

SAW Seminar:

History and Philosophy of Mathematics

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More on Brahmagupta in Germany: Which Quadrilaterals? Which Proofs?

As a result of Colebrooke's 1817 English translations of Brahmagupta's and Bhaskara's mathematical works spreading across Europe among scholarly circles, the French geometer Michel Chasles pointed out the importance of a group of sutras within the mathematical chapters of Brahmagupta's *Brahma-sphuta-siddhanta*, viz. BSS XII 21-38. He argued that in spite of the sutras being mere statements unsupported by individual proofs, the whole system of them made sense as providing a unified geometrical theory which, in his view, would solve completely, with precision and in all its generality, one single question, viz. how to construct a cyclic quadrilateral whose sides, diagonals, perpendiculars, segments and area, as well as the diameter of the circumscribed circle, may be expressed in rational numbers. A few years later, that interpretive puzzle and Chasles' purported solution to it aroused renewed interest in Germany. At about the same time he developed his theory of ideal numbers, E. E. Kummer also fell under the spell of Brahmagupta's quadrilaterals. In connecting the problem of rational quadrilaterals, duly transposed into an algebraic framework, to Eulerian methods in Diophantine analysis, Kummer established, through reconstructing Brahmagupta's methods, that Chasles wrongly imputed generality to Brahmagupta's theory. Eventually, more than two decades later, by virtue of his conjoining philological precision and mathematical expertise, Hermann Hankel outlined an alternative interpretation of BSS XII 21-38, which would do justice to Chasles' main insight, though in a minor key, owing to Kummer's rectification. The present paper unfolds this reading against the backdrop of Chasles' and Kummer's previous attempts, thereby showing how it also qualifies as the cornerstone of Hankel's characterization of so-called Indian intuitive 'proofs', by contrast to Greek deductive ones.