

Architectural Caveats... Rummaging in the Pierian Spring

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A little learning is a dang'rous thing; Drink deep or taste not the Pierian Spring...

– Alexander Pope, *An Essay on Criticism* (1711)

ARCHITECTURE AND THE PIERIAN SPRING

The Pierian Spring commands attention in a line that follows Alexander Pope's warning, "A little learning is a dang'rous thing". Reference to drinking deeply from the spring, a location that symbolized both knowledge and inspiration in classical mythology, completes the aphorism: knowledge itself is not a danger, the peril lies rather in shallow or superficial understanding. Assuming that knowledge pertaining to architecture, along with art and science, lies metaphorically within the Pierian Spring, it should be possible to delve – or, at least rummage a bit. And, in conjunction with current discussions and disagreements, unresolved conflicts from the past may surface...

During the mid-1980s, two independent scholars – Peter G. Rowe (Rice University/Harvard) and Donald Schön (MIT) – investigated patterns intrinsic to the process of architectural design. Both reported on the observation of student behavior gleaned within a studio setting. Although their findings were in many ways similar, their respective interpretations differed dramatically. Rowe wrote a preliminary article, "A Priori Knowledge and Heuristic Reasoning in Architectural Design" – published in the autumn 1982 issue of the *Journal of Architectural Education*, coincident with the start of a new academic year.¹ Shortly afterward in 1983, Schön presented his research in *The Reflective Practitioner: How Professionals Think in Action*.² Rowe would continue his work, eventually producing the book *Design Thinking* in 1987.³ Despite intervening developments, assumptions and beliefs relating to these studies continue to influence contemporary methods of teaching design.

"A PRIORI KNOWLEDGE..."

Rowe's *JAE* essay would prove seminal in several ways. Perhaps most importantly, it introduced architects to the concept of heuristics, arguing that heuristic strategies have long been present, if not dominant, in the process of architectural design.⁴ The text identifies five heuristic types: anthropometric analogies, literal analogies (iconic and canonic), environmental

relations, typologies (building model, organizational framework, elemental type), and formal "languages". In describing each type, Rowe comments on how a heuristic may materialize and translate to a new design.⁵

The first two categories, both designated analogies, are distinguished by the adjectives anthropometric and literal. "Anthropometric" entails the idea of measurement, or a measured observation, relating to the human body, human actions, or human behavior. According to Rowe, this category of heuristic involves "a construct describing the physical occupancy of a space" – the designer may, for example, imagine an elegant or ceremonial descent of a staircase.⁶ Literal analogies by contrast arise from a source that may be animate or inanimate. Rowe identifies two sub-types, iconic and canonic, and cites a specific example of the iconic version of a literal analogy – the idea that the form of the chapel roof at Ronchamp came about through Le Corbusier's thinking about the shell of a crab.⁷ According to Rowe, the canonic grouping originates in abstractions that may be mathematical in origin – shapes, volumes, or systems such as cartesian grids, golden sections, and so on. Rowe further notes that, "Specific analogs are apt to possess simultaneously both iconic and canonic properties."⁸ Another category, "typologies", entails reference to existing buildings in whole or part, including the abstraction of an organizational system.⁹ As a whole, this category closely resembles what is currently understood as precedent study. However, all of these types – anthropometric analogies, literal analogies (both iconic and canonic), and typologies – can be grouped together insofar as they serve either as direct models or give rise to metaphors that become models. In other words, something from the physical world, whether a visualized experience or pre-existing form, can be requisitioned for purposes of design.

Two categories remain: "environmental relations" and formal "languages". Rowe describes environmental relations as calling upon "a principle or set of principles, often derived empirically". These principles represent "what appear to be appropriate relationships between man and his environment and between components of the building fabric."¹⁰ This type of heuristic departs from others in that the formation of a rule is implied. Rowe is less clear about the meaning of "formal 'languages'", describing the category as "a heuristic process where the content represents generalizations of the information inherent in other kinds of heuristics, particularly those involving typologies and man-environment relations."

He places the word language in quotation marks and alludes to Christopher Alexander's "pattern language" (also in quotation marks), suggesting a closed system that can serve to generate architectural form. His description concludes with the thought that, "More often than not, this form of heuristic reasoning is to be found in the work of experienced designers."¹¹

A characteristic of the article as a whole is the way in which Rowe tends to list observations followed by their description, leaving the reader to discern meaning through a process of induction. This inductive burden extends into the next section of the essay "Heuristics and Design Behavior". Here Rowe attempts to describe how designers manage heuristics as design progresses. Although the reference to behavior implies specificity, description in this context is conditional and abstract, devolving into a catalogue of ways in which heuristic devices can trigger and interact with the process of design.¹² The article closes with "A Brief Case Study" relating the development of a student project.¹³

In a comment following notes at the end of the essay, Rowe attempts to circumscribe the meaning of *a priori* knowledge:

The term "a priori knowledge" as used in this essay simply means knowledge acquired before tackling a particular design problem, rather than an attempt to become involved in the broader philosophical question of innate or empirically-derived knowledge.¹⁴

THE REFLECTIVE PRACTITIONER

Although "A Priori Knowledge and Heuristic Thinking" technically precedes publication of *The Reflective Practitioner*, Schön's lengthier work embodies a level of development beyond what might be expected in a journal article. The book's subtitle, *How Professionals Think in Action*, underscores Schön's conviction that thinking and acting transpire simultaneously. From the outset, the text differs from Rowe's in approach and tone. Schön's educational background, which included a PhD in philosophy from Harvard with a focus on educational theory, surfaces in an early reference to epistemology – the theory of how knowledge is possible.¹⁵ In preface to *The Reflective Practitioner*, Schön asserts: "We are in need of inquiry into the epistemology of practice. What is the kind of knowing in which competent practitioners engage? ... In what sense, if any, is there intellectual rigor in professional practice?"¹⁶

The book's first chapter, "A Crisis of Confidence in Professional Knowledge", details Schön's concerns and motives for undertaking the study as a whole. He contends that professional culture has reached a point where it has become difficult "... to describe and teach what might be meant by making sense of uncertainty, performing artistically, setting problems, and choosing among professional paradigms, when these processes seem mysterious in the light of the prevailing model of professional knowledge."¹⁷ The second chapter introduces the term "technical rationality", visibly positioned in the first half of

the chapter title: "From Technical Rationality to Reflection in Action". Schön defines the concept, which he intends to oppose:

According to the model of Technical Rationality – the view of professional knowledge which has most powerfully shaped both our thinking about the professions and the institutional relations of research, education, and practice – professional activity consists in instrumental problem solving made rigorous by the application of scientific theory and technique.¹⁸

For Schön, technical rationality is firmly lodged within the crisis he has identified. In the pages that follow, Schön discusses empiricism – the acquisition of knowledge through observation and testing of physical phenomena – and its expansion to logical deduction (*a priori* knowledge), with both types ultimately trending toward positivism.¹⁹ The shortcoming of these linkages has to do with the reductive characteristics of positivism. To some extent, Schön assumes the failure of positivism is universally understood.²⁰ Commenting on the deficiency of technical rationality with respect to problem-solving, he observes: "From the perspective of Technical Rationality, professional practice is a process of problem *solving*.... But with this emphasis on problem solving, we ignore problem *setting*... In real world practice, problems do not present themselves to the practitioner as givens."²¹

As the title of the chapter predicts, the text transitions to the idea of replacing technical rationality with a new concept, "reflection in action".²² In the following chapter, "Design as a Reflective Conversation with the Situation", Schön reviews data collected in the process of observing an architectural design studio over an extended period of time. Although the locations differ – in 1982-83 Rowe was at Rice in Houston and Schön at MIT in Cambridge – similarities between Rowe's and Schön's reports are striking.²³ Schön's description reveals a relationship between instructor and student in which the instructor directs the student toward preferred rules – and even outcomes – that suggest the two are working within a heuristic universe. But Schön shifts away from the idea of deploying *a priori* knowledge and focuses instead on the behavior of the designer. He is struck by the realization that the designer enters into "a conversation with the materials of a situation", observing that "the situation 'talks back'".²⁴ Schön concludes, "In a good process of design, this conversation with the situation is reflective".²⁵ Summarizing the case study leads Schön to another insight: "Drawing and talking are parallel ways of designing, and together make up... the *language of designing*".²⁶ Schön's relative disinterest in design as systemic logic compared to his fascination with the designer as an actor and participant proved timely in an unanticipated way. When the common understanding of reflection becomes conceptual, his line of reasoning joins with a broader sequence of events that had begun unfolding within the reaches of hermeneutic epistemology and design theory – in particular, Hans-Georg Gadamer's development of conversation as a metaphor for reciprocal dialogue in the hermeneutic circle.²⁷

Contemporary understanding of the hermeneutic circle is rooted in the efforts of German scholars, Friedrich Schleiermacher (1768-1834) and Wilhelm Dilthey (1833-1911). Working within the climate of Romanticism and Idealism that succeeded the Enlightenment, Schleiermacher and Dilthey developed a technique for the more effective interpretation of difficult or obscure texts. Their methodology specified the perception or initial projection of a whole, however incomplete, followed by identification of its contributing parts. The parts and the whole were then placed into a reciprocating dialogue with each other. As this dialogue develops in complexity and depth, a corresponding knowledge of the whole and its parts would simultaneously take shape. The cyclical, iterative nature of the process led to its identification as a “hermeneutic circle”.

With the arrival of the twentieth century philosophers working in the area of phenomenology became interested in hermeneutic methodology and thought, broadening its scope to encompass works of art. Developments were slow to reach American audiences due, in part, to the difficulty of obtaining English translations of scholarship formed in other languages. Of particular importance was Hans George Gadamer’s essential text, *Truth and Method*. Although the book was published in Germany in 1960, an authoritative English edition did not become available in the United States until 1989.²⁸ Since then architectural scholars and educators have been drawn to Gadamer in part because his philosophical arguments provide a theoretical explanation for what they were already doing. Among other things, Gadamer expanded the nineteenth century concept of dialogue, transforming a common understanding of conversation into a theoretical construct that emphasizes elements such as engagement, alternating roles of listening and speaking, flexibility, and openness to change. His pursuit of studies pertaining to structured play led to the recognition that the dialogic model could extend to include multiple players, not all of whom needed to speak a verbal language.²⁹ This position is strikingly consistent with Schön’s conclusion that that drawing and talking in tandem constitute the “language of designing”.³⁰ For Gadamer, a conversation cannot reach closure as understanding unless the voices of the participants are articulated and heard as equals.³¹ Schön appears to agree with Gadamer when he identifies design as a “reflective conversation” with a “situation” that is capable of “talking back”.³²

DESIGN THINKING

By the time Rowe completed *Design Thinking* in 1987, *The Reflective Practitioner* had reached a wide audience. Although the title of Rowe’s first chapter, “Designers in Action”, closely resembles the wording of Schön’s subtitle, *How Professionals Think in Action*, Rowe does not acknowledge the parallel. “Designers in Action” presents a series of three case studies without discussing Schön’s findings except for a brief reference at the end of the chapter.³³

The content of “A Priori Knowledge and Heuristic Reasoning in Architectural Design” reappears in the new work – largely unaltered although greatly expanded – in a lengthy chapter entitled “Procedural Aspects of Design Thinking”. A few changes stand out: the phrase *a priori* occurs occasionally – almost incidentally – in the text, but Rowe has dropped this problematic reference to Kant, likewise replacing *heuristic reasoning* with *design thinking* in the chapter title. The latter change is particularly significant insofar as it also reflects the book’s title.

The *JAE* article had established Rowe’s position that design is a problem requiring solution. *Design Thinking* as a whole retains this premise with even greater insistence. Anticipating criticism, Rowe argues that design is appropriately categorized as a problem-solving activity:

Before continuing, it is well to address a point that usually arises as soon as the so-called creative aspect of design is introduced into a discussion of problem solving. After all, some might maintain, design is much more than mere problem solving. The veracity of this observation, however, clearly depends on our understanding of the word *problem*. To paraphrase Thorndike’s venerable definition, a problem can be said to exist if an organism wants something but the actions necessary to obtain it are not immediately obvious. It is hard to imagine circumstances under which the impetus for design is not covered by this definition...³⁴

A brief but succinct allusion to “wicked problems” – a concept associated with Horst Rittel – had prefaced the *JAE* article.³⁵ “Procedural Aspects of Design Thinking” expands considerably on the what the term problem entails, both in the chapter’s introduction and four sections that follow: “Some General Characteristics of Design Problems”, “Early Theoretical Positions”, “Staged Process Models of Problem Solving in Design”, and “The Information Processing Theory of Problem Solving”.³⁶

Rowe retrieves the phrase heuristic reasoning in a section entitled “Heuristic Reasoning and Design ‘Situations’”.³⁷ Placing the word *situations* in quotation marks, Rowe again appears to reference Schön. He claims, however, to be extracting the concept from Maurice Merleau-Ponty – odd because Merleau-Ponty is a phenomenologist unlikely to be in sympathy with Rowe’s empirical position.³⁸ Throughout this section Rowe elaborates on the meaning and definition of *heuristics* and its extension as heuristic reasoning – a clarification that had been lacking in the journal article. Referring to scholarly work completed in the late 1960s, Rowe supplies a definition: “a heuristic is any principle, procedure, or other device that contributes to reduction in the search for a satisfactory solution”.³⁹ After commenting briefly on other sources, Rowe concludes, “In short, heuristics is a term that is applied to specific problem-structuring devices ranging from explicit decision rules... to a wide variety of analogies, analogs, and models.”⁴⁰

The heuristic categories identified in the *JAE* article are reprised in a section renamed “Types of Rules and Constraints at Work in Design”. Although the categories themselves do not change, their descriptions are elaborated. For example, Rowe adds two examples to the category of literal analogies – Frank Lloyd Wright’s prayerful joining of hands to explain the roof form of his Unitarian Church in Madison, Wisconsin, and Utzon’s allusion to the image of sails as the formal origin of the Sydney Opera House.⁴¹ The chapter ends with a reprise of “Aspects of Design Behavior”, expanded from the earlier article, and a new section entitled “Limitations of a Procedural View”.⁴²

On the whole, *Design Thinking* is densely written and thorough. It is also highly analytic and focused on problem-solving almost to the point of obsession. Empirical reduction is considered a strength – a stripping away of elements that distract from finding the right solution.

In Spring 1990, three years after the publication of *Design Thinking*, Michael Rubin reviewed the book for the *Journal of Architectural Education*. Rubin did not stint on enthusiasm or praise for Rowe’s study:

Rowe has presented the architectural community, and hopefully a wider audience, with...a radically alternative way of understanding the activity of design as a mode of inquiry and a re-appreciation of architectural production as a way of human knowing.⁴³

IRRECONCILABLE DIFFERENCES?

There can be no doubt that the respective positions which these two canonic works espouse are diametrically opposed. The approach that Rowe advocates in *Design Thinking* epitomizes the technical rationalism Schön rejects. If Schön’s argument in *The Reflective Practitioner* is valid, the two positions are mutually exclusive. Alternately, Schön’s dismissal of technical rationalism may be unjustified, or only partially correct – leading to the conclusion that positivism and empirical thinking are at worst incomplete components of a broader process. Unresolved conflicts implicit in these possibilities affect current faculty and students in multiple ways.

Design Thinking promotes techniques (the technical in technical rationality) that are relatively easy to teach – and also, relatively easy to learn. Students are encouraged to cultivate images or rule-based ideas that motivate the development of a design. In this context, heuristic strategies can be generative – a productive and convenient method for initiating the project. Unfortunately, nothing about heuristics explains how a crab’s shell rises to become the cover of *Meaning in Western Architecture*.⁴⁴ Rowe deflects this concern, suggesting that designers are by nature nimble thinkers who know when to move in and out of a heuristic mode, or when to abandon one particular strategy in favor of another.⁴⁵ If there is a guiding principle, it is embedded in the rational side of technical

rationality – in other words, somewhere in the realm of logic, testing, or analysis.

In the design studio the empirical process requires that students possess “a reason”, which they are expected to communicate verbally. Sometimes the reason is there but cannot be articulated, in which case the idea must be discarded. At the same time, collateral disadvantages may be ignored when an empirical progression justifies the original idea.

Because it dictates the elimination of options in searching for a correct solution, empirical methodology is by definition reductive. Tasked with guiding students through the labyrinthine effort that can attach to design, studio instructors may likewise advise simplicity, encouraging students to focus on a single idea. This is the source of the student presentation that opens, “My concept is...” – a line familiar to anyone who has ever participated in a design review. Emphasis on reduction and singularity inevitably leads to the belief that design revolves around a search for the right idea. To fulfill this criterion a student may isolate a formal or technical innovation found in a professional magazine, or invent a “gimmick” – an idea so outrageous or seemingly unique that it must be deemed creative. In studio critiques, students may demand to be told whether a particular idea “will work” – resistant to the notion that among the plethora of possible ideas (crab shell? sails? praying hands?) success depends less on a vague or indeterminate idea than the process that inquires into and engages a seminal thought. Is this the failure of technical rationality, or simply too little learning?

In recent years the word “iteration” has gained a foothold in the lexicon of design, yet many students have difficulty describing what an iteration is. A student may point to an idea that can assume numerous aspects – e.g., a form flipped from left to right, rotated, or subject to a series of distortions generated by “a rule”. Each of these variations is thought to represent an iteration. This type of iteration exists in an empirical realm – options are conceived, tested, and accepted or rejected in an effort to reduce the possibilities until the right one can be identified. Within a hermeneutic context, the process is different. An iteration – the root of the word, *iter*, means “journey” in Latin – will entail both length and distance. Following the structure of the hermeneutic circle, an iteration requires participants and a conversation – perhaps between words and drawing, or between designer and a representational study. The ensuing situation, as Schön observed, is expected to “talk back”. Like the metaphor of conversation that explains it, a hermeneutic iteration opens a dialogue that ends with a new understanding – something that could not be anticipated at the onset becomes visible as the iteration progresses. The process is not easy to learn. Conditioned by the relative ease and speed of visualizing an empirical result, students can have difficulty appreciating the value of a sequence whose outcome cannot be projected in advance. Nevertheless, a hermeneutic iteration does reveal an interpretive understanding, which in turn becomes the basis for entering into a new iteration.

BACK TO THE PIERIAN SPRING

Although thirty years have elapsed since the conflicting perspectives in *The Reflective Practitioner and Design Thinking* were open to scrutiny and debate, the role of empirical methodology remains a point of controversy among design professionals. We still cannot agree how, or whether, problem-solving resides within the realm of design. Most of us don't recognize the difference between analytic and hermeneutic techniques, or understand why analysis is reductive whereas hermeneutics is not. We accept the term pedagogy but dislike epistemology. We know that we are living in a post-modern era, yet we are reluctant to accept post-modern developments in philosophy. We seem unable to identify, let alone discuss the sources of our disagreement – all of which renders us unable to explain these differences to students.

Architectural educators, and teachers of design in particular, may not want to pose as experts in philosophy, but we must accept responsibility for knowing essential tenets of philosophy that impact our discipline. In order to understand and evaluate Schön's opposition to technical rationality, several questions must come forward: What is *a priori* knowledge (versus *a posteriori* knowledge)? What is empiricism and how does it come to include *a priori* knowledge? What is logical positivism, and why is it considered reductive? In order to accept or reject Rowe's vision of design thinking, other questions need to be asked: Are problem solving and heuristic strategies necessarily empirical and reductive? Are reductive methodologies necessarily bad? Is a hybrid possible? Schön offers "reflection in action" as a preferred epistemology that may align with philosophical developments such as hermeneutics. Are there other possibilities?

ENDNOTES

1. Peter G. Rowe, "A Priori Knowledge and Heuristic Reasoning in Architectural Design," *Journal of Architectural Education* 36, no. 1 (Autumn 1982): 18-23.
2. Donald Schön, Donald, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983).
3. Peter G. Rowe, *Design Thinking* (Cambridge, MA: MIT Press, 1987).
4. Rowe, "A Priori Knowledge," 18.
5. Rowe, "A Priori Knowledge," 18-19.
6. Rowe, "A Priori Knowledge," 18.
7. Rowe cites Le Corbusier, *The Chapel at Ronchamp* (London: Architectural Press, 1958); "A Priori Knowledge," note 6, 23.
8. Rowe, "A Priori Knowledge," 19.
9. Rowe, "A Priori Knowledge," 19.
10. Rowe, "A Priori Knowledge," 19.
11. Rowe, "A Priori Knowledge," 19.
12. Rowe, "A Priori Knowledge," 19-21.
13. Rowe, "A Priori Knowledge," 21-23.
14. Rowe, "A Priori Knowledge," 23.
15. Schön's educational credentials according to Mark K. Smith, "Donald Schön: Learning, Reflection and Change" (2001, 2011), *Encyclopedia of Informal Education*, accessed October 8, 2019, <https://www.infed.org/thinkers/et-schon.htm>.
16. Schön, *Reflective Practitioner*, viii.
17. Schön, *Reflective Practitioner*, 19-20.
18. Schön, *Reflective Practitioner*, 21.
19. Schön, *Reflective Practitioner*, 31ff. Regarding the origin of the relationship between positivism and professional education, Schön references Richard J. Bernstein, *The Restructuring of Social and Political Theory* (New York: Harcourt Brace Jovanovich, 1976).
20. Schön, *Reflective Practitioner*, 48.
21. Schön, *Reflective Practitioner*, 39-40.
22. Schön, *Reflective Practitioner*, 49-69.
23. Rowe names the student observed at Rice University's School of Architecture: "A Priori Knowledge," note 20, 23. The study on which Schön's observations are based was conducted jointly by MIT's School of Architecture and Harvard's Graduate School of Design in the 1970s (prior to Rowe's arrival): *Reflective Practitioner*, note 1, 360.
24. Schön, *Reflective Practitioner*, 78.
25. Schön, *Reflective Practitioner*, 79.
26. Schön, *Reflective Practitioner*, 80.
27. Hans-Georg Gadamer, *Truth and Method*, 2nd rev. ed., trans. Joel Weinsheimer and Donald G. Marshall. (New York: Crossroad, 1989), 367-69, 383-88.
28. The German title is *Wahrheit und Methode* (Tübingen: J.C.B. Mohr, 1960); for the English version see note 25 above.
29. See "Play as a Clue to Ontological Explanation in Gadamer, Truth and Method, 105-134.
30. Schön, *Reflective Practitioner*, 80.
31. Gadamer, *Truth and Method*, 367.
32. Schön, *Reflective Practitioner*, 78.
33. Rowe, *Design Thinking*, 34-35.
34. Rowe is referencing E. L. Thorndike, *Human Learning* (Cambridge, MA: MIT Press, 1931); *Design Thinking*, 39.
35. Rowe, "A Priori Knowledge," 18.
36. Rowe, *Design Thinking*, 39-74.
37. Rowe, *Design Thinking*, 74-79.
38. Rowe bases his interpretation of Merleau-Ponty on Samuel B. Mallin, *Merleau-Ponty's Philosophy* (New Haven, CT: Yale University Press, 1979); *Design Thinking*, 76-77.
39. Rowe credits Allen Newell, J.C. Shaw, and Herbert A. Simon, "The Process of Creative Thinking" in *Contemporary Approaches to Creative Thinking* (New York: Atherton Press, 1967) with this definition; *Design Thinking*, 75.
40. Rowe, *Design Thinking*, 75.
41. Rowe, *Design Thinking*, 82.
42. Rowe, *Design Thinking*, 91-113.
43. Michael Rubin, review of *Design Thinking*, by Peter Rowe, *Journal of Architectural Education* 43, no. 3 (Spring 1990): 45-47.
44. Christian Norberg-Schulz, *Meaning in Western Architecture*, rev. ed. (New York: Rizzoli, 1980). A color photograph of the chapel of Notre Dame du Haut at Ronchamp serves as the cover for this paperback edition.
45. Rowe, "A Priori Knowledge," 18, 19-20, 21-23; Rowe, *Design Thinking*, 103-109.