

Philosophy of Space and Time: Week 7

Newtonian Mechanics

Prima facie, Newtonian mechanics looks to be a hospitable for presentism:

- Time in Newtonian mechanics is absolute. (On either Newtonian or Galilean spacetime.)
- Simultaneity in Newtonian mechanics is also absolute. (On either Newtonian or Galilean spacetime.)
- So there exists sufficient spacetime structure to identify the class of spacetime points which might qualify as ‘the present’.

Special Relativity

By contrast, special relativity does not appear to be a hospitable environment for presentism. The reason is that a privileged simultaneity slicing appears not to exist in the theory:

- The relativity of simultaneity tells us that how we ‘spread time through space’ depends upon the frame from which the physics is described. (Recall the tilting of the simultaneity hyperplanes.)
- The conventionality of simultaneity tells that, even within a frame, there’s no fact of the matter about the simultaneity of spatially-separated events.

Putnam’s Argument

In 1967, Putnam advanced a formal argument purporting to show that presentism is incompatible with special relativity. Here’s Eleanor’s summary:

1. All events that I consider to be simultaneous with me-now are real. (Remember, the presentist thinks only these things are real.)
2. Some of these events involve other observers, so I should believe that these other observers are real. Some of them are in motion relative to me.
3. There are no privileged observers, so if one of the other observers thinks something's real, then I should think it's real too.
4. Special relativity tells me that the events moving observers consider to be simultaneous will be different from those that I think are simultaneous.
5. Therefore, some events are real that are not simultaneous with me—so presentism is false!

Presentist Fallbacks

Many think that considerations of special relativity close the debate in favour of the block universe. But not everyone endorses this conclusion—what are the presentist fallbacks?

Privileged simultaneity slicing

A privileged simultaneity slicing is *not* incompatible with special relativity—although the position is a bit weird. Here's one way to implement it:

- Suppose simultaneity is *not* conventional, but that the correct ϵ factor changes from frame-to-frame.
- Then, we can *eliminate* the relativity of simultaneity.
- Moreover, since simultaneity is not conventional, there is a fact about simultaneity in each frame.
- In this way, we can introduce a privileged slicing into special relativity—though, of course, it won't be empirically accessible.

Point presentism

On one's worldline, there are earlier/later than facts—problems for presentism in a special relativistic context only arose when it came to attributing these properties to spatially-separated events, *off* one's worldline. The *point presentist* will say that only the present exists, but the present is *no longer* a simultaneity surface, but rather *a single point on a worldline*.

Worries:

1. Lonely/solipsistic? (Hinchliff: “just a restatement of the view as an objection” (p. 579).)
2. *Whose* worldline? (Present as relativised to an observer?)

Cone presentism

Another option is to try to use the structures that *are* held to be invariant by special relativity—namely, the lightcone structure. Call this view *cone presentism*. Hinchliff:

One virtue of [cone presentism] is that it captures the idea that what is present is what I am seeing now. A second virtue is that it identifies the present with an invariant feature of the special theory. A third virtue is that we are not alone. (p. 580)

Some worries:

- The cone presentist defines the present relative to a spacetime point as a surface of the backwards lightcone at that point. But why the *backwards* lightcone? Savitt on this:

[Cone presentism] seems to rest on the idea that events on the past light cone of E have a lightlike separation from E and hence the spacetime interval from E to (say) E' (on the past light cone of E) is 0. But then it seems arbitrary to exclude from the present events on the future light cone of E, which are also light like separated from E. (1998, 6)

Hinchliff is not convinced by Savitt's argument:

The surface of E's past light cone is the set of events *from* which a light signal or ray could be sent *to* E. The surface of E's future light cone is the set of events *to* which a light signal or ray could be sent *from* E. The difference between the cones is due to the asymmetry built into the nature of a light *ray* or *signal*. And that asymmetry arises from the asymmetric nature of causation itself, which is a non-arbitrary foundation on which to rest the distinction between cone and double-cone presentism. (p. 582)

Is Hinchliff introducing extra structure in the form of a primitive causal relation here?

- Again, there is a worry about with respect to *whose* worldline the present is meant to be defined. (Present as relativised to an observer?)
- Radiation is currently reaching us from the Big Bang, so that's strictly in our backwards light cone. Does that mean we're simultaneous with the Big Bang? Hinchliff's response:

To the extent that you find this objection compelling, you should be a presentist. The objection derives its force from the "fact" that CMBR originated 15 billion years ago. This "fact" comes from outside the special theory. The special theory is silent on the matter. Indeed, according to the special theory, there is no fact of the matter concerning how long ago this event happened. If we think it is a fact that this event happened 15 billion years ago, we must think there is a distinguished inertial frame which assigns event their "correct" dates. As a presentist, I say, "Great, the events that are simultaneous with me now in that frame are the existing events." If we think there is no distinguished inertial frame, then we cannot appeal to alleged facts like the radiations originating 15 billion years ago in objecting to cone presentism. If there is a distinguished frame, we can stay good old-fashioned presentists. If not, we can be cone presentists. Either way, presentism is unscathed by objections of this sort. (p. 581)