

- STEVE RUSS, *The mathematical motivation for Bolzano's logic*.

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It is now fairly well known that Bernard Bolzano made numerous fundamental technical contributions to mathematics (especially in analysis and set theory) and that he did so as a partial consequence of some strict conceptual constraints. For example, he adopted and used effectively (in 1816) notations and arguments similar to the  $\epsilon$ - $\delta$  methods usually credited to Weierstrass in the 1860's, he came as close as possible at the time to a rigorous proof of the intermediate value theorem (1817). He developed a theory of real numbers and constructed a function everywhere continuous and nowhere differentiable in the 1830's, long before the Weierstrassian example. His major work "Theory of Science" [*Wissenschaftslehre*] appeared in 1837 and contained numerous remarkable contributions to logic. (See the Stanford Encyclopedia entry "Bolzano's Logic" by Jan Sebestik for details.) One of the central ideas of that work was his notion of an objective "ground-consequence" [*Abfolge*] relation. This notion is introduced informally, and for the first time, in the publication we are celebrating in this session, his 1810 *Beyträge zu einer begründeteren Darstellung der Mathematik*.

In this paper we shall examine the idea that the "objective connection" proposed by Bolzano in 1810 was strongly motivated as a remedy for the profound disorder in mathematics – especially in geometry – that Bolzano had diagnosed in his earlier publication (1804) on geometry and which he continued to emphasise in his 1810 work. We shall draw evidence for our case from several volumes of the on-going publication of the Bernard Bolzano *Gesamtausgabe*. Further details of Bolzano's mathematical work may be found in Paul Rusnock, *Bolzano's Philosophy and the Emergence of Modern Mathematics*, Rodopi, 2000; English translations of the mathematical works mentioned here are in Steve Russ, *The Mathematical Works of Bernard Bolzano*, Oxford University Press, 2004.