Matter and Meaning

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The twentieth-century mathematician G.H. Hardy once declared that one of the most important qualities he sought his discipline was "depth"—in essence, a measure of the links between one idea and others associated with it. Ideas might take what he considered higher forms, expressing in localized, fairly specific concepts, such as that of a whole number. Or, they might pertain to a lower, more foundational, level, as in the case of numerical categories, such as rational and irrational. The latter were preferable, he suggested, because they dealt not with superficial traits, but with the underlying laws that govern and unify those traits. In this respect, he was echoing a sentiment that had long characterized not just mathematics, but in fact a broad range of endeavors. Recall the declaration, in the Book of Wisdom, that God "hast ordered all things in measure, and number, and weight" (11:21). Implicit in both Hardy's statements and in Scripture is the idea that the physical world is, in effect, an accumulation of more or less crude objects that gain their value by virtue of their transitive potential, their ability to *refer to something else*.

However, as Ayana's paper nicely demonstrates, both physical objects and the means by which we perceive them could have surprising conceptual density. Indeed, the long discourse of ocularcentrism that she deploys to such good effect was founded on a paradox: many presumed that sight was the noblest of senses, but they also understood that it carried at least two risks. According to the Pauline tradition, the greatest risk was that of *concupiscentia oculorum*. The second, as Ayana discussed to such good effect, was the deceptiveness of appearances—that is to say, their *ignoble* potential to mislead. One could so easily be too captivated by surface details to gauge the more fundamental significance of a given object, be it either manufactured or naturally occurring. This is, in fact, the root of the Pauline suspicion of sight and, indeed, of the sensorium more generally: that perception, unless kept on a tight leash by judgment, will cleave to the superficial and overlook the measure, number, and weight of Creation. Pressing the transitivity of objects was, for Paul, the sole possible recuperative avenue. One could work toward redemption only by seeking "invisible things ... clearly seen [through] the things that are made."[1] But how might one gauge the clarity of one's perception?

One possible answer lies with a word that Ayana uses at a couple of different points in her paper: "speculation," which appears to carry a pejorative connotation for her. She writes of "significant confusion between science and speculation" and "fascination, fear, and speculation in the public consciousness and in intellectual discourse" (pp. 1 and 4)—in both cases implying a dichotomy between *ad hoc* interpretive effort and the pursuit of more rigorous, disciplined understanding. At the risk of putting too much weight on the term as deployed in her paper, one nonetheless wonders if here (as with mirrors) we might find another useful paradox.

The term *speculatione* has an interesting history, both with respect to Pauline theology (as Jeffrey Hamburger has demonstrated), and with respect to the measure, and number, and weight of Creation. Consider, for instance, *De viribus quantitatis* (On the Virtue of Numbers), a pedagogical text by the mathematician Luca Pacioli written around 1500. Occasionally described as "the

[1] See Jeffrey Hamburger, "Speculations on Speculation: Vision and Perception in the Theory and Practice of Mystical Devotion," in: W. Haug and W. Schneider-Lastin, eds. *Deutsche Mystik im abendländischen Zusammenhang. Neu erschlossene Texte, neue methodische Ansätze, neue theoretische Konzepte. Kolloquium Kloster Fischingen 1998* (Tübingen, 2000), p. 379.

first recreational mathematics text," *De viribus quantitatis* lays out a series of algebraic problems, geometric challenges, and—perhaps most delightfully—mechanical puzzles, including two now known as the "Chinese Rings" and the "Victoria" disentanglement.[2] The puzzles are less important, at least for now, than how Pacioli discusses them. He begins his introduction to the Victoria by declaring that, "some operations, which are greatly insightful (*de grande speculatione*), are done to give delight to the group."[3] Elsewhere, he describes another disentanglement as a "thought-provoking object that refines the ingenuity of youths in a similar fashion [to the one he mentions immediately before it]."[4] Speculation, in this instance, has more to do with reflection and insight than with undisciplined interpretation. One wonders, then, if something similar might have been the case for Komarek, Pollarolo, and their respective intellectual networks. Or, had some kind of shift occurred?

On a related note, both papers raise the vital question of how one should value perception. Objects may possess transitive potential, but they also remain objects nonetheless—whether near or far, within reach or beyond the stratosphere. Pacioli's puzzles certainly weren't abstractions. After describing the mechanics of solving the Chinese Rings, for instance, he recommends that his reader have an example on hand. In addition, he says, one should minimize explanation of the process involved in solving the puzzle because, "... not just describing the method, but actually showing the effort [enables a youth] to grasp [it]."[5] You don't have to be Maurice Merlau-Ponty to realize that apprehension was both physical and intellectual for Pacioli. One *saw* and could *feel* the results of successful or unsuccessful responses to a given problem because mathematics, like the physical phenomena it governed, had tangible consequences.[6]

A sour and mean-spirited man once observed that "words mean things." Perhaps we might spare a moment to consider the possibility that things also mean things.

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[2] The suggestion comes from David Singmaster, "*De Viribus Quantitatis* by Luca Pacioli: The First Recreational Mathematics Book," in: Erik D. Demaine, Martin L. Demaine, and David Eppstein, eds. *A Lifetime of Puzzles: Honoring Martin Gardner* (Natick, MA, 2008), 77-122.

[3] Luca Pacioli (eds. Maria Gerlaschi Peirani and Augusto Marinoni), *De Viribus Quantitatis* (Milan, 1997), p. 282: "Sonno alcune operationi facte per dar dilecto alla brigata, quali sonno de grande speculatione."

[4] Pacioli, 284: "Un altro caso ancora speculativo, lima de ingegno a li giovini, si propone in questo modo."

[5] Pacioli, 292: "[E] così sucessive, de mano 'in mano mettarai li altri, et parcas lector, perché non solo a scrivere el modo, ma actu mostrandolo, con fatiga el giovine lo aprende."

[6] One suspects there might be an interesting connection for both authors with Matthew Hunter's recent book *Wicked Intelligence: Visual Art and the Science of Experiment in Restoration London* (Chicago, 2013).