

Where Logic meets Psychology: Dewey's Philosophy of Mind and Piaget's Genetic Epistemology

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In his essay "Toward a Pragmatic/Contextual Philosophy of Mathematics: Recovering Dewey's Psychology of Number," Kurt Stemhagen successfully pursues three tasks. First, he posits John Dewey's philosophy as an original, albeit neglected, contribution to mathematics education. Second, he proposes a distinctive move from Dewey as a social philosopher focusing on community, democracy and society, to Dewey who appears to be, as it seems to me, almost a developmental psychologist. Stemhagen specifically emphasizes Dewey's position in examining the creative and constructive aspects with regard to children's exploration and learning of mathematical concepts. Stemhagen stresses Dewey's pragmatism as an approach to knowledge embedded in real human experiences. In Stemhagen's reading — although he himself stops short of putting it in words — Dewey is seemingly coming up on the anti-realist side. To be fair, Stemhagen, throughout his essay, does not make this claim; in fact, he specifically underlines Dewey's contribution to educational philosophy as a "mediating influence between firmly entrenched opposing schools" of philosophical thoughts. Dewey's anti-dualistic position with respect to rationalism and empiricism is thereby what Stemhagen and I would agree upon. The absence of a sharp division between logic and psychology in Dewey's approach to mathematics is at the core, as Stemhagen notices, of his overall pragmatic method. The world understood as the *experienced* world betrays the notion of some transcendental stable reality, and human cognition is the mediating factor through which a change of existence is indeed *experienced*. As pertains to mathematical concepts, such a mediating, transactional activity of mind is what contributes to a child's "construction of the...notion of number" within the dynamic process of many sequential operations — or, as Stemhagen says quoting Dewey, "fitting together a number of minor acts in such a way as to constitute a complete and more comprehensive act."

It is thereby clear that the constructivist aspect is presented in Stemhagen's essay as a key notion in Dewey's philosophy of mathematics: Stemhagen says that it is the inseparability of action and thought that is at the core of the Deweyan educational philosophy. No argument here. Constructivism, as Nel Noddings acknowledges in her text *Philosophy of Education*, indeed has become a current paradigm of mathematics and science education and is based as such on a premise that the knowers actively construct their own knowledge.¹ In what follows, I would like to explore further Dewey's *Psychology of Number* as presented by Stemhagen. I am going to revisit, even if in brief, psychologist Jean Piaget's approach to developmental psychology — genetic epistemology, as he called it — as a counterpart to Dewey's philosophy. I expect objections to my position because epistemological stance is not one of the favourites among the educational philosophers' scholarship on Dewey. However, as Harvey Siegel earlier noticed, "so much the

worse for Deweyans” if they consider Dewey more as a resource for solving social problems and less as a thinker capable of advancing philosophy’s “own intellectual agenda.”² Stemhagen’s essay indeed makes a decisive step towards the latter while stressing the larger social *context* of Dewey’s philosophy of mathematics education as a means of overcoming what Stemhagen calls “deficiencies in other methods.” These pale binary opposites, the “symbols” method and the “things” method, are, as Stemhagen shows, united by means of Dewey’s positing his philosophy of mathematics within “his more general pragmatic philosophy [so that] mathematics is defined by its use [and] mathematics through measuring encourages an active conception of the discipline” as well as, I would add, an active conception of *concepts* as such.³ Interestingly, it was almost two decades ago that Howard Gardner acknowledged psychology’s turn to functionalism, put forth by William James and John Dewey, with respect to current developments in cognitive science.⁴ Gardner revisited Richard Rorty’s critique (in view of Dewey, Wittgenstein, and Heidegger) of epistemology as breaking the firm foundations of knowledge.⁵ Indeed, Gardner reminded us that Rorty posits the very “concept of mind [as] a blur.”⁶ I disagree with such a conception of mind and I think that Stemhagen’s reading of Dewey supports my judgment here. Does it?

Stemhagen says that Dewey, addressing the concept of number, posited it as a rational process and not a sense-fact, that is, the very use of number is possible “only after a great deal of rational, abstract thought.” It is unquestionable that a social environment is a precondition for inquiry understood as active and dynamic: in *The Quest of Certainty*, Dewey says — and Stemhagen reminds us — that thinking is a directed activity that changes the conditions under which objects are perceived. But this activity is the activity of *mind*, which thereby cannot be explained away, in the manner of Rorty, as a blur. Here is where psychology enters the territory of logic. And here is also where Dewey meets with Piaget. For it was Piaget who in 1952 presented a series of lectures in the University of Manchester that resulted in his book *Logic and Psychology*, which explored a way in which the child’s logical, mathematical and physical concepts arise.⁷ Piaget’s conception of symbolic logic as a useful tool — that is, his assigning logic an instrumental value — accords, in my opinion, with Dewey’s positing logic as a method of experimental and experiential inquiry and stressing the functioning of the human mind in its mediating role. It is precisely such a relational position, assumed by the function of *thinking*, that makes, for Dewey, the eternal question of “how one sort of existence, purely mental, immaterial... can get beyond itself and have valid reference to a totally different kind of existence — spatial and extended,” moot.⁸ And symbolic logic, as posited by Piaget, is not reduced to a blind manipulations of formal symbols (recall Stemhagen denouncing a solely “symbol” approach in Dewey’s philosophy of mathematics) but represents an operational algebra capable of constructing structures, or schemas, in accord with child’s dynamic (that is, developmental) process of *thinking* from pre-operational thought to the formation of representations, that is, “the internalisation of actions into thoughts.”⁹

Dewey’s philosophy of mathematics overcomes the limitations of both the strictly formalist perspective in mathematics education and the Platonism that, as

Stemhagen says, encourages, quite ironically, “conceptual understanding” through the use of physical objects in an effort to gain access to the realm of abstract but existent mathematical objects.” Piaget, on his part, was equally sceptical of logic-according-to-Platonism, the latter having posited, as he pointed out, “a system of universals existing independently of experience and non-psychological in origin.”¹⁰ Similar to Dewey, Piaget was an interactionist recognizing *both* external and internal modes of experience in the child’s construction of reality (the title of Piaget’s book). Dewey indeed uses a biological that is, genetic (recall Piaget’s *genetic* epistemology) metaphor, *growth*, as synonymous with knowledge acquisition and education in general. In line with the Piagetian child’s construction of new objects,¹¹ Dewey’s pragmatic method contributes to “a modification of the objective order [and] the institution of a new object” in the process of bridging,¹² as Stemhagen insightfully notices in his essay, “the philosophical gap between the two intractable positions.” Addressing mathematical discourse, Dewey traces the liberation of mathematics from an ontological reference;¹³ however — and this is important — he posits the possibility of an “indefinitely extensive existential reference — such as is exemplified in mathematical physics,” for example.¹⁴ This brings me to Stemhagen’s using Plato’s *Meno* and Socrates’ conversation with a slave boy to help him discover pre-existent mathematical knowledge, so as to illustrate his (Stemhagen’s) point of a persistent, never mind impoverished, Platonist method in the classroom. This also brings me to the very beginning of this response where I mentioned the perceived anti-realism of Stemhagen’s Dewey. I disagree with the historically retrograde, and shared by Stemhagen, reputation of *Meno* and I would like to stress that it is precisely Dewey’s *Psychology* that might help us in resolving the *Meno*’s learning paradox.¹⁵

In the realm of logic the mediating function is operational: the additive change, for example, “marks the assumption of a new relationship” leading to new properties serving as an object of knowledge that appears as a consequence of the said relationship.¹⁶ In the psychological realm, the mind’s mediating function defies the direct stimulus-response model because the whole experiential situation “calls up something not present to the senses,” and thinking must originate in its as yet pre-reflective and artistic state amenable to a “clear insight.”¹⁷ Such a pre-cognitive, yet insightful, thinking borders on imagination and represents, for Dewey, “a substratum in the depth of the subconsciousness, the basic pattern of the relations of the live creature to its environment.”¹⁸ For Dewey, the unconscious activities indeed refer to potential realities of the kind that enable one to re-shape natural objects. What he calls an *affective thought*, is part of “an economical balance of the unconscious and the conscious” so as to make explicit that what was only a prior intuition.¹⁹ All logical reasoning is preceded by “more unconscious and tentative methods.”²⁰ If we recall that Plato’s approach to knowledge depends on reminiscences, or pre-cognitive memories, then perhaps we should pause before rejecting *a priori* (pun intended) the potential reality of the objects of knowledge discovered by a slave boy.

1. Nel Noddings, *Philosophy of Education* (Boulder, Colorado: Westview Press, 1998).

2. Harvey Siegel, "Philosophy of Education and the Deweyan Legacy," *Educational Theory* 52, no. 3 (2002): 280.
3. See my Ph.D. dissertation "Continuities, Discontinuities, Interactions: Gilles Deleuze and the Deweyan Legacy" (Columbia University, 2002) that posits philosophical inquiry in terms of the dynamical process of constructing concepts.
4. See Howard Gardner, *The Mind's New Science: A History of the Cognitive Revolution* (New York: Basic Books, 1987).
5. See Richard Rorty, *Philosophy and the Mirror of Nature* (Princeton, N.J.: Princeton University Press, 1979).
6. Gardner, *The Mind's New Science*, 72.
7. Jean Piaget, *Logic and Psychology* (New York: Basic Books, 1957).
8. John Dewey. "Does Reality Possess Practical Character?" (1908), in *The Essential Dewey*, vol. 1, ed. Larry A. Hickman and Thomas A. Alexander (Bloomington: Indiana University Press, 1998), 124-33.
9. Piaget, *Logic and Psychology*, 11.
10. *Ibid.*, 3.
11. For the extensive analysis of Piaget's constructivism in line with post-Cartesian philosophy see Edward M. Hundert, *Philosophy, Psychiatry, and Neuroscience: A Synthetic Analysis of the Varieties of Human Experience* (Oxford: Clarendon Press, 1990). This wonderful book unfortunately does not mention Dewey or pragmatism, except for one brief reference to William James.
12. John Dewey, *Experience and Nature* (New York: Dover Publications, 1958), 220.
13. See John Dewey, "Mathematical Discourse. From *Logic: The Theory of Inquiry* (1938)," in Hickman, *The Essential Dewey*, vol. 2, 180-93. Dewey mentions crises in mathematics (such as, discoveries of irrational numbers, negatives, and imaginaries) as presenting opportunities in its logical development to expand the realm of references.
14. *Ibid.*, 180.
15. I address this question in detail in my essay "Learning by Abduction: A Geometrical Interpretation" presented at the C.S. Peirce Symposium at the 8th International Network of Philosophers of Education Biennial Conference, 7-11 August 2002, University of Oslo, Oslo, Norway.
16. Dewey, *Experience and Nature*, 222.
17. John Dewey, *How We Think* (New York: Prometheus Books, 1991), 75, 224.
18. John Dewey, *Art as Experience* (New York: Perigee Books, 1980), 150.
19. Dewey, *How We Think*, 216.
20. *Ibid.*, 113.