The Speed of Thought
Experience of change, movement, and time : a Lockean account

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Abstract :

This paper is about our experience of change and movement, and thus about our experience of time – at least under the reasonable assumption that we (can only) experience time by having experiences of change. This assumption is shared by Locke, whose view on temporal experience, expounded in Book II, Chap.14 of his Essay, will be the main focal point of my paper. Some of the most influential accounts of temporal experience embrace the notion of a "specious present" as an explanatory tool in order to account for the continuous and unfolding aspect of our experiences. In this article, I will raise some points of dissatisfaction with the very notion of the specious present, and while I shall not reject the specious present theories, I will argue that more is needed in order to have a proper understanding and explanation of our temporal experience. I will then discuss and defend a view of temporal experience whose basis can be found in Locke's Essay, and which, given some amendments and further development within a contemporary framework, provides us with a very good analysis of our experience of movement, change, and time – a view that helps us to avoid some burdensome commitments incurred by specious present theories and that can be fruitfully combined with these theories in order to yield a complete and more informative picture of the phenomenon of temporal experience.
Introduction

§1. The running example in this paper will be one of a horse running. Look carefully. As it moves along, it constantly and continuously changes its position and shape. Not only is it running, you can see it running. You can see its movements. Thus, at least *prima facie*, you can have a visual experience of change and movement.

This paper is about our experience of change and movement, and thus about our experience of time, at least under the reasonable assumption that we (can only) experience time by having experiences of change. The underlying idea which I will use as my working hypothesis is that we do not experience time or the passage of time directly but only *via* experiences of change (often, movement). Locke, whose view on temporal experience I will discuss in detail below, puts it like this:

4. That we have our notion of Succession and Duration from this Original, viz. from Reflection on the train of Ideas, which we find to appear one after another in our own Minds, seems plain to me, in that we have no perception of Duration, but by considering the train of Ideas, that take their turns in our Understandings. When that succession of Ideas ceases, our perception of Duration ceases with it; which every one clearly experiments in himself, whilst he sleeps soundly [...]. And so I doubt not but it would be to a waking Man, if it were possible for him to keep only one Idea in his Mind, without variation, and the succession of others: And we see, that one who fixes his Thoughts very intently on one thing, so as to take but little notice of the succession of Ideas that pass in his Mind, whilst he is taken up with that earnest Contemplation, lets slip out of his Account a good part of that Duration, and thinks that time shorter that it is. [...]

6. [...] But wherever a man is, with all things at rest about him, without perceiving any motion at all; if during this hour of quiet he has been thinking, he will perceive the various ideas of his own thoughts in his own mind, appearing one after another, and thereby observe and find succession where he could observe no motion. [...]

Locke (1975, Book II, Chap. 14)
Thus, in agreement with Locke, or more recently with Robin Le Poidevin\(^1\) and L. A. Paul\(^2\), it seems to me correct to say that if we did not perceive any change at all (including change in our own thoughts), it would not seem to us that time is passing. This reasonable assumption – that we only experience the passage of time by having experiences of change – parallels a less controversial claim about the way we measure time. Indeed, any measure of time, be it an ordinary or a scientific measure, involves measuring change: we only measure how much time has elapsed by observing changes happen – the movement of a hand on a wristwatch, the apparent movement of the sun in the sky, the succession of our own internal mental states, or a disintegration of Caesium atoms in an atomic clock. The general thought here is that without observation of changes, there is neither measure of elapsed time nor ordinary perception of the passage of time. (These claims are of course to be distinguished from the Aristotelian metaphysical claim that time itself implies change, and that without change there is no time \((contra\) Shoemaker's (1969) argument involving global temporal 'freezes' of a possible world), or the even stronger Leibnizian relationist idea that time \textit{is} change (see, for instance, Forbes (1993) for a detailed relationist account)).

Let us focus on the running horse again. One striking feature of the experience we have of its movements is the continuous way in which the horse changes its position and shape. We are in some sense aware of the fact that at a certain time it is in such-and-such a state and that at a subsequent moment it is in a different state, and so on – but this is not how things appear to us. We do not have a succession of experientially isolated instantaneous experiences of different states of the horse succeeding each other; instead, we have a continuous experience of the horse running. This feature of our experience has not only been insisted upon famously by James (1890, p.629) who says that "A succession of feelings, in and of itself, is not a feeling of succession. And since, to our successive feelings, a feeling of their own succession is added, that must be treated as an additional

\(^1\) "In fact, it seems odd to say that we see, hear or touch time passing. And indeed, even if all our senses were prevented from functioning for a while, we could still notice the passing of time through the changing pattern of our thought." Le Poidevin (2009)

\(^2\) "[...] if we were in an entirely static environment where there were no contrasts between property instances (this would have to include no contrasts with respect to properties of my thoughts), then it would seem to us as though time were standing still. And, indeed, I think this is a very plausible supposition." (L. A. Paul (2010, p.23))
fact requiring its own special elucidation" but also, for instance, by Husserl (1964, p.31) who claims that "The duration of sensation and the sensation of duration are different. [...] The succession of sensations and the sensations of succession are not the same."

These considerations lead some of the most influential accounts of temporal experience to embrace the notion of a "specious present" as an explanatory tool in order to account for James' and Husserl's observations and, more generally, for the continuous and unfolding aspect of our experiences such as our seeing a running horse. In this paper, I will raise some points of dissatisfaction with the notion of the specious present (in §2), and while I shall not reject the specious present theories, I will argue that more is needed in order to have a proper understanding and explanation of our temporal experience. In §3-§7, I will then discuss and defend a view of temporal experience whose basis can be found in Locke's Essay, and which, given some amendments and further development within a contemporary framework, provides us with a very good analysis of our experience of movement, change, and time – a view that helps us to avoid some burdensome commitments incurred by specious present theories and that can be fruitfully combined with these theories in order to yield a complete and more informative picture of the phenomenon of temporal experience. To do this work, I will not be, strictly speaking, involved in a Lockean exegesis; rather, I shall point out to some good ideas Locke had, and expand them into a detailed account of temporal experience.

The Dubious Specious Present

§2. The notion of a 'specious present' comes in many varieties (and the specious present comes in different lengths, from a couple of milliseconds up to a full minute) and it has been defended on various grounds by many eminent participants in the debate on temporal experience, such as Kant (1781), James (1890), Husserl (1964), and Broad (1923), and more recently Foster (1982, 1992), Dainton (2000, 2003), Hoerl (2009), and Phillips (2011). Common to all accounts is the general idea that in order to understand the continuous and unfolding aspect of our experience of movement, change, and time we need the notion of a non-zero temporal interval which our mind embraces 'at once'. As James (1890) puts it, "the prototype of all conceived times is the specious present, the short duration of which we are immediately and incessantly sensible". This general idea has been
articulated in different ways; in what follows I shall concentrate on what Dainton (2010) labels the "extensionalist model" and the "retentionalist model", respectively.

The extensionalist's understanding of our experience of change is nicely direct: change (in the world) takes time, and our experience of change also takes time. More precisely, our total experience of the running horse which lasts, say, five minutes is composed of very short overlapping experiential episodes which are the (temporally) smallest but still temporally extended pieces of experience we can have. Thus, at any stage of our total five-minute-long experience of a running horse, we do not have an experience of a 'frozen' static stage of the horse; rather, our total experience is composed of very short but temporally extended experiences featuring temporally extended and temporally ordered content, where this content is given to us 'as present', or 'as occurring now'. The 'specious present' idea is given here a straightforward meaning: the experiences we have are themselves temporally extended and their phenomenal content is both temporally ordered and unified into a single experiential episode which appears to us as present.

The retentionalist's view, while sharing the general idea, articulates the notion of a specious present quite differently: the specious present is here construed as an instantaneous (and not temporally extended) experiential state, but one that includes not only instantaneous content. According to this view, our five-minute-long experience of the running horse is composed of instantaneous experiences which have a temporally extended content (whose apparent extension can be compared to the real extension of the extensionalist's specious present). At any moment, our experience of the horse is such that it presents us with the horse at the moment at which we have the experience and with the horse's states at a few previous moments – all of this content being given to us as present. The recent states themselves are not part of the specious present in the sense the extensionalist would claim; rather, they are represented, they are "retentions". Retentions are typically not said to be memories in the sense of rememberings. They are parts of the content of a specious present displaying more or less "presentedness" (Broad's term), which provides a temporal order among them, where presentedness signifies the phenomenal quality of appearing to us as present. Thus all of the parts of the specious present appear to us as present, but some of them appear to us, so to speak, as more present than others.

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3 Taking into account the finite speed of light, of course.
This short characterization of the two main accounts of the specious present does not of course do enough to completely explain them. But I hope I have done enough, first, to show what their motivations and main claims are, and, second, for being able to articulate my worry concerning these views – a worry that is rather general and not related to any specific detail of the inner workings of these theories. In short, the very general problem is that the specious present theorist does not have a good account of what it means that there is a temporal order among things which are all said to be present. In what follows I shall try to render this concern more precise.

As I have just formulated this challenge, it might seem as though it is a worry about a potential contradiction. Ultimately, it is not – but let us nevertheless start with that (false, yet dialectically useful) thought. In both the extensionalist and the retentionalist view, the content of the specious present has the characteristic of being, on the one hand, temporally ordered (and, thus, its parts not appearing to be simultaneously present) and, on the other hand, of being given to us as present (and thus, its parts all appearing to be simultaneously present). Once we summarise these accounts in this way, they seem to run into a contradiction. In fact, the way specious present theorists sometimes talk seems to me unfortunate since it encourages the very suspicion that there is a contradiction lurking in their account – indeed, one often hears them say that all of the content of a specious present is given to us "as present" or "as occurring now". However, if "present" and "now" are understood as something like "at the present time", it seems to follow that all parts of the content of a specious present appear to be simultaneously present (that is, to be occurring at one and the same time). Of course, specious present theorists are not guilty of holding such a blatantly contradictory view. But, as we shall see imminently, their way of avoiding this contradiction gives rise to a troublesome mystery embraced by their view and, hence, to a serious worry which I want to highlight.

The reason why there is no contradiction in the specious present view is that the phrases "as present" and "as occurring now" which are used to qualify the content of a specious present do not mean that all of the content occurs at the present time (now) and is simultaneous. Rather, these phrases (must) mean something else. To start with the extensionalist view, it uses a notion of "together-in-succession-ness" to talk about the content of the specious present – thus, all of its content is said to be given to us not as present (in the sense in which this would mean that it is simultaneous) but rather as
"together in a succession", that is, "together" but with a temporal order\(^4\). There is no threat of contradiction here since "together" is not a temporal notion like "present" or "now", it just means that we somehow experience together a content with a temporal structure (succession). It is thus crucial here to recognize that when the specious present theorist uses the phrase "as present" she does not take it to be a temporal notion, but rather a notion of "phenomenal presence" (see, for instance, Dainton (2010)).

Thus, we see that the initial simplistic objection which accused the specious present theorist of subscribing to a contradiction only arose because of an ambiguity in the word "present", which either means "together-in-succession-ness", namely, in its non-temporal version, or alternatively refers to the temporal notion of "the present time". (To my mind, this ambiguity is not the result of the objector's lack of fair-play, but is rather due to the kind of terminology which specious present theorists often employ. In order to avoid such misunderstandings, one might suggest that the term "present" should only be used as a temporal notion, and that, instead, other terms like "together-in-succession-ness" are applied systematically for expressing the thought which the specious present theorist wants to appeal to in her view.)

With the same purpose in mind of avoiding a seeming contradiction, the retentionalist view uses terms like "vividness" and "presentedness". The core idea here is similar to the extensionalist view: "vividness" and "presentedness" are not temporal notions in the (temporal) sense of "present" or "now"; rather, they are non-temporal notions that refer to a certain phenomenal quality of the contents of the specious present, where some parts are more "vivid" or have "more phenomenal presentedness" than others. This is then how both views straightforwardly avoid the threat of a contradiction: first, by disambiguating the meaning of the word "present" and, secondly, by appealing to a non-temporal rather than a temporal reading of the term.

The worry I have is that a contradiction has indeed been avoided here but only at the cost of embracing a dubious notion of vividness, togetherness, and together-in-succession-ness. Vividness, for once, does not seem to be a very helpful notion in this context. It clearly is not Hume's notion of vivacity. The claim is that the different contents of the specious present are given to us as having a 'before-and-after' character and also as being more or less 'vivid' – but what does that mean? When I hear three notes in a succession

\(^4\) This is Dainton (2010)'s "Diachronic Unity Thesis" : simultaneous contents can be experienced together, but so too can contents that appear to be successive (at least over short intervals).
(where I have an experience of succession (a melody), and not just a succession of experiences), I do not experience the three notes as differently vivid. They are all experienced with equal vividness, they all have the same 'phenomenal strength', so to speak. Perhaps the retentionalist means something else when she uses the word "vividness", but to my knowledge there is no good and clear explanation available in the literature. It seems then that the notion of vividness is a hopeless cure for the retentionalist: it replaces a contradiction with a mystery.

The extentionalist's "together-in-succession-ness" does not seem to fare much better. Indeed, it might seem that the term exhibits a blatant contradiction in adjecto, which would take us back to square one. But even under a more charitable interpretation of this technical term, it seems entirely unclear what it could possibly mean on the understanding that it should be both non-contradictory and non-temporal.

I do not mean to claim that specious present theories should be completely rejected, nor was my intention in the preceding paragraphs to refute them. Admittedly, they do good work in trying to articulate something crucially important, namely, the continuous, unfolding, and dynamic aspect of our experience. The fact that they do so by appealing to a primitive notion such as "together-in-succession-ness" is not in itself a reason to reject them – since it may simply be the case that no more is available, at least at the purely phenomenal level – but it would certainly be welcome to have a non-temporal explanation of these central notions of vividness and together-in-succession-ness to which they make appeal at the core of their theory. (I shall come back to this below.)

Before the prize, the task that awaits the victor is then to be able to specify the link there is between the different contents of our experience of change, movement, and time – where such a link must account for our having experiences of successions and not only successions of experiences. 'Mere' memory in the sense of a remembering does not seem to do the job, and vividness or together-in-succession-ness do seem to be more embarrassing than helpful. In what follows I shall explore a view that tries to do the job, without rejecting the specious present theorist's main concerns and motivations.
§3. Let us look at Locke (1975, Book II, Chapter 14):

7. And this, I think, is the Reason, why Motions very slow, though they are constant, are not perceived by us; because in their remove from one sensible part towards another, their change of distance is so slow, that it causes no new Ideas in us, but a good while one after another: And so not causing a constant train of new Ideas, to follow one another immediately in our Minds, we have no Perception of Motion; which consisting in a constant Succession, we cannot perceive that Succession, without a constant Succession of varying Ideas arising from it.

8. On the contrary, things that move so swift, as not to affect the Senses distinctly with several distinguishable distances of their Motion, and so cause not any train of Ideas in the Mind, are not also perceived. For any thing, that moves round about in a Circle, in less times than our Ideas are wont to succeed one another in our Minds, is not perceived to move; but seems to be a perfect, entire Circle of that Matter, or Colour, and not a part of a Circle in Motion.

9. The train of ideas has a certain degree of quickness. Hence I leave it to others to judge, whether it be not probable that our Ideas do, whilst we are awake, succeed one another in our Minds at certain distances, not much unlike the Images in the inside of a Lanthorn, turned round by the Heat of a Candle. This Appearance of theirs in train, though, perhaps, it may be sometimes faster, and sometimes slower; yet, I guess, varies not very much in a waking Man: There seem to be certain Bounds to the quickness and slowness of the Succession of those Ideas one to another in our Minds, beyond which they can neither delay nor hasten.

10. The Reason I have for this odd conjecture is, from observing that, in the Impressions made upon any of our Senses, we can but to a certain degree perceive any Succession; which, if exceeding quick, the Sense of Succession is lost, even in Cases where it is evident, that there is a real Succession. [...]
§4. **Case 1: the hour hand**

The hour hand on a mechanical watch moves much more slowly than the minute hand and the seconds hand. Indeed, so slowly that we do not perceive it moving. If we look at the hour hand in, say, fifteen minutes intervals, we will be able to observe *that it has moved*, namely, by having a succession of experiences of the hour hand (one experience every fifteen minutes), and by remembering the hour hand's position from one experience to another and by comparing them. Nevertheless, in this case, we do not have an experience of movement, change, or succession. We do not have such an experience because the hour hand's continuous movement is far too slow for us to be able to perceive it.

This is Locke's case in the first paragraph of the quotation above (his section 7) which he develops in more detail in the subsequent sections 11 and 12:

11. This also happens, *where the Motion is so slow*, as not to supply a constant train of fresh *Ideas* to the Senses, as fast as the Mind is capable of receiving new ones into it; and so other *Ideas* of our own Thoughts, having room to come into our Minds, between those offered to our Senses by the moving Body, *there the Sense of Motion is lost*; and the Body, though it really moves, yet not changing perceivable distance with some other Bodies, as fast as the *Ideas* of our own Minds do naturally follow one another in train, the thing seems to stand still, as is evident in the Hands of Clocks, and Shadows of Sun-dials, and other constant, but slow Motions, where though after certain Intervals, we perceive by the change of distance, that it hath moved, yet the Motion itself we perceive not.

12. So that to me it seems, that *the constant and regular Succession of Ideas* in a waking Man, *is*, as it were, *the Measure* and *Standard of all other Successions*, whereof if any one exceeds the pace of our *Ideas*; as where two sounds or pains, *etc.* take up in their Succession the Duration of but one *Idea*; or else where any Motion or Succession is so slow, as that it keeps not pace with the *Ideas* in our Minds, or the quickness, in which they take their turns; as when any one, or more *Ideas* in their ordinary course come into our Mind between those, which are offered to the sight, by the different perceivable distances of a Body in Motion, or between Sounds, or Smells, following one another, there also the Sense of a constant continued Succession is lost, and we perceive it not, but with certain gaps of rest between.
Locke's idea is, roughly, that our perceptions and thoughts have a natural speed at which they succeed each other in our mind, and if a change in the world, such as the movement of the hour hand, happens so slowly that it only produces new qualitatively distinct perceptions (or thoughts) in us at a temporal distance which is too great, we will not perceive them as forming a movement, but only as isolated successive experiences, for the hand moves, so to say, more slowly than our thoughts. Thus, we will have a succession of experiences, but not an experience of succession. What Locke makes us see here, in his own particular way, is that our capacities to notice change and movement have a lower limit and that anything that moves too slowly will not be registered by our perceptual system as moving. His idea that this is so because our perceptions and thoughts follow each other in our minds at a certain natural pace (see his sections 9, 11 and 12 above) has a contemporary counterpart in neuro-biology and experimental psychology, as we shall see below (§7). For now, let us consider another case involving a moving object.

§5. Case 2: the moving dot

Locke's example in his paragraph 8 above furnishes the 'opposite' case. If a dot, say, on a computer screen, moves sufficiently quickly along a circular path, we do not see it moving; instead, we see a complete (non-moving) circle – that is, we don't see any dot at all, whether moving or not. There is, then, a dot here that moves very quickly, and we might even know about it, and, still, this is not as things appear to us. We see neither a succession of dots on the screen nor a moving dot – we only see a circle. Thus, we do not have an experience of succession (we perceive no moving dot), and we do not have a succession of experiences either (we do not see a succession of dots in various locations at different times – unlike in the hour hand case). The reason for this – as Locke diagnosed well – is that our capacities for detecting and perceiving movement have an upper limit: any movement that is too fast will simply not be registered by our perceptual system as a movement.

Thus, in Case 1, we have a succession of experiences but no experience of a succession due to the lower limit of our perceptual faculties; and in Case 2, we have neither a succession of experiences nor an experience of a succession due to the upper limit of our perceptual faculties. It is only in the next case which we consider that we have an experience of movement (an experience of a succession).
§6. Case 3: the running horse

A horse galloping at 40 miles per hour moves just fast enough, but not too fast, for us to see it moving. The speed of an object moving in this way remains well between the lower and upper limits of our perceptual system's recognitional capacities, and thus it is interpreted as moving. There are many good examples of this kind. The film industry is a case in point where this particular feature of our perceptual system is exploited in creating the illusion of movement by having static picture frames following each other at an appropriate speed (usually at 25 frames per second). In another example, when notes of a melody succeed each other at a certain pace, we likewise only hear the melody if they do so at an appropriate speed – were they to be slowed down or sped up too much, we would be unable to hear the melody even if still being able to hear some tones. The reason why we have a perception of change, movement and succession in all such cases is, again, because they 'hit' our perceptual system at an appropriate speed. Only in cases of this kind, as opposed to Case 1 and Case 2, do we have an experience of succession.

The Speed of Thought

§7. The claim that stems from the considerations in §3-§6 above is that a succession of appropriately linked experiences gives rise to an experience of succession, where "appropriately" means that the successive experiences must occur at an appropriate speed, namely, within the lower and upper temporal limits of our perceptual system's capacities. (To repeat, the analogy with how illusion of motion is created in film is illuminating here.)

This appears to have been Locke's view, and in one form or another it is still very much alive in the contemporary debate. Robin Le Poidevin seems to hold something like it when he says that "The perception of E is accompanied by the memory of C. But because of the proximity of the perceptions the experience of succession is not consciously inferential. The conjunction of the very recent memory of C with the perception of E gives rise to an experience of 'pure succession'." (Le Poidevin (2007, p. 91, my italics)) Although Le Poidevin does not go into more detail here, it seems quite clear that the point he shares

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5 Of course, they also have to be experiences of the same object: a succession of experiences of totally different objects occurring one after another would not be an experience of movement. Other more or less trivial requirements of this kind might also be added.
with Locke is that the "appropriate link" between successive experiences when they give rise to an experience of succession is temporal proximity; that is, the appropriate link is an appropriate speed of succession. (Le Poidevin then adds that short-term memory, in an unconscious way, plays a crucial role in producing the experience of a succession.)

A more elaborated and detailed account of this Lockean kind is to be found in Paul (2010), who sets up to provide "an account of how temporal experience could arise from the way the brains of conscious beings experience and interpret cognitive inputs from series of static events" (Paul (2010, p. 7)). She provides us with some other well-tested and well-documented experiments from experimental psychology and cognitive science that fall well in line with the Lockean classification in Cases 1, 2, and 3 and his claim concerning the lower and upper limits of our perceptual system's recognitional faculties, one of which is the following different example of a moving dot experiment:

To prepare the ground for my account, I will first describe an interesting and empirically well-documented fact about our experience – namely, the illusion we have when, first, one small dot is shown on the left-hand side of a computer screen and then, very quickly, that dot disappears and a small dot is shown on the right-hand side of a computer screen. Then, the right-hand dot disappears, and the left-hand dot appears, again and again, in rapid succession. Even when we are told that what the computer is actually doing is merely blinking different dots on alternating sides of the screen, as long as the succession is rapid enough and spatiotemporally close enough, the effect is that we have the illusion of the dot moving back and forth across the screen. This is what cognitive scientists usually describe as "apparent motion." (Paul (2010, p. 15-16, my italics))

This scenario and many other similar ones tested in cognitive science experiments provide a strong experiential basis for the Lockean claim we have discussed above. A crucial point, supported by these experiments, is highlighted here by Paul (2010, p. 16): it is prior to any conscious experience that our perceptual system, on a psycho-neurological but not on a phenomenal level, interprets the successive stimuli (say, of the running horse), which are in effect the inputs the system gets 'from the world', in such a way as to produce a phenomenal experience of movement – that is, an experience of succession, built up by the perceptual system from a succession of inputs. This is why we never have an experience of a dot at all in Case 2 and an experience of singular static frames in the case of film projection in the cinema – our perceptual system 'computes' for us an experience of
movement precognitively before we become aware/conscious of it (before, so to speak, it reaches the phenomenal level of our experience). Interestingly, this is totally independent of whether we know that there is a genuinely moving object in front of us that we are perceiving (like a running horse) or whether we know that we find ourselves confronted with an illusion of genuine movement (like in the case of the moving dot on the computer screen or film projection in the cinema). In short, the illusion persists independently of whether or not we are aware of its illusory nature.

Thus, the Lockean proposal accounts for our temporal experience in two distinct stages, one of them being precognitive, unconscious and non-phenomenal (where our perceptual system gets 'brute' inputs from the world and interprets them), and the other being phenomenally accessible to us (where we have (or not, depending on in which one of the three Cases 1, 2 or 3 we find ourselves) an experience of movement and succession).

Locke himself apparently thought that both of these stages were consciously and phenomenally accessible to us. Indeed in many places in Chapter 14 (for example, in his sections 3, 4, and 6, as well as in section 9 I quoted above), he says that the Ideas which constitute the 'train of Ideas' responsible for our experience of succession appear in our minds. The neo-Lockean account seems then to make a distinction (by appealing to two genuinely distinct stages) where Locke does not. But if this was indeed Locke's view, it does not seem to be phenomenally correct: when we have an experience of a succession, like the experience of a running horse, we do not have it in virtue of having a succession of conscious experiences – a series of static snapshots of various stages of the horse's movements. Barry Dainton makes this point clear:

It is perfectly true that perceiving a succession of still images can result in a full-blooded perception of motion. [...] This phenomenon – known as 'illusory motion' or 'the phi phenomenon' [...] while it is real enough [...] is of little assistance to the [friend of the Lockean view]. What the latter needs is an account of how successions of momentary conscious states, each possessing entirely static contents, can give rise to the experience of motion. Static images are indeed being displayed on a cinema screen while we view a movie, but not only are these onscreen stills not themselves experiences, they do not register in our visual experience as static images: what we actually seem to see onscreen are objects in

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6 Dainton labels such a type of view "Cinematic Realism".
motion. *Phenomenologically speaking, the stills are invisible.* (Dainton (2010, my italics))

As an objection to what seems to have been Locke's own original view, Dainton's point is correct: such a view just does not fit our phenomenology, and the phenomenon of illusory motion is of no help here since it is an unconscious phenomenon. But this is where I believe that a contemporary amendment, like Paul's, can helpfully expand Locke's original view into an amended-but-still-broadly-Lockean view, which is still Lockean in spirit but better, and with respect to which Dainton's worry does not arise. Indeed, what constituted the heart of Dainton's objection (to the original view), actually constitutes the heart of the amended view which recognizes the pre-conscious character of the phenomenon of illusory motion, and expands and generalizes it to all cases (illusory or not) of experience of movement and change.

In the spirit of Dainton's objection, one could perhaps still worry about the way the amended Lockean view is being construed. When we do a phenomenological analysis, such as the analysis of our temporal experience, how is it relevant to appeal to phenomenally inaccessible pre-conscious facts about the way our brain works? What we want, the objector could claim, is to do phenomenology, and for this we should only rely on phenomenally accessible content. Thus, the very strategy used by the contemporary Lockean is, according to the objector, wrongheaded.

The disagreement takes here a meta-philosophically interesting form: what the objector raises as an *objection* to such a Lockean view, its defender actually takes to *be* her view. An interestingly similar dialectical situation is to be found in the debate about what *change* *is* – as opposed to what our *experience of change* is – which opposes, typically, perdurantists and endurantists. Allow me to make a quick sketchy detour to consider this analogous situation, before I come back to our main concern here7.

Change is supposed to be a dynamic phenomenon. But in the four-dimensionalist's perdurantist world there is just a distribution of matter (or something else, depending on your favourite ontology) across the four-dimensional space-time manifold: a static world

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7 There is also a very similar and interestingly analogous dialectical situation in the case of the so-called "Humphrey objection" to the modal and temporal counterpart theories – but that would make my detour too long here.
where, so to speak, 'everything just sits there'. Change, in this view, is understood analogously to spatial variation. \(x\) changes iff \(x\) is F at some time and is not F at another time. In perdurantist terms: \(x\) changes iff \(x\) has a temporal part\(^8\) which is F at some time and has another temporal part which is not F at another time. In this view, a horse is a four-dimensional space-time worm which occupies a spatially and temporally extended spatio-temporal region, and which has spatial and temporal parts, where some of these parts are running and some are sleeping, and this is what change amounts to – the horse changed from sleeping to running in virtue of having one sleeping part followed by a running part.

The objector is utterly unhappy with such an account of the nature of change. Where did the dynamic aspect of change go? More precisely, what is it that changes in the perdurantist's world? The four-dimensional worm does not change – it 'just sits there' – nor do any of its parts, since they only exist at one time (or during one interval). To the objector, perdurantists do not provide an account of change; rather, they deny change altogether. The problem with their 'account' is that they take change to be too much like simple spatial variation (where one part has a property that another part does not have). A dynamic phenomenon like change cannot consist in a mere temporal juxtaposition of static qualitatively different parts.

Now, returning to our main discussion, the interesting analogy with the dialectical situation we encounter with Lockeans and their opponents is that perdurantists typically meet this objection 'head-on'. Ted Sider makes it as clear as one could wish: "The objection may simply be met head-on. Change is analogous to spatial variation. […] There are no good arguments to the contrary." (Sider (2001, p. 214)). Mark Heller (1992, p. 703) provides an illuminating example and explanation of why this is so: he suggests that "we do in fact sometimes describe an object as changing in virtue of its having different properties at different places". When I give instructions to a friend for him to find my house, to take Heller's example, I can tell him: "It's exactly two miles after the road changes from paved to dirt" and, so, I am speaking about the road as if it changed, while, in fact, I am speaking of the dissimilarity amongst its spatial parts. If I were viewing the road from a bird's eye view (from a helicopter, for instance), I would not describe it as changing. The difference between the two cases, as Heller points out, is that, in the latter case, I have a neutral perspective while, in the former, I have given my friend a direction:

\(^8\) Or "counterpart", if one prefers the perdurantist Stage View. I shall use here the Worm View, but nothing really hinges on that choice.
following this direction, the road is first paved and then a dirt track, and this is why I said it changed.

I have sympathies with the perdurantist and I do believe that their 'head-on-istic' reply to the objector's worries is adequate. A static series of qualitatively distinct temporal parts gives rise to the phenomenon of change in the case where these parts are appropriately linked – typically, by way of similarity, causality, and spatio-temporal connectedness and contiguity. Thus I find it highly plausible to claim that a prima facie dynamic phenomenon (change) can arise from appropriately linked static components (temporal parts). (Which renders this debate even more appropriately analogous to our concerns, in addition to the similarity between the two dialectical situations.)

So, let us now get back to the Daintonian (but not Dainton's) objection against the broadly Lockean (but not Locke's) view. The objection does not deny the phenomenon that lies at the heart of this contemporary version of the Lockean account of temporal experience, namely the fact that there are two stages to be distinguished: first, the precognitive, unconscious and non-phenomenal stage, and, second, the phenomenally conscious stage. Nor, it seems, would the objector deny the claim that there is a lower and upper limit to the recognitional capacities of our perceptual system, as we have seen above.

What the objector does deny, however, is that such a view constitutes a good account of our temporal experience, since it appeals to non-experiential (non-phenomenal) steps in its explanation. According to the objector, a proper account should only rely on phenomenally accessible elements – all others being irrelevant.

The Lockeans, rightly to my mind, are not likely to be moved too much by such a worry, while of course recognizing its point. Why exactly, the Lockean can ask, is there a problem? What we have is an explanation of how our experiences of change and movement, with their dynamic content, arise from the stimuli our perceptual system gets from the world (a running horse, a dot on a computer screen, or cinema). The explanation is not a purely phenomenological one, and perhaps not even a purely philosophical one (since it involves neuro-psychological claims), and from this it also seems to follow that it is a contingent one (since it tells a story about how our brains function in the actual world) – but all this does not make it to be a bad explanation. It is a systematic one, to which we have no good counter-examples. Granted, we do not get here any deductive argument for a metaphysically necessary truth (and we do not get that from the specious present theorist either, of course), but we do get a well-behaved and well-understood argument for how our
experience of change and movement works in the actual world in normal cases. After all, what the whole debate is about is to try to understand our (human, actual) normal experience. We are not here to try to understand any alien's or other-worldly possible types of experiences. Thus, the contingency of the neo-Lockean account and its empirical components are in no way a reason to reject it. Neither is there a reason for disliking it because of the fact that it appeals to non-phenomenal elements in its explanation – for why would there be? The constraint that only "conscious" and "phenomenally visible" elements should play a role in the account of our temporal experience is unreasonably strong and unjustified. Compare to colour perception: if I want to understand what my perception of red consists in, I will be satisfied with an answer that involves explanations about surface reflectance properties, light, my retina, and so on. These non-phenomenal elements are parts of a good and complete explanation of the phenomenon of me having a perception of red. The same is true of our perception of movement and change.

(This way of putting things is perhaps exaggeratedly optimistic. Indeed, our current understanding of the workings of our perceptual system and of our brain is limited, as is our understanding of the way the phenomenon of illusory motion is generated, and of how any experience (dynamic or not) can arise from brain processes at all. The neo-Lockean view thus does not provide a full and genuine explanation, but rather a promising research programme.)

An interesting point about the dialectical situation here is that each of the two sides to the debate does not really deny what the other side claims. We have already seen that specious present theorists do not deny the main claims of the contemporary Lockeans – they just seem to think that these are irrelevant. The converse is true as well: the Lockeans do not (have to) deny that on the phenomenal level things appear to us as exhibiting something like a 'together-in-succession-ness' character – they just seem to think that noticing this is insufficient on its own for a good explanation. Perhaps one can then understand the Lockean proposal not as opposed to what the specious present theorists want to say, but rather as a complementary contribution that further develops their theory.

On the phenomenal level, we do not have an informative non-primitive understanding of what 'together-in-succession-ness' means (see §2 above). Indeed, Dainton and the other specious present theorists appeal to a primitive notion to unify the contents of a specious present. I do not mean this to be such a bad thing: after all, not only is it true in general that every theory has its primitives and one should respect that, but it seems actually
adequate to say that at the phenomenal level the unity of the different contents of a single experience just is a brute non-analyzable fact, to which we can point to in our explanations but of which we can hardly hope to provide a reductive analysis. What we need to understand is the nature of the unificatory link there is between different successive perceptions which gives rise to an experience of succession. On the phenomenal level, there is no such explanation available, but we can have one on the precognitive non-phenomenal level, provided by the Lockeans via considerations of Cases 1, 2 and 3 and the claim that our capacities to perceive movement and change have a lower and upper limit. It is not on the phenomenal and conscious level that our experience of movement and change is created, since it comes from the interpretation of external stimuli our brain does on a precognitive level. On this pre-phenomenal level, the unconscious counterpart of the 'together-in-succession-ness' phenomenon just amounts (roughly) to the phenomenon of speed of succession – and the Lockean account therefore actually helps and supplements (rather than rejects !) the specious present theorist's main claim, since even if we do not possess an informative explanatory account of 'together-in-succession-ness' on a phenomenal level, we at least have an explanation of how it arises from precognitive processes – which, I think, helps us to accept the primitiveness of this central notion.

Perhaps then, a cease-fire is in order.

Perhaps, an alliance can be built. As an example, consider the following objection that one can raise against the extensionalist version of the specious present theory (see §2): it seems to imply that one can be phenomenally aware of something before it actually happens. The extensionalist's specious present is temporally extended but by definition we are aware of it as a whole entirely whenever we are aware of it at all. Say, for instance, that I hear three notes in a rapid succession within a single specious present – a short and simple melody. The three notes are experienced "together-in-a-succession". But the three notes occur (in the world) at different times, say, t₁, t₂, and t₃, respectively. The question is: what do I have an experience of at, say, t₁ ? Since I have an experience of the content of the specious present, I should by definition be aware of the whole of the content of this specious present. But this seems absurd since the second and third note did not yet occur.

The Lockean claim that our perceptual system interprets stimuli from the world before it produces a conscious phenomenal experience, such as an experience of the three notes in a succession, easily solves the problem for the extensionalist since it shows that all three notes occur in the world before the subject has any experience of them at all, that is, even
before she has any experience of the first note. There is just some temporal discrepancy between the objective time at which things occur in the world and the objective time at which we become phenomenally/consciously aware of them. As the Lockean view shows, this is (not only because of the finite speed of light but also) because of the fact that our perceptual system takes some time to interpret the stimuli it gets from the external world prior to producing a conscious experience. Not only does this avoid the objection from the preceding paragraph, but we see here how importantly and closely the two views – the neo-Lockean and the extensionalist – work together. Thus, as before, extensionalists should not (and do not) deny what neo-Lockeans say here; relevantly, see Dainton (2008, §5) who explicitly accepts and puts to use the neo-Lockean claim: "[our brains] try to work out a single, coherent version of events on the basis of the fragmentary and (at times) conflicting data available to them. Only this 'final draft', as it were, reaches consciousness".

The two views – the Lockean and the extensionalist – thus not only seem to be no longer in opposition, but they actually seem to be able to helpfully interact and complete each other⁹.

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