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In Re, Ante Rem, and Naturalist Varieties of Structuralism

Eliminative structuralism is the view that mathematical structures and places in structures do not exist, and that mathematical statements are non-specific generalizations over all systems of a certain kind. Another type of structuralism, sometimes termed ante rem as opposed to the eliminativist in re, sees structures and their elements as property-deficient entities that exist in their own right, independently of exemplifying systems. This paper will propose a third, naturalized account of structuralist philosophy of mathematics. Naturalism rejects philosophical arguments that judge mathematical practices by non-mathematical considerations. On this view, philosophical discussion should ultimately impact standard mathematical practice. The history of mathematical progress shows that the expansion of mathematics was quite possible without the development of structuralist philosophical accounts, but the opposite cannot be true since advances in mathematics, especially algebra and model theory, were precisely what enabled the formulation of structuralism in the first place. The lessons apparent from the origins of structuralism indicate that mathematical practice is epistemologically prior to its philosophy, and therefore that philosophers should, as a point of methodology, conform closely to implications for mathematical practice. The observation, due to Burgess, that the philosophical distinction between in re and ante rem varieties of structuralism only manifests itself in metaphysical discourse, and never in actual mathematical practice, thus gives grounds for a naturalist dismissal of this supposed distinction in structuralist ontology.