

Seminar SAW
Seminar History and Philosophy of Mathematics – 2011-2016
March 7th, 2016

Historical approaches to the history of indeterminate analysis

Ivahn Smadja (ERC Project SAW & SPHERE, CNRS & Université Paris Diderot)

*On Two Conjectures That Shaped the Historiography of Indeterminate Analysis :
Strachey and Chasles on Sanskrit Sources*

Abstract - This paper is part of a research project on the historiography of mathematical proof in ancient traditions. Its purpose is to shed light on the various ways in which nineteenth-century European scholars attempted to make sense of Sanskrit mathematical sources dealing with indeterminate analysis. Attention will be paid to the historical processes by which these different strands interwove into a cumulative historiography of the field. The focus is on two interpretive conjectures that shaped alternative readings of an evolving corpus of texts, with significantly different emphases and viewpoints.

The British scholar and EIC servant Edward Strachey first identified a consistent algebraic theory in Bhāskara's Bija-gaṇita, which he translated from a seventeenth-century Persian manuscript. While reading his sources through the lens of the Euler-Lagrange theory of periodic continued fraction expansions for quadratic irrationals, he offered an insightful interpretation of the so-called cakravāla, or «cyclic method». Two decades later, in the context of his investigations on the historiography of geometry, the French geometer Michel Chasles delved into Henry Thomas Colebrooke's translations of Bhāskara and Brahmagupta, from the Sanskrit original, which had become authoritative all over Europe in the meantime. While working out an overall interpretation of Brahmagupta's theory of quadrilaterals, Chasles incidentally spotted a geometrical construction which opened the way to a geometrical solution of the indeterminate equation $Cx^2 \pm A = y^2$. He conjectured that this geometrical way may have been the Sanskrit path to indeterminate analysis. Furthermore, on the basis of textual reconstruction, he supplemented his rigorous interpretive conjecture with a more sweeping historical assumption about a possible transmission of this geometrical approach to algebra, from Sanskrit to European mathematics, through the Arabs and Fibonacci. Owing to further scholarship by Boncompagni, Woepcke and others, the wheat would be sorted out from the chaff.