

***Four Dimensionalism*—Reading group 4**

In this chapter, Sider assesses various arguments in favour of four-dimensionalism, “roughly in order of increasing plausibility-to-me” (p. 74). Given that there are many such arguments, and particularly those presented in later sections are rather sophisticated, I’ve truncated at around the half-way point; we will consider the remaining arguments next time.

Chapter 4: In favour of four-dimensionalism, part I

Russell’s argument from parsimony

Underlying this argument is the thought that we experience moments of time one-by-one. Then, “[t]he argument is that the postulation of anything *more* than temporal parts would be empirically unjustified” (p. 75).

Sider doesn’t find this compelling; he writes:

Suppose I infer, from a sequence of perceptions, a sequence of objects o_1, o_2, \dots . Grant Russell for the sake of argument that it goes beyond the evidence to claim that the observations are of a single thing, that $o_1 = o_2 = o_3 = \dots$. It would likewise go beyond the evidence to claim that $o_1 \neq o_2 \dots$. At best, the conclusion can be that we should be neutral, so far as observations and science are concerned, about whether objects endure or perdure; the question must be resolved on philosophical grounds. (Sider pp. 75-76)

One might also question Russell by calling into doubt that the ‘specious present’—“the short duration of which we are immediately and incessantly sensible” (James, *The Principles of Psychology*, 1890)—is a mere instant. (For more on this, see the SEP article, ‘The Experience and Perception of Time’.)

Russell’s argument from parsimony

Quine (*Word and Object*, 1960) points out that we can formalise tensed natural language sentences using tenseless quantifiers over times and relativising temporary predicates to times.

(We'll see more on the idea of relativising temporary predicates to times below, when we look at Lewis' 'problem of temporary intrinsics'.) For example, 'A mammal was one trampled by a dinosaur' might be formalised as

$$\exists x \exists y \exists t (t < n \wedge Dx \wedge My \wedge Txyt).$$

The first thing to point out, which Sider also notes, is that Quine's approach to formalising tensed statements is somewhat outdated, given the 'tense logic' developed by Prior and others (see Sider's *Logic for Philosophy* for the details). Even setting this aside though, Quine's claim that in order to make sense of formalised sentences such as the above, one must embrace perdurantism, is questionable; as Sider writes,

Only the B-theory is needed. Even if past dinosaurs endure, a B-theorist can still quantify over them and relativize their temporary predicates to times. (Sider p. 77)

The A-theory of time is incoherent

Smart, in *Philosophy and Scientific Realism* (1963), argues that (i) the A-theory of time is incoherent, and (ii) endurantism goes part-and-parcel with the A-theory. He presents three arguments against the A-theory:

1. The A-theory does not sit easily with contemporary science.
2. The A-theory is anthropocentric.
3. The A-theory introduces 'unnecessary mystification'. (E.g.: If time flows, how fast does it flow?)

But, as Sider notes, even if one buys into the arguments, it's simply wrong to identify the endurantism with the A-theory: rather, the two debates are best understood as distinct.

Four-dimensionalism and special relativity

It's sometimes suggested that special relativity implies perdurantism. Sider, however, isn't convinced:

It is often claimed with little argument that the special theory of relativity requires perdurance. ... In fact, however, the support for temporal parts here is weak; one can accept special relativity and endurance alike. (Sider pp. 79)

The fact that we use spacetime diagrams when doing special relativity, and perhaps sometimes even speak in perdurantist terms, doesn't *per se* speak in favour of that view over endurantism!

That said, there is a deeper issue here. Given the relativity of simultaneity (recall again the trains example from the presentism discussion), when the endurantist says things like 'an object is wholly present at any time at which it exists', it's not obvious what they mean by 'time'—*according to whose reference frame?* But, as Sider points out, it's not clear why the endurantist can't incorporate this into their definitions, revising definitions of e.g. being strongly wholly present to be frame-relative, as follows:

SWP: Given a choice of frame, F , in the partition of spacetime relative to F , x is *strongly wholly present* throughout region T iff anything that is at any time in T part of x is, at every time in T , part of x .

With this in mind, Sider then writes:

Relativity now raises the additional question of which reference frames the claim and conjecture will be made from. The natural course seems to be relativised to all (inertial) reference frames. The claim would then be that it is possible for there to be an object that is, with respect to every reference frame, strongly wholly present throughout some extended interval with respect to that reference frame. The conjecture would be that, with respect to every reference frame, every fundamental particle is strongly wholly present throughout its career. (Sider pp. 85-86)

(Aside for the PhysPhils: will the conventionality of simultaneity throw a spanner in the works here?)

Space and time are analogous

The thought underlying this objection is that, insofar as space and time are analogous, and insofar as we think that objects have spatial parts, we should likewise think that they have temporal parts—and, so, we should be four-dimensionalists. Again, Sider isn't convinced. He writes,

One way of challenging the argument is to point out disanalogies between time and space that even the four-dimensionalist will accept. Unlike time, space has three dimensions and lacks a distinguished direction; unlike space, time seems to be specially connected with causation. A second challenge would be this: why should similarity in one respect, for example, metricality, persuade us of similarity in a quite different respect, namely, parthood? (Sider p. 87)

(For more discussion related to these matters, see Callender, *What Makes Time Special?*, 2017.)

The problem of temporary intrinsics

The question here is whether an endurantist account of change is possible. Lewis' discussion of the 'problem of temporary intrinsics' suggests a negative answer to this question—in which case, if we want an account of change (or at least, a B-theoretic account of change), we should be perdurantists.

Sider begins by recalling from Lewis (1986, pp. 202-204) three possible models of change:

1. *An eternalist-endurantist model according to which so-called properties are in fact relative to times. ... I bear the bent-at relation to the present time, and the straight-at relation to another.*¹
2. *A presentist model. On this model, the only properties a changing object has are its present properties, because only the present time is real. ...*
3. *A temporal parts model, according to which the incompatible properties involved in change are really had, not by the persisting object itself, but rather by its temporal parts. Change is heterogeneity of temporal parts. (Sider, pp. 93-94)*

¹Those of you who have done K&R will recall that Mellor has such a view.

We'll set aside (2), given the previous critiques of presentism. The problem with (1) is this:

According to this model, what we ordinarily think of as properties are in fact relations to times. But this is an implausible view, according to Lewis, given that change sometimes involves intrinsic properties. Being bent is intrinsic; its instantiation by me cannot, therefore, involve my relations to other things, even times. Surely I am just plain bent, not bent with respect to something else. (Sider, p. 95)

Put another way, “the eternalist-endurantist model would obliterate the distinction between intrinsic and relational properties; all properties would turn out to be relational” (p. 95).

It certainly sounds plausible that properties such as ‘being bent’ are not relational. As Sider remarks, though, after a point it’s hard to make progress in these discussions:

At this point it is hard to evaluate the argument. The main premise of the argument, that some things are just plain straight, is accepted by the argument’s proponents, and denied by its targets. The argument does, I think, favour four-dimensionalism, but not strongly so. We do have some initial attachment to the main premise, but the rejection of that premise is certainly not rationally unacceptable. (Sider p. 97)

Arguments from exotica

Suppose that one is an endurantist who (as per option (1) in the previous section) is willing to index property instantiation to times. In addition to facing Lewis’ problem of temporary intrinsics, this will face issues if, for other metaphysics/physics reasons, we end up denying that times exist *at all*—for, as Sider writes,

If being straight-shaped is a relation to times, nothing would remain straight-shaped if you cut away all the times from a world. And yet surely objects in a timeless world could be straight-shaped. (Sider p. 99)

Sider doesn’t go too much into the physics of ‘timeless worlds’, but two examples taken seriously by many are:

1. Barbour's 'shape dynamics' (see his popular introduction, *The End of Time*, 1999).
2. Certain theories of quantum gravity, e.g. 'loop quantum gravity' (see Huggett and Wüthrich 2013 for a good introduction).

The second matter which Sider discusses in this subsection is the following: endurantism seems to face problems with backwards time travel, in a way that perdurantism does not:

Suppose I travel back in time and stand in a room with my sitting 10-year-old self. I seem to be both sitting and standing, but how can that be? The four-dimensionalist's answer is that there are two distinct person-stages, one standing, the other sitting. ... If three-dimensionalism is true, on the other hand, the case involves only a single 'wholly present' person, which seems to be both sitting and standing. (Sider p. 101)

Now, as Sider remarks, the endurantist should only be concerned by this to the extent that she regards time travel as being possible. But, indeed, it does seem to be possible according to our best physical theory of space and time, general relativity! (See Earman, *Bangs, Crunches, Whimpers and Shrieks*, 1995.) Unless one wishes to renege on the ontological picture presented by contemporary physics (cf. some responses to presentism), it seems that one must take these cases seriously.