Drawing As Designing

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INTRODUCTION

Not too long ago I was speaking with a friend about his memories of architecture school. "I was led to believe that architects are born - not made," he told me. "I saw myself as a large block of stone. Each day that I went to class the professors would chip away a little bit of the stone, and hopefully what remained at the end of the day still had the potential to be an architect. My greatest fear was that one day the chipping would reveal me to be something other than an architect."

I am amazed by how many times others have related similar versions of this story to me as they recount their days in architectural school. The metaphors may vary, but the underlying implications are the same: the function of architecture school is not to educate a student, but rather to reveal those who have a magically innate ability. I suspect that phrases such as "gifted," "talented," and "innate ability," to name only a few, reveal this belief.

Of course there are counter examples of architects who have had truly productive learning experiences while in school; perhaps most have. Still, the issue of productive learning and thinking merits attention.

I believe that experiences like the one related by my friend have contributed to the development of a culture of architecture, in both schools and the profession. In a very real way becoming an architect or a successful student is like joining a club with is own particular rites of initiation. To join the club one must learn a particular way to letter, draw trees, poche materials, draw design diagrams, and so forth. Rather than engaging in productive thinking and reflectively carrying out tasks in a way that reveals an understanding of *this* tree or **this** design diagram, students learn to draw icons of trees and icons of design diagrams. They adopt the form without an understanding of its making.

In adopting these icons, students pass a rite of initiation on their way toward becoming architects. Like the design diagrams they have learned to draw as icons, they themselves become icons of architects. They letter like architects, draw trees like architects, render sky like architects, and produce design diagrams like architects. In so doing they sculpt themselves into the piece of stone they believe they must be if they are to succeed in school and the profession. Deeper, more productive, reflective thinking may actually impede the student's assimilation into the culture.

To more fully illustrate my point I will use drawing as an example. First I will briefly discuss attitudes about drawing and the teaching of drawing as reflected in current literature. Next I will discuss a productive technique of drawing, where drawing is seen not as a mechanical or rule-based process, but as designing, with its attendant aspects of inquiry, discovery, hazard, and so forth. Finally I will discuss implications of this research for education and practice.

CURRENT ATTITUDES ABOUT DRAWING

It is well known that drawing is an important part of architects' work and that it is integral to their design procedures. What is meant by "drawing," however, is often vague and ambiguous. In contrast to the verbal richness of the Eslumos who reportedly have seven different words for various types of snow,' architects have only one term to describe a wide variety of drawing activities. For example, "drawing" can refer to the sketching process integral to design exploration, free-hand sketches of actual or imagined environments, development documents, construction documents, analytical documents, diagrams, finished renderings, and so forth. Many writers tend to group the many types of drawings into three headings; sketching, development drawings, and presentation drawings (either rendered or technical).[2]

It is not my intent to provide a history of architectural drawing; that has been done elsewhere.' Neither is my intent to describe development or presentation drawings. Again, there are many interesting discussions of these styles of drawing.[4] What I want to consider is free-hand drawing or sketching. More specifically, as opposed to design sketches,[5] I want to consider the ways in which architects sketch built environments.

A survey of books that purport to teach drawing often reveals methods that promote the use of icons. Rather than

encouraging students to engage in productive drawing techniques, these books encourage students to learn a type of architectural shorthand. As previously noted, the use of icons in drawing is quite seductive to students as it enables them to join the "club" of architects.

For example, in the popular *Manual of Graphic Techniques* series of books, Porter and Goodman offer readers what they refer to as a "basic set of design (drawing) tools" which can be used to give "graphic birth" to ideas. According to the authors, the goal of the books;

> Is to introduce the beginning design student to a deeper understanding of the basic range of graphic systems and their use...[6]

These books claim to provide readers with the "tools" necessary to produce "professional" drawings. In example after example, readers are shown "tricks" that will enable them to produce sketches similar to what architects produce in their offices. From the perspective of these books, the successful reader will be one who has learned the techniques presented and is able to apply them to a variety of drawing situations. Any deeper understanding of the basis for these techniques is not considered.

As one example of this approach, consider the way in which readers are taught to draw trees. The authors begin by saying that trees are a "great indication of scale, time, and place." After being told that trees can be drawn to appear as "sympathetic" to the drawing technique and to the architecture they compliment, readers are given "some ideas" for techniques. What follows is approximately twenty-one techniques for drawing trees, two of which are shown in Figure 1. Below all of these trees is a footnote which reads;

> If designing for an existing site where trees will play an important role in the resulting act of architecture, it is a good idea to sketch specimens directly on site, or to photograph them for later reference.'

Although the authors claim to dislike the use of stereotypes - what I am calling icons - in drawing, this is exactly what they provide the reader. The twenty-one techniques for drawing trees are shown in a variety of scales, obviously ready for copying. The footnote that follows the drawing is almost humorous; readers are told that in an actual environment they should sketch the real trees on the site. However, readers are not given information as to how this sketching should take place. All they are given is the twenty-one tree icons. I believe that while such methods indeed teach readers to draw "like architects," the emphasis on learning a particular style or form of drawing without regard for the specific nature and content of what is being drawn is an ultimately damaging experience as it substitutes for deeper, more productive learning.

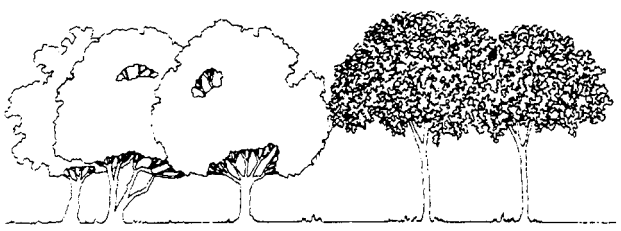

Figure 1 Taken from Porter and Goodman

This technique of drawing promoted by Porter and Goodman, and others is not a recent approach to the subject. In 1803 while writing about the ways students should be taught to draw, Delagardette said;

> We set the student before a sheet of paper on which he is to do the drawing. We lead his hand, as it were, by letting him draw the line first with a pencil and then with ink; from that to an evenly applied tone all the way to complex shadowgraphs. Eventually we guide him, step by step, to the complete and perfect execution of his drawing. In all these processes we draw his attention to everything which may aid him in his efforts and lead him to attain the highest perfection.[8]

Delagardette promotes a way of learning to draw that is not unlike that proposed by Porter and many similar authors. Drawing is seen as a skill that is perfected when a particular method, a set formula, is acquired through repetition and/or example.

In all of these instances there is a major commonalty; the emphasis is on acquiring a particular type of drawing skill as opposed to acquiring a productive understanding of the subject's structural relationships. Students are taught to execute their sketches in a formulaic fashion. This situation is summed up nicely by Oechslin when he says, "...not every sketch bears the mark of genius, and some people take great trouble and more time to create a likeness of a sketch."[9] Again, the emphasis is on the production of a sketch that meets the requirements necessary for admission to the "club." Form takes precedence over content.

AN EXAMPLE OF A PRODUCTIVE DRAWING PROCESS

In order to study the sketching process as it occurs, I conducted an experiment whereby I had five different architects go to the same site and under the pretext of preparing for a renovation project, draw a group of buildings. (Reference Figure 2) Sound and video recordings were made of each participant in order to capture the sequence of their sketching activity. Participants were also asked to "think aloud,"[10] saying what they were currently doing and thinking. The recordings were then transcribed and annotated for analysis. What follows is a brief snippet from one of these drawing protocols.

In *Productive Thinking*, Wertheimer" discusses the difference between "sensible" and "blind problem solving. In the first instance a person solves a problem by understanding the subject matter, while in the second instance the problem is solved by external procedure. Wertheimer's discussion of

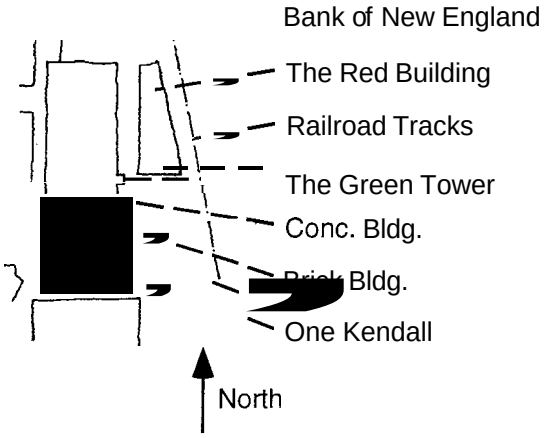

Figure 2. Line Drawing of Site Plan - NTS

sensible problem solving describes the sketching activity of the participants who engaged the drawing exercise. By understanding the structural relationships of the site, each participant sought to bring the site's apparent chaos into an ordered, clear sketch; to make the transition from poor to good gestalt.

To illustrate these points consider one example from the drawing exercise. In this example I describe the drawing activity of an architect named Eero and his evolving understanding of the site's structural relationships. I have taken one small, representative snippet from Eero's protocol which I then analyze in light of the site's structural relationships. While the snippet is very brief, it is generally indicative of the reasoning that occurs throughout each architect's protocol.

Of all the participants to take the drawing exercise, Eero is the only one to stop and restart the sketch with a fresh sheet of paper. Only on the third try does he feel that the drawing is blocked-out in a fashion capable of capturing the nature of the site and its important aspects. My intent in this discussion is not to probe why he stops and restarts the sketch, but to describe his evolving understanding of the site's structural relationships and how this evolution influences the way he draws.

In his first start Eero begins by drawing a double line across the lower portion of his paper to represent the railroad tracks on the site. He says;

> I'm going to start with the train tracks as an organizing element for the sketch...

Eero's first lines drawn do not deal with buildings, but with the railroad tracks that stretch before him across the entire site. He indicates that these tracks will be the aspect of the site around which all other features will be referenced.

What Eero draws is not just a line; it is *this* line. Far from a haphazard start, he begins the sketch by drawing what is currently the most personally significant thing he sees. The line is not simply a geometric figure; it is the way in which he understands the site. It is an essential characteristic of the site; a fundamental structural feature that will exert influence on his sketching throughout much of the exercise. It is noteworthy that the line is not something that Eero imposes on the site. Rather it is characteristic of the scene he considers.

Next Eero moves to the red building which he draws as a basic box in perspective. He says;

> And then I'll start with our (the red) building, which is right before me.

With this drawing Eero continues the process he started when he drew the line of the railroad tracks. Like the railroad tracks, the red building has a strong sense of perspective and horizontality. He continues by drawing the building's structural floor lines; a move which only serves to reinforce the strong feeling of perspective and horizontality. Finally he draws an outline to represent the Bank of New England.

Eero then shifts to the site's left-hand side where he draws basic outlines to indicate the green tower, concrete building, brick building, and One Kendall building. He says;

> The interesting set of building adjacent to our site... some interesting forms, some unusual forms.

With this drawing Eero's focus has moved from the site's right-hand side with its strong sense of perspective and horizontality, to its left-hand side. Here he draws basic outlines for buildings which he characterizes as having "unusual forms." He also refers to the buildings as a "set," indicating that he sees them as being a single element. Again, in drawing these outlines he is not simply drawing an array of lines; he is drawing his understanding of the scene before him. Increasingly Eero understands the site as having two major sections; a section of unusual forms and a section with a strong sense of perspective and horizontality. (Reference Figure 3)

Dissatisfied with the amount of space he provided for all the buildings, Eero stops the initial block-out of the sketch and restarts with a fresh sheet of paper. He begins the new sketch by drawing two large rectangles which divide the sheet of paper in half. He says;

> I'm thinking that if I'm going to fill... I'd like to fill the frame with the north building and the edge of the south building and so... just about where our building meets the south building is approximately the center of the...

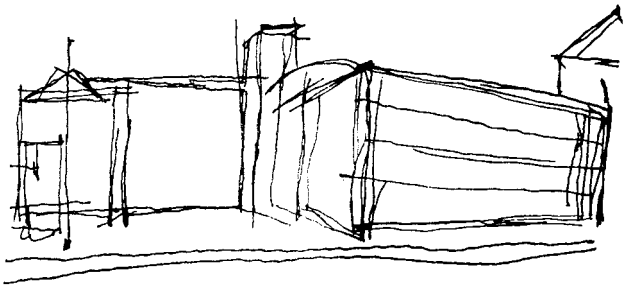

Figure 3. Eero's First Attempt

the center of my visual range here. I'm dividing the paper in such a way that I can fill half of the paper with the south building and the other half with our building and the north building. Um... also... think about the perspective lines again.

With this second start, Eero's intentions have evolved, as has his understanding of the site. Rather than seeing a site dominated by a strong sense of perspective and horizontality, he sees a site with two major sections, which he draws as large rectangles dividing the sheet in half. Only when these rectangles are in place does he draw the line of the railroad tracks. Again, Eero's drawing is not just of lines in space; it is the way in which he understands the scene before him. In this second start he sees the site as having at least two elements; the buildings with the strong sense of perspective and the buildings with the unusual forms.

Eero continues by blocking-out the major building facades within the two large blocks he previously drew. While doing this he expands his understanding of the site's left-hand side. Formerly he had described it as a set of buildings bound together by their unusual forms. While he no doubt continues this way of seeing, he now begins to concentrate on the vertical elements in the composition. In so doing he also names the green tower a "hinge" which separates the site's two sides. With this naming and drawing he shows that the green tower is becoming increasingly important to him. As he continues, however, he discovers that he has once more failed to leave adequate space on his drawing for all of the buildings. He thus restarts the sketch again.

As Eero begins his sketch for a third and final time he says that he is going to draw at a smaller scale and "try to get a bigger picture" of the site. He starts on the far left-hand side of the sketch by drawing a basic box to represent the facade of the One Kendall building. He continues left to right, drawing a flat box for the brick building, the concrete building, and the green tower. When he reaches the red building he draws it as a basic box in perspective, starting with its southern and then eastern facade. He then draws the Bank of New England by sketching basic boxes in perspective.

In his first attempt at sketching, Eero organized his sketch around the railroad tracks and the strong sense of perspective and horizontality on the site's right-hand side. In his second attempt he organized the sketch around his understanding of the two halves of the site. I propose that these two experiments have taught him about the proportions that will be necessary if he is to fit all the buildings that he feels are important onto the sketch. In this third attempt to sketch the site Eero applies his knowledge of proportions and familiarity with the site features to the overall sketch. As he blocks-out the major features, he does not do so in reference to either the sense of perspective or the two halves of the site. Rather, he considers each facade as a distinct element in the larger whole of the entire site. Also, unlike his previous efforts where he drew features contained in individual facades, he now draws only the basic boxes for the buildings. (Reference Figure 4)

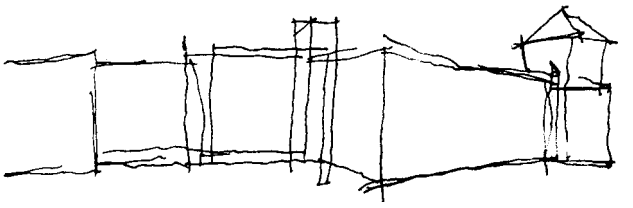

Figure 4. Eero's Third Attempt

It is important to recognize that in his work Eero has not employed a blind trial and error methodology. Rather he has displayed an evolving understanding of the structural relationships and requirements of the problem. Neither has Eero worked in a formulaic or mechanical fashion. While it may be true that he works methodically as he blocks-out the individual facades, it is does not follow that his process becomes mechanical. Rather he shows the growth of a single line of reasoning which is informed by his prior efforts to achieve a complete and good gestalt. That he makes, recognizes, and corrects his mistakes indicates his desire to improve his understanding and portrayal of the site's structural relationships.

IMPLICATIONS

The approach to drawing illustrated in the brief snippet from Eero's protocol is consistent with Wertheimer's discussion of the difference between "sensible" and "blind problem solving. In the first instance a person solves a problem by understanding the subject matter, while in the second instance the problem is solved by external procedure. I propose that a productive drawing process involves not a mere reproduction of the site which is executed in some prescribed fashion, but rather a careful consideration of *this* site and the structural relationships of its elements.

Eero's ability to productively produce a sketch depends on his capacity to see what is really relevant in the scene; what is truly essential. All of the participants who engaged in the drawing exercise performed in just this way. Working in accordance with the structural relationships of the site was fundamental to them. In working this way, drawing truly becomes a creative process. Drawing is designing.

The way Eero draws cannot be accounted for by many of the books which teach drawing. Eero does not utilize a "set of drawing tools" or draw icons of what he sees. Rather he works to see the inner structural requirements of the site and its various features. He engages in a "conversation" with the sketch and the site, whereby he "speaks" by drawing, and "listens" by reflecting on what this new drawing tells him.[12]

Moving from blind to sensible procedures suggests some concerns that should be addressed in education. Clearly drawing studios need to promote ways of learning drawing that are productive. Exercises should be developed which help students to develop their abilities to recognize the structural relationships of what they see. Rather than expect-

ing students to produce drawings which fit a predetermined style, we should expect diversity in the drawings. Students should be encouraged to inquire into their own tacit knowledge[13] which they bring the task and to be reflective[14] about their work. Providing students with "sets of tools" and drawing icons in lieu of productive thinking should be avoided. Every effort should be made to keep students from using drawings In books as icons.

There are also implications for the design studio. It is well documented that drawing techniques have an influence on subject matter.[15] My studies reveal that drawing is designing: it is a hazardous enterprise whose final results cannot be predicted at the outset of the task. A designer's abilities cannot be fully developed if he or she can only think with icons.

Hovering above all of this is the need to avoid environments in which the "club of architects" can be joined by learning to draw "like an architect." If short cuts exist they will often be taken, no matter how destructive to productive learning they might be.

NOTES

[1] Roger Simmonds, *Learning to Learn and Design*, MIT Ph. *D.*, 1978.

[2] For example, see James O'Gorman, "The Philadelphia Architectural Drawing in Its Historical Context: An Overview," in *Drawing Toward Building*, University of Pennsylvania Press, 1986: pp. 1-13. O'Gorman sees a three step process in drawing; Stage One - "the architect is communicating primarily with him or herself or close assistants, graphically working out his or her interpretation of the client's desires. Often executed freehand, the early sketches contain the seeds from which the final produce grows." Stage Two - "Preliminary sketches are turned into preliminary plans, elevations, and sections drawn to scale... ...The architect or the assistant then studies the shapes, proportions, and sizes of openings, roofs, rooms, and walls in alternate overlays of tracing paper until forms emerge that satisfy both the client's program and the architect's sense of good design." Stage Three - "A set of presentation drawings is done (to sell the design)."

[3] For example, for a discussion of drawing history from Piranesi to Libeskind see the entire issue of *Daidalos 1*, 15 September 1981.

[4] For example, see Norman Crowe and Steven Hurtt, "Visual Notes and the Acquisition of Architectural Knowledge," *Journal of Architectural Education*, 39(3) Spring, 1986: 6-16. Also see James Smith Pierce, "Architectural Drawings and the Intent of the Architect," *Art Journal*, Fall, 1967: pp. 48-59. In this article the author argues that, "Consideration of the graphic modes favored by the architect in developing and presenting his ideas and consideration of the medium selected and the particular way in which it is handled may be especially helpful in arriving at an idea of the intended effect of a building, enabling us, in some measure, to see the building as the architect himself saw it." Finally, for a general discussion of drawing see Philip Rawson, *Drawing*, Oxford University Press, 1969.

[5] For a nice discussion of sketching in the development of building designs see Michael Graves, "The Necessity for Drawing: Tangible Speculation," *Architectural Design*, July, 1977; pp. 384-394. Graves argues for three primary categories of drawing; 1. the referential sketch; (like a sketchbook recording of things seen), 2. the preparatory study (design sketches), and 3. the definitive drawing; "an instrument to answer questions instead of pose them."

[6] Tom Porter and Sue Goodman, *Manual of Graphic Techniques 4*, Scribner. 1985; pp. 4.

[7] Porter and Goodman, 46.

[8] Quoted from Werner Oechslin, "The Well-Tempered Sketch." *Daidalos* 5, 15 September 1982.

[9] Werner Oechslin, "The Well-Tempered Sketch," *Daidalos* 5, 15 September 1982.

[10] Although it is not my intent to discuss issues relating to my research method, it is worth mentioning that "Thinking Aloud" has a long tradition in design research. I am particularly fond of David Perkins's discussion of this method, and took his advice to heart in my own research methodology. Perkins says, "When a person is merely asked to think aloud, one of two things often goes wrong. Either the person will over-explain, interrupting the activity to give not a report of the thinking but a speculative analysis of it, or if that doesn't happen, often the person will comment sparsely." He then goes on to outline six guidelines for avoiding problems with the method. David Perkins, *The Mind's Best Work*, Harvard University Press, 1981. Other examples are seen in the work of; Peter Rowe, *Design Thinking*, MIT Press, 1987; Donald Schon, "Designing: Rules, Types, and Worlds," *Design Studies*, July, 1988; Gabriela Goldschmidt, "Interpretation: Its Role in Architectural Designing," *Design Studies*, October 1988.

[11] Max Wertheimer, *Productive Thinking*, ed. Wertheimer, Michael. Harper and Row, 1959.

[12] For a more complete discussion of the conversational process in drawing see Donald Schon and Glenn Wiggins, "Kinds of Seeing and Their Functions in Designing," *Design Studies*, April, 1992.

[13] I am using the term "tacit knowledge" in the sense advanced by Michael Polanyi, *The Tacit Dimension*, Doubleday and Company, Inc., 1966.

[14] In saying "reflective," I am referring to the larger concept of reflection in action as discussed in Don Schon, *Educating the Reflective Practitioner*, Jossey-Bass, 1987.

[15] For example, see Robin Evans, "Architectural Projection," in *Architecture and Its Image*, Canadian Centre for Architecture. distributed by MIT Press, 1989; pp. 19-35.