Stewart Shapiro, *Foundations without Foundationalism: A Case for Second-Order Logic* (New York/Oxford, Oxford University Press, 1991)

Reviewed by

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In a nutshell: Shapiro likes second-order logic and feels it has been unfairly neglected by proponents of first-order logic. In the book under consideration, he attempts to prove that first-order logic has terrible inadequacies that are removed only by second order logic. At the same time, he realises that second-order logic has its own problems.... The net result is the conclusion that the Foundations of Mathematics must do without the demand that there be a single best foundation, which demand he calls *foundationalism.* Actually, he distinguishes between *strong* foundationalism (there is a unique foundation for mathematics) and *moderate* foundationalism (there is at least one foundation for mathematics). Anyway, the book is divided into three parts—an Orientation (philosophy), Logic and Mathematics (a technical survey of second-order logic punctuated by an occasional philosophical aside), and a closing section on History and (more) Philosophy.

In the preface, Shapiro acknowledges that many of those who contributed their time and comments found his programme to be "seriously misguided." Let me say at the outset that I agree with them. I certainly agree with Shapiro that Foundations of Mathematics needs no foundationalism. At the same time, however, I must say that I see no need for an argument. (If one does need an argument, why not simply point out the simultaneous legitimacy of classical and intuitionistic mathematics and their obvious foundational incompatibility?) To argue that second-order logic deserves more attention is reasonable, and, perhaps, even necessary. To argue for such by attacking first-order logic is unseemly, smacking more of politics than of philosophy. But, if one is going to carry out such an argument, one ought at least to present an argument that is clear, fair, and informed. I would not care to say that Shapiro argues through confusion, cheating, and ignorance, but he could have done a better job of it.

The central confusion in my mind—and I take it as axiomatic that confusion in a reader is entirely the fault of the author—is what he is talking about. There are Mathematics (M), Foundations of Mathematics (FM), Mathematical Logic (ML), Philosophical Logic (PL), Philosophy of Mathematics as practised by Philosophers (PMP), Philosophy of Logic (PoL), Foundations of Logic (FL), and Epistemology (E). While there are relations among these subjects (e.g., PMP E), no two of them coincide (except possibly PoL and FL), and what may be inadequate for one may be perfectly adequate for another. What I never understand in the book is which of these perspectives is operational. Is first-order logic inadequate for M, FM, ML, PL, PMP, ... or what? On page 15 we read that "it may come to pass that logicians advocate and study only classical first-order systems. We cannot rule out the possibility that the 'triumph' of first order logic will be complete. However, if I may be permitted to be smug, both towards this possibility and towards those who currently hold that first-order logic is all there is, it might be recalled that it was once held that Aristotelian logic is the only logic there is. The considerations that toppled this view were of the same