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The myth of Leibniz's proof of the fundamental theorem of calculus. (English summary)

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This short and accessible article offers a primer on current historical understandings of seventeenth-century theories of curves and construction [e.g. H. J. M. Bos, *Redefining geometrical exactness*, Sources Stud. Hist. Math. Phys. Sci., Springer, New York, 2001; MR1800805 (2001h:01013)] through a reconsideration of what has often been taken to be Leibniz's 1693 proof of the fundamental theorem of calculus. Blåsjö begins by explaining why the passage in question from 1693, when considered out of context, appears to be a proof of the fundamental theorem—a theorem Leibniz would have understood to be implicit in the very definitions of differentiation and integration. He then illustrates Descartes's theory of mechanical and geometrical curves and shows how Leibniz's 1693 argument fit within the Cartesian tradition of quadrature construction. Blåsjö argues that, placed in context, Leibniz's apparent proof of the fundamental theorem is instead a method to produce quadratures in precisely those situations "when the theorem is of no use" (p. 49) because an explicit antiderivative could not be constructed by existing means. The key is to remember that the calculus was originally about constructed curves, rather than about abstract functions of the kinds that would emerge in the ensuing centuries (see A.-A. P. Yushkevich's classic article, "The concept of function up to the middle of the 19th century" [Arch. History Exact Sci. **16** (1976/77), no. 1, 37–85; MR0497639 (58 #15925)]). Blåsjö explains this distinction while effectively balancing seventeenth-century terms and ideas against more recognizable modern interpretations.

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