Higher-Order Quantification and the Elimination of Concrete Objects

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1 *Beyond Materialism*

Materialism Everything is a material object.[1]

[1] Alternatively: 'concrete'; 'non-abstract'; 'spatially located'; ...

This faces pressing, simple objections such as 'Redness is not a material object; therefore not everything is a material object'.

I suggested the following response: 'everything' in (the interesting interpretation of) Materialism is a *first-order* quantifier; but 'redness' is not semantically of type e, and 'everything' in the reading of 'not everything is a material object' that follows from 'redness is not a material object' is a *higher-order* quantifier.[2]

[2] Maybe et, or maybe some sum-type like $e + et$.

Of course there are other less simple arguments against Materialism$_e$. I think the type-ambiguity of quantifiers helps with some of them, but it would be foolish to try to survey them all. Still, I suggested that insofar as my response to the simple arguments is accepted, Materialism$_e$ at least deserves substantial credence.

The first order of business for today is to advocate taking the same attitude to more radically minimalistic ontological hypotheses that might be inspired by various theories in physics. Examples:

Particulism Everything is an elementary particle.

Particle-or-instantism Everything is either an elementary particle or an instant of time.

Pointillism Everything is a spacetime point.

$\Leftarrow$ I'll initially focus on this one.

Regionalism Everything is a spacetime region.

and more abstractly

Fundamentalism Everything is fundamental.

Such views face pressing objections:

> {This chair is/that bucket is/Lisbon is/I am} not {an elementary particle/an instant/a point/a region/fundamental}. Therefore, not everything is {an elementary particle/an instant/a point/a region/fundamental}

But one could respond that 'This chair' ('that bucket', 'Lisbon', 'I'...) is not semantically of type e, so that for the conclusion to follow from the premise, 'everything' must be interpreted as a higher-order quantifier of some sort.[3]

- This may initially seem unintelligible: the expression 'first order quantification' is often explained using paradigms like 'some chair squeaks', 'every man is mortal', etc.
- But we can get a grip on the idea by trying to imagine planets where they speak variants of Higher-Orderese in which the communicative role of words like 'Lisbon' is played by words of some type σ, higher than e, and the communicative role of words like 'chair' is played by words of type $\sigma \to t$.[4]
- Claims like Pointillism$_e$ will not seem blatantly counterexample-prone, and will seem attractive if the physics works out appropriately. Are they doomed to error?

2 *Big things as properties*

In the setting of Pointillism$_e$, a natural candidate for σ—the type of names of ordinary objects like 'Lisbon', 'Gottlob Frege', ...—is et.[5] Ordinary count nouns ('table', 'bucket', 'fish', 'person') and verb phrases ('swims', 'loves sardines'), correspondingly, have meanings of type $et \to t$.[6]

Which property of points is identical to a given ordinary object? What does a point x have to be like for it to be true that $\mathsf{lisbon}\, x$, or $\mathsf{frege}\, x$, or whatever?

Well, let's suppose we are already comfortable with the idea that ordinary objects are *located* at spacetime points. Then we can propose that *being located at* is just *being instantiated by*. In semantic terms:

$$\text{'located at'}\ \mathsf{E}_{e \to et \to t}\ \lambda x^e Y^{et}.Yx$$

Given β, it follows that any ordinary object is the property of being a point at which that object is located.

In order to engage with objections is worth pulling out some weaker consequences:

Identity-strength Location Plenitude For every property F, there is an object x such that to be a point at which x is located is to be a point that has F.

[3] I'll discuss what the right type might be below.

[4] 'So that you would find that the logical status of Piccadilly is bound up with the logical status of series and classes, and if you are going to hold Piccadilly as real, you must hold that series of classes are real, and whatever sort of metaphysical status you assign to them, you must assign to it. As you know, I believe that series and classes are of the nature of logical fictions: therefore that thesis, if it can be maintained, will dissolve Piccadilly into a fiction. Exactly similar remarks will apply to other instances: Rumania, Twelfth Night, and Socrates.' (Russell 1918–9)

[5] Every ordinary object is a property of points.

[6] More carefully: they have *interesting* meanings in this type. As explained yesterday, they'll also have *boring* meanings (e.g. of the form $\lambda x.\bot$ in other types of the form $\sigma \to t$), as well as hybrid meanings in sum-types.

Location Plenitude For every property F, there is an object x that is, necessarily, located at all and only the points that instantiate F.[7]

[7] Dorr, Hawthorne, and Yli-Vakkuri (2021: ch. 11) argues for Location Plenitude on entirely independent grounds.

Abundance For every property F, there is an object x that is located at all and only the points that instantiate F.

3 *Objections to Abundance*

Abundance implies that, e.g., there is an object that is located exactly at those points where either my nose or the Eiffel Tower is located. Some find this implausible.

- But to my mind, a theory that only posits objects corresponding to familiar categories seems objectionably uncharitable to mild variations of our actual practices, and unbelievably unsystematic.

Abundance also implies that there are objects located even in the intergalactic voids.

- This seems OK to me, so long as we don't read 'object' as 'material object' (in a traditional sense of 'material object').[8]

[8] If you really did't want this, you could consider redefining 'x is located at y' to mean 'y instantiates x, and every point that instantiates x is "matter-filled".

4 *Objections to Location Plenitude*

What Location Plenitude adds to Abundance is that every object *coincides*[9] with infinitely many others, which between them have all sorts of modal profiles. Some find this further multiplication incredible.[10]

[9] x coincides with y := x is located at exactly the same points as y.

[10] (D. Lewis 1986: 252): it 'reeks of double counting'.

But there are strong arguments that ordinary objects do, routinely, coincide.[11]

[11] For example, many statues coincide with lumps of clay, but no statue is *identical* to any lump of clay, since any lump of clay could, whereas no statue could, survive being squashed into a ball.

What I agree *would* be wild would be thinking that every *chair* coincides with many other *chairs*; every person coincides with many other people; etc.

But we don't have to think that! Instead, we can say that a typical property U expressed by a count noun like 'chair' or 'person' is such that it can't happen that $\exists_{et} X \exists_{et} Y \exists_e z (UX \wedge UY \wedge Xz \wedge Yz)$.[12]

[12] At least under normal circumstances.

- This implies that something can be arbitrarily similar to a chair without being a chair (etc.). But we had better get used to saying that sort of thing, since otherwise the Sorites paradox will lead us into disaster.

- Words like 'chair' are plausibly highly vague—they have many "admissible precisifications", each of which is instantiated by only one of any collection of coincident objects.[13]

[13] So, don't expect a defensible definition of 'chair' in other terms!

5 Objections to Identity-Strength Location Plenitude

'The property of being F can't be identical to the property of being a point at which x is located, since one could believe that some points are F without believing that x is located there'

- This is a bad way of arguing against identities: consider Hesperus and Phosphorus.[14]

[14] Maybe our intuitions about the truth values of attitude-ascriptions are systematically wrong; maybe they are highly context-sensitive in a way that would block such arguments; maybe they are logically ill-behaved in something like the way quotation is.

'For any object x, the property of being a point at which x is located is *about* x and not about anything else. But some properties are about more than one object, or about none. So some properties F are such that there is no x such that being an F point is being a point at which x is located'.

- The required ideology of "aboutness" is extremely controversial. It can't be extended to arbitrary types: if we want to say that the proposition that *Cleopatra is a self-lover* is about self-love, given β we'll have to say that the proposition that Cleopatra loves Cleopatra is too. The claim that it works for type e would require an independent motivation.

6 Objections to the identification of objects with properties

- No chair is a property—that is a *category mistake*!
  - Such judgments strike me as much too theoretical to carry argumentative weight. Sentences like 'This chair is a property' are *weird*, but 'weird' should not be conflated with 'obviously false'.[15]
- Whatever about chairs, *I* am certainly not a property.[16]
  - The history of philosophy suggests to me that the metaphysical interpretation of our *introspective* knowledge is less clear than the metaphysical interpretation of our knowledge of ordinary material objects.

[15] However, if you were really set on making 'This chair is a property' come out false, you could do so using the technology of sum-types from last time. 'Chair' and 'property' could have meanings of type $(et + et) \to t$, where the meaning of chair entails $\lambda x.\exists_{et} y(x = \mathsf{inleft}\, y)$ while that of 'property' is equivalent to $\lambda x.\exists_{et} y(x = \mathsf{inright}\, y)$.

[16] 'I think, therefore $\exists_e x(x = \text{me})$'.

7 Variants

In the setting of Particulism with an A-theory of time, we can still have ordinary objects be of type *et*. But in the setting of Particle-or-instantism, it's natural to put then in type $e \to et$ instead: they are relations between particles and instants.

8 Eliminating individuals altogether?

I have suggested that a great many apparent objects can be "eliminated" in the sense that when we quantify over them, the quantifiers are not really type e. Could *all* objects be "eliminated" in this way?

- Would aliens (Purists?) whose language only had the "pure" types $t, t \to t, t \to (t \to t), (t \to t) \to t, \ldots$ be missing out on anything? Could they formulate a true semantic theory for us?

If we answer 'yes', does that mean that there's some important sense in which the following is true?

Nihilism There is nothing.

Not obviously—the Purists of course have reason to regard our quantifiers as ambiguous between many types, but it's unclear why they'd posit a reading that makes Nihilism true.

Still, the elimination will plausibly entail that 'Everything is either a proposition, a property, or a relation' is true on all its readings; and given the philosophical use of the word 'object', that suggests that there's a significant true reading of 'There are no objects'.

9 What might such an elimination look like?

Suppose we had a successful Pointillistic physical theory T, using a basic unary predicate 'filled', as well as various polyadic predicates ('between'; 'greaterMassDensity'; ...). Then we might hypothesize that *each spacetime point is identical to a proposition*: the proposition that it is filled.

- We rewrite T by replacing each predicate of some type $e \to \cdots \to e \to t$ with one of type $t \to \cdots \to t \to t$[17], and replacing all unrestricted type-e quantifiers with type-t quantifiers restricted to points.

[17] 'Filled' goes to $\lambda p.p$; all the other constants, e.g. between, go to new constants of the appropriate type.

- We'll also need a predicate $\mathsf{point} : t \to t$ to restrict the quantifiers. This doesn't have to be taken as a new primitive—for example, we might consider defining it as $\lambda p.\exists q \exists r(\mathsf{between}\ pqr)$.

- Ordinary objects are now of type $t \to t$ (the same as negation!) We might propose that *being located* entails *being such that one could not be instantiated by anything that was not a spacetime point*.[18]

[18] Or we could learn to live with an even greater multiplication of coincident objects.

10 Making it more physically realistic

What if physics doesn't co-operate by providing an appropriate predicate to play the role of 'filled'? We could just leave it out; but then the theory is oddly weak, since it's silent on the question which spacetime points are true.

- We could add a new law that says that they are all true, or that they are all false. But that does somewhat compromise the simplicity of the theory relative to the original Pointillist starting point.

A perhaps more promising avenue is to look for inspiration to formulations of physical theories in terms of some kind of *state space*.

- Some authors (Albert 1996; North 2021) suggest a "substantivalist" approach to such theories: points of state-space are the fundamental objects; at any time one of them (the 'marvelous point') is 'lit up' by a special fundamental property; the dynamical laws concern how the "light" moves around in response to the permanent structure of the state-space; particles and points of space are somehow derivative on this.

- This looks nicer and less artificial if we identify state-space points and regions with propositions, and "being lit up" with being true ($\lambda p.p$).

11 Objection: too many fundamental entities?

The notion of a *fundamental* (or *perfectly natural*) property or relation Dorr 2019; Dorr and Hawthorne 2013; D. K. Lewis 1983 plays an important role in recent metaphysics.

- The fundamental properties and relations are held to be in some important sense *complete*—e.g. all truths are held to *supervene* on the truths about what objects there are and which instantiate each fundamental property and relation.

- The fundamental properties and relations are held to be in some important sense *independent* of one another—e.g. to obey some 'combinatorial' principle (Bacon 2020).

- Physics is held to have a key role to play in the identification of fundamental properties and relations: we seek laws that are *simple* when stated in fundamental terms.

The dominant tradition assumes (in effect) that fundamental properties and relations are all of type $e \to \cdots \to e \to t$; but if we want to take object-eliminativism seriously, we'll need to relax this and allow that perhaps, e.g., $\mathsf{fundamental}_{t\to t\to t\to t}\ \mathsf{between}$.

Since propositions (type t) are just the limiting 0-adic case of relations, this notion should also make sense in type t. But one wouldn't standardly suppose that anything of type t *is* fundamental (in this sense).[19]

But there is pressure on our theorist to think that *lots* of propositions are $\mathsf{fundamental}_t$—e.g. all the spacetime points/statespace points. There seems to be no prospect of defining them all in terms of some short list of fundamental higher-type entities.[20]

This might seem very costly: we've gone from having just a handful of fundamental entities to having a large infinity of them.

But is that right? Before, we had infinitely many entities of type e, all of which we were (in effect) treating as fundamental. The new theory just moves all that into type t (while dispensing altogether with the old fundamental property Filled).

[19] A fundamental zero-adic property seems to do much less useful work than, e.g., a fundamental binary relation. People sometimes use a different $t \to t$ meaning for 'fundamental', where Fa is automatically "fundamental" when F and a both are. Set this meaning aside.

[20] Indeed, on the "filled" version and the "marvelous point" version, they don't even *nomically supervene* on the truths about betweenness etc.

12 *Objection: combinatorialism leads to implausible results*

Combinatorialism (rough statement): if a sentence is *logically consistent*, then it's *possibly true* when each of its nonlogical constants is interpreted as expressing something fundamental.[21]

In the theoretical setting we are considering, this will lead to some very strange modal judgments. For example:

- If we take each state-space point to be fundamental, we'll have to say it's possible for them all to be true (= lit up) simultaneously.

- If we take $\mathsf{between}$ to be fundamental, we'll have to say it's both possible that $\mathsf{between}\ \top\top\top$ and that $\neg\,\mathsf{between}\ \top\top\top$. Etc.

This is all weird. But even in the familiar setting where we do have objects, accounts of what's fundamental have similarly weird consequences given combinatorialism—e.g. if $\mathsf{between} : e \to e \to e \to t$ is fundamental, we'll have to say that $\Diamond\exists_e x \exists_e y(\mathsf{between}\ xxx \wedge \neg\,\mathsf{between}\ yyy)$.

[21] See Bacon 2020 for a more careful statement. Bacon only accepts the view when 'possible' is interpreted as what he calls *broad* possibility, which hee takes to be different from *metaphysical* possibility. I'll ignore this, but if he's right, it makes the objection much easier to resist.

Combinatorialists arguably have to just get used to not trusting "modal intuitions" about such theoretical posits.

13 Objection: more complex laws

Suppose we take between to be fundamental. In the old theory T where between was of type $e \to e \to e \to t$, the (geometrical/physical) laws only needed to tell us about how betweenness behaves on the points. In the new setting, we'll also need laws to tell us how betweenness behaves on propositions that aren't points.

This could be fairly simple—e.g. we could just say that whenever between pqr, p, q, and r are all points, so that, e.g.

$$\forall_t p \forall_t q \forall_t r (\mathsf{between}\ pqr \to \neg\ \mathsf{between} (\neg p) q' r') Orwecouldsaythat$$

between pqr is true whenever there are points p', q', r' such that between $p'q'r'$, p' entails p, q' entails q, and r' entails r. There are many possibilities.

Still, these laws and the need to choose between them don't correspond to anything in the old theory. Eliminating type e has made things (somewhat) more complex.

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