Who discovered imaginaries? On the Historical Nature of Mathematical Discovery

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In the aftermath of Thomas Kuhn's "The Structure of Scientific Revolutions", which established a new image of science, philosophers of mathematics also turned their attention to the role of paradigms and the possibility of revolutions in mathematics (e.g. Donald Gillies (ed.) *Revolutions in Mathematics* (1992)) What seemed to be needed was a new historiography of mathematics analogous to the new historiography of science proposed by Butterfield, Lovejoy and especially Alexandre Koyre.

Yet the case of mathematics proved to be more difficult and less fruitful than that of modern physics. Mathematics, after all, presents us with a conceptual stability that grounds all other objective (empirical) sciences (this is the core of the argument that structural realists still use to counter Kuhn's position). Mathematical entities seem to have an existence outside of time that makes them immune to historical change as well as to the mathematician's mortal touch! In this paper, I argue that the history of mathematics, if seen as a "repository for more than anecdote or chronology" can present us with a fascinating and dynamic image of mathematics different from what appears to us from textbooks and what the traditional schools in philosophy of mathematics (e.g. Formalism, Intuitionism, Logicism and, Platonism) have proposed.

My methodology is based on the analysis of the case of imaginaries (square root of negatives) from the 16'th century on. While any number of examples can be used to demonstrate the point about the dynamic nature of mathematics, imaginaries present a particularly interesting case given their origins, the longstanding dispute on their status, and their indispensable applicability in mathematics and other sciences. The goal of this study is to show that the distinction that philosophers of science make between *seeing* and *seeing as* is also of crucial importance in mathematics. Through examining the problems of "reification" and "identification", I hope to persuade philosophers of science (and mathematics) about the dynamic nature of mathematics, similar to that of modern physics and other empirical sciences.