

Philosophical implications of the paradigm shift in model theory

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Abstract

Traditionally, logic was thought of as ‘principles of right reason’. Early twentieth century philosophy of mathematics focused on the problem of a general foundation for all mathematics. In contrast, the last 70 years have seen model theory develop as the study and comparison of formal theories for studying specific areas of mathematics. While this shift began in work of Tarski, Robinson, Henkin, Vaught, and Morley, the decisive step came with Shelah’s stability theory. After this paradigm shift there is a systematic search for a short set of syntactic conditions which divide first order theories into disjoint classes such that models of different theories in the same class have similar mathematical properties. This classification of theories makes more precise the idea of a ‘tame structure’. Thus, logic (specifically model theory) becomes a tool for organizing and doing mathematics with consequences for combinatorics, diophantine geometry, differential equations and other fields. I will present an account of the last 70 years in model theory that illustrates this shift. This reports material in my recent book published by Cambridge: *Formalization without Foundationalism: Model Theory and the Philosophy of Mathematical Practice*.