

Lecture 2

Paradoxes of Tense and Flow

1. Introduction

Last week we looked at McTaggart's arguments against the reality of time. McTaggart argued that, time cannot exist without change, and change cannot exist without the A-series. But, he went on, the A-series is incoherent, so the A-series cannot exist. Therefore, change does not exist, and therefore time does not exist.

This notion of time's changing plays a role in questions about **flow**. It is often thought that time changes in the sense that it **moves** and that it does so in a particular direction (metaphorically, from past to future). This is also known as the notion of time's **passage**.

2. Williams on the Myth of Passage

McTaggart raised the problem of consistency for the A-series, but since then others have raised distinct challenges for any picture of time on which there is passage or flow.

D. C. Williams presents several such arguments.

The nature of motion

First, he argues that "true motion [...] is motion at once in time and space. Nothing can 'move' in time alone any more than in space alone" (463). So it cannot be that time's 'flow' is defined relative to the temporal dimension alone. And thus time *itself* cannot move.

Perhaps we could define time's flow relative to a distinct temporal series, such that $time_1$ moves at a certain rate in $time_2$. But this would only shift the problem back. If $time_2$ does flow, then you would need a third temporal dimension on which to define its flow. And if $time_2$ doesn't flow, then it seems there can be a temporal dimension without flow; in this case, it is unclear why it couldn't be true that $time_1$ doesn't flow.

Time's Asymmetry

One motivation for supposing that time flows arises from time's (at least apparent) asymmetry. Without flow, it is argued, the temporal dimension would be symmetric (in the same way that the spatial dimension is). But while we can move as we will in any spatial direction, we have no such freedom on the temporal dimension.

However, Williams argues that this asymmetry does not demand the passage of time. "[...] a sufficient difference of sense [...] would appear to be constituted [...] by the inevitably asymmetrical distribution of properties along the temporal line" (465).

What is more, he continues “the irrevocability of past time [...] seems to be no more than the trivial fact that the particular events of 1902, let us say, can not also be the events of 1952” (465). Once again, no sense of flow or passage is required in order to return this result.

The Phenomenology of Time

Williams notes that our *experience* of time is unavoidably one that involves passage. He rather poetically describes how we are “immediately and poignantly involved in the jerk and whoosh of process, the felt flow of one moment into the next” (466). He also accepts that we shouldn’t deny the experiences themselves; but remarks that this does not entail anything in particular about their “correct description”—that is, the correct description of what it is we’re experiencing.

He argues that the desire to accommodate this experience in our theory comes from metatheoretical considerations. In particular, from our chosen **methodology**, which he describes thus:

we must here scrutinize the undoctored fact of perception, on the one hand, and must imagine our way into a conceptual scheme, and envisage the true intrinsic being of its objects, on the other hand, and then pronounce on the numerical identity of the first with the second. (466)

He goes on to argue that, while we often have intuitions against particular theories, this is not because those theories are no true, but because the entities countenanced therein are not identical with our experience. “This kind of diversity is inevitable to every concept and its object, and hence is irrelevant” to the truth of the theory in question. Conceptual schemes are “indifferently flat and third personal” whereas experience is “centripetal and perspectival”.

Thus, it is predictable that our experience would come apart from the ‘third-personal’ description of time. And indeed, the way in which it does so is also predictable on the particular description Williams espouses.

3. Dyke on Paradox of Tense

Dyke considers a number of different ways of clarifying McTaggart’s original arguments against the reality of time; though, she argues that they are better understood as arguments against the reality of *tense*. Tense, she claims, essentially involves two characteristics:

- (1) a distinction between past, present, and future;
- (2) a notion of flow.

Her strategy is to show that “the distinction between past, present and future can only be maintained if the flow of time is omitted from the picture” (p.6 of preprint). She considers five distinct accounts of tensed time, and shows that this is the case on each of them.

Tense as properties acquired and lost

This is not unlike the view of tensed time that McTaggart seemed to describe. On this picture, the extensions of the three properties—past, present, and future—turns out to be the same. But if the extensions are the same, then the properties are not distinct; i.e. then (1) fails. But if (1) fails, then time cannot be tensed, since (1) was essential to tensed time.

One might object that we shouldn’t understand extension timelessly in this way (and it is only on doing so that the distinction between tensed properties collapses). So suppose we understand the extension of the properties to be indexed to particular times. In this way, what is past-at- t is distinct from what is present-at- t and from what is future-at- t . However, notice that these properties will be different again at t^* ; that is to say, the extension of past-at- t^* will not be the same as the extension of past-at- t . So past-at- t and past-at- t^* are distinct. It follows from this that we have n many past-like concepts, where n is the number of moments in time. Such a picture leaves out any notion of flow, since there is no sense of changing properties—simply acquiring new ones. But if we include flow in the picture, so that events are past until they are present, and then present until they are future, then the extensions of ‘past’, ‘present’, and ‘future’ become identical again.

Tense as a moving now

This is a kind of ‘moving spotlight’ view of tense according to which moments in time are ordered from earlier to later, and the spotlight of Now moves along this series of moments. The distinction between past, present, and future is fixed by the location of the spotlight (the now). And the passage of time, or its flow, is determined by the movement of the spotlight.

Similarly to the last case, Dyke argues that past, present, and future can only be distinguished relative to a particular location of the spotlight (i.e. relative to a particular now). But as above, this leaves out the notion of flow. This is even clearer when we consider a particular event. Take Trump’s election to office: today that was 2.25 years earlier than the now, in 2000 it was 16 years after the now, and on Nov 5th 2016 it was present to the now. Not only does that description lack any notion of flow—it only includes static descriptions of relative positions in a series—it also lacks any reference to tensed properties (notice that the description only includes B-properties).

Tense as a temporal succession of worlds

This is a modal account of tense. On this picture, there is a series of worlds in which the exact same events exist, and in each world there is an “absolute and unchanging distinction between past, present and future” (12). The properties ‘past’, ‘present’, and ‘future’ are intrinsic to each event, and no one event possesses more than one of these properties at a world. This preserves the distinct extensions of the three tensed properties.

However, as you might by now be anticipating, Dyke argues that there is no sense of flow on this picture. As described, we have only a snapshot of events at different worlds possessing different temporal properties eternally. What is worse, if passage were to be introduced in terms of becoming *actually present*, or *actually past*, or *actually future*, then the extensions of these properties would collapse into the same set.

Tense as a ‘growing block’

Dyke refers to this as an “accretion of facts” (15). On this view, it is clearly the case that the property of being future is distinct from being past or present, since events with the property of being future *do not exist in the block*. We can even distinguish between the properties of past and present, for what is present is that which is at the “limit of existing reality” (16) and what is past is anything that is not at that limit.

On this view, while it is not possible for the extension of ‘future’ to collapse into that of the other two, it is possible for the extensions of ‘past’ and ‘present’ to collapse into each other. After all, any event that has the property of being present, will eventually have the property of being past. Or, if it this is not the case, then it must be that each event has its tensed property eternally, in which case the notion of flow disappears and the view is static.

Tense as the present moment

This is similar to the growing block view, except that on this view, *only* those events with the property of being present exist. This distinguishes the property of being present from the other two properties. Further, the property of being past only extends over those events that now don’t exist but did at one point exist; and the property of being future only extends over those events that now don’t exist and have never existed.

Once again, either every event possesses every one of these properties. Or else the view is a static view of time.

4. Price on the Arrow of Time

Price's chapter from the Oxford Handbook gives a good survey of the debate on time's flow and direction from the perspective of philosophy of physics.

He identifies **three** features necessary for "the flow of time to be an objective feature of reality" (276):

- (1) The view that the *present moment* is objectively distinguished
- (2) The view that time has an objective *direction*
- (3) The view that there is something objective *dynamic* [...] about time (277)

Concerning the Present Moment

Briefly, Price argues that the challenges faced by the notion that there is an objectively distinguished present moment is that the present must at once be **inclusive** and **exclusive**.

It must be *inclusive* in the sense that it must be such that *every moment can be it*. That is to say, it must be the case that for every moment in the series, it was, is, or will be present.

It must be *exclusive* in the sense that, whatever is present is objectively unique in this regard.

On a view that privileges exclusivity, Price argues, "the materials for a realist view of passage, change, or temporal transition" (279) are lost. But on the other hand, a view that privileges inclusivity, if it can make sense of change in the future (or the past), then it can make sense of change without a privileged moment, and otherwise it cannot make sense of change in the past or in the future.

Concerning the Direction of Time

Contrary to Williams, Price argues (following Maudlin) that not just *any* asymmetry in time will suffice for establishing the *objective* asymmetry of time. It is not enough for spacetime to be temporally orientable in some way or another; we need an asymmetry that will give rise to the *flow* of time. (Compare: the room is asymmetric in its spatial orientation, but does not give rise to a flow of space from one side of the room to the other.) (NB: In the chapter, Boltzmann represents the opposing view; i.e. the view that time does *not* have an objective direction.)

From **Earman**, we get the view that "the existence of an objective direction of time turns on issues of **time-invariance** and **reversibility**" (285, my emphasis). The position that, if time has a direction, that direction is *not reducible* to non-temporal features is called **the Heresy**.

Price describes Earman as engaging with those (like Reichenbach) who take it that, “if all the laws of nature were time reversal invariant, then there would be no right or wrong in the matter [of the direction of time] since there could be no temporal orientation” (Earman on Reichenbach in Price 2011: 287).

Now, the trouble is that, as our current laws of physics stand, they *are* time-reversal invariant. Earman argues that it must follow that there is an irreducible orientation to time. He says that while it makes sense to talk of space having no objective direction (since the laws are ‘space-reversal invariant’ if you like), it doesn’t make sense to say the same of time. After all, “one can suppose at least in principle that an idealized observer can rotate himself in space [...] but how is an observer, even an idealized one, supposed to ‘rotate himself in time’?” (Earman 1974 in Price 2011: 289).

Price accepts Earman’s conditional: namely that *if* time has a direction, and the laws are time-reversal invariant, *then* that direction is not reducible to non-temporal features. However, *Price rejects that time has any objective direction at all.* (He refers to this as a Boltzmannian view.)

Price considers several different candidate non-temporal ‘arrows’ that might ground the asymmetry of time, but ultimately rejects each of them.

Initial Conditions

The proposal here is to explain the asymmetry of time in terms of the asymmetry of entropy. Proponents of this proposal observe that the universe was in a state of very low entropy at a time in the very distant past, and is progressing towards a state of high entropy.

Price objects: “what if the required [low entropy] conditions are not found uniquely at one temporal extremity of the universe, but can occur in multiple locations” (295). If they could, and the direction of time were analysed in such a way that the past were identified with a point with the required low entropy conditions, then it would seem that there would be multiple candidate temporal locations for ‘the past’.

Second, he objects that it’s not clear entropy could do the job we want it too. This is because, the asymmetry of entropy “is usually presented as a temporal asymmetry in the physical arrangement of matter *within* space and time” (296). But if we need to appeal to temporal asymmetries in order to explain the differences in entropy in spacetime, then we cannot in turn use entropy to explain the asymmetry of time.

Third, he objects that to explain the asymmetry of time in this way is to make time's asymmetry cease to be fundamental; instead it is contingent or local to the way the universe happens to be in our 'vicinity'.

Causation

You might think you can ground the asymmetry of time in the asymmetry of causation. However, very briefly, Price notes that this will depend on causation's having an objective asymmetry. If it does not, then anyone arguing for the *objective* asymmetry of time will not meet their intended ends by appealing to causation. (Price, in fact, argues elsewhere that the asymmetries of time and of causation should be understood in terms of the asymmetry of the agential perspective.)

Experience

Finally, there is an asymmetry to the way in which we experience events. The argument here is that, given the way our brains work, our experience of time could not work in any other temporal direction. However, Price dismisses this argument as unconvincing; for why would our psychology be oriented in our 'direction' in time in a world where we suppose time's asymmetry ran the other way?

Concerning Flow or Flux

Finally, on the matter of flow, Price objects that if time flows, it must do so at some rate. But to say that it flows at a second per second is *uninformative*.

Positive Account – Flow is a Secondary Quality

Price argues that it is only from *our perspective* that time appears to flow. Such a position avoids the problem faced by the above attempts to assert the asymmetry of time and its flow as objective features of reality. In other work he has suggested that we can understand this asymmetry in a similar way to the way we understand the concept of 'foreignness'; it's true that, relative to citizens of a certain country, there is a correct answer to the question 'who is foreign?', but it does not follow that foreignness is an objective feature of reality.