Introduction.

There is a debate in contemporary philosophy of time whose opponents differ primarily in the theoretical role they assign to change. One set of claims, loosely those of the A-theorists, has change as an ultimately real phenomenon, while claims from the opposing B-theorists locate change somewhere closer to the mind.

There is another debate about time that runs parallel to the substantivalist-relationist debate in philosophy of space. On one side, the time-substantivalists claim that time exists independently of what goes on in it, while on the other, the time-relationists claim that it does not.

I will show how one philosopher used what followed from taking the relationist position in the second debate about time to construct a famous argument which more or less gave rise to the current debate between A-theorists and B-theorists. I will briefly describe the stereotypical positions held by contemporary A- and B-theorists, and then consider an alleged objection to the A-theory from special relativity.

I.

J. M. E. McTaggart in 1908 published a paper called "The Unreality of Time" in which he attempted to prove that if there can be no time without change, then there can be no
time. His paper more or less spawned the debate between the A- and B-theorists as it exists now, and in it can be found some of the debate's central observations and distinctions. In what follows, I will give all the steps of McTaggart’s argument, but first I will examine his justification of the relationist position from which he launches it.

During a given passage of time, a given object (system, state of affairs) either changes or it doesn't. Change is more or less directly perceptible to us; we see, hear, feel, and generally experience things changing. But what do we mean when we say that something doesn't change? McTaggart argues that we can only mean by this that something stays the same while other things are changing; if we had not some change somewhere to go by, we couldn't perceive anything staying the same. Without change somewhere, the passage of time would simply not be experienced; and a universe in which nothing ever changes would be an atemporal universe.

This argument is not definitive, and if the relationist-substantivalist debate about space has taught us anything, we should expect no soon resolution to this question. But it is true that change is very deeply implicated in our commonsense notion of time, and whether or not the notion is a correct one, it will be worth examining what follows from the conclusion.

II.

McTaggart begins his argument by making the now-well-known distinction between the A-series and the B-series approaches to time. In the A-series approach, time is a series of
events (by "events" I mean to indicate both actual and possible events) in which every event is either past, present, or future. In the B-series approach, time is a series of events in which every event is either earlier or later than every other event. Facts about the A-series---which events are past, present, and future---are constantly changing, while facts about the B-series---which events are earlier or later than which other events---are permanent.

Which is the more true account? Are presentness, pastness, and futureness the fundamental temporal properties, or are earlierness and laterness? Since facts about the B-series are permanent, and we may prefer this account on methodological principles alone (a theory the truth values of whose fundamental predications are constant is in general preferable to a theory the truth values of whose fundamental predications are constantly changing), let's examine the fitness of the B-series approach first.

If the B-series approach (the "B-theory") is true, then all temporal phenomena---including presentness, pastness, futureness, and, crucially, change---must fall out of the B-facts. As I will later show, there are some plausible attempts to derive the first three, but the fourth is problematic. According to the B-theory, all facts about events can be given in terms of earlierness and laterness: E1 is earlier than E2, E2 is later than E1. But unlike facts about presentness, pastness, and futureness, facts about earlierness and laterness are permanent---if E1 is ever earlier than E2, it always is; if E2 is ever later than E1, it always is. A description of reality in B-theory terms is a description in which the facts never change.
But if the facts never change, nothing changes, and the B-theory fails to account for what the relationist presumes to be an essential feature of time.¹

Let us now examine the A-theory. If it is true, then all temporal phenomena---including earlierness, lateness, and change---must fall out of the A-facts. The first two are easy enough to derive: all past events are earlier than all present and future events, all future events are later than all present and past events, all present events are later than all past events and earlier than all future events, etc. And change saturates the A-series account: the facts about which events are past, present, and future, are constantly changing: at E₁, E₁ is present and E₂ is future; at E₂, E₁ has changed from present to past and E₂ from future to present; and so on.

According to the A-theory, then, every event, having once possessed futureness, comes to possess presentness, and then eventually pastness. All three of these incompatible

¹McTaggart suggests looking for change elsewhere in the B-theory:
(1) Change could be found in the fact that at a boundary between two events E₁ and E₂, E₁ ceases to be an event while E₂ becomes one, and thus there is a change in the state of affairs in which there exists an event E₁ but not an event E₂ to the state of affairs in which there exists an event E₂ but not an event E₁. But in the B-series, events do not ever become events or cease to be events: if an event is ever an event in the B-series, it is always an event. Just because E₁ is only happening when it is happening does not allow us to talk about its becoming an event when it begins to happen: it was an event all along, and will continue to be an event even after it is no longer happening.
(2) I personally don't see how the second proposal is substantially different from the first, but I will make a brief attempt to explain it. So we've shown that E₁ cannot suddenly cease to be an event and that E₂ cannot suddenly become one, but what if we let E₁ and E₂ be events all along but insist that they change into each other---that E₁ itself becomes E₂, and E₂ the event which follows it, and so on? E₁ then never ceases to be an event, it simply turns into a different one, and E₂ never comes into eventhood from nowhere, it is transformed into by E₁. So whatever it is that ceases to be E₁ at the boundary begins then to be E₂. But whatever E₁ is, it cannot cease to be E₁ in any way; and whatever E₂ is, it likewise cannot become E₂---E₁ is always E₁, and E₂ is always E₂. So switching the discussion from one of becoming out-of-nowhere to one of becoming-out-of-the-previous-event doesn't give us any more room for change than we started with.
(3) Could change be found in the locations of the events along the B-series? In other words, could we consider the facts that E₁ occurred at position 'x' in the series and that E₂ occurred at 'y', according to some coordinatization, and that 'x' and 'y' are different evidence of change? Again, no. These facts are just as permanent as all the others: if an event is ever located at position 'x', it is always located there.
properties (incompatible because no one event can possess more than one of them at a given time) are predicable of every event. It sounds like a contradiction, but it isn't—so the A-theorist claims—because no one event possesses more than one of them at a given time.

But wait—"at a given time"? In order to give the intuitively obvious explanation necessary to remove the apparent contradiction, the A-theorist finds himself invoking time. But time is that of which he is attempting to construct a theory. Perhaps, instead of invoking time itself, he can introduce another dimension along which events vary with respect to the properties they possess, which has just enough timelike attributes to get the job done but not enough to generate a contradiction.

But even if this dimension has just the minimal attributes—it is a dimension along which things change, and things change along it in a certain direction—he will need ultimately to answer the same question about this new dimension that he began with by asking about time—namely, whether its fundamental nature is that of an A-series or a B-series. To avoid circularity and answer that question meaningfully, he will have to introduce yet another timelike dimension, and he'll need to answer the same question about it, which will force him to introduce yet another such dimension, and so on. The A-theorist is trapped in an infinite regress of explanation, and the contradiction remains.

The B-theory is not really a theory of time because it doesn't account for change, and the A-theory—which does—entails a contradiction. Therefore, McTaggart concludes, time
itself entails a contradiction, and because of this, it simply cannot be real. There are two ways to interpret this conclusion: (1) whatever it is that’s responsible for our experience of time is not real; and (2) whatever it is that’s responsible for our experience of time is real but not temporal. I believe McTaggart himself endorses the second view by advocating what he calls a C-series account of time.

To get a C-series, take a series of events which has both A- and B-structure and remove temporality. We lose the A-series distinctions of past, present, and future; we lose the B-series distinctions of earlier and later (since these are inherently temporal notions, and the B-series by its failure to incorporate change fails to be a temporal series); but we are left with a set of events on which we can define a permanent, symmetric ordering relation. The C-series, like the B-series, is not a temporal series. But unlike the B-series, it doesn't claim to be. The C-series, unlike the A-series, does not account for change. But also unlike the A-series, it does not entail a contradiction. Could it be that "the realities which we perceive as events in a time-series" form a C-series? It's possible, says McTaggart. "It is also possible...that they do not form such a series, and that they are in reality no more a series than they are temporal. But I think...that the...view according to which they really do form a C-series is the more probable" (1908).

III.

So if change is an essential feature of time, then a C-theory is as far as we can go in describing time, and a C-theory is not really a theory of time at all. But what if change is not an essential feature of time---what if we give up the relationist position that time
would not exist without some change happening within it? Then a B-theory of time, which fails to account for change but gives us both an ordering on and a direction for the series of events, could be satisfactory. But, as mentioned above, the B-theory will need to somehow reduce talk about pastness, presentness, and futureness to talk about earlierness and lateness.

The predominant B-theory view is that this can be done by reducing all instances of A-properties to instances of deixis (also known as "token indexicals"): the sentence "E1 is past", for example, means simply that E1 is earlier than the moment at which the sentence is uttered; likewise the sentence "E2 is future" means that E2 is later than the moment of utterance (where I use "is" as a tenseless copula). Just as the meaning of any particular utterance of the pronoun "I" depends on who utters it, or as the meaning of any particular utterance of "here" depends on where it is uttered, the meaning of any particular tensed expression depends on when it is uttered; and just as there are no absolute properties I-ness or here-ness, there are no absolute properties pastness, presentness, or futureness.

But for those who remain unsatisfied with the B-theory’s failure to incorporate change, is there any way to save the A-theory? Contemporary A-theorists have claimed that by declaring tensed propositions like "E1 was future", "E1 is present", and "E1 will be past" to be irreducible, unanalyzable primitives of the theory---by "taking tense seriously"---the fatal contradiction is prevented from taking root. Recall that the contradiction spawned from the fact that three mutually incompatible properties are truly predicable of every event, and recall that our attempt in our explaining it away to show that there is no
contradiction because it is not the case that, e.g., E1 is past, present, and future at the same time, but rather that it was future, is present, and will be past, failed because it invoked, by these tensed expressions, that of which we were trying to provide a theory in the first place. Such an A-theorist claims that by granting tense the status of a theoretical primitive, irreducible and unanalyzable, we fail to reference time by these statements, and thus have a contradiction-free theory.

IV.
So what further evidence have we to accept one theory over the other? As usual, philosophy and science are never long isolated from one another with respect to questions like this.

It is sometimes claimed that Einstein’s special theory of relativity supports the B-theory by exposing the relativity of the supposedly primitive and absolute A-theory properties past, present, and future in the following way. According to special relativity, whether two distant events are simultaneous depends upon the inertial reference frame in which simultaneity is to be calculated: if I am in a given inertial reference frame and calculate events E1 and E2 to be simultaneous, and my friend is in another inertial reference frame moving at a very high speed with respect to me, he won’t calculate E1 and E2 to be simultaneous. So when E1 is present for me, E2 also is; but when E1 is present for him, E2 could be either future or past. The A-theory then describes a different temporal reality for every distinct inertial reference frame. This is typically understood to be a conclusion
counter to the aims of the theory, or otherwise unacceptable or undesirable. The B-theory then allegedly provides an alternative to this unacceptability or undesirability.

But what is often overlooked is the fact that the B-theory is subject to precisely the same objection: whether one event is earlier or later than a distant event is relative for the same reasons as above---according to me, E1 is no earlier or later than E2 and vice versa, but according to my moving friend, E1 could be earlier or later than E2. Thus, since the facts about the earlierness or lateness of distant events vary from observer to observer, the B-theory also describes a different temporal reality for each distinct inertial reference frame, and suffers from an identical failure, unacceptability, or undesirability.

The special relativity objection to the A-theory then only gives the B-theory a substantive advantage when the A-theorist allows existence to become a function of the passage of time.

Some A-theorists believe that future events do not exist, and will not exist until they become present. (Most B-theorists believe that all events, regardless of their earlierness or lateness with respect to the present, have equal and full existence.) According to this version of the A-theory, then, all events which are neither prior to nor simultaneous with the present moment are non-existent. But as we have seen, according to special relativity, simultaneity is relative---therefore, which events exist and which events do not exist according to this A-theory depends entirely on the reference frame of the observer. On this view, then, if special relativity is true, existence itself is relative.
This is quite a big pill for the A-theorist to swallow, given the experimental evidence in support of the truth of special relativity. But supposing there is no purely philosophical reason to accept one theory over the other, and that we are thus turning to science to tip the scale, then if the truth of some particular physical theory is the only thing tipping it in the B-direction—end even then only tipping it for a subset of A-theorists—then the scale is not tipped very far at all.
Bibliography


