

Abstract Ontology

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1. Quick arguments for the existence of abstracta

'Mars has two moons, therefore the number of Mars's moons is two, therefore there are numbers.'

'Mars is red, therefore Mars has the property of being red, therefore there are properties.'

'Mars is red, therefore Mars belongs to the set of red things, therefore there are sets.'

- 'Existence in the fundamental sense'
- Russell's paradox and the naïve abstraction schemas:

$$x \text{ is } F \leftrightarrow x \text{ belongs to the set of } Fs$$
$$x \text{ is } F \leftrightarrow x \text{ has the property of being } F.$$

- The 'higher order logic' response: let's just learn HOLese by the method of immersion, and talk that. OK: but what about our original English question 'are there properties'?

2. The indispensability argument

(a) General idea: good inductive reasoning (broadly understood) from our evidence leads to belief in mathematical entities in the same way that it leads to belief in [electrons/spacetime points/strings/...].

(b) A standard, unhelpful formulation from the SEP

(P1) We ought to have ontological commitment to all and only the entities that are indispensable to our best scientific theories.

(P2) Mathematical entities are indispensable to our best scientific theories.

(C) We ought to have ontological commitment to mathematical entities.

(Colyvan)

- Colyvan: P1 is supported by the doctrines of 'naturalism' and 'holism'...
- For this argument to get us anywhere, we need some light between 'best' and 'most belief-worthy'.

(c) IBE and the challenge for non-platonists.

'These platonistic theories we have seem to provide *pretty good* explanations of a wide range of empirical phenomena—convince us that there is a nominalistic theory that is at least as good.

(i) 'Honest toil' responses. Field's programme.

(ii) 'Theft' responses.

(T[◇]) Possibly, the concrete realm is just as it actually is, and T.

(T[□]) Necessarily, if M and the concrete realm is just as actually is, then T.

(d) Arguing about theoretical virtue by appeal to scientific practice. 'Naturalism'.

(i) Direct appeals to scientific authority. ('Submit it to *Physical Review* and we'll see what they think.')

- Even if deference to scientists convinces us that good reasoning requires belief in numbers, should it convince us that the *topic-neutral, general* standards of inductive reasoning require such belief? Scientists seem to reason about numbers very differently from how they reason about electrons.
- This doesn't help us in any case with the question 'are there numbers in the fundamental sense?', if we think we understand it.

(ii) Indirect appeals to scientific authority.

(T[◆]) Possibly, the observable realm is just as it actually is, and T.

- Does the argument from analogy carry over to T[□]-style theories?

3. The 'problem of universals'

(a) 'How is resemblance possible?'

The same property can belong to different things. The same relation can relate different things. Apparently, there can be something identical in things which are not identical. Things are one at the same time as they are many. How is this possible?... How is [the Nominalist] to account for the apparent (if usually partial) identity of numerically different particulars? How can two different things both be white or both be on a table? (Armstrong, *Nominalism and Realism*, 11-12).

(b) Arguments from truthmaker principles

$\phi \rightarrow \exists x(\Box(x \text{ exists} \rightarrow \phi))$

$\phi \rightarrow \exists x(\Box(x \text{ exists} \leftrightarrow \phi))$

- Why are we supposed to believe anything like this?

- How does the existence of these modally fragile objects support the existence of properties?

(c) Ideological economy

- Which *predicates* does God need in his book of the world? Candidate answers:
 - (i) Ask the physicist (or maybe the phenomenologist...)
 - (ii) 'instantiates', 'bears₃', 'bears₄', ...
 - (iii) '___ resembles ___ more than ___ resembles ___', e.g.
 - (iv) '___ are natural', e.g..
 - (v) None—he only needs names and quantifiers, to list the truthmakers.
- Can we get rid of the picture thinking here? Maybe= in terms of supervenience?

(d) A challenge to explain necessities by appeal to analyses

- (R1) Necessarily, if x and y are both [electrons], then x and y resemble-in-some-respect.
- (R2) Necessarily, if x [is an electron] and x and y are duplicates, then y [is an electron].
- (R3) Necessarily, if x [is an electron] and x and y are qualitatively indiscernible, then y [is an electron].

x is a duplicate of y \leftrightarrow_{df} x and y have the same [intrinsic?] properties

(i) List-style responses

x is a duplicate of y \leftrightarrow_{df} (x is an electron \leftrightarrow y is an electron) \wedge (x is a line \leftrightarrow y is a line) \wedge ...

- 'Alien properties' objection to Short List: things could fail to be duplicates while resembling in all respects in which things *actually* differ.
- Worries about Long List. 'Necessarily, however many things there are, there could be that many things no two of which are duplicates'...

(ii) 'Structural nominalist' responses

x is a duplicate of y \leftrightarrow_{df} whenever some things are "natural", x is one of them iff y is one of them.

(iii) Rejecting the challenge: 'brute necessities'.

Recommended Reading

John Burgess and Gideon Rosen: *A Subject with No Object: Strategies for Nominalistic Interpretation of Mathematics*. OUP, 1997. See especially the first and last chapters.

David M. Armstrong: *Nominalism and Realism*, vol. 1 of *Universals and Scientific Realism*. CUP, 1978. Esp. parts I and II.

Alex Oliver, 'The Metaphysics of Properties'. *Mind* 105 (1996), 1–80.

CD, 'There are No Abstract Objects', in *Contemporary Debates in Metaphysics*, ed. Sider, Hawthorne and Zimmerman. Blackwell, 2007.