The Language Games of Science and Philosophy: Bridges Rather than Anchors

M. Jayne Fleener
University of Oklahoma

In their essay "Science Education: Constructing a True View of the Real World," Christine McCarthy and Evelyn Sears critically examine the tenets of constructivism as the received view of science education that informs much of the discourse and practice in that field today. This dominance of constructivism over alternative philosophical and theoretical approaches informing pedagogical practice occurs despite already existing challenges to the constructivist foundations of science education. The constructivist perspective is especially problematic for science educators, they argue, given the anti-realism implicit in the constructivist ontology and epistemology. Their argument for a modest realism as the foundation for science education assumes that realism is implicit in scientific practice and that knowledge, to count as knowledge, must entail a correspondence between truth claims and actual states of affairs in the world.

That these issues have been sufficiently treated in the history and philosophy of science literature makes a direct assault on their reasoning unnecessary and inappropriate.[1] W.V.O. Quine laid out the playing field of this controversy between scientific realism and constructivism almost fifty years ago in his challenges to empiricism as did Ernest Nagel in his articulation of Dewey's logic.[2] Philosophers of science similarly have explored understanding of the scientific process from post-epistemological perspectives. Post-epistemological approaches to the philosophy of science challenge Realism, not to retreat or be condemned to Idealism but by questioning the underlying approach of and foundations in empiricism.

Traditionally, Cartesian doubt has set us on a path of dualisms that has been challenged at its most fundamental levels. Starting with Immanuel Kant, these challenges take the form of questioning and offering alternative approaches to doing philosophy. Upon what other basis besides certainty can philosophy be approached? Ernst Von Glasersfeld and H. Grayson Wheatley are two examples of philosophers who have chosen a different path from that which was set by analytic philosophy.

I do not feel the need to come to the rescue of von Glasersfeld and Wheatley since both have adequately presented their positions elsewhere.[3] I also do not want to fall into the trap of arguing against the ill-founded conclusions of McCarthy and Sears resulting from analytic approaches to philosophy by arguing analytically. This is a game, as we can see with the attacks by McCarthy and Sears, that post-epistemologists cannot win. Decontextualizing and analyzing the arguments of post-epistemological approaches to philosophy as McCarthy and Sears have done, defeats the very change in approach that post-epistemological thinkers represent.

Rather than using the analytic tools of argumentation, deconstructing and challenging their argument point by point, I will employ an analogical form of argumentation.[4] Using as an analogy problems in the foundations of mathematics,

I will argue that modernist questions about knowledge, truth, and being are not meaningful from a post-epistemological perspective. I will describe how Ludwig Wittgenstein approached the problems in the foundations of mathematics as language games. The language game of the constructivist-realist debates will be informed by the problems from the history and philosophy of mathematics. From the vantage-point of language games, I will offer the perspective that the realist-constructivist debates make no sense.

Language Games as a Philosophical Approach

Wittgenstein, as a student of Bertrand Russell's, set out to solve the problem of the foundations of mathematics introduced by Russell's paradox.[5] His first attempts to solve the problem of the foundations of mathematics were within the tradition from which the problems occurred, namely logic. The problem in the foundations of mathematics and philosophy in general, he explained in the *Tractatus*, result from our confusing the things we talk about with the things in themselves. With regard to science, for example, Wittgenstein explained, "The whole modern conception of the world is founded on the illusion that the so-called laws of nature are the explanations of natural phenomena."[6]

The point: we have confused our explanations with the things they explain. Similarly, he argues, logic as the form of the language of mathematics cannot be used to express truths about mathematics. Logical form only makes its appearance through use. Through the use of language, we "show" or reveal its logic. There is no underlying logic to describe.

Using logic, Wittgenstein came to the conclusion that logic could not be the foundation for mathematics. He had not, however, solved the problems of the foundations of mathematics.[7] His approach in his early writings, like the efforts of post-epistemological thinkers to employ analytic methods to communicate with their more traditional counterparts, was not sufficient to explain Russell's paradox or solve the problems in the foundations of mathematics. His later writings explored a different approach not only to the problems in the foundations of mathematics but also to the process and methods of philosophy.[8]

In his later works, Wittgenstein developed his notion of language games as a philosophical technique. Language games as an approach to philosophy explore how language is used. Thus, rather than answering philosophical questions such as "What is knowledge?" or "What is mathematics?," Wittgenstein used language games to explore not the "thing" which answers these questions but "family resemblances" of related and over-lapping ways in which we use language. The question, therefore, is not about the objects of scientific reasoning but the processes of science within our historical and practical contexts, and our understanding of the "family resemblances" in scientific discourse.

Consistent with Wittgenstein's approach, Von Glasersfeld traces the "history of epistemological dissent" to support the need for alternative questions about and approaches to knowledge claims, in general, and scientific process and knowledge more specifically.[9] The constructivist-realist debates perpetuated by modernists like McCarthy and Sears reveal the multiplicity of ways we use "knowledge," "truth,"

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and "reality" and only further support the need for exploring these debates from post-modernist perspectives. That their own arguments against constructivism cite the many ways we use words like "knowledge" is not an indictment of constructivism but of their own modernist approach to the language games of philosophy. The problems seem to result from the processes of analytic thinking and philosophical processes rather than substantive issues of what it means to engage scientific method and theories.

As described in *The Blue Book*, Wittgenstein explains this about games themselves:

> We are inclined to think that there must be something in common to all games, say, and that this common property is the justification for applying the general term "game" to the various games; whereas games form a *family* the members of which have family likenesses. Some of them have the same nose, others the same eyebrows and others again the same way of walking; and these likenesses overlap.[10]

Similarly, in *The Investigations*, using the duck-rabbit gestalt, Wittgenstein discusses the role of active participation on meaning and perception as opposed to a mechanical view of stimulus-response. His goal is not to explain the shift in perception but to emphasize the importance of the shift, that is, to explore the significance "that seeks to clarify without explaining the phenomena with which it deals."[11] He continues:

> The expression of a *change of aspect* (emphasis added) is the expression of a new perception and at the same time of the perception's being unchanged.…"Seeing as"…is not part of perception. And for that reason it is like seeing and again not like.[11]

Our goal is not to identify the lens through which we look, explains Wittgenstein later in the *Investigations,* but to understand the role of the lens in our seeing. This abandonment of certainty is threatening to modernist thinkers entrenched in the method of Cartesian doubt. This is described by Lorraine Code, in positing feminist epistemology:

> Not only does it call for abandoning categories and theories in favor of the complexity of experiences, but it insists on a recognition that first-person narrative accounts may *not* afford immediate access to truth.… Reductivist analyses interpose theoretical tenets and presuppositions *between* subject and object, creating and maintaining a rift, a dichotomy. They inhibit the construction of knowledge and belief out of an interplay of subject-and-object, interconnected and reciprocally influential.[13]

But questions arise. By utilizing the method of language games to explore the many ways we use words like knowledge, truth, and objectivity, have we completely thrown out the baby with the bath water? Does this mean scientific inquiry cannot be a useful way to explore and meaningfully experience our world?

Dewey's logic, especially as presented in his later period, and differently presented than by McCarthy and Sears, has implications for science instruction and scientific theory-building. The expansive proliferation of potential for interaction through problem solving is consistent as a goal for science educators who hope their students, without relying on epistemological groundings, possess a mix of skills, understandings, abilities and insights for future potential problem solving investigations and inquiry. This approach is not founded on realist assumptions about the nature of reality or the goals of science but on expansive growth, creative emergence

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and potential. While Dewey may have been a realist, his logic, like Wittgenstein's, transcends his method through his naturalistic process. Dewey is a good example of how the practices and theories of science need not address nor represent the perspectives of modernist reductionism, preestablished foundations, and truth with a capitol "T." Wheatley and von Glasersfeld similarly have provided approaches to mathematics and science education that do not require explaining the lenses of scientific and mathematical process but explore meaningful mathematics and science learning from post-epistemological perspectives.

Tightrope Walkers and Other Post-Theories

Friedrich Nietzsche's tightrope walker provides the final analogy by which we may explore the constructivist-realist debate. He described the tightrope walker as the rope itself supported by but not to be reduced to either of its ends:

> Man is a rope, tied between beast and overman — a rope over an abyss. A dangerous across, a dangerous on-the-way, a dangerous looking-back, a dangerous shuddering and stopping. What is great in man is that is he is a bridge and not an end.[14]

We are in process, beyond our primitive origins yet not having reached the illusive superman we sometimes think we have. We are connected to our past and to our potential futures, hanging precariously over an abyss of complacency often brought about by our own reductionistic tendencies and needs for foundations. There is danger in questioning and uncertainty, as there is danger in looking back or remaining stationary. What is great about us is not our answers, not our arrivals or accomplishments, but our perpetual comings-and-goings, our being a bridge from the past to the future. The evolutionary flow is not teleological but perpetual process.

The lesson for science educators is to facilitate the dangerous crossing, to encourage the creative and meaningful growth of the crossing as process rather than ends-as-goals. Learning the methods, practices, and theories of science allows our students to engage in the intelligent games of science. We place much stock in these games and reap the benefits of the technological and scientific advances associated with scientific method and inquiry. We must not mistake, however, the methods with some underlying realities. Meaning through use is sufficient and important for engaging in our language games of science.

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1. See for example, Richard Boyd, Philip Gasper, and J.D. Trout, eds., *The Philosophy of Science*, 6th ed. (Cambridge: MIT Press, 1997).

2. W.V.O. Quine, "Two Dogmas of Empiricism," first published in 1951 and later published in W.V.O. Quine, *From a Logical Point of View* (New York: Harper Torchbooks, 1953), 20-46; Ernest Nagel, "Dewey's Reconstruction of Logical Theory," in *The Philosopher of the Common Man: Essays in Honor of John Dewey to Celebrate His Eightieth Birthday* (New York: Greenwood Press, 1968), 56-86.

3. Careful reading of von Glasersfeld's, *Radical Constructivism: A Way of Knowing and Learning* (Washington, DC: Falmer Press, 1996) offers both cogent resolutions of the realist-constructivist debates and explanations of a method of inquiry that is not based on scientific empiricism.

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4. Analogical reasoning has a long-standing tradition as a method of inquiry and knowing and was used, for example, by Goethe in his poem "Metaphorphosis of Plants" to explore the growth and development of plants; Goethe, "The Metamorphosis of Plants" in *Goethe: Selected Poems*, trans. John Whaley (Evanston, IL: Northwestern University Press, 1998), 77-79.) Spengler, using Goethe's approach in the early twentieth century, distinguished between the Principle of Form and the Principle of Law. Form is associated with living, evolving, changing, synergetic relationships while Law is associated with mechanics and the non-living. His approach to history as an unfolding of patterns of relationships used the Principle of Form through analogy. In his book, *The Decline of the West* (New York: A.A. Knopf, 1926-28), Spengler argued that the over-emphasis in Western culture on the mechanical approach of the analytic method made the study of living, dynamic, natural phenomenon inert and void of meaning. Over-use of the analytic method to explore complex human phenomena, including philosophy, is like giving a child a hammer. All problems begin to look like nails.

5. David M. Burton, *The History of Mathematics* (Newton, MA: Allyn and Bacon, 1985).

6. Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, trans. by C.K. Ogden and F.P. Ramsey (New York: Routledge, 1922), 6.371.

7. This conclusion was proven more formally 15 years later when Godel published his proofs of the inconsistency and incompleteness of mathematics.

8. Interestingly, Wittgenstein's middle period, between the *Tractatus* published shortly after World War I, and the work of *The Investigations* (published posthumously but begun in the 1930s), found him attracted to the intuitionism of L.E.J. Brouwer, much to his mentor Russell's chagrin. Could it be, beginning with the struggles of Kant to reconcile the rationalist-empiricist debates, that a natural transition from coloring outside of the lines to jumping off the page is through intuitionism? The darkest night before morning's dawn, is the strange attractor of intuitionism the logical implications of our modernist ideas and analytic approaches to philosophy?

9. Von Glasersfeld, *Radical Constructivism*, 15.

10. Ludwig Wittgenstein, *The Blue and Brown Books* (1938; reprint, New York: Blackwell Press, 1975), 17.

11. Raymond Monk, *Ludwig Wittgenstein: The Duty of Genius* (New York: The Free Press, 1990), 511.

12. Ludwig Wittgenstein, *Philosophical Investigations*, ed. G.E.M. Anscombe and R. Rhees (New York: Blackwell Press, 1953), 196-97.

13. Lorraine Code, *What Can She Know? Feminist Theory and the Construction of Knowledge* (Ithaca, NY: Cornell University Press, 1991), 169-70.

14. Freidrich Nietzsche, "Thus Spoke Zarathustra," in Walter Kaufmann, *The Portable Nietzsche* (New York: Viking Press, 1968), 126-27.

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