Time, metaphysics of

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Article Summary

Metaphysics is the part of philosophy that asks questions about the nature of reality – about what there is, and what it is like. The metaphysics of time is the part of the philosophy of time that asks questions about the nature of temporal reality. One central such question is that of whether time passes or flows, or whether it has a dynamic aspect. By this metaphysicians mean something very specific: is one time metaphysically privileged in some way, and does this metaphysical privilege move on from time to time? A-theorists answer in the affirmative, and different A-theorists offer different ways of thinking about the metaphysical privilege involved. Some say the privilege consists in being the only time that exists (presentism). On presentism, only the present exists, but which time that is changes as time passes. Other A-theorists, known as growing block theorists, say the metaphysical privilege consists in being the latest time that exists. On the growing block view, the past and the present exist, but the future does not. As time passes, new times comes into existence. Yet another version of the A-theory says that all times exist, but that one time is metaphysically privileged because it is present in an absolute sense. This version of the A-theory is known as the moving spotlight theory. Different times gain the privilege in turn by becoming the one time that is present in an absolute sense.

The A-theory is opposed by the B-theory. B-theorists take all times to exist (eternalism), but unlike moving spotlight theorists, they deny that any one time is metaphysically privileged in any way. Each time is present, but only relative to itself, not in an absolute sense. The B-theory is usefully understood by comparison with views about space. A natural view of space is that all spatial locations exist, and that none is 'here'in an absolute sense, even though each one is 'here'relative to itself. The B-theory says the same about time. Thus, according to B-theorists, time is in a key respect much like space: what is past, present, or future, is just a matter of temporal perspective, just like what is here or over there is a matter of spatial perspective.

Modern physics is more hospitable to the B-theory than to the A-theory, while ordinary thought and experience arguably favour the A-theory. One reaction to this is to endorse the B-theory, but to ask why it is that time presents itself in ordinary thought and experience as being different from how it really is. There is a growing literature on this problem that draws on cognitive science work on time perception.

1 The A-theory and the B-theory

In the metaphysics of time, the main divide is between the A-theory and the B-theory. The A-theory also goes by the names 'tensed theory', or 'dynamic view', whereas the B-theory also goes by the names 'tenseless theory', 'static view', or 'block universe view'. The A-theory says that time passes, in a metaphysically robust sense: one time is metaphysically privileged (the present), and this metaphysical privilege moves on from time to time, as time passes (the 'robustness' terminology is taken from Skow 2015: 2). However, what the metaphysical privilege consists in is different for different versions of the A-theory.

Presentists say that it is an ontological privilege, namely being the only time that exists. So according to presentists, only the present exists. As time passes, times come into and go out of existence. Growing block theorists also attribute an ontological privilege to one time, namely being the latest time that exists. According to them, the past and the present both exist, but the future does not. As time passes, new times come into existence. The growing block view is an attempt to do justice to the intuition that the future is an open realm of possibilities, while the past is fixed and immutable. It captures this by saying that the future is open in an ontological sense; the future, unlike the past, does not exist. There is also a version of the A-theory that says that all times exist, the moving spotlight view. According to moving spotlighters, all times exist (this is known as eternalism), but only one of them has the metaphysical privilege of being present absolutely. As the privilege moves on, time passes. (Note that there are more versions of the A-theory beyond these three, and that there are variants of presentism that do not clearly constitute versions of the A-theory (Tallant 2012).)

The B-theory is more unified. B-theorists are eternalists – they think that all times exist. This much they have in common with moving spotlighters. But, unlike moving spotlighters and all other A-theorists, B-theorists deny that time passes, in the metaphysically robust sense. That is why their view is sometimes called a static view of time. According to B-theorists, time is like space, in certain key respects. In particular, while each time is present relative to itself, much like each spatial location is here relative to itself, there is nothing metaphysically significant about the present. 'Past', 'present', and 'future' simply serve to pick out times earlier than, simultaneous with, or later than the time of speaking - in just the same way that 'here' and 'over there' serve to pick out spatial locations that coincide with, or don't coincide with, the place where the utterance occurs.

2 Origins of the A versus B debate

Something like the A versus B opposition has a long history, reaching back at least to the Presocratics. Heraclitus famously proclaimed that 'everything is in flux', while Parmenides seems to have denied the reality of change. In some ways, this mirrors the contemporary divide between dynamic and static views of time (though note that contemporary B-theorists do not take themselves to be denying the reality of change).

Similarly, the views that only the present is real (presentism), and that only the past and the present are real (the growing block view) both have important historical roots. The growing block view was defended, for example, by C. D. Broad (1923). (See 'presentism' for more on its origins.)

The contemporary debate owes much to the work of the British idealist J. M. E. McTaggart (1927). McTaggart held that time was unreal, and his argument for this claim makes central use of a distinction between two ways of thinking of the events that make up world history. First, one can think of these events as being earlier or later than one another. The result is the B-series of events. Second, one can think of the events as being past, present or future. This results in the A-series of events. One way to appreciate the difference is to notice that it's always true that World War I happened before World War II, no matter when one says it, but that it is not now true to say that World War II is in the future. The B-series is always the same, but the A-series is not, since it distinguishes one moment as being present.

As McTaggart recognized, both the A- and the B-series are needed at the level of ordinary thought, in the sense that we do seem to conceptualise time in both of these ways. The metaphysical issue is whether one of these two series is more fundamental than the other. According to McTaggart, the A-series is more fundamental than the B-series.

This issue is central to the contemporary debate. A-theorists agree with McTaggart that the A-series is more fundamental. A-facts, such as that your reading this paragraph is present, cannot be reduced to mere B-facts, such as that your reading this paragraph happens at a time later than my writing it. If there is a reduction, it goes the other way: B-facts obtain in virtue of A-facts. The big bang precedes your reading this sentence (a B-fact) only because it was present while your reading this was future, and is past while your reading this is present (A-facts).

B-theorists, by contrast, think that the B-series is more fundamental. Of course, B-theorists recognize that we use terms like 'past', 'present', and 'future'. But they think of these as being on a par with terms that express spatial perspectives, like 'here', 'over there', or 'on the left'. Just like there is nothing metaphysically significant about the location one is at (even though one can refer to it and no other location as 'here'), there is, according to B-theorists, nothing metaphysically significant about the time one is at (even though one can refer to it and no other time as 'now'). At the fundamental level, there are only B-facts (such as that the Big Bang precedes your reading this).

3 Tensed Language

The A- and the B-theory are also referred to as the tensed and the tenseless theories of time, respectively. These labels reflect a long-standing focus on questions about the meaning of tensed sentences. In the context of the A versus B debate, 'tense' is used very broadly. Any statement that ascribes an A-location (a location in the A-series) to an event

is a tensed statement, including 'your having breakfast is in the past', 'the train is about to leave', and 'it is now 3pm'. What distinguishes the A-theorist from the B-theorist is that they think true tensed statements correspond to fundamental tensed facts. These fundamental tensed facts change, and that is what the passage of time amounts to. The B-theorist, by contrast, thinks that the fundamental temporal facts are tenseless. These facts only involve B-relations such as earlier-than, later-than, or simultaneous-with, not A-properties, such as pastness, presentness, or futurity. For the B-theorist, the fundamental temporal facts don't change.

Until the 1980s, B-theorists generally held that tensed language could be translated into tenseless language ('old B-theory'). For example, the sentence 'World War II is in the past' would be translated into a tenseless sentence like 'World War II occurs before *t*', where *t* is the time of speaking. In the wake of influential work on the essentiality of indexicals such as 'now' (and 'I', and 'here', Perry (1979)), it became apparent that such translations were unlikely to succeed. So the old B-theory fell out of favour. Instead, it became the common B-theoretic view that while tensed sentences are made true by tenseless facts, they cannot be translated into tenseless sentences ('new B-theory'; Smart 1980, Mellor 1981 and 2001, Oaklander and Smith 1994, Dyke 2002). The significance of this for the metaphysics of time was as follows. The untranslatability of tensed language showed that tense could not even in principle be eliminated. This in turn might have been taken to suggest that tense must be a feature of reality (so that there are fundamental tensed facts). Against this, the new B-theory offered a defense: while tense is an ineliminable part of language, temporal reality, and the truthmakers it contains, could still be thought of and described in purely tenseless terms.

4 McTaggart's Argument

McTaggart is perhaps best known for his argument against the reality of time. The argument was once very widely discussed, with A-theorists typically endorsing sub-argument 1 and B-theorists typically endorsing sub-argument 2 (though typically neither camp accepted the conclusion that time is unreal).

There are different reconstructions (see the citations after 'insightful' below), but the original goes roughly as follows. Sub-argument 1: Time is only real if there can be change. But there can be change only if events have A-properties (such as pastness, or presentness). After all, B-properties (such as earlier than, or later than) are properties events have permanently. So if events have only B-properties, then nothing can change. Therefore, time is only real if events have A-properties (sub-conclusion 1). Sub-argument 2: However, no event has an A-property. The reason is that if an event had any A-property, it would have all the A-properties. For example, if it had presentness, it would also have pastness and futurity. After all, the thing about the present is that it moves; each event is present in turn. But the A-properties are incompatible – for example, no event can be both past and present. So it's not possible for an event to have all the A-properties. Therefore, no event has any A-property (sub-conclusion 2). Overall conclusion: time is not real.

McTaggart's argument starkly polarized philosophical opinion, with some taking it (or part of it) to be deeply insightful (e.g. Dummett 1960, Horwich 1987, Mellor 1998, Fine 2006), and others taking it to be embarrassingly misguided (e.g. Broad 1938: 316, Sider 2001, Zimmerman 2005). The argument is notably controversial for being a purely a prioristic, metaphysical argument for a very ambitious conclusion.

5 Physics and the A-theory

The A-theory faces a well-known challenge arising from the theory of relativity (see 'Time', 'Relativity theory, philosophical significance of'). If the present is to be metaphysically privileged, there had better be a present. That is, there had better be such a thing as a spatially extended, global instant, the world as it is now. At least, this is a good candidate for what we ordinarily mean by 'present'. But that is just what the special theory of relativity does not leave room for (and the situation is not much helped by moving to general relativity). In Minkowski spacetime, the spacetime of special relativity, which spatially distant events are simultaneous with a given event is no longer an absolute matter. Rather, it is something that is different in different frames of reference. Thus, which spatially distant events get to count as simultaneous with the here and now depends on one's frame of reference. The upshot is that there is no longer any such thing as distant simultaneity, so that the idea of a global present that has metaphysical significance becomes hard to sustain. This is a problem for any version of the A-theory insofar as the A-theory depends on an absolute distinction between the past, present, and the future. The problem has been particularly thoroughly discussed in connection with presentism (e.g. Saunders 2002, Wüthrich 2013).

There are a number of responses to the challenge. Some respond by attempting to modify or augment special relativity. One example of the modifying strategy is the 'neo-Lorentzian interpretation' of special relativity (e.g. Tooley 1997, Craig 2001). On the neo-Lorentzian view, simultaneity is in fact absolute, rather than relative to a reference frame. Absolute simultaneity is simultaneity relative to the privileged frame of reference that is at rest with respect to absolute space. However, which frame this is, is in principle empirically undetectable, due to the relativistic effects of time dilation and length contraction. Thus, there is extra structure to spacetime that is hidden from us, because the laws effectively governing matter, including rods and clocks, happen to be Lorentz invariant (see Balashov and Janssen 2003 for a critical discussion). By contrast, the augmenting strategy accepts that the background spacetime of special relativity is Minkowski spacetime. On this view, the structure of spacetime itself does not privilege one way of foliating ('slicing up') spacetime into 'slices' of simultaneous events. However, the *contents* of spacetime do privilege one such foliation (e.g. Zimmerman 2011: 215). Matter happens to be distributed in spacetime in such a way as to ensure that one frame of reference, and one foliation, is special.

A rather different way of addressing the tension between relativity theory and the A-theory focuses on re-construing the A-theory in a way that removes the need for a global

present. Proposals have been made for the growing block view (Earman 2008), and for the moving spotlight view (Skow 2009). (See (Pooley 2013) for further discussion.) Beyond relativity theory, what are the A-theory's prospects of being in line with modern physics? Many have looked to certain interpretations of non-relativistic quantum mechanics, such as Bohmian mechanics and collapse theories, to vindicate the A-theory (see Wüthrich 2013 for critical discussion). Finally, there may be hope for the A-theory arising from one approach to quantum gravity. In particular, the causal set theory approach to quantum gravity may leave room for something reminiscent of the growing block view (e.g. Wüthrich and Callender 2017, Earman 2008).

6 The B-theory and Temporal Experience

The B-theory is thought to give rise to a problem about temporal experience. After all, while the B-theory's denial of robust temporal passage makes it fit better with our best physical theories, it also results in a view of time that can seem starkly at odds with how things appear. Doesn't one time, the present, seem more real than the others? In particular, doesn't it seem more real than the future? And is it not obvious that in experience at least, there is a pervasive dynamicity to time that space lacks? Don't we experience time's (robustly) passing?

There are many different aspects to the problem. One way to tackle it makes use of a distinction between experience in a narrow, perceptual sense, and experience in a broader sense. In the narrow, perceptual sense, one typically has an experience in each of the five sensory modalities, along with a proprioceptive experience, at any waking moment. For example, as you read this sentence, things look and sound and feel to you a certain way. You are having various perceptual experiences. Temporal experience in this narrow sense may seem like an odd notion. After all, time is not an object like a table or a chair, and we do not perceive time in the way we perceive tables and chairs. There is no particular sense associated with time perception. Nonetheless, one is continually aware of temporal features of the world - in perceiving anything, one perceives simultaneity, duration, and succession. For example, your reading this sentence involves your being perceptually aware of things unfolding in a certain way, and of events following one another at a certain speed. Or consider what it is like to hear a melody. One is perceptually aware of one tone following another in a certain order and at a certain speed. One is thus perceiving temporal features of the world. This is temporal experience in the narrow sense.

One can contrast this with temporal experience in a broader sense. Suppose you reminisce about the 1990s and think about how things have changed since then. The experience of reminiscing involves an awareness of time, but that awareness is more indirect than that involved in time perception (Le Poidevin 2007: 87).

This distinction allows one to hone in on the aspect of the problem that concerns temporal experience in the narrow sense. Do we perceive the (robust) passing of time?

We perceive things as unfolding in a certain way. But does that involve a perceptual awareness of different times' becoming successively metaphysically privileged? Those B-theorists who think the answer is yes, take our perception of time to involve a striking illusion. The question for them is, how is this illusion is created? Their concern is to identify a process whereby the brain creates a perceptual illusion of (robust) passage, even though time does not (robustly) pass.

Some B-theorists have looked to cognitive science, and in particular, to findings concerning illusory motion perception, for such an explanation (Paul 2010). For example, in the 'colour phi' experiment, a subject is presented with a rapid succession of flashes of a static dot of different colours on opposite sides of a screen. If the flashes are timed and spaced appropriately, the subject can have an illusion of a dot moving back and forth, and abruptly changing its colour somewhere along the trajectory. Thus, what we have here is the creation of a continuous, dynamic output, from a series of static inputs. In a similar way, the brain creates the impression of robust passage from a succession of static, tenseless inputs of the form 'O is F at t_1' and 'O is not F at t_2'. (See Prosser 2016: 28 for further discussion and Hoerl 2014ab, Deng 2013 for critical reactions.)

There are a variety of stances on the relation between the B-theory and temporal epxerience, in both the narrow and broad senses (e.g. Grünbaum 1967, Butterfield 1984, Mellor 2001, Falk 2003, Skow 2015, Ismael 2011, Prosser 2016, Callender 2017; Baron et al 2015 and Phillips 2017 contain further useful references). Questions are also emerging about the relation between the A-theory and temporal experience (Frischhut 2013, Dorato 2015, Prosser 2016), and about the dialectical role that considerations about experience can play in the A versus B debate (Benovsky 2013).

Some authors make a connection with other debates about temporal experience, such as the traditional puzzle of how we can perceive temporal features at all (Tallant 2013). This puzzle arises on the assumptions that we only ever perceive things in the present, and that the present is instantaneous (e.g. Dainton 2008, Phillips 2010). The various different approaches to this puzzle and related problems about temporal experience may offer resources for the B-theorist who is seeking to account for an illusory perception of (robust) passage.[1]

See also the entries on: Presentism, Time, Spacetime, Change, Continuants, Time Travel, Relativity Theory – Philosophical Significance of

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[1] This work was supported (in part) by the Yonsei University Future-Leading Research Initiative of 2018 (2018-22-0100).

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