

Marcus Giaquinto

The Search for Certainty

New York, NY: Oxford University Press, 2002

xii + 286 pp. ISBN 019875244X

REVIEW

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In *The Search for Certainty* Marcus Giaquinto presents an historically informed and philosophically rich account of the major attempts at providing a justification for classical mathematics. Mathematical knowledge had been regarded as the paradigmatic example of certainty for a long time, but a need for its justification began to emerge in the second half of the nineteenth century. It became all the more pressing with the discovery of several paradoxes within the theories that were intended to serve as foundations, and some spoke of a “foundational crisis” in mathematics. Giaquinto’s book relates and discusses the fascinating enterprise of securing mathematics from the threat posed by the paradoxes.

The book is divided into six parts and, despite the fact that it is not intended to be a history, the material is presented in chronological order. The background for the later developments is provided in the first part, which presents the quest for clarity and rigor in nineteenth century mathematics. This foundational endeavor led to the development of a logical calculus, work on the arithmetization of analysis and on the axiomatization of number systems, and finally to the development of a theory of transfinite classes. It is in this context that the paradoxes emerged that cast doubt on what had been proposed as the foundations of mathematics. Thus, these foundations were in need of reconsideration and the search for certainty began.

In the second part of the book the class paradoxes named after Burali-Forti, Cantor, and Russell are presented carefully together with a discussion of Cantor’s, Frege’s and Russell’s responses to them: Cantor introduced the notion of absolutely infinite multiplicities, Frege tried to amend his logical axioms, and Russell invented type theory to block the paradoxes. As Giaquinto emphasizes, however, none of