Post-Quinean Naturalism in the Philosophy of Mathematics

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- The central (ongoing) debate in the philosophy of mathematics after the 1960s: Realism vs Anti-Realism

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- The central (ongoing) debate in the philosophy of mathematics after the 1960s: Realism vs Anti-Realism
- Specifically, the Indispensability Argument from Quine is carefully reconsidered.
- And to a large extent, the debate takes place within the naturalistic line of thought: Burgess, Rosen, Colyvan, Baker, Field, Hoffman, Sober, Maddy, Chihara, Feng Ye, and etc.

Introduction

In this talk, I present three forms of naturalism in the philosophy of mathematics after Quine, which make their places by different responses to the aforementioned debate while sharing the same basic naturalistic principles:

- Burgess: realism
- Maddy: equalism
- Ye: anti-realism/nominalism

Introduction

Plan of the rest talk:

- Introducing the Quinean context common to the three post-Quineans.
- Describing how the three post-Quinean naturalistic cases differ from Quine and each other.
- Some conclusive remarks.

Introduction

Some works among other references we will heavily depend on are:

- Quine: *Word and Object*, 1960; *Theories and Things*, 1981.
- Burgess and Rosen: *A Subject with No Object*, 1997.
- Maddy: *Naturalism in Mathematics*, 1997; *Second Philosophy: A Naturalistic Method*, 2007; *Defending the Axioms: on the philosophical foundations of set theory*, 2011.

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- Feng Ye: *The Applicability of Mathematics as a Scientific and a Logical Problem*, 2010; *On What Really Exist in Mathematics*, online; *What Anti-Realism Must Offer*, 2010; *Naturalism and Objectivity in Mathematics*, online; *Strict Finitism: the logic of mathematical applications*, 2011.
- Paseau, Alexander: *Naturalism in the Philosophy of Mathematics*, The Stanford Encyclopedia of Philosophy (Summer 2013 Edition), Edward N. Zalta (ed.).

The Quinean Context

Quine characterizes naturalism as:

- the abandonment of first philosophy
- the recognition of that it is within science the reality is identified and described

The fundamental idea is that no extra-scientific method of justification could be more convincing or reliable than the scientific ones, the best means we have.

The Quinean Context

Thus:

- ontology naturalized: ontological questions are on a par with questions of natural science, ontological commitments of science.
- epistemology naturalized: how human animals arrive science, improving scientific methods within.

Philosophy is primarily the scientific study of science itself.

The Quinean Context

the scientific study of science:

- confirmation holism
- theoretical virtues are the evidence at bottom, e.g., empirical adequacy/conformity to observation, simplicity, consertivism, generality, fecundity, refutability, etc

The Quinean Context

Then comes the indispensibility argument for mathematical objects, which depends on four premises:

- naturalism
- holism
- the criterion of ontological commitment of a theory
- the indispensability of reference to mathematical objects in science

The Quinean Context

Summary:

- accept p iff p is sanctioned by scientific standards
- truth and existence confirmed holistically, so accept X iff X have such and such virtues
- mathematics is taken as a part of natural science, mathematical truth at the same status as empirical truth

Three Post-Quinean Naturalists

Among many post-Quinean naturalists in the philosophy of mathematics, I choose three representatives ranging from radical realist to radical anti-realist. In the following I will outline their different interpretations of the principles of naturalism and corresponding conclusions about the nature of mathematics. And firstly, let us consider Burgess.

Three Post-Quinean Naturalists

Burgessian interpretation of the principles of naturalism:

- the X-standards: mathematics is a science in its own right, philosophers should respect scientists' literal understanding of the mathematical language.
- econnomy of abstract ontology is not among the theoretical virtues: *a matter to which most working scientists attach no importance whatsoever*.

Three Post-Quinean Naturalists

Ontological conclusion:

- *A thorough-going naturalist would take the fact that abstracta are customary and convenient for the mathematical(as well as other) science to be sufficient to warrant acquiescing in their existence.* (Burgess and Rosen, 1997)
- our best scientific theory will include mathematical entities regardless of the success or failure of strenuous nominalistc efforts to remove them.

Three Post-Quinean Naturalists

In contrast with Burgess, Maddy share Quine's starting point in natural science. However, she departs from Quine's naturalism in another sense. Let us also consider this.

Three Post-Quinean Naturalists

Maddy's interpretation of the principles of naturalism:

- the X-standards: second philosophy,taking natural science as the final arbiter of truth and existence.
- resisting holism, mathematical accounts of physical phenomenon are now not taken as literal truths but free-standing abstract models that resemble the world in complex ways.

Three Post-Quinean Naturalists

- mathematics is autonomous.
- double standards: distinguishing mathematics proper from the philosophy of mathematics.

Three Post-Quinean Naturalists

Ontological conclusions:

- Thin Realism and Arealism are equally accurate, second philosophical descriptions of the nature of pure mathematics
- Shift our attention away from the questions of truth and existence to the challenge of understanding the common objectivity, the mathematical depth, underlying both Thin Realism and Arealism.

Three Post-Quinean Naturalists

Ye's interpretation of the principles of naturalism:

- taking natural science as the starting point, and the naturalistic view on cognitive subjects as the most important idea of naturalism.
- the human cogonitive subject and process is a part of the physical world, homunculus fallacy.

Three Post-Quinean Naturalists

- Quine's misleading notions such as ontological commitment, disquotational theory of truth, and confirmation holism.
- naturalizing reference, truth, logical validity, modality, apriority, etc

Three Post-Quinean Naturalists

Ontological conclusion:

- what really exist in human mathematical practice are just neural activities in human brains.
- explaining all aspects of human mathematical practice by referring exclusively to physical things, especially the applicability of maths in science.

Some Conclusive Remarks

- where post-Quinean naturalists find Quine's original version unnatural.

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- where post-Quinean naturalists find Quine's original version unnatural.
- from naturalism to nomiminalism.
- what such naturalist nominalists have to offer and have already offered.

Thank you!