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A Philosophical Introduction to the Experience of Time

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Abstract

In this introduction to contemporary conceptions of time and change, I investigate what our experience of time, that is, our experience of change, seems to be and ask whether or not we can say that how it seems could match the reality. My conclusion is that more recent contemporary conceptions of time can do this but that more intuitive or traditional conceptions cannot. Thus, I conclude that the more contemporary conceptions are preferable for research into time-consciousness.

Key Words: Experience of time, metaphysics of time, time-consciousness, retention theory, A-theory, B-theory, temporal illusions

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Introduction

This paper surveys contemporary philosophical debates in the experience of time. Furthermore, although I provide a philosophical introduction, it is aimed at researchers interested in the mechanisms and structures of consciousness. The primary target is the existential commitments different conceptions of time have for our experience of time and where these conceptions and experience clash.

There are discussions of this scattered throughout existing literature but only as part of other philosophical concerns (e.g. Dainton and Le Poidevin 2007). However, the topic is of interest in itself.

Different conceptions of time make significant claims about what philosophers call *ontology* – what there is or, we might also say, what exists. Any model that explains some feature of the world must make ontological assumptions to do so e.g. if my explanation for a whistling kettle is that the water in it has evaporated into steam then I assume that water and steam exist.

This is as true of experience as of anything else. In order to explain our experience of something you must make assumptions about what exists. Since the manner in which one thinks of time imports certain presuppositions about what exists, then it also imports presuppositions about what can be experienced and about how that experience comes about.

My discussion will proceed as follows:

First, I discuss what might be meant by experiences (and contrast it with imagination, anticipations or illusions).

Second, I outline the different conceptions of time, giving a brief explanation of why these alternative conceptions exist.

Third, I discuss what might be meant by experiences of time. These tend to fall into two general types: perceptions of immediate change (and persistence) and experiences of the flow of time.

By examining these views, I also examine contemporary philosophical theories of

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experienced time; the most notable being *retention theory* (originating with the phenomenologist Edmund Husserl).

Fourth, I examine some problems with these theories from what are sometimes called *temporal illusions*. I sketch some possible solutions to these. I then close with a comment on the validity of any evidence that shows we do not experience change.

My main conclusion is that one's account of experienced time depends on how we conceive time; and that, given research into consciousness, one might prefer the more contemporary conceptions.

A Note on Quantum Theory

I have entirely neglected quantum theory in this discussion. There is a very good reason for this. One of the (if not the most) difficult problems in current physicists is the unification of quantum theory and general relativity. Central to the problem is reconciling the dynamic concept in general relativity with the static concept in quantum theory. Currently, there is no agreed solution to how this ought to be resolved.[2] As relativity is a significant factor in more contemporary conceptions of time, I will leave the relevance of quantum theory until there is such a resolution.

1. Kinds of Experience

Before proceeding, it is necessary to present some important assumptions about what I understand as *experience*. While these assumptions may seem trivial or even naïve, it is important to make them explicit to avoid confusion later on.

I assume that experience is an awareness or consciousness of something and I assume that any *non*-conscious occurrence is not an experience. There are two (relatively, perhaps) unproblematic kinds of experience: perception and episodic memory (Le Poidevin 2007); perception is the main kind of experience I consider here.

There are others kinds of conscious awareness that one might want to call 'experience'; these are imagination (or hallucination and/or illusion) and anticipation. However, I advise caution on this since there is a very important distinction between these, on the one hand, and perception and episodic memory, on the other.

When we *experience* something, e.g. perceive something, that something is real. If it is not real, we might very well *seem* to experience it, but we do not actually experience it. Instead, we imagine it; or, we might say, we hallucinate it or are under an illusion. Importantly, should we experience anything in this case it is something else which *does* exist.

To illustrate, consider the following story: I claim that, one night on the banks of Loch Ness, I experienced the Loch Ness monster thrashing in the water before me. If it is true that I experience what I seem to, then the Loch Ness monster exists. However, if there is no Loch Ness monster, then I only imagine the monster. In such cases, I may still experience *something* - a freak waterspout, an oversized otter, fatigue-induced neural firing - but, whatever it is, it is *not* the (non-existing) Nessie.

Similarly, if I *anticipate* something, it also does not exist; what I might experience in such anticipation is not what I anticipate. Harbouring an impatient desire to *see* Nessie, I anticipate seeing her upon reaching the lakeside. This anticipation may be so great as to induce a vivid picture of her as I stalk nervously through the reeds. Still, even if there is *experience* of something in this, it is not what I *anticipate* (to my disappointment).

We have spoken so far about what we experience. However, much of what we commonly *report* as experiencing is not what we actually experience. I see the silhouetted side of a tree by the lake. I say 'I see a tree' not 'I see this side of a tree'. In effect, I am not experiencing the tree in its entirety; I *infer* the entire tree from what I experience.

Here, I will call what we *correctly* infer from what we experience *indirect* experience. There are, however, two important points about inference in general:

(i) *What I infer may be wrong.* On seeing the silhouette of a tree thrashing in the wind, I think, 'I'm seeing the Loch Ness Monster!' In this case, I am mistaken; I am not experiencing the creature but imagining it.

[2] Indeed, some recent theorists seem to deny time exists at all (e.g. Barbour).

(ii) *I may* seem *to experience what I only infer.* I may believe that I experience what I only *infer* from experience. To do so, I must experience something (from which I make this inference), but it is not what I infer it to be.[3]

(iii) *I may be compelled to infer what I report.* In many cases, I may be consciously aware of my thought processes that lead me to infer something from what I experience. For example, I am consciously aware that, in seeing what looks like this side of a tree, I am inferring the tree. I may be wrong, of course, and if convinced otherwise (e.g. that the ´tree's side' is just a painting), I might be able to alter my inference.

However, psychological research into perception strongly suggests that we sometimes automatically infer from what we experience to what cannot exist. Many theorists argue that this is the conclusion of an inferential process in the unconscious part of perception (see Gregory). In the precise terminology here, there is something in these cases which I only imagine; it need not exist for me to *seem* to experience it.

The variety of such illusions is vast; to briefly mention examples, there is the illusion of *depth* (e.g. *stereopsis;* Gordon) or difference in length (e.g. *the Muller-Lyer illusion*; Gregory, Rookes and Wilson). In all such cases, people seem to experience what they could not be experiencing - and continue to do so even when they know this.

If we are experiencing what we do in illusion even when there *is* depth and colour etc, then it seems as if the actual existence of depth, colour, motion etc. is unnecessary for what we experience. What we actually experience, then, is something else. It is just that, in non-illusory cases, we correctly infer from what we experience to what is in the world. Illusions are just where the process breaks down.

Let us, however, turn back to the central question: Do we experience time? To answer that, we must briefly describe what we might mean by 'time'.

[3] This may happen because I have the wrong theory of experience. For example, I may be a *naïve realist* (e.g. Dancy), believing that I directly perceive objects in the world. Yet, the causal theory of perception may be true (e.g. Grice), objects in the world may only *cause* what I experience, not *be* what I experience. For example, I believe that I perceive a red fire engine ten metres from me. However, I do not experience it; I only experience an *effect* of light bouncing off the fire engine's surface, striking my retina and causing the relevant neural processes. (For more discussion on this, see Gregory and Le Poidevin 2007).

2. Conceptions of Time

Do we experience time? If so, what of it do we experience? We certainly sometimes talk as if we do:

A. We talk of experiencing a period of time or *duration*, e.g. we experience the hour of a lecture or two weeks of a holiday. We even talk as if there are standard ways such durations feel but that they *can vary*: the lecture drags or the holiday flies by faster than a normal two weeks.

B. We talk of experiencing *temporal order*, of one thing following another, e.g., we see someone come up to our house and *then* hear a knock at the front door.

C. We also talk of experiencing a particular time or event in different ways, e.g., we perceive our tenth birthday as *present* and then remember it as *past*.

At least, that's what we might say we experience. But, do we really experience *time* in these cases?

Absolute Time

By 'time' we might mean *absolute* or *independent* time – that which, according to Newton, 'of itself, and from its own nature, flows equably without relation to anything external' (Newton, 6). By independent is meant: this time flows even if everything else stops or nothing else exists.

Many philosophers have argued that we could not experience independent time. [4] In order to do so, we would have to experience time *without experiencing change* (Shoemaker, 67). Yet do seem to experience time even when there is no obviously changing thing, e.g., there is still a sense of time passing as we sit in a room on our own?

Many philosophers and psychologists have suggested that, even in this case, a change is involved. They suggest we measure a change in what we might call a biological *pacemaker*. Any sense we have of 'time' is actually of a change in *ourselves* (see James (626), Ornstein and Le Poidevin 2004b).

[4] Though we may *infer* from what we *do* experience that there is such independent time (see Shoemaker **and** Le Poidevin 2004).

I will not dispute the claim that we never experience time by itself. This does not, however, mean that we do not experience time at all. We must experience at least some properties of time if we experience *change*.[5] So, do we experience change?

Let us define what is meant by change. Doing so also leads us into another debate about time.

A-change and B-change

We can see change's dependency on time by giving a definition of change. What we accept as change depends on what we accept as time.

Let us begin by suggesting a simple definition of change. It is just this: *Something changes from being X to being Y by being X at one moment and Y at a later moment.*

Consider a ripening apple on a branch as it changes *from* green *to* red. If the apple really does change like this then, at one time, the apple is green and, at a later time, it is red.

This differentiates change in something from a *non-temporal* difference in it. For example, the apple can vary in the colour of its skin without changing at all: one part of its skin is green while another is red. Neither this nor those we can experience this non-temporal variation is surprising.

This might seem to be a sufficient definition of change. However, some philosophers claim that this is not *real* change at all. Real change, they claim, involves the passage of time.

The Passage of Time

The passage of time is the constant change of events from being future, to being present, to being past. It is the seemingly ceaseless change in the tense of events. For example, your tenth birthday is constantly changing by becoming more and more past; the future death of the sun is constantly changing by coming nearer to being present.

McTaggart presents a distinction which distinguishes this latter change from the earlier one. This distinction is in the *A-series* and the *B-series*:

> Positions in time [...] are distinguished in two ways. Each position is Earlier than some, and Later than some, of the other positions. And each position is either Past, Present, or Future. […] I shall speak of the series of positions running from the far past through the near past to the present, and then from the present to the near future and the far future, as the A series. The series of positions which runs from earlier to later I shall call the B series. The contents of a position in time are called events. (McTaggart, 24)[6]

McTaggart argues that the A-series is essential to time but the B-series is not. Those who agree with his claim that a change in the temporal location of *events* is necessary for time are called *A-theorists* (e.g. McTaggart, Prior, Loizou, Lowe and Zimmerman). In contrast, those who hold that we only need the B-series order in events are called *B-theorists* (e.g. Le Poidevin, Mellor, Sider).

According to A-theorists, the B-series is insufficient for *real* change. Speaking of the heating and cooling of a poker on different days, McTaggart writes that 'this makes no change in the qualities of the poker. It is always a quality of that poker that it is hot on that particular Monday… [and always a quality that it] is not hot at any other time' (*Ibid*, 27-28).

Let us call A-series change *A-change* and B-series change *B-change*.[7] Then, B-change is merely variation in an objects' properties over time: apples turning from green to red, pokers heating and so on. A-change is the change in an event's *tense*: my birthday becoming more past.[8]

[5] Time as a condition of change has been accepted by philosophers as far back as Kant. Kant considers time as a *form of intuition* - a necessary condition of all sensible experience; however, he does not accept it as something that exists independent of the human mind. It is only how the world appears (the phenomena) rather than how it really is (the noumena). (Kant, Strawson)

One may be tempted to argue that, for the experience of time, when it comes to building models to explain it, we may only need to explain the *appearance* of temporal features rather than their existence.

It must be stressed, however, that if we do this, then we cannot explain our experience in terms of processes or causal systems. Processes and causation presuppose change and temporal order. If temporal order is only *apparent*, processes and causal chains are only apparent; they do not really occur.

For this reason, I do not explore this possibility (though others may find it fruitful to do so).

[6] Similarly, Loizou states that an event 'just is the bearer, one at a time, of a succession of tense-profiles.'(146)

[7] This distinction is similar to the distinction between first-order change and second-order change (Le Poidevin 2003, 16-17). In order to reinforce which change matches which I theory, I prefer the terminology here.

[8] There has been some significant discussion in the A/B-theory debate about how best to represent tensed change. Some A-theorists argue that tensed change is not change in an event's

Unfortunately, McTaggart also argued that A-change was impossible. In his infamous McTaggart's paradox, he argued A-change either led to contradiction or an infinite regress (McTaggart). Despite its simplicity, I will not outline his argument here (but see Prior, Mellor, Lowe and Le Poidevin 2003). What is significant here are the positions other A-theorists assume in order to overcome it.

There is two typical approaches: either insist that A-change is a 'defeater-defeater' of its opponents, i.e., so fundamental to our understanding that any denial of it should be rejected (e.g. Prior, Lowe) e.g. Lowe argues that McTaggart's paradox, even if it *seems* to work, must be flawed in some way because we are *certain* that there is A-change.[9] (As for B-theorists, who think we do not need genuine A-change: they must only be badly confused, e.g., Loizou, Capek).

Presentism

Another approach to the paradox has been to insist on what contemporary philosophers call *presentism*. We can illustrate this position through a puzzle from St Augustine.

Augustine asked: how could time exist? How could anything with duration exist? Perhaps surprisingly, he concluded that it could not.

Briefly, his argument is this: On the one hand, the past and future can be said to have duration; however, they do not exist. On the other hand, the present has *no* duration; for if it did, no matter how short it might be, for *any* moment in it that is present, all the other moments of it would either be past or future; thus, they would not exist. Therefore, nothing has duration: whatever is present is too brief and the past and future are unreal.

Although we *seem* to measure duration, then, we must actually measure something else – for Augustine, something 'in the mind' (Augustine (265-267), Le Poidevin 2004b). In the terms of this paper, we only *imagine* a period of time; we never experience it.

If you find this argument convincing, it is most likely because of the following intuitive assumption: only what is *strictly* present exists – 'strictly' meaning no part of it is earlier or later than any other part. Whatever is at *other* times either no longer or has yet to exist.

This intuitive position is *presentism* (e.g. Prior, 290; Bigelow, 35; Hinchliff, 126). However, it is not the only position. There is also *eternalism*: no matter what might be called the present, what is at *any* time is equally as real as what is at any other (e.g. Mellor, Le Poidevin, and Sider).

The ontological significance of these positions is that which of them you hold determines what you consider to exist. If you are a presentist, only what exists *now* has any real existence. Thus, no matter how we talk or think, what occupies or occurs at two different times cannot *both* belong to or be part of anything real.

If you are an eternalist, however, all times are equally real. Which moment is present is irrelevant to this. What exists at different times, then, might belong to or be part of an existing thing.[10]

The Special Theory of Relativity

While A-change and presentism might be *prima facie* motivated by our experience of time, the special theory of relativity casts doubt on their validity.

The special theory of relativity denies an absolute present, past or future shared by spatially separated things; instead, it is only relative to velocities of objects.[11] As Einstein puts it, '[…] 'now' loses for the spatially extended world its objective meaning.' (Cited in Yourgrau, 122). Yet, on any version of A-theory, including

tensed properties. No such properties exist. Instead, the change involves *tensed verbs*. 'The poker is hot in the past' suggests a property of 'being past'. We should say 'the poker *was* hot' which suggests no such thing (Prior, Zimmerman).

I am unconvinced by the usefulness of such claims because I do not know how tensed A-change is supposed to be change if it is not at least a change in how *something is* – that is, at least in something or other's properties. However, I will sometimes use tensed talk as a concession to these views. It does not, in my view, make the experience of A-change any more or less palatable.

[9] This is similar to Moore's response to Hume's claim that we cannot be certain that an external world exists. Moore responded that we *are* certain an external world exists; what we are less certain of is Hume's argument (Moore, 137).

[10] This has generated a separate discussion regarding how things *persist* over time (see Sider for a partisan but thorough review).

[11] It is more typical to say that it is relative to *inertial references frames* of objects. However, since an inertial reference frame is defined as the frame in which something is not moving, I have glossed over this issue here by referring to the velocities of objects (but see e.g. Mellor, Sider, Yourgrau).

presentism, present events are absolutely present, and so absolutely simultaneous.

If we are A-theorists, real change is A-change. If the single tense of spatially separated things is relative, real change of spatially separated things is relative. Similarly, if we are presentists, the *existence* of different things in different places is relative. Most philosophers who accept relativity find this absurd, e.g., Sider (45-52), Mellor. Gödel writes: 'the concept of existence [...] cannot be relativized without destroying its meaning completely.' (Cited in Yourgrau, 132)

For special relativity, however, some *B-relations* are not relative. These are the B-relations defined by *causation*: one event is earlier than another because one event *causes* the other (Mellor). Thus, B-change that is causal change can be real in relativity. In addition, because relativity denies presentism, it affirms eternalism by default (Mellor, Sider).

Thus, if A-change really is fundamental to the world, something must be wrong with relativity. Alternatively, if A-change is fundamental to what we *seem* to experience, but relativity is true, we suffer from a very deep illusion.

B-theory's Tense and Indexes

Before we move on, let us revisit Augustine's problem: if all but one moment of a duration is past or future, how can anything have duration? Given presentism, nothing can. But what about eternalism?

A-theorist can be eternalists (e.g. Lowe, Capek, and Loizou). For an A-theorist, the past and future, being as real as the present, can have duration. However, it is still the case, however, that whatever is present does not: for the A-theorist, only one moment is *the* present.

B-theorists do not hold that events are fundamentally past, present or future. Instead, they are derived from the more fundamental B-relations. These B-relations connect a series of moments. A duration is a series of these moments and a B-change can occur over any such duration. Yet, how do we derive tense from this series?

For B-theorists, tenses are defined by *indexicals*: they are defined by a time in the B-series. This makes them similar to spatial 'properties' such as *here* and *there* or *above* and *below*. Such spatial terms do not refer to fundamental properties of a point in space. They depend on the relation between that point and some location, whether it is another location or the point itself. For another location, it is 'there'; for itself, it is 'here'.

With B-theory, tense is defined by the *date*. If the event is *past*, it is always past according to some time. If we pick another time, the event may be future or even present (Mellor, Le Poidevin 2003 (143-146**)**, Sider, Callender).

If a spatial point is within a large enough region, it can be both 'here' *and* 'there' without contradiction. It only depends, for each term, on the index own location, i.e., the region in which the index exists. Consider, for example, your body and two of its parts, your heart and your head. To your heart, your heart can be *here* while your head is *there*, and vice versa. However, according to your entire body, *both are here*.

For tense, B-theory provides a similar analysis. As a result, the *present can have duration*. And so, a change in that duration can be present.

For the B-theorist, one moment of a duration is *past* according to a second, *later* moment; and the later moment is *future* to the first, earlier moment. Yet, to the duration overall, both moments are present. If a duration can be present then a change can also be present.

How we pick the *present* period of time is a separate question. A contemporary B-theory has been that it depends on what we experience of time. To answer that question, let us first start with a preliminary one: what do we *seem* to experience of time?

3. Change We Seem to Experience

We have discussed kinds of experience and conceptions of time and change. With these distinctions drawn, we can say the following:

A. If we experience change, then there is change. This change is not inferred from what we experience, consciously or unconsciously, but just is what we experience.

B. However, if we *indirectly* experience change, although it exists, we only infer it, consciously or unconsciously, from what we actually experience. If it seems that what we

experience *is* change, we only imagine it is change. Though we may correctly infer change from it, what we experience is actually something else.

C. If there is no change at all, of course, we must *only imagine* there is change (no matter how compelling the change seems to be).

In this section, we will examine what kinds of experience we *seem* to have of change and of what kind of change, A-change or B-change, this may be. In doing so, we temporarily ignore what we may *actually* experience.

Change through Memory

As with time, we *talk* about experiencing change in some way. We see leaves changing colour over a season, hear the verse of a song follow the chorus and feel the vibration of a moving train. But do we directly experience these changes? For example: Do we *see* the leaves changing colour?

The process of leaves changing colour is much too slow for us to see it. Such an experience seems to be a matter of perceiving it as yellow accompanied by remembering having perceived it as green. Dainton calls such an account of experienced change the 'memory' account of experience (Mellor, Dainton, Kelly).

What is it that makes us aware of the change? Part of it is this: we remember having perceived the changed object before in a different state. Central to this memory is that we recognise this earlier state as being earlier than what we perceive and, more importantly, as something less immediate or direct as what we perceive. This raises a question: What if we were to fail to recognise what we experience in the memory as something we already experienced? What if, for whatever reason, we believed that this was the *first* time we experienced the green leaf?

In such a case, it seems doubtful this would be an experience of a change in the leaf from being green to yellow. Instead, the 'memory' of greenness would not seem to be a memory at all. If it seems to be anything, it is something we are imagining or perceiving.[12] Importantly, if we fail to recognise that we experienced it *before*, that this is a re-experiencing of sorts, then we will not infer from this memory that there has been change.

The memory account has a problem however, one noticed by several philosophers (notably, Husserl, Dainton and most recently Kelly). There are cases of experienced change where we do not remember *having* experienced any of it before. This is where change seems much more directly experienced, with everything of it experienced for the first time. If this is true, then the memory model, at least as it is presented here, is insufficient.

However, could this perception and memory be what we experience as the passage of time? Again, this is the change of events from being future to being present to being past. And this is a fundamental part of our experience.

Mellor, as a B-theorist, certainly thinks this is adequate for the passage of time. He suggests that this passage is merely the accumulation of memories; and our awareness of these memories is sufficient for our sense of events receding into the past.[13]

However, the passage of time is not just the tense of the event; it is the change in the tense. Although we may experience tense on remembering, and perhaps it is the tense of the event we remember, what we need, in order to experience the flow of time, is to experience the event's *change* in tense. Do we experience that?

Does this give us an experience of tensed change just through memory? It is if in the memory we experience the given event getting *more* past. Consider your tenth birthday again: if you, by remembering it in some way,

[12] Whether it seems to be imagined or perceived depends on whether we believe that we are experiencing a green leaf (rather than imagining one). It may be that anything we imagine is a construct from previous experiences. For example, if I imagine what it is like to stand in the heat of the Sahara, I can only draw on my memories of the hottest day I have ever felt (basically, an overcast autumn day in Barcelona). If this theory is correct, then in cases where we hallucinate or imagine something of which we do not remember the source, this is exactly the case that is being discussed here. We do not remember having ever perceived what we are now imagining.

[13] A very sparse sketch of this might be: from one time to the next, my store of remembered perceptions increases; and they increase in such a way that the order of their occurring to me is somehow represented in the storage mechanism; lastly, I am aware of this representation. (We will meet a similar model when we discuss retention theory).
The model is sketchy because whether or not it accurately represents our awareness of the past is not at all clear; for example, do we really store the order of events? Research from Friedman on long-term memory casts doubt on this. And Ornstein suggests that there is no evidence of anything in the brain resembling such a 'store'.

experience it changing tense, then you experience an A-change. Do you do that?

I do not think that this is anything like the experience of remembering: that we remember an event *getting* more past, i.e. changing tense. Instead, what we remember only *seems* past; it seems to be *in* the A-series. But this is not A-change.

Therefore, it does not seem that we experience A-change in memory. However, memory is not the only kind of experience. Might we not *perceive* A-change?

Perceptible change

We have spoken about remembering that something has changed. However, many philosophers think that we also *perceive* change. (Dainton, Grush, Kelly, Le Poidevin 2007).

Perception is usually associated with sensory experience, e.g., seeing, hearing, touching what we may call immediate things or events. Consider what you experience when you see or hear the following examples: a bird flying by overhead (from Dainton); the wail of an approaching siren becoming louder and higher pitched.

These phenomena *seem*, at least, to be changes. And they seem to be perceived as directly as other seemingly perceived properties such as colour or shape: You see the bird change location; you hear the changing pitch and increasing volume; you perceive these as immediately as you see the bird's colour or hear the siren's piercing clarity. 'If I hold my hand in front of me and rotate it at the wrist' Dainton writes, 'I see this rotation as clearly as I see my fingers.' (Dainton, 114).[14]

However, what kind of change is being perceived in these situations? Do we perceive *A*-change in an event's tense or *B*-change in an object's qualities?

Well, what is the natural way to describe a perceived change? Is it not this: of the bird (or siren) as having, at one moment, one location (or pitch) and, at a later time, another location (or pitch). If so, then the natural way to talk about such perceived change is in terms of *B-change*; not in a *tense*-changing event but a location- (pitch-) changing object.

Perhaps, however, we more accurately capture the perceived change if we describe it in terms of A-changes. To do so, we must describe it in terms of events changing tense. For example, the change that is *seen* in the bird's flight would be the change of tensed events, tensed happenings at a time, e.g., a tensed change in *the bird being above us*. Thus, we would better describe what we perceive as a change from:

1. The bird will be above us.
2. to
3. The bird is above us.
4. to
5. The bird was above us.

Yet, this kind of change does not seem to be what we experience at all. It is only a description of a single location of the bird repeatedly changing tense, not of the bird moving through several locations.

We might modify the above statement by placing the successive locations into the description of the change. Assume the bird moves overhead from left to right and that we only experience whatever seems to be present or past. The A-theorist claim, then, is that we perceive a change from:

1. The bird being to our left.
2. to
3. The bird having been to our left and being above us.
4. to
5. The bird having been above us, having been to our left before that and being to our right.

This model of A-change resembles a currently debated theory of experienced time called *retention theory*, a theory developed from Husserl (Merleau-Ponty, Miller, Dainton, Gallagher, Grush and Kelly). Husserl's analysis of experienced time is that, while having an experience of the world as it is now, we also

[14] If we perceive something (a change) which requires duration then we experience the duration. This is one motivation for the claim that our experience occurs in the *specious present*.
The specious present is a common, even dominant, topic in the literature on the experience of time. However, the meaning of its terms sometimes (though certainly not always) lead to confusion, which I wish to avoid here. As a result, I will not use it. However, for helpful discussions, see James; Dainton; Le Poidevin 2007 (and also Le Poidevin 2004a for an interesting alternative definition).

retain something from what has *already been experienced*. This retention process gives our experience of duration, persistence and change: 'We arrive at the idea of succession only if the earlier sensation does not persist unaltered in consciousness but [....] is specifically modified, that is, is continuously modified from moment to moment...' (Husserl, 32).

Retention theory *might* give us A-change. Given it is true, experience seems to be of a continuous modification of retained events; this may be a modification of *tense* i.e. A-change: '[F]rom moment to moment the content […] seems to be shoved back more and more.' (Husserl, *Ibid*) i.e. the retained event seems to become *more* past.

However, as Dainton points out, whatever this 'shoving back' is, it is not *perceived* change or persistence: '[]n the perception of a simple tone, our consciousness is remarkably *clear*: all we are aware of is the tone itself as an enduring auditory item.' (*Op. cit.*, p.157). Consider the bird's motion above: do we experience a tensed A-change of a retained event? Do we not perceive just the bird moving from one place to the next? If it is the latter, the only thing 'retained' through the (B-)change is the bird in its flight.

The Stream of Consciousness

But then what would motivate us to think that we perceive A-change? One reason might be the *next* kind of experienced time: the stream of consciousness.

Whatever our perceptions and memories may be of, they seem to be preceded and followed by an entire series of *other* experienced events. This succession of experiences is the stream of consciousness (James, Dennett, Flanagan, Dainton, and Blackmore).[15]

A-change and retention theory may be describing how *this* stream seems. In doing so, they must mean that we are aware in some way of previous experiences and sensations as being retained and becoming more past. But is this retention *and* A-change how such a stream of experiences seem?

You are reading this paragraph; consider what you just read before it. Does it seem that you retain something from what you have just read? Most likely – it probably seems that you could recall what you have read if you were prompted to. However, this capacity for recollection is not what retentions are supposed to be.

For retentions, the question is: how does the *previous* reading of the paragraph seem to you? Does it not seem past, i.e., not present at all? That is not the recollection of what is in the paragraph; it is the act of reading it the first time. It does not seem to be something retained, like a ticket stub from a concert; it seems to be the original ticket. It is gone.

But, is this something we do experience or just what we imagine? To answer that, we need to move from what we seem to experience to what we actually experience.

4. Experienced Time

This final section regards the question of what we *do* experience (rather than what we seem to experience). The answer depends on the conception of time and has implications for what we seem to experience.

If our experience is not what it seems to be then we are misinterpreting what we experience. If we cannot help but *seem* to experience it this way, then we are under an illusion. It is true that we are under this illusion *even if* we infer correctly from it to something that is actually there.

With that in mind, we can ask: What conceptions of time and change can give us what we *seem* to experience? Or do they all force us to merely imagine both?

The Role of Retentions

As discussed, Dainton denied that retention theory described how change *seems* to be. Gallagher, however, responds that retentions are not supposed to be what we *seem* to experience. They are parts of the actual structure of the experience (Gallagher, Section 4). Thus, they are part of how experiences of change *are*.

[15] This seems to be a 'stream' rather than a series of discrete bursts, i.e. like drops from a tap, because these experiences seem to flow from one to the next up until the present one; that is, their succession seems *continuous.* Such appearance of continuity motivates an alternative account of how it seems by Dainton: *overlap theory*, where (at least seemingly) later stages of one experience are the earlier stages of what follows it, and so on. (See Dainton, 244)

To get the experience of change, the following must happen: Given two successive experiences, something (whatever it might be) from the first is retained, that is, *persists* into the next experience.[16] This retention is *simultaneous* with the rest of the latter experience and it is this simultaneous structure which gives the apparent change. As Grush puts it, an experience by retention is the 'consciousness of not-now that is mediated by something that is now' (Grush, 427).

However, this analysis means that an experience is not actually of change. The retentions and new elements are simultaneous; there is no time for change to occur. Thus, we can not directly experience change. If we seem to, it is an illusion; we imagine it. At best, we only *infer* change (consciously or unconsciously) from our experiences.

That an experience has only simultaneous parts is what Miller calls the Principle of Simultaneous Awareness, PSA (Miller, see Dainton (133-6) for comment). If PSA holds, a theorist would need to explain an experience of *change* using something like retention theory.

A-theory and Retention Theory

If you assume presentism, you must assume PSA since what you experience must be at *one* moment because no *two* moments exist. In this case, it is no surprise that we cannot directly experience change.

It seems as if A-theorist *eternalists* ought to hold retention theory as well. An objection from Kelly reveals why: If we experience a change we experience a duration; this means we are in 'direct perceptual contact […] not only with what is *now* occurring but also with what *has recently occurred* and indeed with what is *about* to occur […]' (2005, 9). Kelly claims that it is deeply implausible that we could ever experience such tensed events *directly*; how can our experience be of something that is no longer taking place or that is *future*?

If A-theorists hold that we experience A-change, they must somehow have it that we experience past and future events; otherwise, how could we experience the events changing from being past and future? Yet it is not clear what this direct experience could mean.

Does it, perhaps, mean memory? That is, our memory of events is a *direct experience* of past events. In remembering the birthday cake on the table of our tenth birthday, for example, we see the *past* cake *past*-being on the *past*-table. How this cake looks, tastes and feels in our memory is the way the cake on that table, along with everything else happening at that time, *is*. This is how becoming past has changed it. Zimmerman likens them to strange ghostly entities (Zimmerman); further, it is unclear how we would be aware of such ghostly cakes and tables.

Indeed, A-theorists have assumed that what we experience is *present* not past or future. If, however, what we experience is present as A-theorists understand it, then it is all at one moment. Thus, we are in the same position as presentists regarding change. We may adopt retention theory and, thus, be able to infer change from what we experience, but it is still the case that any *apparent* change is something else that occurs all at one moment.

B-theory and Retention Theory

For the B-theorist, what is present, past or future is defined by a time. That time can be defined by what we experience. In addition, this time for the B-theorist can be a moment *or* a duration. As a result, we can experience a duration which is *present*.

There is a problem, however, with saying we *directly* experience any duration of which we seem to be aware. Consider, for example, this experience described by Kelly:

If you watch an airplane taking off from the runway you can follow its continuous motion for several minutes before it disappears. […you] must *keep track* of the earlier phases of long movements in some way other than by perceiving them directly (*ibid*, p.13).

This seems to have the following problem. B-changes can not themselves change: if one thing comes before another or if something has certain properties at one time and not another, then it is always the case that it has that order or the properties at those times.

Yet, our awareness of the earlier motion of the plane has changed even though the motion during that period *cannot* have changed.

[16] Although altered as it persists; it is not as it was originally experienced (see Gallagher, Kelly for discussion).

Thus, something in our awareness of the earlier motion seems to have changed from then to now. But, given the order and the properties of the event cannot change, what can change? Must we be *imagining* change?

I would reply that the change we experience is not completely imaginary. More specifically, given B-theory, we are mistaken about *what* is changing, some past event or perception of it, but we are not mistaken that we experience change. What we experience is a B-change. This apparent change associated with the past events is actually a change in *us*. The change is in a series of effects of previous perceptions, i.e., a B-change in a series of *retentions* within us.

What, then, are these retentions? It is likely that this is something for cognitive science and empirical research to discover. However, perhaps the retentions are just the operation of the 'pacemaker' (discussed in §1). Thus, what we measure as the passing of time is also what seems to be the A-change of events; and it is a B-theory change.

Thus, unlike A-theorists and presentists, B-theorists can at least say we directly perceive change; we need not imagine or just infer it. Further, B-theory can also explain some of what *seems* to be A- change.

Temporal illusion

In this section, we will look at some empirical evidence that may support the view that, even if B-theory is true, we cannot be experiencing change (and thus time). [17] This evidence involves possible cases of temporal illusion, that is, experiences of change when there cannot *be* change.

For example, there is the well-documented *phi phenomenon*: A subject is presented with two spots of light at two different locations which are, one after another, briefly illuminated. Depending on how far apart these spots are, and how quickly one follows the other, the two spots seem to be only *one* spot moving from one of their locations to the other. But there is no single spot in motion, rather there is just the successive flashes of light (Kölers (15, 178-179), Dennett (114-115), Gordon (74)). (I will return to a variant of this later).

Similarly, the *waterfall illusion* seems to be of something flowing where nothing does (Crane, Bach) and the *rotating snakes* optical illusion seems to be of movement in a frozen image (Bach). Again, in these cases, what *seems* to be moving is not moving.

However, all such illusions are unproblematic as experiences of change. These illusions at most demonstrate that we mistake a change to be happening in something which is not actually changing. However, it may still be explained as a change in something else. This makes it similar to the general solution to experienced A-change. In the A-change case, it seems that a past event changes when it does not; while in this case, it seems that an external event changes when it does not. In both cases, it is possible that something changes.

However, the following illusions are more problematic for an experience of B-change. One variant of the *phi* phenomenon suggests that the order of the change we *seem* to experience cannot be that order. Here's Dennett:

> [I]f the two illuminated spots were different in color […] what happened to the color of [the apparently single moving spot] as "it" moved. […] The answer [:] the first spot seemed to begin moving and then change color abruptly in the *middle of its illusory passage* toward the second location. (Dennett, 114)

It seems as if the illusory colour-change only happens when the later spot occurs. This is because we experience a stage (the colour-change) of a motion given what happens *next* (the later coloured spot). However, if so, then either we know about what happens next, as we experience the illusory colour-change, or else the experience of that change is determined by, and thus happens *after* we are aware of the later stage.

The first seems implausible as it implies an awareness of future states; we will not

[17] We are concerned here with candidate temporal illusions of duration and change. For reasons of space, we do not discuss other illusions which may be related to time. For example, neither *time-lag* (Houts, Le Poidevin 2007) nor succession perceived as simultaneity (Le Poidevin 2004a) is discussed here. This is not because there is nothing interesting to be said about these issues. However, the focus here is only on experiences which lead us to suppose we *do* experience change and duration.

explore its implausibility here. However, the second implies that the order of what we seem to experience - i.e., first, the 'single' spot at the first location; second, the spot's colour-change while in motion; and third, the spot at the later location - is not the order of what we *can* experience. That is, what seems to be a change *from* one thing *to* another and on *to* another cannot be actually ordered that way. So, why suppose it is change at all?

Dennett thinks the entire discussion is misled; rather than the actual event it seems to be, it is only a *representation* of it; thus, what we *seem* to experience need not be what we *do* experience. (Dennett, *ibid*). We might find this view tempting in this context; that is, though we seem to experience time and change, it is merely a representation. Perhaps a *fallible* retention system may be appropriate here, since such a system does not require actual experiences of change. However, considering how fundamental change is to experience, an alternative might be better. But is there one?

If when we experience change via some sense, e.g. we see motion or hear a changing pitch, then the experience is partially determined by non-conscious processing via the same sense. For example, it is now generally accepted that there are two processing streams in the visual system (and indeed in other sensory systems as well), the *ventral* and *dorsal* streams. One, the ventral system, seems directly related to conscious experience and the other, the dorsal system, seems only *indirectly* related to it. Significantly, however, dorsal processing is more rapid than ventral processing; in addition, though it *is* indirect, it can affect our experience (Goodale and Milner).

If this is true, a possible solution is available for experienced change. It is this: dorsal processing detects the later stage of the change before ventral processing gives rise to our experience. In doing so, it alters the ventral stream and thus the resulting experience. In other words, the dorsal stream's detection of the later stage partially determines our experience of motion. Where it corresponds to actual motion, this would be of that motion; but where there is no real motion, it results in illusions such as we see here.[18]

Whether or not this explanation is the case needs further empirical research. In any case, the evidence so far does not commit us to holding that the temporal order we seem to experience must be an illusion.

Illusions of Depth and Change: a comparison

It may seem as if our apparent experience of change is as open to empirical refutation as other apparent experiences. However, this is not so. For to clearly demonstrate that we experience an illusion of something, we must first show we experience what *seems* to be it in its *absence*.

In *Stereopsis* (Gordon), two different two-dimensional images of scattered dots are presented to each of a subject's eyes. The dots in each image are randomly generated. After a period of time, the subject reports experiencing a single image of dots scattered throughout a three-dimensional space before them. That is, they experience what seems to be *depth*. However, the subject is only seeing the two-dimensional images and cannot be seeing depth as there is no depth there. Thus, what seems to *be* depth is not.

Thus, we *might* say we do not experience depth, even if we seem to. Can we have a similar test for change?

To do so, the following scenario would need to occur: we would need to experience change in the *absence* of change. Only then could we say that, whatever we are experiencing, it cannot *be* change.

Just as one needs to see depth in a scenario where there is no depth, one would need to see change in a scenario where there is no change. This situation would be either a duration or an instant without change. Yet, both are controversial given the discussion so far.

On the one hand, a duration without change is changeless time, i.e., the absolute, *independent* time which it is argued that we

[18] This suggestion is largely due to a paper presented by Valterri Astrila in the *Consciousness and Time* workshop in University of Edinburgh (April 1-3, 2008). Astrila's solution is not exactly the same as it concerns the presence of feedback from visual region V5 to V1 in both experiences of genuine and illusory motion. However, Astrila also concludes from it that what seems to be order need not be illusory.

could never experience or even know occurs (see §2 above). On the other hand, we would need to show that our experience of what seems to be change occurs in an instant. We have to say this given presentism or A-theory. However, amongst those who do not hold these views, that experience can occur at an instant is controversial (see Dainton and Le Poidevin 2007).

If we cannot get an uncontroversial changeless scenario, then that we seem to experience change is not open to empirical refutation.

5. Conclusion

We have talked about the different conceptions of time and how they relate to the way we explain our experience of change (and thus time). In closing, we briefly outline the implications from this discussion to neurological research.

One issue for any investigator into consciousness is finding the correlates of consciousness (Hohwy). The time in which the correlates happen is generally thought to be the time in which the experience happens. An experience of change, then, occurs be when all the elements, the apparent *stages*, that seem to make the change occur. With retention theory, these apparent stages would be simultaneous. With the B-theory alternative, the apparent stages would genuinely be at different times.

These alternatives imply very different neural structures for experiences of change. If you accept retention theory, you should seek, for each experience of change, a correlate with many simultaneous elements (and should expect to see a succession of such complex experiences). However, with B-change, the correlate need not have this structure at any moment in its existence. All that the correlate will look like is a *change*.

Which should the researcher take on? I do not expect to answer this question here. At a guess, it depends on which of these fits with the best model of correlation. Prior to that, however, something might already be suggested:

Of the two possibilities for change, the B-theory alternative is both *simpler* and closer to how our experience *seems*. Retention theory posits more complex entities than we seem to experience and, given presentism is false, there is no obvious *need* for retention theory.

At least in this case, we could say: change is what it seems to be, and we experience change.

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