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Catching the Tortoise: A Case Study in the Rules of Mathematical Engagement.

Many responses to Zeno's paradoxes rely heavily on Cantor's work on infinity and the work of Weierstrass and Dedekind on limits; this is certainly the case with Bertrand Russell's resolution of these puzzles. It is interesting to note that Russell believed there is no reason to accept the idea that the spacetime structure of the universe is continuous rather than discrete since if the universe is not continuous, arguments of this sort are irrelevant. As he points out in another context, simply postulating continuity has all the advantages of theft over honest toil. Russell could not have missed the fact that his argument had a hole in it if read physically. Evidence suggests he took Zeno's paradoxes as purely mathematical in nature, but the historical context of Zeno's writings make this conclusion questionable at best. The current project proposes a model for motion in a discrete spacetime to complement Russell's response to Zeno, but it also addresses another question: How do we properly use mathematics in debates in which the issues may be read as purely mathematical or as pertaining to the physical world? (Received August 07, 2006)