

### Presentism and relativity: Putnam, Monton

*Remark 1.* The classic source on presentism is Prior's short paper 'The notion of the present' (1970), though the view was outlined or assumed elsewhere, even in 'Changes in events and changes in things'.

**PRESENTISM.** The doctrine of presentism is easy to formulate:

All and only things that exist now are real. (18-1)

Yet, as Putnam notes, for this to be a meaningful statement, we need to spell out the notion of reality a bit. We have these assumption:

I[Now] is real (my present is real). (18-2)

There are other observers beside me that are real. They are also capable of motion relative to I[Now], i.e. to the frame of reference of I[Now]. (18-3)

There are no privileged observers: from the fact that all and only things that are *R*-related to I[Now] are real, and the fact that you[Now] are real, it follows that the things that are *R*-related to you[Now] are also real. (18-4)

In classical physics these further claims jointly deliver (18-1), at least if we take *R* to be the relation of simultaneity. In particular, every observer, regardless of his relative or absolute velocity, will have the same set of events designated as 'now'. This is because simultaneity can be fixed by reference to absolute time. Or in other words, every clock in every frame of reference can be synchronised with a 'date' in absolute time.

**SPECIAL RELATIVITY.** Let us picture the situation according to special relativity:

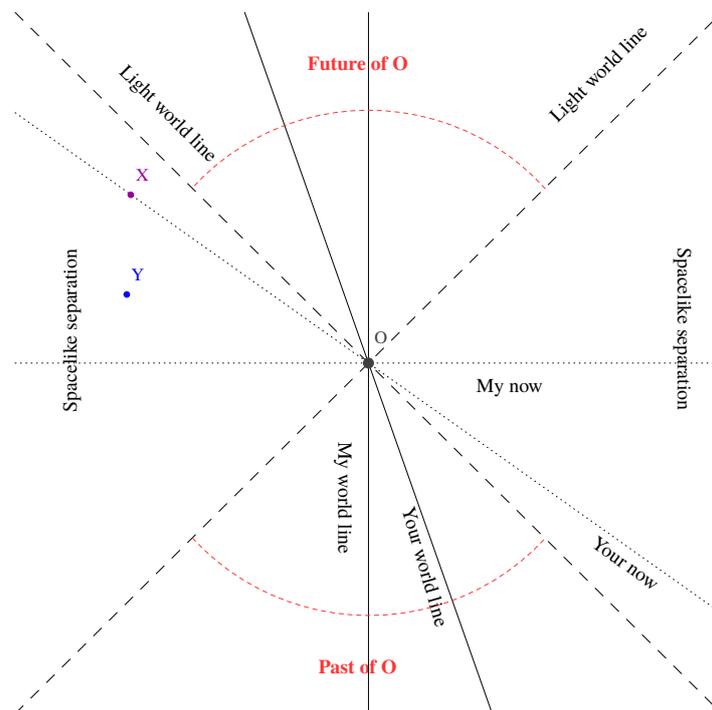


Figure 1: Presentism in relativity

Time is charted along the vertical axis, and one-dimensional space is along the horizontal axis. 'I' remain at rest, i.e. my frame of reference is at rest. Hence my world line is vertical. 'You' are moving with a constant velocity relative to me, hence your world line is inclined. Your velocity is very large, comparable with the velocity of light.

In classical physics, to repeat, these facts about your motion will make no difference. The lines of your-now and my-now coincide. It makes then no sense to talk of my-now and your-now, of the sets of events simultaneous to you and me. We should better talk of 'world-now'.

In SR, on the other hand, these facts make all the difference. For in SR we drop the assumption of the existence of absolute time. We no longer imagine the possibility of synchronising clocks according to the

fixed arrow of one time. Instead time is allowed to flow differently in different inertial frames. That is, (well functioning) clocks will show different time in different frames. Thus, e.g., the event X that is in my-future may well be in your-now.

*Remark 2.* Time dilation in relativistic frames is described according to this formula:

$$t' = \frac{t - \frac{ux}{c^2}}{\sqrt{1 - \frac{u^2}{c^2}}},$$

where  $c$  is the velocity of light. Strictly speaking, every inertial frame that is not at rest will have a time dilation. But the effects will be observable only when velocities are sufficiently large compared to  $c$ .

*Question 3.* Can the line of your-now have such an inclination that the event X would be inside the area called the ‘Future of O’ in Figure 1? Why?

The upshot of this argument is that the claims of presentism mutually inconsistent. For suppose that an event  $x$  is simultaneous to  $y$ , and that  $y$  is simultaneous to  $z$ . Then  $x$  is simultaneous to  $z$ . This claim of transitivity is plausible intuitively, and it works in classical physics. It can no longer work in SR. For the event O is simultaneous to me (it is in my-now). It is also simultaneous to you (it is in your-now). But it is also simultaneous to X (because both are in your-now). Consequently, X must be simultaneous to me, which it is not by assumption.

You might think that the flaw in the above reasoning was that we allowed ourselves concepts of simultaneity with no distinction between simultaneity according to a frame of reference. If the previous argument were conducted with the concept of simultaneity-in-my-frame or with simultaneity-in-your-frame, no contradiction would have obtained. That is true. But to do so would be to violate the principle 18-4: we would have singled out a privileged frame of reference.

**IS RELATIVITY IRRELEVANT?** Monton makes the following objection. SR is actually false, since it delivers wrong predictions in the presence of a strong gravitational field. General Relativity is supposed to do better in these cases. But you should not conclude that presentism is refuted according to GR (as it may well be, too). This is because GR is likely false as well: it is incompatible with quantum mechanics. It should be perceived as a precursor to some other future theory (well, *our-future* theory).

And in general, it is a bad idea to base your metaphysics on physics. Many well-established physical theories were refuted in the past. Our current theories are likely to be refuted in the future. Of course, you might curtail your ambitions and pursue not metaphysics *simpliciter*, but metaphysics-according-to-current-physics. This, however, is not how the enterprise of metaphysics is practised. We want to get to reality, not to reality as interpreted according to the physical theories that are likely to become as jaded as Cartesian physics or Ptolemaic astronomy.

It seems to me that Monton picked a wrong fight. For the history of the *concepts* of SR predates the actual development of SR. Notoriously SR rejects the concepts of absolute length, absolute simultaneity, absolute time, or absolute mass (more cautiously, is incompatible with them). The problem is that these concepts were unclear to begin with. Just look at absolute simultaneity. What does it even mean that we can always date events in absolute time? We must be able to do that practically by describing the procedure of synchronising clocks in different locations. But once you begin doing that, you soon realise that you depend on the velocity of signals used in synchronisation. And once you assume that there is an upper limit to any velocity, relativistic effects (time dilation) will kick in.

Things are not better with any intuitive notion of simultaneity. I suppose any such notion begins with the idea that all events I am able to survey, i.e. all events in my visual field, so to speak, are simultaneous with each other and also with my perception. Then we proceed to the idea that some events I did not survey, but could—if located high above, or if my eyes had a different position, were larger etc. Then we extend this to the idea of God-like point of view surveying the universe in a glance.

But of course this idea is suspect from the start. As soon as we are aware that light signals deliver information for my brain to process, and that signals travel with a finite speed, I should begin making distinctions between, say, a flash of light and my perception thereof. I have no direct perception, in this sense at least, of the flash itself. I will no longer say that my perception is simultaneous with the flash. Instead, I will be making calculations about the time of my perception and the time of the flash. But what events would be declared simultaneous at this stage of the argument? The events where the clocks show the same time. Hence we are back to one of the central insights of SR, that simultaneity must be established practically, rather than simply assumed to correspond to some absolute date.