, and other design and economic constraints resulted in what was built. In my opinion, this use of a thick description of an actual situation serves better as a demonstration of the complexity of the structural decision making process than asking the student to integrate all of these decisions into his/her studio project.

The same case study might be used in a materials course, mechanical systems course, a professional
practice course, a construction documents course, a history course, and a design course. In each case, a common example can be scrutinized with respect to a specific subject area, applying the same method of scrutiny. Each area of specialization produces a series of thick descriptions about the role to that area with reference to the influences, as understood from that area, exerted from other areas on the case study. The sum of these descriptions, while not producing a "total" picture, does reveal a lot about the interplay between these various areas of specialization.

The management of this interplay is a primary concern of the professional architect. It is unreasonable to presume that this interplay can be reproduced in the design studio, treating the studio as a model of professional practice. Each area of specialization constitutes an area of academic focus with its own form of knowledge to be understood and mastered by the student. In a professional situation, each of these areas of specialization is represented by its own advocate; the production of the body of knowledge necessary to produce a building grows by way of a critical dialogue between the advocates, managed by the architect. To ask a student to play out both sides of the dialogue is unrealistic; to ask a student to understand the growth of the knowledge by critically analyzing the dialogue and
developing a series of thick descriptions is by far more realistic.

However, it is not unreasonable to ask the student to make what we will call "primary assumptions" about each area of specialization within the studio context. For example, while it is not essential to ask a group of students in the design studio to "design" a structural system, sizing the members and developing concrete mixes, it is important for the students to understand the implications of certain structural systems, when compared to other systems, on other aspects of the design process. A "primary assumption", which structural system to use--when compared to other possible systems--adds another layer of complexity to the design investigation.

Likewise, it is important for students to understand the different mechanical needs of different use types. A student does not need to size the ducts to understand that while residential and smaller commercial applications are measured in terms of inches, other commercial, manufacturing and meeting spaces are measured in terms of feet; laboratories and specialized computer manufacturing spaces are measured in terms of whole floors.

Both of these examples represent primary decisions. As such, they constitute very thin descriptions. Much of the actual complexity has been reduced to rules of thumb. It
is this annotated complexity, these rules of thumb, which are used in the design studio, as well as in the early phases of professional activity. It is in the later phases of professional activity, as well as in specific studios which deliberately choose to focus on these open problems, that the actual complexity is engaged.

The studio project functions as a point around which layers of thick description are developed. The purpose of these layers of description is to critically investigate the architectural activity, with its bodies of knowledge, frameworks, images and ideologies. Some of the layers of the investigation are left annotated or thin, while others are expanded or thickened, becoming the primary foci of the studio investigation. The layers which are selected to be expanded constitute the open architectural problems. These are the foci of the studio investigation. The selection of open problems, as we have previously discussed, is functions of the images of knowledge represented by a particular instructor, studio project, student wishes or goals, curriculum, school, region, outlook or ideological position, to mention but a few.

For example, the studios I have offered have tended to focus on existential problems; questions of identity, control and the production of meaning. These concerns have been explored with various projects, ranging from
the very private [ex. housing] to the very public [ex. plaza]. The reasons behind this preoccupation are varied. They range from the very personal to my own educational experiences. Like the members of Team Ten, I am convinced that architecture needs to be discussed in terms of human relationships. But unlike Team Ten, I do not believe in positive science. Nor do I think that there is a unique structural relationship between a culture and the forms of its architecture. Rather, the fit is a loose one. The degree of the fit, tightness or looseness, is a function of the culturally embedded frameworks and images of knowledge; and varies from one culture to the next.

It is this degree of fit, and how the fit is given architectural form, which forms the central open problems of the studios I offer. Other problems are opened as they pertain to these central questions. Still other problems are engaged in their annotated state.

This set of open problems--the degree and nature of the fit--like those investigated by Pevsner, Van Eyck, or Norberg-Schulz, constitute the basis for a particular theory of architecture. Every one of these theories can be described, as we have demonstrated, within the metatheory of architecture we initially proposed. Each one of these theories agrees and disagrees in certain respects with the others. The agreements form the body of open architectural questions subject to critical
discourse. It is the interplay of these agreements and disagreements which leads to the growth of knowledge. The pedagogical model which I have proposed provides an environment in which these agreements and disagreements can be explored.

5. THE DESIGN STUDIO AS A CONTEXT FOR INQUIRY

But then, why the design studio? As we have discussed, the pedagogical model offered here for the design studio is applicable, and maybe even essential in the teaching of other subject areas in architectural education.

The answer is twofold. First, there seems to be a greater consensus about the body of knowledge, frameworks, images and ideologies within the culture of architecture. There are fewer open problems.

The second answer is more complex. There appear to be other contexts, other than the design process, which are more culturally accepted contexts in which to examine the open problems that do exist. These contexts fall under the gross heading of research. In certain subject areas, like structures and materials, this research often resembles laboratory science. In others, like history and law, the research is archival.

Design, on the other hand, is often responsible for opening new problems which require further research by other means. In other instances, design responds to the
results of recent research, even if the research was only indirectly related to architecture.

If, as Elkana has pointed out, it is this use of thick description and critical dialogue, around which we have built our pedagogical model, which is central to all forms of research, then the design studio, as we have defined it, can be considered a context in which at least one form of research, about architecture, occurs.

Some of the problems opened in the design studio are examined within the studio, often with the help of other subject material. Other problems opened in the design studio are removed; the context in which these problems are examined is different, even though the method is fundamentally the same.

We have discussed how this knowledge grows during the studio, but what about afterwards? If we accept the validity of this proposition, that design is a context in which a form of architectural research occurs, then we must realize that it imposes certain obligations on the design studio. Research, no matter its form, is undertaken in order to increase knowledge. Knowledge grows by way of a critical dialogue between competing and complementary bodies of knowledge, frameworks, images and ideologies. One context in which this knowledge grows, to be sure, is in the individual student. But this should
not be the only place. The results of the studio investigation should become part of the public record.

The results of the studio investigation should be presented in a public form in which the issues investigated are given at least equal weight as is given to the relative success of the individual projects.

Often this public forum, the final review of the studio work, functions as a jury, evaluating the relative merits of individual projects, often in terms which are irrelevant to the investigation. In this case, a different theory of architecture, with different culturally embedded frameworks, associated images of knowledge and ideologies is imposed on the situation. While I am not denying that there is pedagogical value in this activity, demonstrating the strengths and weaknesses of various theories and projects with respect to other theories and projects, the preoccupation with the individual projects severely limits the impact of the studio's research on larger culture-wide architectural debates.

In larger terms, the studio projects should function as case studies and illustrations for larger debates, much in the way the case studies are used in other classes. Thick descriptions of the studio experience should be developed. In studios concerned with a particular cultural debate, the emphasis should be on the
debate, and on preserving records of the debate, rather
than on the production of finished objects.

Furthermore, if we assume that student design work,
performed in the studio, constitutes a form of
architectural inquiry, leading to the production of
architectural knowledge, we might make the same
assumption about the instructor's work as well.

While the questions "how should architecture be
taught?", or "...taught better?", are common questions
instructors ask, reflecting on the studio activity, "what
constitutes architectural knowledge?" with respect to
active participation in the larger architectural debate,
is not. However, it should be. And much of the
responsibility for introducing the studio research in
public forums falls to the instructor; the studio becomes
a context of investigation for the instructor as well.
The studio projects revolves around open problems which
the instructors is interested in investigating, rather
than around a body of knowledge, independent of context,
which students are expected to repeat. The results of the
studio--student projects, discussions, thick description
---constitute the basic research from which academic
papers are written and presented. The projects are used
as illustrations; they are evaluated as illustrations or
studies about issues rather than as objects. It is this
use of critically produced design, supported by thick
descriptions, situated in polemics or critical dialogue, which constitutes legitimate research. It is this legitimate research which leads to the growth of architectural knowledge.
"If you are not teaching facts, what are you teaching?"\textsuperscript{73}

In response to this question, I can surely say that I am not advocating the teaching of facts, if it can be said that such things exist at all. Knowledge--facts and information--once removed from the cultural frameworks which provide it significance, is no longer recognizable as such; it loses its authority.

What I am teaching, if we want to call it that, in addition to a culturally embedded body of knowledge, frameworks, images and ideologies, is a method to unravel the webs of significance which surround the process of architectural decision-making.

The method, as we have seen, is equally valid in academic and professional situations.

The unraveling, as well as the decision-making itself, results in thick descriptions of the complexity of the situation within culture.

The critical examination of these descriptions in public dialogue, with increasing precision, leads to the growth of knowledge.

In actuality, I am not teaching. \textit{We} are inquiring, the students and I. I bring to the inquiry the focus project, the open problems which we will explore through the

\textsuperscript{73}Maurice Smith; op. cit.
project and a method to explore with, all of which I feel are important to their education and to mine.

The immediate goal of the studio is to expose the students to a series of open architectural problems, and to a method of approaching these, as well as other open problems. The long term goal, either through their work or mine, is the production of culturally bound architectural knowledge.


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