Background

Ted Sider
Philosophy of Time

(Good overview: Emery et al. (2020))

1. McTaggart

(McTaggart, 1927, chapter XXXIII)

1.1 The A series and the B series

> Positions in time, as time appears to us *prima facie*, are distinguished in two ways. Each position is Earlier than some and Later than some of the other positions… In the second place, each position is either Past, Present, or Future. The distinctions of the former class are permanent, while those of the latter are not. If M is ever earlier than N, it is always earlier. But an event, which is now present, was future, and will be past.
>
> For the sake of brevity I shall give the name of the A series to that series of positions which runs from the far past through the near past to the present, and then from the present through the near future to the far future, or conversely. The series of positions which runs from earlier to later, or conversely, I shall call the B series. (pp. 9–10)

Positions = events; but then the A-series = B-series. Never mind: A-concepts $\neq$ B-concepts.

A-judgments are "from the perspective of the present moment, and change in truth value. B-judgments are "from the atemporal perspective", and don't change.

1.2 The argument for the unreality of time

The A-series is *needed* in order for time to be real, but it is self-contradictory.

I'll skip the second part (see Broad (1933, Vol. II, part I) and Prior (1967, pp. 4–7) for critiques).

1.3 No-change objection

Without an A series, nothing would really *change*, since B-ish temporal facts don't change.

B-locations in time don't change.

And event can't change any characteristics other A characteristics:

> Take any event—the death of Queen Anne, for example—and consider what changes can take place in its characteristics. That it is a death, that it is the death of Anne Stuart, that it has such causes, that it has such effects—every characteristic of this sort never changes. "Before the stars saw one another plain," the event in question was the death of a Queen. … But in one respect it does change. It was once an event in the far future. It became every moment an event in the nearer future. At last it was present. Then it became past and will always remain past, though at every moment it becomes further and further past. (p. 13)

Russell's response:

A *thing* changes if and only if it has different properties at different times. E.g., the poker changes because:

(S) The poker is hot on Sunday

(M) The poker is not hot on Monday

McT's first reply:

> But this makes no change in the qualities of the poker. It is always a quality of that poker that it is one which is hot on that particular Monday. And it is always a quality of that poker that it is one which is not hot at any other time. Both of these qualities are true of it at any time – the time when it is hot and the time when it is cold. The fact that it is hot at one point in a series and cold at other points cannot give change, if neither of these facts change — and neither of them does. (p. 15)

But this just shows that *the fact that the poker changes* doesn't change.

McT's second reply

Spatial variation is analogous to what Russell calls change:

> The USA is mountainous at Longitude W 104° (Colorado)
>
> The USA is flat at Longitude W 98 ° (Kansas)
>
> But no one would say that this gave us change. Why should we say so in the case of the other series? (p. 15)

A Russellian reply: variation with respect to a series is change iff that series is *time*. *A McTaggartian comeback*: this distinguishes change from other sorts of variation only to the extent that time is dissimilar from space.

In general, many A-theorists complain that the B-universe is "static".

1.4 Aftermath of McTaggart

McTaggard divided philosophers of time into two camps:

A theory The A series exists (or is fundamental, etc.)

B theory The A series doesn't exist; only the B series exists

2. Smart in favor of the B theory

(Smart, 1963)

> …the concepts of past, present, and future have significance relative only to human thought and utterance and do not apply to the universe as such. They contain a hidden anthropocentricity. So also do tenses. On the other hand, the concepts of 'earlier', 'simultaneous', and 'later' are impeccably non-anthropocentric. (Smart, p. 132)

2.1 Tenseless language

> In what follows I shall want to make use of tenseless verbs. I shall indicate tenselessness by putting these verbs in italics. Tenseless verbs are familiar in logic and mathematics. When we say that two plus two *equals* four we do not mean that two plus two equals four at the present moment. Nor do we mean that two plus two always equalled four in the past, equals four now, and will always equal four in the future. (Smart, p. 133)

E.g., "the poker *is* hot on January 1, 2022".

(There is a question of whether we really can introduce tenseless talk.)

2.2 Token-reflexive account of 'now', 'past' and 'future'

> Let us replace the words 'is past' by the words '*is* earlier than this utterance'. (Note the transition to the tenseless 'is'.) Similarly, let us replace 'is present' and 'now' by '*is* simultaneous with this utterance', and 'is future' by '*is* later than this utterance'. (Smart, pp. 133–4).

This makes 'present' (and 'now') analogous to 'here'.

2.3 Smart against the A theory

> We can also see how misleading it is to talk of the flow of time, or of our advance through time. To say that by next year a year of time will have gone by is simply to say that our conscious experiences of a year later than this utterance *are* (tenseless) a year later than this utterance. Our consciousness does not literally advance into the future, because if it did we could intelligibly ask 'How fast does it advance?' We should need to postulate a hyper-time with reference to which our advance in time could be measured (seconds per hyper-seconds), but there seems to be no reason to postulate such an entity as a hyper-time… Moreover, anyone who thought that time-flow was necessary for time would presumably want to say that hyper-time-flow was necessary for hyper-time. He would therefore be driven to postulate a hyper-hyper-time, and so on without end. (Smart, pp. 96-97).

Many opponents think the B-universe is "static", and genuine change requires "time's flow"—some sort of change in which moment is present beyond the triviality that 2021 is present with respect to 2021, 2022 is present with respect to 2022, etc. Smart's argument is seen as challenging this notion of time's flow.

Though, it's very unclear what time's flow is supposed to be.

3. Temporal ontology

There is an ontological question mixed up in all this. Are there such things as, e.g., dinosaurs?

3.1 Eternalism

> "(In the four-dimensional way of talking, of course, we must not say even that things come into existence—we replace talk of a building coming into existence at t by talk of the earliest time slice of the building being at t.)" (Smart, p. 135)

The "four-dimensional way of talking", in the case of 'Ted walked to a park':

$\exists x \exists y (Px \wedge Ty \wedge Byn \wedge Wtxy)$

"There is a park, x and a time, y, such that y is before now, and Ted walks to x at y"

Note:

1. Quantification over times
2. 'Walks' sprouts an argument place for times
3. Once the argument place is filled, the result is "tenseless"—no further relativity or sensitivity to time
4. The status of 'now' is left open by this symbolization (it's indexical for B theorists)

But now consider 'Once there were dinosaurs located in New Jersey':

$\exists x \exists y (Dx \wedge Ty \wedge Byn \wedge Lxjy)$

"There is a dinosaur, x, and a time, y, such that y is before now and x is located in New Jersey at y"

The symbolization logically implies "$\exists x Dx$". Dinosaurs exist.

Nevertheless, what we (allegedly) ordinarily mean by "dinosaurs no longer exist" is that no dinosaurs that are *located* at the current moment (at any place):

$\sim \exists x \exists y (Dx \wedge Lxyn)$

Compare: "there are no black holes located around here". Also compare David Lewis's conception of "unicorns could have existed, but don't actually exist": there are unicorns located at other possible worlds, but not this one.

3.2 Presentism

(Prior, 1970)

> Philosophers often speak as if the real world were just one of a number of different big boxes in which various things go on, the other boxes having such labels as 'the mind' or 'the world of Greek mythology'. For example, centaurs exist in the world of Greek mythology but not in the real world, aeroplanes exist in the real world but not in the world of Greek mythology, and horses and men exist both in the real world and in the world of Greek mythology.…
>
> …this way of conceiving the relation between the real and the unreal is profoundly mistaken and misleading. The most important way in which it is misleading is that it minimises, or makes a purely arbitrary matter, the vast and stark *difference* that there is between the real and every form of unreality.…
>
> It is tempting to think of the present as a region of the universe in which certain things happen, such as the war in Vietnam, and the past and the future as other regions in which other things happen, such as the battle of Hastings and men going to Mars. But to this picture there is the same objection as to the picture of the 'real world' as a box or region among other boxes or regions. It doesn't bring out what is so *special* about the present; and to be more specific, it doesn't bring out the way in which the present is *real* and the past and future are not. (Prior, 1970, pp. 320–1)

So Prior denies the Eternalist's claim that there are dinosaurs.

Presentism: "the only objects are those that presently exist" (analogy: "actualism" is the view that "the only objects are those that actually exist".)

But also, the *facts* are those in the present; *reality* is present reality.

(Questions about whether the dispute is substantive.)

3.2.1 Prior's tense logic

(Prior, 1957, pp. 8–12)

As we saw, according to Smart, we can talk about time with no change in our logic; we just quantify over times and add argument places for times to predicates. According to Prior, time requires a shift in logic itself.

For Smart, an expression like:

> Ted is standing
>
> St

is not a complete sentence, does not express a proposition, and does not have a truth value, since the argument place for times in 'is standing' isn't filled. For Prior, it *is* a *is* a complete sentence, *does* express a proposition, and *does* have a truth value. The proposition changes its truth value over time. We describe this change over time using *tense operators*, according to Prior:

> It was the case that: Ted is (was) standing
>
> $\mathsf{P}St$

The tense operator P is a new logical constant. Grammatically, it is a one-place sentence operator, like $\sim$. Prior introduced other tense operators too:

$\mathsf{P}\phi$: "it was the case that ϕ"
$\mathsf{F}\phi$: "it will be the case that ϕ"
$\mathsf{H}\phi$: "it always has been the case that ϕ"
$\mathsf{G}\phi$: "it is always going to be the case that ϕ"
$\mathsf{S}\phi$: "it is sometimes the case that ϕ"
$\mathsf{A}\phi$: "it is always the case that ϕ"
$\mathsf{P}^x\phi$: "it was the case x minutes ago that ϕ"
$\mathsf{F}^x\phi$: "it will be the case in x minutes that ϕ"

Some of these can be defined in terms of others. E.g.:

$$\mathsf{H}\phi =_{\text{df}} \sim\mathsf{P}\sim\phi$$
$$\mathsf{S}\phi =_{\text{df}} \mathsf{P}\phi \vee \phi \vee \mathsf{F}\phi$$

These are new additions to logic.

(Compare the dispute between the view that predicates have argument places for worlds, and the view that modal operators are primitive.)

Notes:

- Unembedded sentences "about the present"

- In a sense, so are sentences with tense operators. E.g., $\mathsf{P}\phi$ says that ϕ is *now* past
- Existential quantification inside e.g. P isn't "ontologically committing". ($\mathsf{P}\exists x F x$ doesn't imply $\exists x F x$)
- Analogy between tense logic and modal logic: sentences have their truth values temporarily/contingently
- Analogy continued: possible worlds semantics. (Like modal actualists, Prior thinks that possible worlds semantics for tense logic, while formally illuminating, is metaphysically misleading.)
- Are tense and modal operators part of *logic*?—perhaps not a deep question.

3.3 Growing block

Past and present objects (and facts) exist but future objects don't. A "growing block universe".

Common motivation is to avoid *fatalism*. If there were a "fact of the matter" what I will do, I wouldn't have free will. (This alleged threat to freedom is distinct from that posed by *determinism*, i.e., laws + past settle future.)

Issue: in the growing block universe there are two sorts of temporal facts: "B-ish" facts about the contents of the block universe, and facts about the growth of the block universe. How to understand the latter? (Maybe: apply Priorean tense operators to statements about the block universe.)

4. Moving spotlight

Is the present "special"?

B theory says no. Presentism and the growing block view both say yes, for "ontic" reasons.

Another A theory, the "moving spotlight" view, says yes, for non-ontic reasons. Past and future objects exist, but there is something special about the ones that are present:

> "Along [the order of events], and in a fixed direction, … the characteristic of presentness [is] moving, somewhat like the spot of light from a police-

> man's bull's-eye traversing the fronts of the houses in a street. What is illuminated is the present, what has been illuminated is the past, and what has not yet been illuminated is the future". Broad (1923, p. 59)

As with the growing block universe, there seem to be two sorts of time in this picture: the "B-ish" temporal facts, and the facts about the change in presentness.

5. Presentism vs the B Theory

5.1 Common sense status of past and future

5.2 Presentism and physics

Does presentism attribute more, or less, structure to time than physics? Presentism seems to…

> …deny the existence of spacetime
>
> …accept a distinguished notion of simultaneity
>
> …accept a distinguished direction of time

5.2.1 Cross-time facts

Priorean tense operators talk about "one time at a time", which seems to leave out temporal facts that involve multiple times at once. E.g.:

> "There have been two kings named Charles" (Lewis, 2004)
>
> "Event c caused event e"
>
> "Points or events a, b, and c are spatiotemporally collinear" (Sider, 2001, section 2.2)

5.3 Grounding objection

What is the "metaphysical basis" for, e.g., "It was the case that dinosaurs exist"?

> Current existence of, e.g., dinosaur fossils?
>
> The possession by the world of the property of *previously containing dinosaurs*?

Nothing; tensed facts are "brute"?

6. Some things I won't cover

6.1 "Thank goodness that's over"

Mellor (1981, 1998); Prior (1976); Paul (1997); Sider (2001, pp. 18–21)

6.2 Time and rationality

Sullivan (2018)

6.3 B-theory and experience of time

Callender (2008); Paul (2010); Skow (2011)

6.4 Tense logic and nonexistence

Marcus (1946); Prior (1957); Fine (2005); Williamson (2013); Sullivan (2012*b*,*a*)

1. It's a logical truth that Ted = Ted
2. So, it's always the case that Ted = Ted

6.5 The open future

Thomason (1970); Prior (1968, chapter 7); MacFarlane (2008); Barnes and Cameron (2008)

1. Either F_1(there is a sea battle) or $\mathsf{F}_1\sim$(there is a sea battle)
2. If F_1(there is a sea battle) then I (now) have no freedom regarding the battle
3. If $\mathsf{F}_1\sim$(there is a sea battle) then I (now) have no freedom regarding the battle
4. Therefore I (now) have no freedom regarding the battle

6.6 Epistemic objection to nonpresentist A theories

Braddon-Mitchell (2004); Forrest (2004); Russell (2016)

Given the growing block view and the moving spotlight view, there are many people who think they are in the present, but are wrong. So how do we know that *we* are in the present?

6.7 Time travel

Arntzenius and Maudlin (2013); Lewis (1976); Sider (2005); Vihvelin (1996)

6.8 Direction of time

Albert (2000); North (2011)

The laws of physics seem to be time-reversible: if they permit a sequence of events in which a glass is dropped and shattered, they also permit the reverse: small pieces of glass re-forming into a whole glass. Does this mean that time itself lacks a direction? But then why are past and future so different? (E.g., why don't we ever see glass shards re-forming?)

6.9 Connections to persistence, identity, laws

6.9.1 Temporal parts

> It is perfectly possible to think of things and processes as four-dimensional space-time entities. The instantaneous state of such a four-dimensional space-time solid will be a three-dimensional "time slice" of the four-dimensional solid. Then instead of talking of things or processes changing or not changing we can now talk of one time slice of a four-dimensional entities *being* different or not different from some other time slice. (Note the tenseless participle of the verb 'to be' in the last sentence.) (Smart, p. 133)

Associated conception of change: the poker changes from being hot to being cold by having distinct temporal parts, one that is hot (simpliciter) and one that is cold (simpliciter).

Associated (though nonmandatory) view: *Humean supervenience*: the entire truth about the world supervenes on the distribution of "point-qualities" over all of space and time.

6.10 It's verbal

Meyer (2005); Sider (1999, 2011); Deasy (2019, chapter 11)

Maybe all the presentist means by "there are no dinosaurs" is what the eternalist means by "there are no dinosaurs located at the present moment". Maybe all the eternalist means by "there *are* dinosaurs" is what the presentist would mean by "there either are, or were, or will be dinosaurs".

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