MORRIS KLINE (1908-1992)

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Professor Morris Kline of New York University's Courant Institute died 10 June 1992 after a long career of bringing mathematics in various aspects to a wide public. He was born in New York 1 May 1908 and spent most of his academic life there. He considered himself an applied mathematician and his contributions to research fell under that heading. To the general public, however, he represented mathematics as a whole.

Kline consistently tied mathematics to other themes in his popular writings. His *Mathematics in Western Culture* (Oxford University Press, 1953) discussed mathematics as part of the general intellectual milieu of Europe. *Mathematics and the Physical World* (New York, Thomas Y. Crowell, 1959) addressed subjects dear to the author's heart and was subsequently reprinted by Dover Publications. Perhaps his most famous work was the polemic *Why Johnny Can't Add* (New York, St. Martin's Press, 1973), an assault on the shortcomings of the 'New Math' in the public schools. Kline's observation that the students in schools where the 'New Math' curriculum was flourishing were neither learning the traditional skills nor understanding the new ideas may have helped to curb the curricular excesses. His later *Why the Professor Can't Teach* (New York, St. Martin's Press, 1977) indicted mathematical education in a liberal arts setting. It caused concern in the mathematical community, where some said that it could be used as ammunition by legislators seeking to cut funding of universities.

The two books of Kline of most interest to historians of logic are *Mathematical Thought from Ancient to Modern Times* (Oxford University Press, 1972; 3-volume paperback edition, 1990) and *Mathematics: The Loss of Certainty* (Oxford University Press, 1980), which soon appeared in a Russian translation (Moscow, Mir, 1984). The former he intended to deal with ideas, not men, and he announced in the preface that he supported a historical introduction to mathematics as one of the best ways to acquire an understanding and appreciation of the subject. He dealt with the earlier material primarily at secondhand, but for the post-calculus period usually cites the original papers. Carl Boyer in a review in *Isis* (65 (1974), 104-106) paid tribute to Kline's 'excellent surveys' and 'attractive, vigorous, and hard-hitting manner.' Although he did observe some 'unseemly hyperbole' and 'very occasional lapses,' Boyer predicted that the book would become a standard reference,

and so it has proved. A volume as recent as the collection edited by Detlef Spalt, *Rechnen mit dem Unendlichen* (Boston/Basel/Stuttgart, Birkhäuser, 1990), takes Kline as a historical reference.

Most of Kline's discussion of mathematical logic in his historical survey occurs in chapters 41-43 and 51. (Page references are to the 1972 edition.) In chapter 41 he presents a picture of Kronecker closer to Bell's caricature than to the eirenic portrait defended by Harold Edwards (p. 995). In the same chapter he describes Cantor's work on the denumerability of the algebraic numbers and the uncountability of the reals. As might be expected, his treatment of Zermelo's axiomatization of set theory suggests that it arose out of the paradoxes (p. 1185), a view taken to task in G.H. Moore's volume *Zermelo's Axiom of Choice* (New York/Heidelberg/Berlin, Springer, 1982).

After a chapter on the foundations of geometry in which he discusses Hilbert's axioms for geometry and the idea of independence, Kline devotes most of chapter 43, 'Mathematics as of 1900,' to matters of foundations. He notes that the development of non-Euclidean geometry raised the issue of truth for geometry (p. 1032) and discusses Russell's 1897 *Essay on the Foundations of Geometry*. He draws an analogy with non-commutative algebras, which he sees as raising the question of truth for algebra. One is reminded of Boyer's remark about hyperbole by the following: 'By 1900 mathematics had broken away from reality; it had clearly and irretrievably lost its claim to the truth about nature, and had become the pursuit of necessary consequences of arbitrary axioms about meaningless things' (p. 1035).

He maintains the same perspective in chapter 51, 'The Foundations of Mathematics,' the concluding one of the book. He notes that 'by far the most profound activity of twentieth century mathematics has been the research on the foundations' (p. 1182) but seems to find the crisis raised by the paradoxes unresolved. He traces the rise of various schools of foundations (logicist, intuitionist, and formalist) and describes their intellectual ancestry. Kline displays no reluctance to draw morals from technical results: '...while Brouwer made clear that what is intuitively certain falls short of what is mathematically proved, Gödel showed that the intuitively certain goes beyond mathematical proof' (p. 1207). The story is carried up through Cohen's work on the independence of the continuum hypothesis, although technical points continue to be smoothed over. Kline's conclusion is that 'mathematics remains alive and vital, but only on a pragmatic basis' (p. 1209). From this negative standpoint it is not surprising that he does not mention Skolem, Löwenheim, Schröder, Church, Heyting, Curry, Quine, or Ramsey.

That deficiency is repaired in his 1980 volume, which is essentially an extended indictment of abstract mathematics. The historian of logic will find in chapters 8-12 a fuller treatment of the themes raised in the earlier book. One new aspect is the introduction of a 'set-theoretic school' of foundations (to include Bourbaki) by the side of logicism, intuitionism, and formalism (pp. 256-257). Kline describes the bases of non-standard analysis as developed by Abraham Robinson but argues that no new results 'of any consequence'

had arisen from it. He proceeds to observe: 'the present state of mathematics is anomalous and deplorable. The light of truth no longer illuminates the road to follow.' The attitude is clear, but it can exaggerate the historical record, as when Gödel's results are described as a 'disaster' (p. 263).

In short, although Kline's later book goes into more detail on the history of logic than the earlier survey, his descriptions suffer from his extreme position as applied mathematician. After referring to G.H. Hardy and L.E. Dickson, he writes, 'Their pure mathematics, like all mathematics created for its own sake, will almost certainly not have any use. However, the possibility is not out of the question...a monkey who types letters at random may produce a play of Shakespearean quality' (p. 296). Kline's zeal obscures his perspective. That zeal is less obtrusive in *Mathematical Thought*, which will remain, for completeness if not for balance, a standard reference.

## IN MEMORIAM – WILLIAM C. KNEALE

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William C. Kneale, who with his wife Martha wrote *The Development of Logic* familiar to all English-speaking historians of logic, died on 24 June 1990. He was 85 at the time of his death. Kneale was better known to his colleagues at Corpus Christi College, Oxford, as a philosopher of science and the author of a book on *Probability and Induction* (1949) which gives an account of the range theory of probability. He was a Fellow of Exeter College, Oxford, and in 1965 succeeded to the White Professorship of Moral