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Mathematical Notation as a Philosophical Instrument

The Advent of Mathematical Formulas

Modern science would be unthinkable in more than one sense without symbolic mathematical notation, and that is for the most part a product of the late seventeenth and the eighteenth century.[1] In this contribution I shall try to show how the development of such notation was much more than a purely formal achievement, of interest only to historians of mathematics or, more often than not, not even to them. In the seventeenth and eighteenth century, the growing variety of mathematical symbols and rules of manipulation was a new medium being explored for the possibilities it offered of producing reality and relating to it. As such, it played an important role in shaping natural philosophical and, later, scientific epistemology.

One possible objection to the view just stated must be dealt with immediately. Since the method of infinitesimal analysis[2] emerged in the Enlightenment period along with symbolic mathematical notation, it could be argued that what influenced natural philosophy was not so much the symbolic notation in itself, but rather the new mathematical concepts it helped to discover and express. While this schematisation is of great use for many historical investigations, it is being increasingly recognized that the history of mathematical knowledge cannot be sharply separated into a history of mathematical thought, on the one side, and a history of the forms in which that thought may come to express itself, on the other. There are two central arguments in favour of the view that such a clear-cut division is not possible: first, on the level of the individual, thought and its representation are as closely interwoven in mathematics as in any other field of human activity and, second, individuals can only share the knowledge of a mathematical community if they are educated in those forms of expression peculiar to the community itself.[3]

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1 The only work dedicated entirely to the history of mathematical notation is: F. Cajori, *A History of Mathematical Notations*, 2 vols. bound as one (La Salle, 1928–1929, reprinted 1993). For subjects relevant to this paper, see especially vol. 2, pp. 196–267.

2 For an overview of the history of infinitesimal analysis I used: I. Grattan-Guinness, *The Fontana History of Mathematical Sciences. The Rainbow of Mathematics* (Glasgow, 1997), pp. 234–346.