Title: In Education We Trust

Author: Venkata Rayudu Posina

Article Type: Opinion

Word Count: 860

Affiliation:

Independent Scientist

ORCID ID: http://orcid.org/0000-0002-3040-9224

Google Scholar: https://scholar.google.co.in/citations?user=cnMxV9MAAAAJ&hl=en&oi=ao

Address for Correspondence: Mr. Venkata Rayudu Posina, 101- B2 Swathi Heights, A. S. Rao Nagar, Hyderabad - 500062, Telangana, India

Email: posinavrayudu@gmail.com; **Tel:** +91-963-222-4686

An invariant of human experience is the yearning for understanding. We struggle to make sense of the particulars we are suspended in and we preserve the resultant good. One such good thing: we think about things and make things that we think of. One good thing about this back-and-forth between mind and matter is THEORY: theories of things. Theories are subjective generals that help us deal with particulars.

We talk and we think of talking. In telling and listening and in thinking about talking, we abstracted the essence—a theory—of talking, i.e. grammar. Grammar, not unlike any good theory, was useful in talking properly. In the spirit of preserving good things, we started teaching grammar, very early. This tradition of nurturing theory abstracted from practice, from the practice of planned perception (experiments), continues to this day: we teach calculus (a theory of change) early in high school.

Thinking about scientific theories led Professor F. William Lawvere to abstract a theory of the development of scientific theories (Lawvere, 1994). Lawvere's functorial semantics of algebraic theories spells out how the essence (theory) of a given category of particulars is abstracted, how the thus abstracted theory is interpreted to obtain models with which particulars can be compared, and how generalization depends on a doctrine (viewpoint). Changing the doctrine, as James Clerk Maxwell emphasized, brings different phenomena into view. Given the correspondence between

Particulars – Properties – Theory – Models – Doctrine

and

Stimuli – Sensations – Concepts – Percepts – Self which is a well-defined reflection of cognition in mathematical knowing (Posina, 2020), I thought scientists committed to solving the mind-matter problem would readily recognize a solution to their problem in Lawvere's functorial semantics, and begin to study *Conceptual Mathematics: A First Introduction to Categories* (Lawvere and Schanuel, 2009), a good textbook for learning the science of the relations between particulars and generals that is at the core the mind-matter problem.

The times are a-changing. Given the ease of building extremely large and useful lookup tables, theory—scientific theorization—appears to be in danger: scientists are subscribing to faith (Nature Editorial, 2016). As though this is not sad enough, scientists are parading flashy speculations as scientific theories of the relations between things and thoughts (see Posina, 2019). What does it take for scientists to take a break from selfies and renew their respect for serious thought (cf. Geman and Geman, 2016)? Just in case professors find studying textbooks below their pay grade: Roderick MacKinnon studied textbooks long after his tenure at Harvard and was soon rewarded with a Nobel Prize. More importantly, is it pedagogically ethical not to teach Conceptual Mathematics—our scientific understanding of abstracting theories and building models—to high school students, who may or may not want to participate in the practice of science, but are surely thinking about things and making things made-up in their minds (e.g. kites, music, and family)? In education we trust.

Added rationale for introducing Conceptual Mathematics in high school curriculum is provided by what I learned from studying Conceptual Mathematics: (i) Every change of any object [of a category] preserves its essence; based on these natural transformations, objects are represented for ever more refined understanding needed to create: make imagined real, anew. (ii) The way we ought to reason about things varies with the nature of things. (iii) The comprehensibility of our universe, which befuddled Einstein, is made possible by reflective parts; reality consists of parts that are reflective of reality. In light of the moral significance, practical value, and the heartwarming success of literacy drives, Education has no excuse not to make our scientific understanding common knowledge!

Conceptual Mathematics is also the needed corrective of the common misunderstanding of mathematics. We all begin mastering abstraction early in childhood (e.g. GRANDMOTHER). Addressing the commonplace question ‘what is it good for?’ is a mathematical method of defining objects (Lawvere and Rosebrugh, 2003, pp. 26-29; Lawvere and Schanuel, 2009, p. 334). In addition to true or false and numbers, purpose, subjectivity, and qualities, which are often cited as difficulties in solving the mind-matter problem, are all suitably positioned in mathematical reflections of reality (ibid. pp. 84-85; Lawvere, 2007).

References

Geman, D. and Geman, S. (2016) Science in the age of selfies. *Proc. Natl. Acad. Sci. USA* 113: 9384-9387.

Lawvere, F. W. (1994) Tools for the advancement of objective logic: Closed categories and toposes. In J. Macnamara, and G. E. Reyes (Eds.) *The Logical Foundations of Cognition*, New York: Oxford University Press, pp. 43-56.

Lawvere, F. W. (2007) Axiomatic cohesion. *Theory and Applications of Categories* 19: 41-49.

Lawvere, F. W. and Schanuel, S. H. (2009) *Conceptual Mathematics: A First Introduction to Categories*, Cambridge: Cambridge University Press.

Nature Editorial (2016) Digital intuition. *Nature* 529: 437.

Posina, V. R. (2019) Theories of consciousness. *Science* (eLetter; https://science.sciencemag.org/content/366/6463/293/tab-e-letters).

Posina, V. R. (2020) Hard, harder, and the hardest problem: The society of cognitive selves. *Tattva - Journal of Philosophy* 12: 75-92.