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D. Bushaw
Washington State University

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MATHEMATICS AND PHILOSOPHY*

D. Bushaw

It is the first premise of this discussion that mathematics is indeed a humanistic discipline. We should therefore be interested in the relations and possible interactions of mathematics with other humanistic disciplines. Many people are aware of some of the relations and interactions of history with literature, or of literature with philology; so why should they not be aware of some of the relations and interactions of mathematics with, say, philosophy, which is possibly the humanistic discipline par excellence?

Long ago I heard or read someone's quip that René Descartes was regarded as a great mathematician by philosophers and as a great philosopher by mathematicians. The quip is fair neither to philosophy, to mathematics, nor to Descartes; but it does remind us of the somewhat ambiguous historical relationship between mathematics and philosophy.

Without making a systematic search, I easily come up with the names of quite a few people who figure, in at least a minor way, in histories of both mathematics and philosophy. They include Pythagoras, Boethius, Nicolas of Cusa, Pascal, Leibniz, Wronski, Bolzano, C. S. Peirce, Bertrand Russell. The list could be much extended.

There have been other philosophers who, without exactly being mathematicians, knew a great deal of mathematics. Kant and Husserl were examples. (Husserl, the leading phenomenologist, was a student of Weierstrass.)

At the same time, many philosophers who never claimed any intimate technical knowledge of mathematics nevertheless did have penetrating things to say about our discipline. In this group my own favorite is George Santayana.

On the other hand, many mathematicians who would never claim to be philosophers have nevertheless been interested in philosophy, if only in the way that every person with a civilized outlook should have some interest in philosophy.

These affinities should not be surprising. Without committing

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ourselves to a definition of either mathematics or philosophy, we can probably agree that each can be described as an aggregate of systems of abstract ideas that are often very attractive in themselves, but also can provide wonderful frameworks within which to organize and analyze other aspects of human experience. Are there any other disciplines that can be so characterized?

Indeed, there have been those, like Russell and other logicians, who have claimed that mathematics is a part of philosophy--more precisely, of that part of philosophy called logic. On the other hand, there have been those, like Descartes and--in the twentieth century--Heinrich Scholz, who have argued that philosophy and a great many other subjects should aspire to the condition of mathematics and thereby, perhaps, become part of applied mathematics.

What do our students know of all this? Being our students, they study mathematics; some of them, but certainly not so many as we might like, study philosophy too; but it must be a rare undergraduate indeed who even begins to appreciate past, present, and latent relationships between the two subjects.

I would like to suggest again that it would be a very good thing to create opportunities for easy interaction between mathematical and philosophical ideas and ways of thought in the minds of undergraduates--and of their instructors.

I am not speaking here only of the philosophy of mathematics, especially when understood as the study of the foundations of mathematics, nor of those branches of philosophy, like "mathematical logic," that sometimes have the word "mathematical" in their names. I have in mind mathematics in general and philosophy in general.

Here are a few examples of questions that could be considered: What are some of the historical connections between mathematics and philosophy--in particular, how did some of the great mathematician-philosophers regard the relationship between the two subjects? What should we make of Pascal's rejection of mathematics--until he returned to it to take his mind off a toothache--as a dangerous distraction from the contemplative life? What are we to make of Wronski's use of his mathematics as a "guarantee" of his philosophy? What is the meaning of "existence" in mathematics?

A mathematician can hardly read the literature of the modern

philosophical movement called "structuralism" without sensing its inherently mathematical character. How might this character be made more explicit? How, if at all, might lattice theory be applied to axiology, the theory of values? What is the relation, if any, between simplicity and validity in mathematical models?

Clearly, inquiries like these could be concerned primarily with study of existing sources; but they might also involve much original--or locally original, so to speak--speculation. They could be taken up in courses, or in tutorial arrangements of some kind, or just in independent study projects. Capstone courses in general education programs might offer ideal opportunities. Visitors between colleges, or at least between departments, might be enlisted. Team-teaching might be in order. Papers might be written, even for publication. I do not want to make my suggestions too concrete. It seems to me that we should try all sorts of things, then gather and disseminate information about successes and failures.

Some parts of philosophy may be distant from mathematics, and some parts of mathematics may be remote from philosophy. But (the traditional boundaries between philosophy and mathematics (not to mention other disciplines) are after somewhat arbitrary, and may be of little significance except for purposes of academic convenience. If all went well, a major outcome of experiments of the kinds I have been suggesting could be the emergence of a group of people who would have learned that it is possible to ignore those boundaries, or at least to leap lightly back and forth over them. This in turn might have all sorts of marvelous consequences.)

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