On the significance of categoricity arguments
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The purpose of my paper is to assess the philosophical significance of categoricity arguments in the broader context of the philosophy of mathematics. With respect to this purpose we analyze five main proposals regarding the philosophical significance of categoricity: 1) that the categoricity of a theory shows there is a unique structure which is the intended model of that theory, 2) that the categoricity of a theory is a marker for the theory’s successful axiomatization, i.e. completeness of axiomatization with regard to its subject matter, 3) that categoricity arguments give thrust to semantic realism, that is, ensures that the sentences of a categorical theory have a determinate truth value, 4) that the categoricity of a theory is a useful concept in classifying theories as algebraic and non-algebraic, and 5) that the categoricity of a theory enables to communicate mathematics: two mathematicians accepting the same axioms of a categorical theory can be sure that they are talking about the same structure modulo isomorphism. I will examine several proofs of categoricity theorems in different settings (first order logic and second order logic) in order to highlight the essential components involved in the proofs as well as some substantial philosophical positions assumed in the process. Shapiro’s (1991) modern reconstruction of Dedekind’s (1888) proof of the categoricity of Peano arithmetic will be a focal point of the discussion, contrasted with categoricity proofs conducted in weaker systems. In the light of this clarifying discussion, I will analyze whether categoricity arguments fulfills some of the above proposals. Also, I will assess the relevance of the categoricity arguments for the ante-rem structuralism. I’ll show that categoricity arguments fails to fulfill, at least, proposal 1) and 3) and in consequence their relevance for ante-rem structuralism is highly problematic.

Proper Classes, Forcing Extensions, and Universism; Understanding the role of simulation in mathematics
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Universism in Set Theory, the view that there is a single, unique, maximal interpretation of set-theoretic discourse has come under a good deal of scrutiny over the last decade. Two of the strongest arguments that have been presented against the view are its susceptibility to revenge paradoxes and inability to interpret forcing extensions of $V$. In this paper I analyse the dialectic of the debate and argue that Universist solutions depend crucially on intuitions regarding the philosophical significance of simulation in mathematics. My strategy is as follows:

Section 1 provides a characterisation of Universism and situates the view within contemporary philosophy of mathematics. Section 2 presents two kinds of revenge paradoxes that have been generated for the Universist. The first concerns ordinals of apparent length greater than $\Omega$. I present this in two different ways; an intuitive problem and the issue as it arises in mouse theory (where one way to understand this practice is as iterations of the construction of $L$ past $\Omega$). The second revenge problem is the issue of being able to give semantic content to the claim that for any class $C$, there are ‘more’ subclasses of $C$ than members of $C$. Section 3 presents a different issue, the apparent inability of the Universist to interpret forcing extensions of $V$. Section 4 argues that both difficulties depend for the Universist on the claim that various forms of simulation of mathematical entities entails the existence of said entities. Section 5 then provides reasons to doubt the claim that simulation implies existence in the case of mathematics, in particular with respect to infinitesimals and non-well-founded sets.
It is concluded that if these criticisms are to be powerful against the Universist's position, a better account of the nature and significance of mathematical simulation is required.

**Fixed Point Models for Theories of Properties and Classes**
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There is a vibrant (but minority) community among philosophical logicians seeking to resolve the paradoxes of classes, properties and truth by way of adopting some non-classical logic in which trivialising paradoxical arguments are not valid. There is also a long tradition in theoretical computer science—going back to Dana Scott’s fixed point model of the lambda calculus—of constructions allowing for various fixed points. In this paper, I will bring these traditions closer together, to show how these model constructions can shed light on what we could hope for in a non-trivial model of a theory for classes, properties or truth featuring fixed points.