Comparativism versus Absolutism 2

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Properties seminar

1. Existence assumptions continued

Even if the existence assumptions fail, we can formulate laws like this:

Extrinsic law There exist homomorphisms f, m, and a, from the nonmathematical force, mass, and acceleration structures, respectively, into the relevant mathematical structures, such that for any object x, $f(x) = m(x)a(x)$

But what about intrinsic laws? Simplified version of Newton's second law:

$$\frac{m(x)}{m(y)} = \frac{a(y)}{a(x)} \quad \text{for all } x, y \tag{1}$$

Intrinsic statement in the special case of rational ratios:

> For any objects x and y, and any integers c and d, if there exists something that is both c times as massive as y and d times as massive as x, then there exists something that is both c times as accelerated as x and d times as accelerated as y

For a more general intrinsic statement, use the fact that real numbers correspond one-to-one to the sets of fractions that are less-than-or-equal-to them. Thus, (1) is equivalent to:

$$\left\{\frac{c}{d} : \frac{m(x)}{m(y)} \geq \frac{c}{d}\right\} = \left\{\frac{c}{d} : \frac{a(y)}{a(x)} \geq \frac{c}{d}\right\} \quad \text{for all } x, y \qquad (c, d \text{ integers})$$

which is in turn equivalent to:

$$\frac{m(x)}{m(y)} \geq \frac{c}{d} \text{ iff } \frac{a(y)}{a(x)} \geq \frac{c}{d}, \quad \text{for any } x, y \text{ and integers } c \text{ and } d$$

To which there is a corresponding intrinsic statement:

Intrinsic law For any objects x and y and integers c and d: (everything d times as massive as x is at least as massive as everything c times as massive as y) iff (everything d times as accelerated as y is at least as accelerated as everything c times as accelerated as x)

But this might be false because of missing entities. (Choose different fundamental comparative predicates?) (Another approach to existence assumptions: Arntzenius and Dorr (2011).)

2. Modality

"If comparativism is true then it would be impossible for everything to double in mass (say); but that is possible; so comparativism is false"

Lewis on cheap haecceitism (see also Boris Kment, Jeff Russell, Brad Skow)

- No worlds differ solely by a permutation of individuals.
- But we want to say: "I could have lived in the second, rather than the first, epoch in this world of eternal recurrence"
- Solution: allow things to have counterparts within their own worlds.

Dasgupta's cheap doubling:

- Call a "local mass property" a maximal set of objects within a possible world that are same-mass-as one another.
- Define counterpart relations between local mass properties that disrupt the comparative mass relations as little as possible.
- If each actual local mass property has a counterpart in the actual world which is the property that is "double" its size, then we've made sense of a possibility in which everything doubles in size

Can the objection be based on a non-counterpart-theoretic notion of possibility: that of a logically possible combination of fundamental properties and relations?

3. Dasgupta's grounding problem

[skipping this; but a possible paper topic. See Dasgupta (2010).]

4. Dasgupta's Occamist argument

Dasgupta argues that the absolutist's facts are undetectable, and shouldn't be posited:

- Most prefer neo-Newtonian to Newtonian spacetime for classical physics, since it says that absolute velocity doesn't "make sense"
- Leibniz's argument against absolute velocity: God would have no reason for or against giving everything a "velocity boost"
- Dasgupta's argument: absolute velocity is undetectable
- But absolute masses are also undetectable, and so shouldn't be posited.
- (Individuals are also undetectable! See Dasgupta (2009))

Concern 1: where will this argument end?

Concern 2: perhaps the problem with Newtonian spacetime isn't that it posits undetectable facts, but rather that it posits superfluous natural spatiotemporal relations. Then the argument doesn't work for comparativism (or for individuals).

5. Intrinsicality

Comparativism implies that all mass and other quantitative properties are extrinsic. It makes the mereologically simple individuals into featureless points in a massively dimensional space, containing dimensions for each quantity in addition to the spatial and temporal dimensions.

6. Mundy and intrinsicality

Is Mundy's view different? Let x be 5 g. Does this just involve x instantiating George? What about the network of relations in virtue of which George is as big as it is?

Another way to bring out this concern: Mundy's view may imply that mass relations, such as *being more massive than*, are not internal. But this is tricky. Its definition suggests that it's not internal, but Lewis's definitions seem to imply that it is internal:

Definition x is as or more massive than $y =_{\text{df}}$ there exist P and Q such that x has P and y has Q and $P \geqslant Q$

Duplication Objects x and y are *duplicates* iff some one-one function maps x's onto y's parts, preserves the part-whole relation, and preserves perfectly natural properties and relations. 'Tuples $\langle x_1 \dots x_n \rangle$ and $\langle y_1 \dots y_n \rangle$ are duplicates iff some one-one function maps the parts of the fusion of the x_is onto the parts of the fusion of the y_is, maps each x_i onto the corresponding y_i, preserves the part-whole relation, and preserves perfectly natural properties and relations

Intrinsicality A property is *intrinsic* iff it never differs between duplicates (including duplicates from different worlds)

Internality A relation is internal iff it never differs between 'tuples of duplicate entities. E.g. a binary relation R is internal iff whenever x is a duplicate of a and y is a duplicate of b, Rxy iff Rab

Externality A relation is external iff it is not internal and never differs between duplicate 'tuples. E.g. a binary relation R is external iff whenever $\langle x, y \rangle$ and $\langle a, b \rangle$ are duplicate pairs, Rxy iff Rab.

The problem is that Lewis's theory doesn't work well when applied to noncontingent properties and relations.

What if Mundy replies that what it is for one object to be as or more massive than another has nothing to do with $\geqslant$. Rather, what it is for x to be as or more massive than y is for x to instantiate Joe and y to instantiate Frank, or for ....

Let's attack this using the concept of ground for a moment. We can argue that given the definition above of "as or more massive as", whenever one object is as or massive as another, this fact is partially grounded in the fact that certain properties of those objects stand in the $\geqslant$ relation. But then the relation is not internal, given this principle:

Principle about internal relations if the grounds of each fact Rxy includes the holding of a fundamental relation between objects that aren't parts of x and y, then R isn't internal.

[Here is the detailed argument. Assume the following principles about ground:

Definiens grounds definiendum if $\phi(x_1 \ldots x_n) =_{\text{df}} \psi(x_1 \ldots x_n)$, then for any $y_1 \ldots y_n$, if $\phi(y_1 \ldots y_n)$ then $\phi(y_1 \ldots y_n)$ because $\psi(y_1 \ldots y_n)$

Instances ground existentials For any $x_1 \ldots x_n$: if $\phi(x_1 \ldots x_n)$, then (for some $y_1 \ldots y_n$, $\phi(y_1 \ldots y_n)$) because $\phi(x_1 \ldots x_n)$

Factivity If ϕ because ψ, then ϕ and ψ

Transitivity If ϕ because ψ and ψ because χ, then ϕ because χ

Then we can argue as follows.

1. Suppose x is as or more massive as y
2. So, x is as or more massive as y because there exist P and Q such that x has P and y has Q and $P \geqslant Q$ (1, Definition, Definiens grounds definiendum)
3. So, there exist P and Q such that x has P and y has Q and $P \geqslant Q$ (2, Factivity)
4. Let P_0 and Q_0 be such that x has P_0 and y has Q_0 and $P_0 \geqslant Q_0$ (4)
5. Then (there exist P and Q such that x has P and y has Q and $P \geqslant Q$) because (x has P_0 and y has Q_0 and $P_0 \geqslant Q_0$) (4, Instances ground existentials)
6. So, x is as or more massive as y because x has P_0 and y has Q_0 and $P_0 \geqslant Q_0$ (2, 5, transitivity)
7. Conclusion: for any x and y, if x is as or more massive as y, then there exist P_0 and Q_0 such that: (x is as or more massive as y because x has P_0 and y has Q_0 and $P_0 \geqslant Q_0$) (1–6)

Mundy's reply would then be to reject Definition, and instead accept:

New definition For any x and y, if x is as or more massive than y, then there exist P and Q such that $P \geqslant Q$ and: x is as or more massive than $y =_{\text{df}} x$ has P and y has Q

By doing so he would be cutting the link between that-which-connects to intrinsicality, and that which is determined by the indispensibility argument (i.e., that which appears in simple generalizations). It's ground (and the notion of a definition) that connects to intrinsicality. But the fundamental properties—which we have reason to posit because of indispensability—are still in the picture. They're just not connected to intrinsicality, ground, or definition.

7. Extrinsic quantities and locality of laws

On many views, the fundamental dynamical laws are local in the sense that what happens to an object depends only on what is going on in its infinitesimal spatiotemporal neighborhood. Comparativism violates this kind of locality. Recall:

Intrinsic law For any objects x and y and integers c and d: (everything d times as massive as x is at least as massive as everything c times as massive as y) iff (everything d times as accelerated as y is at least as accelerated as everything c times as accelerated as x)

Can we single out a small subset of the world's objects that are relevant, according to this law, to what will happen to x and y? At best, these will be those objects whose mass ratios and acceleration ratios are approaching from below the mass ratio of x and y.[1]) But these objects needn't be spatiotemporally near x and y. So it would seem that comparativism makes the laws spatiotemporally nonlocal. Intuitively: arbitrarily distant objects are relevant to what is going to happen to a given object. (This nonlocality is of an entirely different sort than what we find in quantum mechanics.)

References

Arntzenius, Frank and Cian Dorr (2011). "Calculus as Geometry." Chapter 8 of Frank Arntzenius, *Space, Time, and Stuff*. Oxford: Oxford University Press.

Dasgupta, Shamik (2009). "Individuals: An Essay in Revisionary Metaphysics." *Philosophical Studies* 145: 35–67.

— (2010). "On the Plurality of Grounds." MS. Available at http://www.shamik.net/Research_files/dasgupta%20on%20the%20plurality%20of%20grounds.pdf.

[1]More carefully: let δ be any positive real number; and consider two sets: $A_\delta =$ the set of pairs $\langle u, v\rangle$ such that $0 \leq \frac{m(x)}{m(y)} - \frac{m(u)}{m(v)} \leq \delta$; and similarly for B_δ (for the right hand side of the law). For arbitrarily small δ, there exist A_δ and B_δ whose existence suffices for the truth of the Intrinsic law.