

The Ontological Commitments of Mathematical Models

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Abstract

Some philosophers of mathematics argue that the role of mathematical models in science is merely representational: when scientists use mathematical models they only believe that they are adequate representations of the physical phenomenon under investigation. Others disagree with this view and argue that mathematical models also serve as genuine explanations in science. Consequently, the application of mathematical models in science cannot be treated instrumentally and we ought to be realists about mathematics. I advance two reasons to reject realist conclusion: genuine mathematical explanations are indistinguishable from spurious ones. And, for mathematical models to be explanatory, they have to be “bottom-level”; I deny that we can know which explanations (if any) are bottom level in science. I contend that what plays the explanatory role is the impure function that links physical structures to mathematical structures.

Keywords: Mathematical realism, Indispensability argument, Mathematical models

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