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The Passage of Time

Simon Prosser

ABSTRACT: This chapter discusses the notion that time passes, along with two major families of objections to this notion. The first kind of objection concerns the rate at which time passes; it has often been suggested that no coherent rate can be given. The alleged problems for the standard view, that time passes at one second per second, are discussed. A positive suggestion is then made for a way of making sense of the claim that time passes at one second per second, based on the notion of 'stretching' properties such as 'being future' across a time series made up of events. The second family of objections concerns the experience of time passing. Two arguments are discussed, one of which concerns epistemological issues while the other concerns the intentionality of experience. Overall the arguments from experience weigh against the passage of time.

KEYWORDS: Temporal passage; A-theory; B-theory; rate of time's passage; seconds per second; experience; block universe.

Introduction

The notion that time passes is at once familiar and baffling. Everyone knows – or at least thinks they know – what it means to say that time passes. Yet when pressed for a description of the phenomenon it seems hard to avoid obscure metaphors such as 'passage', 'flow' or 'movement through time'. Much has been written about other issues in the philosophy of time, but until the last few decades relatively few philosophers addressed the phenomenon of passage directly. Perhaps, like phenomenal consciousness in the philosophy of mind, it was considered so mysterious as to resist serious study by respectable philosophers; almost as though there were a whiff of the occult about it. But,

as with consciousness, this has changed, and there has been a rapidly increasing interest in the notion of passage in recent years.

In this chapter I shall first distinguish the notion of passage from some other, related notions with which it is sometimes confused; in particular, the notion of an objective present, and the notion that time has a direction. This will help make clearer what it would mean to say that time does *not* pass. Then I shall discuss two families of objections to the claim that time passes: firstly, objections associated with the idea that if time passes, it must pass at some *rate*; and secondly, objections concerning the experience of time passing. With regard to the latter I shall distinguish epistemological arguments, which undermine the claim that experience is compatible only with the view that time passes, from arguments concerning the intentionality of mental states, according to which the passage of time is not a possible object of experience. I shall suggest that the latter arguments constitute the biggest challenge to the passage of time. These are not the only problems for the passage of time; but they are the most prominent arguments that attack passage directly rather than, for example, attacking associated ontological claims, attacking the compatibility of an objective present with relativity theory, or attacking the consistency of properties like *pastness* and *presentness* (on which see below).

Passage, the Present, and the Direction of Time

Much of the contemporary debate over the passage of time has its roots in J. M. E. McTaggart's (1908, 1921) distinction between the A-series and B-series of time, and the distinction that subsequently arose between the A-theory and the B-theory of time (McTaggart did not distinguish these theories himself). According to the A-theory, times or events have intrinsic 'A-properties' such as being *present*, or being *past* or *future* to a given degree, and are ordered by these properties in an A-series. Thus just one time is present, while others are past or future to differing degrees; but *which* time is present constantly changes as time passes, and the A-series positions of all other times shift accordingly. According to McTaggart the A-series is paradoxical, because no time can be past, present and future; the differing A-properties are mutually incompatible. The obvious response seems to be that no time has all of these A-properties *simultaneously*; the year 2100 is future, and as time passes it will become present (but not future or past), then past (but not present or future). There has been much debate over whether this

move really avoids the paradox; it is sometimes suggested that the incompatibility just re-emerges at the level of second-order tenses such as *presently past* or *past future*. I shall not say anything further about the status of McTaggart's paradox, however, since it is covered by other entries in this volume.

McTaggart held that A-properties are essential to time. Consequently, given the alleged inconsistency of the A-series, he drew the radical conclusion that time is unreal. More recently, however, many philosophers have held that the correct the conclusion to draw is not that time is unreal, but that times do not really have A-properties. Instead, they say, time is best characterized by McTaggart's B-series, in which times are ordered by their relations to one another rather than by intrinsic A-properties. Thus for any times t_1 and t_2, t_1 is either earlier than t_2, later than t_2 or simultaneous with t_2 (in the latter case t_1 is the same time as t_2). These relations are eternal; they do not change. According to this view, no time is intrinsically present; indeed no time has a different metaphysical status from any other, and the impression that there is something special about the present, and that time passes, is an illusion. In this respect, at least, time is somewhat like space. This is known as the B-theory of time. One does not have to accept the argument from McTaggart's paradox in order to accept the B-theory; many B-theorists accept it for different reasons, some of which are described below.

The debate between the A-theory and B-theory of time has become one of the major debates in the philosophy of time. But it is important to make some distinctions here. First, although the A-theory is often equated with the view that time passes, insofar as it says merely that times have intrinsic A-properties the A-theory and the view that time passes are at least prima facie distinct. Having intrinsic properties is one thing; passing is another. However, it might be held that genuine A-properties entail passage; there might be a world in which times have intrinsic properties but time does not pass, but in that case the properties in question would not be A-properties. It is, after all, hard to accept a view according to which there is an objective present time, yet time does not pass. At any rate, a full A-theoretic account of time should make clear the relation that holds between A-properties and passage. Since our present concern is with the passage of time I shall assume in what follows that genuine A-properties do entail passage, and I shall use 'A-theory' for any theory according to which time passes.

One should also be careful not to conflate the claim that time passes with the claim that time has a direction. For there to be a direction it is sufficient that there is some kind of asymmetry between earlier and later, as there would be, for example, if the laws of

physics were not time reversible. But there is nothing in the notion of direction that entails passage. If this is not already clear, note that we can similarly make sense of an intrinsic direction to space; we can, for example, imagine a physical process that can take place in an object oriented in one direction, but not when oriented in the opposite direction. This would in no way suggest that space passes.[1]

There are several different ontologies compatible with time passing; but only one kind of ontology plausibly compatible with it not passing. For example, the 'moving spotlight' theory (according to which all times are equally real, and the passage of time consists in the present 'moving' along the time line), the 'growing block' theory (according to which all past and present times are equally real, but the future does not yet exist) and presentism (according to which only the present time is real) are all consistent with passage. But if time does not pass then the natural conclusion should be that the B-theory is true, for according to the B-theory there is no privileged location in time, and hence all times are just like the time that we call the present (and their occupants can just as legitimately refer to their own times as 'present'). The alternative would be to suppose that we occupy a privileged location in time, yet time does not pass. An example of such a view would be a non-passage version of presentism; only the present exists, and nothing changes. Although there is no obvious inconsistency in this view, its solipsistic world-view seems just as implausible as its spatial equivalent (according to which the only place that exists is *here*). Solipsism is hard to disprove, of course, but that does not mean that it should be taken seriously.

How Fast Does Time Pass?

The descriptions of time as *passing* or *flowing*, or of us as *moving* through time toward the future, are clearly metaphorical. Perhaps, then, questions about the *rate* at which time passes take the metaphors too literally; after all, no one thinks that time literally passes (passes what?), or that we literally move through time. Nonetheless a significant number of philosophers, both advocates and opponents of passage, have felt that it makes sense to speak of time passing at a rate.

This has given rise to a set of related objections to the claim that time passes, all centered on the question: "How fast does time pass?" The issue was raised some time ago (Broad 1938; Smart 1949; Markosian 1993), but there has been a flurry of more

recent discussion (Maudlin 2002; Olson 2009; Phillips 2009; Price 2011; Raven 2011; Skow 2011a, forthcoming). One sometimes hears objections of this kind posed by merely asking the question: "if time passes, how fast does it pass?", as though it were immediately clear that there could be no answer. More commonly, however, the objection takes the form of a complaint that the standard answer to the question – that time passes at one second per second – makes no sense.

Many philosophers, on both sides of the debate, seem to agree that necessarily, if time passes, it passes at one second per second. It is not clear where this view comes from, however; it is never argued for. Moreover, one may find it possible to conceive of time passing more quickly, or more slowly, or of there being a change in the rate at which time passes. Perhaps we would be unaware of such differences, since time would be passing more quickly (say) throughout our own bodies as well as throughout our environment. So, since our brain states would remain in the same relation to external events, perhaps nothing about our experiences would change. But it is unclear that such changes are inconceivable; and therefore unclear why the rate of one second per second should be thought to be a necessary truth.

Let us set aside this concern for now and consider the putative problem with a rate of one second per second. All versions of the objection hold that this is not a coherent rate. The most common version says that 'one second per second' means the same as 'one second divided by one second', and one second divided by one second is equal to one. But the number one is not a coherent rate; or so the objection goes.

It is certainly true that in many cases it is possible to 'divide through' and cancel units in the expression of a quantity. Consider, for example, the way in which we calculate the distance that an object moves, at a constant velocity, in a given time. Let D be the distance, V the velocity and T the time taken. Then we calculate distance as velocity multiplied by time: $D = V \times T$. Now, velocity is measured in meters per second (m/s); and time is measured in seconds (s). Let us suppose for simplicity that we have an object moving for one second at a velocity of one meter per second. Then we calculate the distance travelled as follows:

$$D = V \times T = 1\text{m/s} \times 1\text{s} = 1\text{m}$$

Clearly in this case the seconds do cancel through; we do not express distance in ms/s ('meters seconds per second'), but in meters. Does it follow that 'one second per second' is equivalent to the number one?

There is much that can be said about what is involved in the choice of a system of units, and what is or is not implied, metaphysically, by the resulting units for a given quantity (see Skow, forthcoming, for a detailed discussion of this). But, as has been repeatedly pointed out using a variety of examples, the units need not always cancel through. A typical argument runs along the following lines. Consider currency exchange rates (cf. Maudlin 2002, 262). One can exchange dollars for pounds, pounds for euros, and so on. An exchange rate measured in pounds per euro is a perfectly good exchange rate; nothing cancels through. But there might also be circumstances in which one exchanges pounds for pounds. Perhaps, for example, a certain kind of banknote is to be replaced by a new design, and the banks must exchange the old banknotes for new ones. When a customer wishes to exchange the old notes for new ones, the bank does so at a rate of one pound per pound. Perhaps a worry might arise that this is a rate of one new pound per old pound, rather than one pound per pound. But, as Ian Phillips (2009) points out, another kind of example avoids this. Phillips invites us to imagine a scheme in which colored tiling can be exchanged for tiling of a different color. Let us suppose that all that matters is the area of tiling to be exchanged, and that tiling is exchanged at one square meter per square meter. A customer may, however, wish to exchange one single blue tile of ten square meters for one smaller blue tile of five square meters, and receive the difference in the form of five square meters of red tiling. It seems hard to see how such an exchange system would work without a principle that tiling is exchanged at a rate of one square meter per square meter, regardless of color. Bradford Skow (forthcoming) gives another illuminating example: the period of a pendulum is measured in seconds, but if the period is steadily changing then the rate of change is measured in seconds per second. There seems no question of this rate involving different kinds of seconds.

So a rate of one second per second is not inherently problematic. Nevertheless there is a lingering suspicion that something is amiss here. The notion of a rate suggests a ratio of one thing to another, even if both are of the same kind. So if time passes at one second per second, this seems to imply that something stands in a one-to-one ratio to something else, with both being measured in seconds. Otherwise the claim appears to be merely that each second of time stands in a one-to-one relation with *itself*; and it is hard to make sense of this as a rate. Everything stands in a one-to-one relation to itself; there

is one Eiffel Tower per Eiffel Tower, yet this does not help us to make sense of a claim that the Eiffel Tower has some kind of rate. But if, on the other hand, the rate of one second per second is to be interpreted as a ratio of distinct quantities then the advocate of passage owes us an explanation of what these distinct quantities are. Few would wish to claim that there are two time dimensions, and that the rate of time's passage is a ratio of seconds along one dimension to seconds along another. Even if there were two time dimensions it is hard to see a connection between their standing in some ratio to one another and time passing. For consider an analogy with space; meters in one spatial dimension might well stand in a one-to-one ratio with meters in another spatial dimension, but we would nonetheless be baffled by a claim that space thereby passes at one meter per meter.

I would like to make a suggestion on this point, however. Consider what could be meant by saying that time could pass twice as fast as it actually does. If time passed twice as fast then an event that actually occurs at some specific time in the future would, in some sense that we must make clear, become present twice as soon as it actually does. Thus an event that was two years in the future, with time passing twice as fast, would occur just as soon as an event that is one year in the future, with time passing at its actual rate. This suggests an essential link between the rate of time's passage and the degree of futurity of a future event.

Let us define a series called the *E-series* (where 'E' stands for 'event') that is defined by the series of physical events (perhaps the E-series is equivalent to the B-series; I distinguish them only to emphasize that distances along the E-series are defined in physical terms, as explained below). Let us also define the *A-property series* as a series of A-properties, running from 'distant past' to 'distant future', where these properties are not essentially connected with any particular events. Then 'half as far into the future' could be interpreted as meaning 'half as far along the E-series from where we are located'. But it could also mean 'half as far along the A-property series from the present'. It is easy to see how these notions could come apart. To give a spatial analogy, imagine the E-series as being like a ruler, on which we are located at the '15cm' mark, with earlier and later events represented by the points on the ruler with values less than, and greater than, 15cm, respectively. Now take a straight piece of rubber of the same length as the ruler, and write 'distant past', 'past', 'present', 'future', and 'distant future' at regular intervals along its length. Hold it against the ruler so that 'present' is aligned with the '15cm' mark, 'future' and 'distant future' are aligned with the '20cm' and '25cm' marks respectively,

and 'past' and 'distant past' are aligned with the '10cm' and '5cm' marks respectively. We can think of the length of rubber as a representation of the A-property series, aligned with the E-series in the way that it is actually aligned. Now stretch the rubber along its entire length so that 'present' remains aligned with '15cm', but 'future' becomes aligned with '25cm', 'past' with '5cm', and so on. This, I suggest, is a representation of what it would be for time to pass twice as fast. The A-property series is stretched relative to the E-series so that an event at the '25cm' mark on the E-series, that was thus in the distant future when time passed at normal speed, is now only in the future. This seems the best way to capture the intuitive notion that if time passed twice as quickly future events would no longer be as temporally distant from us as they actually are. They would occur sooner; they would thus be future to a lesser degree than they actually are.

What I suggest on the A-theorist's behalf, then, is that the rate of one second per second should be understood as a ratio between durations along the E-series and durations along the A-property series – a ratio that could have been different. We choose 'seconds' for both, but this is misleading, for there are two different notions of duration in play. Seconds along the E-series can be thought of in terms of physical processes – the second is currently defined in terms of the period of a natural oscillator derived from the caesium 133 atom, for example. But because time passes at a constant rate in the actual world, distances along the A-property series map onto distances along the E-series in a constant way. So when we say that an event is *n* seconds in the future, this is an equally good way of expressing both its degree of (A-property) futurity and the quantity of physical processes that will unfold between now and the time at which the event occurs (and hence its distance from us along the E-series).

Strictly speaking, then, we should distinguish two kinds of seconds, which I shall refer to as E-seconds and A-seconds. Science deals in E-seconds; but in the actual world A-seconds stand in a one-to-one ratio to E-seconds, much like the meter to the length of the meter rod. In any possible world in which the meter rod is used to determine the meter, the meter rod is one meter long (as measured in that world); but it still makes sense to say that the meter rod could have had a different length. Similarly, in any possible world A-seconds (as measured in that world) stand in a one-to-one ratio to E-seconds; but it still makes sense to say that they could have stood in a different ratio, had time passed at a different rate. The rate of one second per second should thus strictly be understood as one E-second per A-second, which is unproblematic as a rate. It is guaranteed that time actually passes at one second per second, given that way the two

kinds of seconds are measured, just as it is guaranteed that the meter rod is one meter long; yet time could have passed at a different rate.

This, at any rate, is the best sense I can make of the notion of time passing at a rate. But, as I shall explain in the next section, this is not to say that we can really make sense of the claim that time passes at all.

Arguments from Experience

Many A-theorists will be unconcerned by the kinds of worries discussed in the last section. For, they will say, technical quibbles over the units for the rate of time's passage appear trivial in the face of the main reason for believing that time passes: namely, that we *experience* time passing. One prominent A-theorist goes so far as to describe experience as 'a defeater-defeater that overwhelms any B-theoretic arguments against the reality of tense' (Craig 2000, 138).

There certainly is a sense in which we naturally take ourselves to be aware of time passing, though its precise nature is somewhat elusive. Nevertheless I shall argue that the nature of experience in fact provides no reason whatsoever for believing that time passes, and that in fact, contrary to the usual presumption, the nature of experience ultimately favors the B-theory. There are two kinds of arguments to consider: an epistemological argument (according to which experience favors neither the A-theory nor the B-theory) and an argument from intentionality (according to which it is impossible to have an experience of time passing). The latter argument undermines the very intelligibility of the A-theory.

The Epistemological Argument

The epistemological argument says that experience would be the same whether the A-theory or B-theory were true, and that experience thus provides no reason to favor one theory over the other. Admittedly, as Skow (forthcoming) observes, it might in principle still be argued that one theory provides a *better* explanation of experience, and that for this reason there is more reason to believe that theory than the other. In the next section, however, I shall show that there is a compelling reason to think that the A-theory cannot

give *any* explanation of how passage could be experienced. In this section I shall focus on the claim that experience is compatible with both the A-theory and the B-theory.

The epistemological argument can be traced back to Donald Williams's (1951, 468-9) argument that it is possible to imagine a being whose instantaneous states are exactly the same as those of some normal human being, but occur in the reverse order.[2] Williams suggests that from that being's point of view time would seem to go 'forwards'; yet 'forwards' from their point of view would be 'backwards' from ours. If correct, this would suggest that the nature of experience provides no evidence of an objective direction of time; and if there is no evidence for a direction it seems plausible to think there is no evidence for passage (at least insofar as experiencing time passing entails correctly experiencing its direction). More recently Huw Price (1996, 14-15) has put forward a related epistemological objection.[3] Price argues that nothing would seem different to us if the A-theory were false, and time did not pass. Supposing for the moment that time passes, we would nonetheless be able to imagine a four-dimensional 'block' universe in which everything was exactly the same except that time does not pass. Price argues that events, including mental events, could be mapped one-to-one from the passage world to the block world; in which case our experiences would be exactly the same as they actually are, even if time did not pass. Consequently the nature of experience is compatible with both the A-theory and the B-theory.

Tim Maudlin (2002) objects that Price's argument begs the question by assuming that the 'block' world would contain equivalent experiences, or indeed any experiences at all; for the physical processes of the 'static' block world would be quite unlike those of the 'dynamic' passage world. Assuming that mental states are, or supervene on, physical states there is therefore no justification for assuming that the mental states would be the same in both possible worlds. Given that Price claims only that experience does not favor the A-theory over the B-theory, however, Maudlin's objection fails. For although the A-theorist may hold that only a world in which time passes contains experiences, the B-theorist will disagree and hold that a block world contains experiences (and indeed the B-theorist may well hold that block worlds are the only kinds of possible worlds). Consequently each theory, on its own terms, expects the world that it describes to contain experiences; and the presence of experience therefore cannot settle the question of which theory is correct without begging the question by presupposing the truth of the theory for which experience is supposed to provide evidence. Not, at least, without

further arguments concerning the significance of passage for the physical-mental relation.[4]

Perhaps the A-theorist can still say the following. Let us accept that arguments such as those of Williams and Price do show that our experiences would be exactly the same even on the assumption that the B-theory was true. It does not follow that we cannot experience time passing, and neither does it follow that experience cannot provide a reason for believing that time passes. For illusions and hallucinations also provide examples of non-veridical experiences that are indistinguishable from veridical experiences. Yet some disjunctive theories of perception allow that when one veridically perceives that *p* one can thereby have reasons and evidence for believing that *p*, even though one's experience may be indistinguishable from a case in which one merely hallucinates that *p*. By analogy, it might be claimed, if time passes then one can experience it passing, and one's experience can thereby give one a reason to believe that time passes, even if one's experience would be indistinguishable given the assumption that time does not pass. By thus adopting a degree of epistemological externalism one can rescue the claim that experience can give one a reason to believe that time passes. Perhaps one is not always in a position to know what reasons one has; but it does not follow that one cannot have those reasons, if reasons are construed as the epistemological externalist construes them.

Whether one finds this move acceptable will depend on one's view regarding the epistemological externalism that it requires. But regardless of whether the move is acceptable, it does not help settle the debate over the passage of time. For at best it puts one in a position analogous to that of a person who entertains genuine doubts about whether she or he is a brain in a vat. It would not help resolve this dilemma to be told that *if* one is not a brain in a vat then one has experiences that give one reason to believe that one is not a brain in a vat (perhaps because if one is not a brain in a vat then one can experience states of affairs inconsistent with one's being a brain in a vat). In the same way, it is of no help in resolving doubts over whether time passes to be told that *if* time passes then experience can give one a reason to believe that time passes.

Experience, then, fails to favor the A-theory over the B-theory. But in any case, the situation for the A-theorist who thinks that we experience time passing is far worse than has generally been appreciated. For, as I shall explain in the next section, even if time did pass, no experience could possibly be an experience of time passing.

The Argument from Intentionality

According to the argument from intentionality, no experience can be an experience of time passing because no experience can be *of*, or *about*, time passing. Before proceeding further I should first make some clarificatory remarks about the kind of experience that is in question.

Sometimes people say that they are aware of how much time has passed since some earlier event ("a lot of time has passed since my twelfth birthday!"). This, I think, is *not* what the A-theorist has in mind when saying that we are aware of time passing. For the B-theorist can give a straightforward paraphrase, along the lines of 'my twelfth birthday is much earlier than the present' (and, of course, the B-theorist will then analyze 'present' analogously with 'here', so as to avoid commitment to an objectively present time). Through memory one can be aware that there is a certain interval of time between the present (the time at which one's awareness occurs) and an earlier event, without thereby being aware of time *passing* in the sense relevant to the A-theory.

Still, there remain several candidates for the awareness of time passing. Some people, for example, speak of having a sense of temporal 'motion'; one feels oneself somehow 'moving' through time. Others speak of being aware of time passing by virtue of being able to perceive the *dynamic* quality of change – when one observes motion or any other kind of change, the change has a certain dynamic quality that seems incompatible with the 'static' view of the world given to us by the B-theory. The precise nature of these experiences is elusive, so be sure; the more one tries to introspect and describe them, the harder it becomes to pinpoint exactly what they consist in. It is unclear, for example, whether any relevant element of passage experience belongs to a specific sensory modality, or whether instead there is some kind of internal 'sense' of time passing, which perhaps somehow derives from more specific sensory experience.

Fortunately, however, the argument from intentionality (like the epistemological argument) applies in just the same way regardless of the precise nature of the experience; it applies if we have any non a priori way of coming to know that time is passing. Experiences, of any kind, are *intentional* states – they are directed at, or *about* something. So if someone experiences time passing, then their experience consists in some kind of mental state that is directed at, or about, the passage of time. Nothing could count as an experience of time passing unless it had this feature of directedness toward the passage

of time. But, according to the intentional argument, no experiential state could possibly have this feature.

The argument takes the form of a challenge to the A-theorist to explain how any experiential state can be about the passage of time, backed up with some reasons for thinking that the challenge cannot be met. To see the force of this challenge, consider what is entailed by the intentionality of experience. If some token experience – a specific element of the experience of a specific subject at a specific time – is an experience of some feature of the world, then the experience stands in an *aboutness* relation to that feature of the world, and to no other. No token experience that is not an experience of the same feature can stand in the same aboutness relation to that feature. Consequently there is a one-to-one mapping from token experiences to features of the world by virtue of the former being about the latter. Suppose, for example, that you are looking at a scene in which there are objects of various colors and shapes. There will be a 'triangle' element of the experience that matches up with a perceived triangle; a 'red' element that matches up with the redness of the triangular object; and so on for every perceived feature of the scene.

Now, it is not plausible that the aboutness relation is primitive. While there remains much debate, most theories of intentionality say that for one element of the world (such as a brain state) to be about another (such a perceived feature) is for the former to stand in a relation to the latter than can be understood ultimately in terms of causation. It is not hard to see why. Consider, for example, the visual experience that you have while looking fixedly at this page. For each perceived word on the page there is a corresponding element of the experience. Presumably there is some token neurological state upon which each element of the experience supervenes (we need not assume that there is a distinct neurological state for each perceived word; only that for any given word to have been perceived differently, there is some unique difference in the neurological state that would underlie the experience). Hence there is a one-to-one correspondence between the perceived word tokens on the page and certain token neurological states.

There does not seem to be any deep mystery about this one-to-one correspondence. When one looks at the page, an image is focused on one's retinas. For every perceived word token, a specific part of the retina, and thus a specific collection of retinal cells, is stimulated in a specific way. And while the details of the processes that follow are not all known, it seems clear enough that the specific pattern of retinal stimulation leads to a

specific neurological state, upon which a specific token element of experience supervenes. This unique chain of causation between the perceived object and the experience seems essential to the experience being about the object. Few theories of intentionality accept that such a direct causal relation straightforwardly constitutes the intentionality of the experience, but in all cases causal relations of this kind play a vital role. Even a teleological theory can say, for example, that the experience is about the object because of the role played in the history of the species by causal relations (perceptual or behavioral) between objects of that kind and internal states of the organism of that kind.[5]

When we consider the passage of time, however, a problem emerges. If there is an experience of time passing then something must make it the case that it is an experience of time passing, and not of something else; and something must make it the case that no other element of experience is an experience of time passing. But what can the A-theorist say to explain this? In all other cases we have at least a crude idea of what makes it the case that the experience is about its object, for each experience stands in some kind of unique causal relation to its object. This does not seem to be true of the passage of time. For example, there does not seem to be a unique chain of causation from the passing of time to some one specific neurological state (and not to others). Even if one could make sense of the claim that temporal passage can exert a causal influence on the brain (a claim that already seems dubious), it seems very hard to see how this causal influence could affect one neurological state, but not others. More generally, it is hard to think of any relation holding uniquely between the passing of time and one particular neurological feature that could plausibly constitute the aboutness relation.

Given more space, one could catalogue all existing theories of intentionality and show exactly why, in each case, the passage of time cannot be the object of experience. But for present purposes I shall settle for issuing a challenge: any A-theorist who thinks that we experience time passing must give at least some plausible indication of what could make it the case that the experience in question is an experience of passage, rather than of something else; and of why other experiences do not also thereby count as experiences of passage. Anyone who tries to answer this challenge will find that it is not at all trivial; and I am deeply sceptical of the prospects for solving it.[6]

Although I have described this argument in terms of intentionality, there are other ways to see the same point. In particular, one may observe that perception, and experience more generally, is a causal notion – one cannot perceive anything from which

one is causally isolated. And not just any causal relation will do; in order to perceive some feature of the world, the feature must stand in the right kind of causal relation to one's experience, one in which it stands to only that one element of experience. What the A-theorist cannot do, I suggest, is account for a mechanism whereby the passage of time could stand in any relevant causal relation to a specific element of experience (and not to other elements of experience).

Thinking about the passage of time

Arguably all mental states exhibit intentionality. Does it follow from the argument of the previous section, then, that we cannot even *think* about the passage of time? The suggestion is likely to be met with bafflement; what, after all, are we thinking about when we think about whether or not time passes? Have you, the reader, not been thinking about the passage of time while reading this chapter? But we must distinguish between different notions of thinking about something. One can, of course, think about anything at all, including impossibilia, if one avails oneself of the apparatus of definite descriptions. Thus you are now thinking about the round square. So of course, in one sense, one can think about the passage of time: one can think about it as 'the phenomenon discussed by A-theorists', or as 'the temporal phenomenon of which I have, or at least seem to have, experiences'. As the example of the round square shows, one can think, in this sense, about phenomena that do not, and indeed cannot, exist. But there is a more demanding sense of 'thinking about *x*' that does not involve descriptive content, though it does nonetheless require there to be something that makes it the case that one's thought concerns its object. The details are controversial, but it does at least seem plausible that one's ability to think in this unmediated way about, say, the color red depends on one's having the ability to perceive red things. When one thinks of redness in this way one calls to mind a 'mental image' of redness, and this mental image is closely associated with experiences of redness (it may, for example, be a kind of off-line simulation of an experience of redness). The thought arguably thus derives its content from the experience. Thoughts of this latter kind often seem essential if one is to properly understand what it is that one is thinking about.

Now, suppose an A-theorist were to accept that we do not experience time passing yet still try to claim that time passes. This seems problematic. For if there can be no

genuine experience of time passing then no thought about temporal passage can gain its content in the way just described. One might have a kind of mental image of time passing, but if the content of this mental image derives from associated experiences (perhaps by virtue of being an off-line simulation of such an experience) then given that no experience can be an experience of time passing, no such thought can really be a thought about time passing. The experience is an illusion, and the associated thoughts inherit whatever illusory content the experience might have. The implication of this is that if the above argument is sound, then unless there is some independent way to grasp what it means for time to pass, we really do not properly understand what we mean to say when we say that time passes. For no definite description alone can tell us what it means for time to pass; it does not help to be told that the passage of time is the phenomenon discussed by A-theorists, or that it is the phenomenon that we mistakenly take ourselves to be experiencing, for we do not know which phenomenon this is. We are in the position of someone who thinks that headaches are perceptions of properties (call them 'H-properties') instantiated by clouds; such a person does not genuinely understand which properties H-properties are, and the claim that there are unperceived mind-independent instantiations of H-properties is simply unintelligible. By the same token, then, if the argument from intentionality is sound then the claim that time passes is not merely false, but unintelligible.

Why Does Time Seem to Pass?

For all that I said in the previous section, if the B-theory cannot explain temporal experience then the A-theorist might argue that it is in no better position than the A-theory. But there is no obvious reason to think that this explanation cannot be given; and one might feel that if the above arguments are sound then there must be some such explanation to be had. Finding this explanation, however, is a significant project for the philosophy of mind. At the very least the following questions must be answered: Why is there an illusion of passage? What is the nature of the illusion (for example, does the experience in question just falsely represent that time passes, contrary to what I have suggested above, or does it represent something else, or nothing at all?). Why do we experience time as passing at that particular rate, rather than at some other rate? Why do we experience time as having the direction that it seems to have? Finally, how does the

putative experience of passage relate to the experience of change? These questions will be difficult to answer, but one may hope that attempts to answer them will reveal much about the way we experience the world.

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Biography

Simon Prosser is Lecturer in Philosophy at the University of St Andrews, Scotland.

[1] For an illuminating discussion of the question of whether time has an objective direction see Price 2011. Price points out, in addition, that temporal anisotropy should not be conflated with a direction of time.

[2] A precursor to the epistemological argument was given by Eddington (1928: 91; for discussion see Price 2011).

[3] See also Prosser 2000 for a similar argument.

[4] Price 2011 gives a reply to Maudlin along these lines; I also give a similar reply in Prosser forthcoming. See also Callender forthcoming for a slightly different reply to Maudlin, nonetheless concluding that experience cannot settle the metaphysical debate.

[5] Those familiar with the literature on naturalized theories of intentionality will be aware of the oversimplifications involved in this paragraph. But adding the detail necessary for a properly worked out theory of intentionality changes nothing in the essential point that the one-to-one mapping between token experiences and token perceived features ultimately depends on the presence (historical or otherwise) of unique causal relations between perceived features and experiential states.

[6] I describe much the same argument in more detail in Prosser forthcoming (I do not describe it as 'the intentional argument' there).