

## **On the Ontological Difference between Past, Present and Future**

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### **Introduction and the Alternative Accounts**

Einstein, writing a letter to the bereft family of a former friend, once commented, “To us believing physicists the distinction between past, present, and future has only the significance of a stubborn illusion” (Folsing, 1998:741). As the quote suggests, Einstein thought there to be no ontological difference between past, present and future. I will argue that in this he was correct, looking primarily at Putnam’s argument from special relativity and Sklar’s response. Unlike Putnam, I will not surmise that the matter is a foregone conclusion as I think it at least possible that alternative accounts could be defended. I will however argue that on the general weight of the evidence, we should agree with Einstein. In this I will be arguing against classical dynamic models (hereafter: CDMs). CDMs take there to be an ontological asymmetry between past, present and future, privileging the present as either the only one of the three that exists, or the furthest boundary of an ever growing block of being. (I will focus on *presentism* but with brief mention of the *growing block theory*.)

*Presentism* might be called the default or common-sense point of view. It holds that everything that is real is in the present, i.e. for any X, if X is real then X is in the present. For the presentist “reality consists of a succession of presents” (Dainton, 2011:81). Therefore, past and future are relegated to nonbeing. It can plausibly be argued that most people do indeed believe something like this (until

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they are contaminated by philosophy, at least!) and that our language reflects such intuitions.

The *growing block view* of time, advocated by philosophers such as Broad (1923) and Tooley (1997), holds that both the present and the past exist but the future does not. As the name suggests, a good way to visualise this theory is as a growing block: the block consists of everything that ever is and ever has been, constantly growing as time progresses and more things come into being. To be present is to have the property of presentness, which consists in being the most recent addition to the block. Thus, what is present constantly changes. The things that were present can become past. ‘Past’ can be taken as meaning everything in the block which is not present. The growing block theory avoids some problems faced by the presentists such as how we can talk sensibly about past objects (how can we make sense of ‘Napoleon was taller than Socrates’ if neither of the referents exist?) while preserving the intuition that the future does not exist.

Against such CDMs I will be arguing in favour of *eternalism*, the view that past, present and future all exist, as implied in the above comments from Einstein. This is the view held by, amongst others, Mellor (1998), Oaklander and Le Poidevin<sup>1</sup>. My method is to put enough pressure on CDMs to show that eternalism is the most reasonable option. I will do this largely through the Rietdijk–Putnam argument. I will be looking specifically at Putnam’s version from *Time and Physical Geometry* (1967) but a similar argument is made by Rietdijk (1966). I will look at the argument in more detail later but essentially the argument shows that at a given time and velocity of travel, different events in one observer’s future can be

<sup>1</sup> For a good general introduction to eternalism, see Markosian (2002) at: <http://plato.stanford.edu/entries/time/>

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simultaneous with another observer's present and, given the premise that everything that is simultaneous with something real is real, it follows that past and future must be as real as present. Let's proceed to look at the argument.

**Special Theory of Relativity (STR)**

The Rietdijk-Putnam argument depends on STR which in turn depends on the wedding of two principles: the *relativity principle* – laws of nature are the same in every inertial frame – and the *light postulate* – the velocity of light in a vacuum is the same for every observer. If taken seriously (which Einstein did!), these assertions together lead to some strange results. In this paper I will be assuming that Einstein's *Theory of Special Relativity* is the most plausible account we have of these phenomena. Simultaneity will feature prominently in the ensuing discussion; I follow the account given by Einstein in Relativity (1920: 21-24) according to which as the speed of light is a constant, two events are simultaneous if and only if light from them reaches an equidistantly placed observer at the same moment.

What strange results do we get from the relativity principle and the light postulate? Imagine John, standing at point C, exactly midway between point A and point B beside a rail track. He experiences a flash of light from A and a flash of light from B at the same time, and, because the distance between both points is equal and because the speed of light is constant, the flashes happened at the same time, they were simultaneous. All very well but things become strange when we introduce another inertial frame of reference. Say our friend Bob is on a train, moving along the tracks towards B. The train constitutes Bob's inertial frame. When John says the flashes occur, Bob is parallel to John at point C and both

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equidistant from A and B. Bob though has a different experience from John's. Bob sees B happen first, and A after. John says this is easy to explain, the flashes were indeed simultaneous but since Bob was moving towards B, the light had less distance to travel and correspondingly got there sooner. But Bob says that he was in an inertial frame of reference and the light sources were equidistant from him. As light always travels at the same speed, the flash at B must have happened first. So who is right?

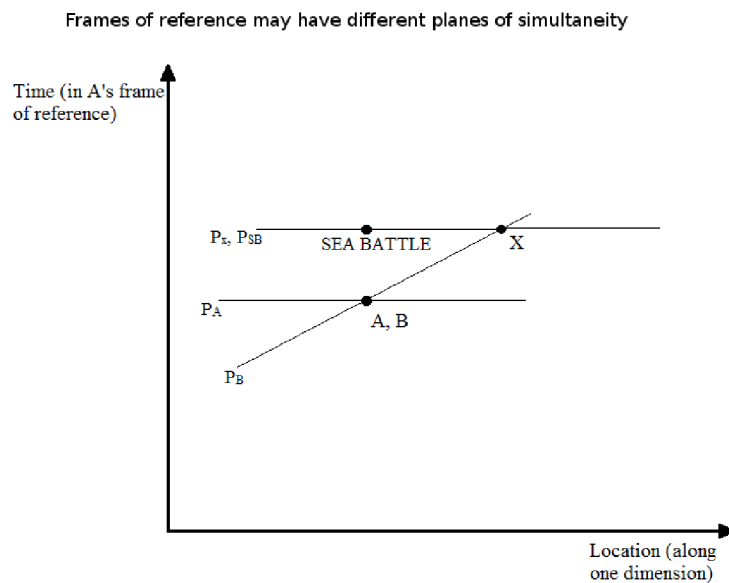
The answer is, loosely, they both are. To be more exact, according to STR simultaneity is relative to frames of reference. John and Bob have different frames of reference so different events are simultaneous relative to them. Of course in our daily lives we do not experience discordance in our planes of simultaneity: Bob wouldn't notice the light arriving at different times as at our relative speeds the effects are negligible. However when we start to approach the speed of light the effects become much more profound. It is these circumstances I will be considering.

**Rietdijk-Putnam Argument: The Argument From STR**

How does this discussion concern my argument? Well, as we saw above, different events are simultaneous to different observers. If the speeds involved are great enough, it is possible to have two frames of reference at, essentially, the same spatial location with significant differences in what is simultaneous relative to them. In the figure the vertical axis represents position in time, the horizontal spatial location. Hyperplanes of simultaneity – the events the respective observe experiences as simultaneous – are represented by lines. The sea battle is in the future for A. You can see that A and B are (in this snapshot) located together in

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space; you can also see that A and B have different hyperplanes of simultaneity ( $P_A$



and  $P_B$ ) so while the sea-battle is in A's future, B experiences it as in B's present, and X experiences it together with B. The reader can add 'observers' with shared or distinct frames of simultaneity at pleasure, the point being that although the sea battle is in the future for A's frame of reference, there can be observers A can encounter in

the present (for A) for whom the sea battle is in the present! Thus, if we are to say that what is simultaneous with A is real, and what is simultaneous with what is simultaneous with A is also real, then we are led to a point where we seem to be saying that the sea battle, a future event from A's frame of reference, is also real.

What does this mean for the advocates of CDMs? Putnam argues that they are thus emphatically disproven. His reasoning in his 1967 paper *Time and Physical Geometry* can be given in four points<sup>2</sup>.

[1] I-now am real. (This assumption changes each time it is made, as it is made by different instantiations of 'me'.)

This premise is uncontroversial. We assume an 'observer' exists in the present where an 'observer' can be anything – a photon, or measuring instrument, a

<sup>2</sup> I have modified Putnam's language; for instance, for ease of understanding I put the relation 'being real with respect to' in the commentary instead of in the premises.

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tree – but let us say we are the 'observer'.

[2] At least one other observer exists, and it is possible for this observer to be in motion relative to me.

Again, we uncontroversially assume two 'observers' in motion relative to each other.

[3] If it is the case that all the things that are simultaneous with an observer (me-now) exist, and you-now are simultaneous with me-now, then you-now exist. Furthermore, everything that is simultaneous with you-now also exists.

This also seems uncontroversial. All CDM theorists agree that the present exists and that what is simultaneous with an observer in the present is precisely the totality of the present. Hence if you are simultaneous with an observer in the present, you also exist. But surely this reasoning applies to you as well – if  $x$  is simultaneous with you, then  $x$  must be present, so  $x$  must exist, and so on *ad indefinitum*. We can express this by saying that for any observer,  $O$ , all things that are simultaneous with  $O$  stand in the relation “being real with respect to  $O$ ”. Call this relation  $R$ . Furthermore, we might say that  $R$  is transitive, so that if  $x$  is real with respect to  $O$ , and  $O$  is real with respect to  $O_2$ , then  $x$  is real with respect to  $O_2$ .

Putnam's final step is to [4] assume STR.

Now, given (3) and STR, we have some interesting results. Looking back to figure 1 we can see that for any observer,  $A$ , there can be another observer,  $B$ , with a different hyperplane of simultaneity. From [1] – [3] it follows that anything that is simultaneous with something that is simultaneous with me-now exists. But say I now am  $A$  in figure 1, this means that the future event, the sea battle, already exists. Thus, the future exists.

Putnam extends this logic so that all of the future and past are shown to exist

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through connected hyperplanes of simultaneity. Thus, if the past, present and future all exist, there is no ontological difference between them. So, Einstein was right!

What is important to note about the Rietdijk–Putnam argument is that it is built on very plausible premises that the CDM theorist would agree with and on STR which is a very well-established scientific theory. Resisting the Rietdijk–Putnam argument then will be a difficult task. In the next section I will look at an attempt to do exactly that.

Putnam, however, thought there could be no resurgence. He ended his 1967 paper with the following words:

I conclude that the problem of the reality and the determinateness of future events is now solved. Moreover, it is solved by physics and not by philosophy.... I do not believe that there are any longer any philosophical problems about Time; there is only the physical problem of determining the exact physical geometry of the four-dimensional continuum that we inhabit (Putnam, 1967:247).

**Resisting the Rietdijk–Putnam Argument**

There are two main ways of resisting the Rietdijk–Putnam argument: arguing that STR is compatible with CDMs, or rejecting STR. I will opt for the former, as I take it to be the stronger candidate, and will focus specifically on rejecting the transitivity of  $R$  like Sklar in Space, Time and Spacetime (1974). Compatibilism, I will show, has good initial success. Eventually though, it must bow to the evidence supporting *eternalism*.

Sklar makes CDMs and STR compatible by rejecting the claim that  $R$  is transitive across different hyperplanes of simultaneity, i.e. rejecting premise [3]. Sure, we might accept that STR shows that different frames of reference have different hyperplanes of simultaneity, and we may also accept that in these

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different hyperplanes different events exist, viz. events that are past or future relative to my own frame of reference. Why though does this mean that we should accept that if something exists in your frame of reference it also exists in my frame of reference?

The spontaneous answer is because relative existence is metaphysically barmy! It seems utterly queer that relative to me one set of events,  $S_1$ , exists while simultaneously another set of events,  $S_2$ , exists relative to you, while  $S_1$ , or at least some part of it, doesn't exist relative to you at all! It seems like it must be a strange universe that can encompass things both being and not-being depending on the observer. Existence, surely, is a property that we want to say is unequivocal: you either exist or you don't. But on this line of thought, all events – past, present and future – must both be and not-be at the same time.

It can be argued though that our appeal to strangeness is merely prejudice. After all, “Since anyone who embraces STR will accept that simultaneity is both non-transitive and frame-relative, what is to prevent them from taking a step further and holding that  $R$  is non-transitive and frame-relative as well?” (Dainton, 2011:348). This, perhaps, is only being true to the relativistic spirit, and those who accept that simultaneity is non-transitive and frame-relative but not  $R$ , have only gone half way! Dainton adds:

Is relativizing existence any less odd than relativizing simultaneity? Those who dismiss any connection between temporality and existence may be inclined to think it is, but exponents of dynamic models of time do not share this view; anyone who believes that time and existence are intimately connected might be very tempted to suppose that if simultaneity is frame-relative, existence must be too. Sklar concluded “The science can change the philosophy and put the dispute in a new perspective, but it cannot resolve the dispute in any ultimate sense.”



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And in this I think Dainton makes a very good point. First, our unwillingness to accept existence is a relative matter rests on an appeal to intuition and if we are willing to go against our intuition and accept that simultaneity is non-transitive and frame-relative, then why not also extend that to the relation  $R$ ? After all, as he suggests, is relative simultaneity not just as barmy *prima facie*?

Remember how we earlier defined simultaneity: two events are simultaneous if and only if light from each of them reaches an equidistant observer at the same time. By this definition, some things that are simultaneous with one frame of reference, A, will not be simultaneous with another frame of reference, B. Transitive simultaneity would flout this definition. But why shouldn't we just change our definition in the wake of these new insights so that it encompasses things that are simultaneous with frames of reference connected by hyperplanes of simultaneity to our own?

One response is that this is inherently problematic: tomorrow simultaneous with today? John alive simultaneous with John dead? This seems very strange. It makes far more sense to conclude simultaneity is a relative matter. But does this same chain of reasoning not also apply to  $R$ ? We see that if  $R$  is transitive and STR holds, then we have a situation where today and tomorrow both exist, John dead and John alive both exist, is this not equally weird? And, as there is nothing in STR that forbids us from doing so, are we not thereby better off concluding  $R$  is non-transitive and frame-dependent? This is how we make CDMs and STR compatible. STR does not entail the block universe, only STR combined with questionable metaphysical assumptions: namely, that  $R$  is transitive across different hyperplanes of simultaneity. This assumption is surely impossible to prove, and given where it

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leads us, surely we are better to abandon it, despite intuition.

I think the CDM theorist has a strong case here. We have no genuine metaphysical reason for supposing R to be transitive, and it is possible that it is not. Here, we must examine our auxiliary beliefs, and be directed by them on this matter of metaphysical principle. Clearly, the CDM theorist has independent reasons for supposing that there is an ontological distinction between past, present and future, reasons which require that R is non-transitive. The eternalist on the other hand has independent beliefs which give him no reason to believe the highly queer assertion that R is non-transitive, in fact, R's transitivity supports beliefs that he already has. He will therefore conclude the opposite. Are we at complete aporia?

No, we must examine the validity of the independently held beliefs. If the CDM theorist cannot justify these independently held beliefs, then they cannot make metaphysical claims based on them. For the sake of brevity, I will consider only the presentist's views as theirs is the 'default' view, and the most widespread – certainly among non-philosophers.

So, why be a presentist? The reason must be, first and foremost, that many of us, most of us, have a very strong intuition that it is the right account – that only the present exists. To what extent intuition can or should be used as justification for a view is a contentious point. I do not think it should be given too much weight. I take the view that, given our evolutionary origins, we should expect our naïve views and intuitions to be generally instrumental, not generally true. It is not clear how much the two overlap. However, I do not want to argue for my view on the value of intuition here. Instead, I will content myself with the following. If you are

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a presentist because of intuition, you might equally be an eternalist by the same token. As we saw with the Rietdijk-Putnam argument, we escape the implications of the block universe only by going against the strong intuition that  $R$  is transitive and not frame-dependent. Is this not equally as strong as the intuition that only the present exists? I suggest so. And then how are we to choose between these two contradictory intuitions? If all we have to go on is intuition I don't see any principled way. In isolation from other considerations the argument from intuition gets us nowhere.

The next most prevalent approach the presentist takes appeals to the nature of language. Language clearly differentiates between past, present and future; thus presentism is the only account that preserves our linguistic commitments. The problem with the argument from language is that one must ask why the character of language gives us justification in drawing metaphysical conclusions. Here are two reasons why we might be justified in doing so: (1) Language has a presentist character because presentism is a true account of the world and this in some way causes the language to have the character it does; (2) Although language is not caused to have a presentist character by the corresponding reality, it has other, sufficient justification for being so. Let's take (1) first. I think there are three possible causes for the presentist character of our language(s):

- (A) our experience has a presentist character;
- (B) we have presentist intuitions;
- (C) presentism is a true account of the world.

These three options are not mutually exclusive, we may invoke all of them in explaining the character of language. However, recourse to explanation via (B)

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or (C) will not further the presentist's case. (C) would simply beg the question<sup>3</sup>, and the reasons why (B) are not adequate were explained in the previous paragraph. (A) then must do the justificatory work, and in this it proves wholly inadequate. For, true enough, our experience has a presentist character, and, also reasonably, we might expect our languages to be as they are because of the character of our experience. But what may we conclude from that fact that our experience is presentist in character? Only that our experience is presentist in character and nothing more, just as from seeing the bent straw in water we cannot conclude that the straw is bent. The fact that we have an experience is not alone sufficient to prove the veracity of the experience as epistemology since Descartes attests. What experience may give us is a *prima facie* reason that to believe that such-and-such is the case. But, in the face of more compelling argument, any mere *prima facie* reasons must be abandoned. And given its scientific backing STR offers that more compelling argument.

The same holds, I think, for (2): we are left with the same options – and the same conclusions. (B) and (C) are question-begging, (A) is insufficient for doing the justificatory work. Arguments for (C) could be elaborated upon. For example, one might claim that the presentist character of language has stood the test of time from some sort of ‘survival of the fittest’ type process in which it has been selected for because, as a true account, it has a selective advantage. However, as rival theories, e.g. eternalism, change nothing for our day-to-day working experience of time, it is not clear how presentist language could have been selected for. Indeed,

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<sup>3</sup> Even if one could make appeal to (C) without begging the question, it is not at all clear what the causal mechanism would be linking the truth of the presentist account to the fact that language has a presentist character.

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as eternalism is equally compatible with all of our subjective experience of time, it is hard to see what mechanism could join the presentist nature of language and the corresponding state of affairs in a justificatory relationship. Thus I surmise the argument from language fails.

**On The Attack: Nails in the Coffin for Presentism?**

It is time for the eternalist to go on the attack. I said that the predominant motivation for presentism is to preserve intuition, specifically, it is to preserve the intuition that there is a universe-wide objective ‘now’ – the present – and that this exhausts everything that exists. Undoubtedly this is a very strong intuition but it has already fallen foul of STR: there is no universe-wide ‘now’, only frame-dependent presents. When faced with a choice between staunch intuition and well-established scientific theory, obviously we ought to side with the science. A large part of the basis for presentism has already been lost to STR.

Furthermore, presentism violates another extremely strong intuition, that  $R$  is transitive and frame-independent. Ostensibly the presentist wants to preserve the intuition that there is indeed an objective, or universe-wide, now. As I have shown though, this intuition, however strong, must bow before well-established scientific theory. Indeed, of the ‘naïve’ intuitions about space-time I have discussed, the only one that can be preserved is that  $R$  is transitive and not frame-dependent. Clearly then, by intuition we should side with Einstein and the eternalists.

The Rietdijk-Putnam argument is built on highly plausible premises and gives strong independent support for eternalism. What my argument comes down to is that presentists do not have intuition on their side and that because of the Rietdijk-Putnam argument, we should accept eternalism. This all combined gives

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us enough reason to side with Einstein. What I hope to have shown is that there is far more pushing us in that direction.

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