

Minima sensibilia: Against the dynamic snapshot model of temporal experience

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Abstract: In our wakeful conscious lives, the experience of time and dynamic temporal phenomena—such as continuous motion and change—appears to be ubiquitous. How is it that temporality is woven into our conscious experience? Is it through perceptual experience presenting a series of instantaneous states of the world, which combine together—in a sense which would need to be specified—to give us experience of dynamic temporal phenomena? In this paper, I argue that this is not the case. Several authors have recently proposed dynamic snapshot models of temporal experience— such as Prosser and Arstila, building upon Le Poidevin— according to which, perceptual experience has no temporal content of a non-zero extent. I argue that there is an absence of motivation for such a view; I develop and defend the claim that perceptual experience minimally presents something of some non-zero temporal extent as such.

Introductory Remarks

In our wakeful conscious lives, the experience of time and dynamic temporal phenomena – such as continuous motion and change – appears to be ubiquitous.¹ How is it that temporality is woven into our conscious experience? Is it through perceptual experience presenting² a series of instantaneous states of the world, which combine together – in a sense which would need to be specified – to give us experience of dynamic temporal phenomena? Or are temporally extended occurrences presented in experience as such? The main interest in this paper is to develop and defend the claim that perceptual experience minimally presents something of some non-zero temporal extent as such (the Duration Claim). This entails a denial of the claim that perceptual experience has no temporal content, or that it presents what is the case at an instant in isolation³. In order to develop and defend the Duration Claim, I consider recent proposals from Prosser⁴ (2013, 2016, & 2017) and Arstila (2018), which both build on Le Poidevin (2007). They both develop variations of the dynamic snapshot model of temporal experience (DSM) – according to which perceptual experience has no temporal content of a non-zero extent.

Snapshot theories of temporal experience tend to be considered minority positions in current debates. Since James' *Principles of Psychology* (1890), if not before, it has been a familiar idea that, in order to experience motion, a subject must have an experience which presents a non-zero temporal extent. As a result, the experience of motion has been thought to give rise to a phenomenological

¹ I am grateful for the many discussions I have had, with numerous people, regarding these issues. In particular, I would like to thank Matt Soteriou, Christoph Hoerl, and an anonymous reviewer for the journal, for their detailed comments.

² I use the term 'present' so as to be neutral between various accounts of the nature of perceptual experience. I take it that saying experience 'presents' x could be read as experience 'presents through a relation of acquaintance', 'presents through a relation to sense data', or 'presents through representation'. I will mostly drop the prefix of 'perceptual', but there is no philosophical significance behind doing so, throughout my focus will remain on perceptual experience.

³ I will explain the significance of saying an instant *in isolation* in what follows (see section 4), but briefly, in order to be aware of something in isolation a subject need not be aware of anything else, or anything of a greater extent.

⁴ Prosser offers a variant of the dynamic snapshot model, though he does not unequivocally endorse it. In what follows, I will refer to the account put forward as Prosser's proposal, though it is to be acknowledged that it is a proposal that he is not ultimately satisfied with.

argument for the Duration Claim (outlined in section 1). The DSM can be read as one attempt at responding to such an argument – and to explain the experience of motion without endorsing the Duration Claim (outlined in section 2).

I argue that the dynamic snapshot theorist does not provide us with a plausible alternative explanation of motion perception; as a proposal concerning the phenomenal character of experience the DSM is left unmotivated. I argue that the findings from cognitive science discussed by Prosser and Arstila do not support the DSM (argued for in section 3); neither does reflection on the phenomenology (argued for in section 4); nor do considerations from certain theoretical claims in the literature (argued for in section 5). We are left without any good reasons to adopt a snapshot view of perceptual experience and with good reasons to endorse the Duration Claim.

1. A Phenomenological Argument: from the perception of motion

Consider seeing fallen leaves blowing in the wind, seeing a dog chasing a ball across a field, or – to stick with the traditional example in the literature – seeing the second-hand of a clock sweep around the clock-face. In all of these cases we take ourselves to experience something in motion, where some appeal to motion is required if we wish to do justice to what it is like for us perceptually (for simplicity I will continue to focus on the case of visually perceived continuous motion). If our experiential lives consist of a sequence of discrete experiences, each presenting something akin to an instantaneous state of affairs – such as a thrown ball at a position in its trajectory – it would appear to follow that we could not perceptually experience motion. That is, if all we experience – all that is presented in experience – is a static state of affairs at one time, followed at a subsequent time by a subsequent presentation of a static state of affairs, we should not perceptually experience motion. All that would be experienced is one static state of affairs at a time.

When proposed as an account of the phenomenal character of experience, the snapshot theory can appear hopelessly confused. Without saying more, far from providing an account of the phenomenology such a view is at odds with the perceptual phenomenology. Against such a view, our experience of motion is often thought to give rise to an argument for the claim that experience must present some non-zero temporal extent. One succinct presentation of this line of argument against the snapshot proposal can be constructed from Stern's (1897/2005: 321-323) writing on temporal experience, which highlights what is *prima facie* an inconsistent triad of claims about our experience:

1. **The Snapshot Claim:** Experience over time consists of a sequence of snapshots, each of which is neutral on whether it presents anything of a non-zero temporal extent (or – though this is a more committal claim – a snapshot only presents *instantaneous* content).
2. **The Static Claim:** Any snapshot must be static; we cannot experience motion/change in a single – non-temporally extended – snapshot presented in experience.
3. **The Motion Claim:** Reflection on the phenomenology of experience contradicts the idea that we have to infer motion and change, we perceptually experience motion and change.

This triad of claims also appears to be captured in a succinct paragraph by Dainton when he discusses the visual experience of a bird swooping across the sky, although in Dainton's discussion such a clear distinction is not drawn between what I am calling the Static and the Snapshot Claims:

“Even the briefest discernible phases of these visual experiences have a content that presents (or represents) *a bird in motion* [the Motion Claim]. This is one reason for supposing that such contents cannot be reduced to contents that are entirely static and motion-free [a denial of the conjunction of the Snapshot Claim and the

Static Claim]: motion is a fundamental and irreducible feature of much visual experience...” (Dainton, 2014: 109).

We appear to have a phenomenologically motivated claim, that we do experience motion/change, and two other claims which would conjunctively make this impossible. That is, those accepting the Static and Snapshot Claim must, Stern thinks, deny that we can experience motion/change (see Stern, 1897/2005: p.321). Stern’s proposed solution – and where most proponents of the specious present follow⁵ – is to reject the Snapshot Claim.

If we wish to do justice to the temporal phenomenology (that we seem to perceptually experience motion and change), then it appears we can dismiss snapshot theories as being at odds with the phenomenological datum. This is not to deny the possibility of there being further considerations which could, on reflection, force us to adopt an error theory⁶, but in the absence of such considerations, or without arguments to support them, we can reject the Snapshot Claim and endorse the Duration Claim. Yet such an approach is not universally accepted, and the utility of posing the argument as a response to an inconsistent triad of claims is revealed when we consider how some theorists have sought to maintain the Snapshot Claim.

2. The dynamic snapshot model

In recent work Prosser (2013, 2016, & 2017) presents a theory of temporal experience which can be read as a different response to the inconsistent triad from Stern. In an effort to accommodate

⁵ See, for example, the specious present theories of: Broad (1938); Dainton (2000, 2001, 2008, & 2014, esp. p.109); Foster (1979, 1991); Hoerl (2009, 2013); Grush (2007); James (1890); Lee (2014a & 2014b); Phillips (2010, 2011a, & 2014); Rashbrook (2013); and Russell (1984).

⁶ Reid appears to have something like this in mind when he claims that perception (the operations of the senses and consciousness, in his terms) is limited to the present instant (Reid, 1785, Essay III. Chap.V).

the Motion Claim, Prosser articulates a position which accommodates the Snapshot Claim and rejects the Static Claim. This is an interesting proposal in and of itself, as it presents an account of how the inconsistent triad of claims can be resolved which has gone under-appreciated throughout much of the twentieth century (in part because the Snapshot and Static Claims are rarely explicitly distinguished between); if successful, Prosser blocks the argument for the Duration Claim.

Prosser presses back against what I have called the Stern-inspired line of argument. He says that such an argument assumes that “[a]n instantaneous content cannot include anything that can only be detected over a non-instantaneous interval”, but this “conflates the properties of the stimulus that are necessary for motion detection with the content of the resulting experience.” (Prosser, 2016: 121-2). That is, in more crude terms, it simply assumes that such an experiential snapshot would have to be static without argument.

Assuming that an experiential snapshot need be static is unjustified, Prosser says, given that we can and do define instantaneous rates of change when talking about the velocity of moving bodies. In an analogous way, Prosser suggests that what is presented in perceptual experience could involve what is the case in the external world at a time, such as the spatial locations of various stimuli, as well as including something like an instantaneous vector rate of change assigned to moving bodies in the external world⁷. Prosser argues that this experiential vector could feature in what is presented as being the case at a time, even if there needs to be a temporally extended external stimulus in order to produce this.

Valtteri Arstila has independently developed a DSM of temporal experience (Arstila 2018), taking inspiration from discussions in the empirical literature (Di Lollo, 1980; Di Lollo & Wilson, 1978),

⁷ It is worth noting that Prosser only needs something roughly analogous to this notion, but which has application in the experiential case. Prosser need not be read as suggesting that mathematically defined vectors feature in experience.

as well as Le Poidevin's (2007) discussion⁸. Like Prosser, Arstila appears to assume that appeal the Duration Claim is solely – or at least mostly – to be motivated by accounting for the experience of temporal phenomena such as continuous motion and change⁹. Arstila suggests that “the experience of motion [can be] explained in a framework where the contents can, subjectively speaking, be confined to an instant. *This follows from* the fact that... we can have an experience of motion without an object appearing to us as being in different places at different times.” (Arstila, 2018: p.290; *emphasis added*)¹⁰.

A common thread in Arstila's and Prosser's proposals is an appeal to Le Poidevin's discussion of the waterfall illusion. The waterfall illusion is a particular type of visual illusion – a form of motion aftereffect – which a subject can experience after watching a moving stimulus for some period of time (remaining – and keeping her eyes – stationary), such as a waterfall, and then fixating her gaze on some stationary stimulus, such as a riverbank. At this point the stationary stimulus is described as seeming – illusorily – to be moving in the opposite direction to the originally perceived moving stimulus, while also seeming to stay in the same position¹¹. That is, the illusion is described in terms of the subject's experience presenting an object/stimulus – the river bank – as remaining in the same spatial location while yet being in motion. Prosser follows Le Poidevin in suggesting that cases such as this demonstrate a potential role for two perceptual mechanisms: the perception of successive states of the world – like static snapshots – and the perception of pure movement –

⁸ Chuard (2011 & 2017) also independently develops a snapshot theory of temporal experience. On one (perhaps uncharitable) reading of Chuard's proposal it falls foul of the Stern-inspired line of argument; on another (perhaps more charitable) reading of Chuard's proposal it shares the relevant features with the views of Arstila and Prosser.

⁹ Arstila argues that even if the specious present – or, any account endorsing the Duration Claim – is supposed to describe the phenomenology, rather than explaining it, the dynamic snapshot theory he offers undermines this motivation for appealing to the Duration Claim (see Arstila, 2018: 297). I argue that this is not the case in sections 3, 4, and 5.

¹⁰ Distinguishing his view from that of Prosser and Le Poidevin, Arstila claims that “all temporal phenomenology can be explained ... by appealing to the existence of automatic, encapsulated, and domain-specific mechanisms.” (Arstila, 2018: 290) From here onwards I focus upon what is common between Arstila's and Prosser's DSMs.

¹¹ Gregory (1966) describes such illusory cases as ‘paradoxical’. Discussing a number of after-effects, he reports: “The illusory movement may be paradoxical: [a stimulus] may *expand* and yet *not get any bigger*. Or, *shrink* but *not get any smaller*. It is changing and not changing. This sounds impossible, and it *is* impossible for real objects; but ... what holds for real objects may not hold for perception once we suffer illusions.” (Gregory, 1966: 109).

adding dynamism to the static snapshots¹². Prosser suggests that the latter might operate independently of the aforementioned perception of successive states.

Postulating two distinct perceptual mechanisms, the waterfall illusion can be explained in terms of the mechanism for perceiving pure movement operating while the subject looks at a stationary state of affairs. This gives rise to the illusion that the riverbank is in motion while remaining in the same spatial location. Regardless of whether an interlocutor is satisfied with this explanation of the waterfall illusion, Prosser suggest that if there is such a mechanism for the perception of pure movement, then the perception of motion would not *necessarily* require some interval to be presented in perceptual experience.

The reasoning goes as follows: That there is such a system for perceiving pure motion entails that “experiencing motion does not essentially involve experiencing the object as being at different places at different times.” (Prosser, 2016: 124). The position of some stimulus (and hence any change in its position), and that it is in motion, would be independently specified by distinct perceptual mechanisms. A subject need not, therefore, have an experience presenting an object at two distinct spatial locations at two times in order to experience motion. As a consequence, Prosser argues that we needn’t suppose that experience presents a subject with some minimal interval in order to explain the experience of motion; we should not simply assume the Static Claim¹³.

¹² Empirical support can be found in sources such as Nakayama and Tyler (1981), who try to isolate visual movement sensitivity from visual position sensitivity in a series of psychophysical studies. On the basis of their results, the authors conclude that “[b]ecause differential motion sensitivity is so much better than position sensitivity when the comparison is made over [what is, within the study, considered to be] very large distances... it is unlikely to be derived from the psychophysically measured position sensitivity... [and it is] best seen as a system wired in parallel to position sensitivity.” (Nakayama & Tyler, 1981: 432). However, further empirical studies appear to suggest that, though there may be something akin to a mechanism for detecting pure motion (irrespective of positional sensitivity), there may also be a role for the detection of motion based on positional sensitivity (Tayama, 2000, and Lappin *et al.*, 2009).

¹³ I will argue that this does not straightforwardly follow (in section 3), but there might be a further problem here. Prosser appeals to distinct visual mechanisms for position sensitivity and motion detection in order to suggest that we may be experientially presented with a snapshot with a vector ‘painted’ onto it. Even if such distinct mechanisms could play an explanatory role, it is not clear that there are distinct mechanisms corresponding to each sensory modality, to be appealed to in all cases of experienced change. An anonymous reviewer for the journal adds that the story of distinct mechanisms for tracking motion and location do not obviously extend even to other visually perceived changes (i.e. changes in colour).

If it has been assumed by theorists that in order to experience motion an experience must present an object at two discriminable locations at two times (plausibly within some other specified limits), proponents of the DSM use the waterfall illusion to reject this assumption. The riposte is to say that such a change in location is what is (usually) required in the world in order to lead to an experience of motion – this is necessary for the stimulus to be in motion and is usually required for motion detection – but it does not follow that this is necessarily what is presented in experience.

It is worth stressing that, for all that has been said, the DSM might outline a possibility in logical space, but this is not to say that the reader is motivated to endorse this account rather than an account which endorses the Duration Claim (thereby rejecting the Snapshot Claim). In the following three sections, I argue that there is an absence of motivation for the DSM: that the empirical literature does not provide independent support for endorsing the Snapshot Claim; that reflection of the phenomenology and comparisons with the visuospatial case supports endorsing the Duration Claim and **not** the Snapshot Claim; and finally, that there are not persuasive theoretical considerations which pressure theorists towards endorsing the Snapshot Claim.

3. Mechanisms and Phenomenology: No support from cognitive science

Artsila, Le Poidevin, and Prosser each argue that the perception of motion is not reducible to the perception of a change of spatial location, using empirical findings in order to suggest that there is “some degree of independence between the computation of motion and the computation of position” (Prosser, 2016: 125). These theorists claim that there are distinct perceptual mechanisms for tracking the change in position of a stimulus and for the detection of motion; further claiming that such findings in cognitive science support appeal to the DSM. I foresee two broad concerns with this argumentative strategy.

Firstly, a proponent of the Stern-inspired argument need not disagree that there are such distinct mechanisms, because a claim about perceptual mechanisms does not straightforwardly translate to claims about the perceptual phenomenology. This appears to be Flanagan's (1998) point, when he says: "Suppose that neuroscientists discover that consciousness is in fact realised like a movie reel consisting of individual images, the moments of consciousness, with small separations between them, the gaps. It is not clear that this would or should have any impact upon what we say about how consciousness seems from a first-person point of view." (Flanagan, 1998: 89). As Flanagan notes, it remains far from obvious what an empirical story on the level of such mechanisms can tell us about how we should characterise the phenomenal character of experience. Accepting that there are two distinct perceptual mechanisms for tracking change in position and for detecting motion does not provide any *independent* motivation for endorsing the Snapshot Claim over the Duration Claim, as these are claims concerning phenomenology.

The second and more substantial concern is as follows. The snapshot theorist is correct to point out that cases such as the waterfall illusion demonstrate that the experience of motion can occur without the experience of a change in spatial location. However, while a subject need not be presented with a stimulus changing its spatial location in order to experience motion, it does not follow that a subject could be perceptually presented with motion without being presented with an occurrence of a non-zero interval. Contrary to what Prosser and Arstila suggest, it simply does not follow that the experience of motion is not in and of itself something with a fundamentally temporally extended phenomenology; that motion/change as it is experienced seems processive, as something occurring over time. All that cases such as the waterfall illusion demonstrate is that motion can be experienced in the absence of an experience of a change in spatial location; it **does not** entail that motion can be experienced in the absence of an experience presenting a temporal extent.

The dynamic snapshot theorist will want to insist that a subject can be perceptually presented with motion without being presented with a non-zero temporal extent. The disagreement here depends on how we are to cash out the phenomenology in cases of perceived motion (as well as cases such as the waterfall illusion). The dynamic snapshot theorist appears to assume that it is to be cashed out in terms of something like a stimulus occupying a position at a time, while seeming to be in motion. This might not be quite right. We might instead characterise the waterfall illusion in terms of apparent motion and stasis *over time*; motion and stasis (apparent or veridical) being phenomena which seem processive and to be occurring *over time*.

The pertinent question then concerns what could decide between these two ways of characterising the phenomenology. It would support the claim that motion seems to be processive and occurring *over time* if there is a distinction to be drawn – from reflection upon the perceptual phenomenology – between cases like the waterfall illusion and cases in which a subject veridically perceives motion. The snapshot theorist's proposal is not well placed to account for such a phenomenological distinction, because in each case – the veridical experience of motion and the waterfall illusion – they would postulate an experiential snapshot which presents a subject with a spatial arrangement of stimuli and an experiential vector (assigned to certain stimuli). Whether there is a change in location or not – whether the experience is of motion *and* a change in location, or a case such as the waterfall illusion where there is motion *without* a change in location – would only be revealed across some series of snapshots.

If the waterfall illusion is best described in terms of the riverbank seeming to be in motion while seeming to *remain* in the same spatial location, we have to say that there is something it is like for an object to be presented *as remaining* in a given spatial location or *as changing* its spatial location. Because the snapshot theory rules out the very possibility of a change of location being presented in perceptual experience, if this is the best way to characterise the phenomenology then the

snapshot theory would be poorly placed to account for the very illusion that is often used in order to motivate its introduction¹⁴. It would be no help to characterise the illusion in terms of perceiving motion while also *failing* to perceive an object changing location. Failing to perceive an object changing location would suggest that there can be success in perceiving an object changing location, which is something that the proponent of the DSM denies. Put another way, on the DSM all perceptual experience could be equally characterised as failing to perceive an object changing location; so this characterisation cannot account for a phenomenological difference between the illusion and the veridical perception of an object in motion.

Arstila appeals to the empirical findings of Di Lollo in order to bolster his argument for the DSM. The relevant findings concern an experiment in which Di Lollo (1980, and Di Lollo and Wilson, 1978) presented subjects with twenty-four dots/ flashes on a five-by-five matrix. The subjects' task was to identify the missing dot. In the most relevant experiment, the dots were shown in two flashes. The leading display comprised twelve dots, chosen at random from twenty-five possible ones; after its offset an empty screen was displayed for 10 milliseconds, followed by the trailing display which comprised twelve dots, chosen at random from the thirteen remaining possible dots, which was also displayed for 10 milliseconds. Di Lollo and colleagues investigated subjects' success in identifying the missing dot when the duration of the leading display varied (10, 40, 80, 120, 160, 200 milliseconds).

The results showed that the subjects performed almost without error in the conditions where the leading display lasted 80 milliseconds or less; for longer leading display durations, the performance

¹⁴ An anonymous reviewer suggests that the snapshot theorist could appeal to vectors for change in location (in addition to 'motion' vectors) in order to account for the waterfall illusion. If it makes sense to appeal to both vectors for change in location and vectors for motion (and I am not convinced that appeal to location vectors in addition to motion detectors does make sense, as I am not convinced that a stimulus could seem to be changing its location without seeming to be in motion), perhaps the DSM can account for the waterfall illusion. But this alone has no positive dialectical force; it does not speak in favour of the Snapshot Claim as opposed to the Duration Claim.

was markedly worse and decreased quickly. When the leading display lasted 120 milliseconds, almost eighty percent misidentified dots belonging to it. Di Lollo's finding is that success in this task (which he takes to be dependent upon the perceptual availability of a stimulus¹⁵) depends on the stimulus' onset – the time that has passed since the stimulus was first noticed – rather than its offset.

Artsila takes from Di Lollo the suggestion that “the presentation of a stimulus triggers sensory coding mechanisms responsible for processing and identification of the stimulus. These processes last roughly 100 milliseconds and the stimulus is perceptually available to a subject during that time.” (Arstila, 2018: 293) Di Lollo plausibly demonstrates a relationship between the duration of a visual stimulus and the duration of the perceptual availability of that stimulus for a subject. If we take perceptual availability to be determined by the stimulus onset (and duration of the stimulus), we might say that any given stimulus is perceptually available for minimally 100 milliseconds¹⁶, and if the stimulus is presented for 100 milliseconds or more then it is simply perceptually available for the duration that it is presented. For example, a 10 millisecond presentation of a stimulus is perceptually available for 100 milliseconds, a 100 millisecond stimulus is perceptually available for 100 milliseconds, a 150 millisecond stimulus is perceptually available for 150 milliseconds¹⁷.

Artsila takes this finding to be problematic for specious present theorists: “The doctrine of the specious present... seems to be committed to the view that what matters for the perceptual or intentional availability of the stimulus is its offset.” (Arstila, 2018: 293). However, there are at least two readings of perceptual availability to be pulled apart; neither should worry the specious present

¹⁵ Di Lollo claims that performance in this task “depends critically on the simultaneous perceptual availability of all twenty-four dots” (Di Lollo and Wilson, 1978: 1607). This is accounted for by making perceptual availability a matter of processing that begins with the onset of a stimulus and takes a certain amount of time.

¹⁶ Arstila says “...if a stimulus lasts only 10 milliseconds, it is perceptually available for an extra 90 milliseconds or so.” (Arstila, 2018: 293). On the minimum duration of visual experience also see Efron (1970).

¹⁷ This is an oversimplification and it is not precisely what Di Lollo's findings support (for critical discussion see Coltheart, 1980: 20), but it is an acceptable model for the purpose of the present illustration.

theorist who is at pains to maintain the Duration Claim¹⁸. First, if we take perceptual availability to be a matter of informational persistence¹⁹, i.e. the persistence of representations posited in an information processing account of perception, then it is not clear what bearing the duration that this information persists for has on either the Snapshot or Duration Claims, these being claims concerning the phenomenology. Arstila may be assuming that the specious present is to be appealed to on the level of information processing (see Arstila, 2018: 297), but this is not obviously how most theorists appealing to the specious present should be interpreted and importantly it is not how we are to understand the Duration Claim in the present context.

Second, if we take perceptual availability to be a matter of visual/phenomenal persistence, i.e. the duration a stimulus is presented as persisting in one's perceptual experience, then this need not trouble the theorist wishing to maintain the Duration Claim either. We can maintain the Duration claim and grant that a stimulus, despite only being displayed on a screen for 10 milliseconds, is presented as persisting for 100 milliseconds. We need to distinguish between the properties of the stimulus and that which is subsequently presented in perceptual experience (as Prosser says in his discussion). Since the Snapshot and Duration Claims are presented as claims about the latter, we might say that what matters is not the offset of the stimulus, but rather the 'offset' of that which is presented in experience. The specious present theorist can allow that stimuli displayed for 10 milliseconds are presented as persisting for 100 milliseconds in experience. Given that the leading display, though only displayed for 10 milliseconds, is presented in experience as persisting for 100 milliseconds, it may be presented in experience as overlapping in time with the trailing display (given a 10 millisecond delay between the offset of the leading and onset of the trailing display). We can therefore allow that all 24 flashes will be simultaneously perceptual availability for a finite interval; this may explain the subjects' success in identifying the missing flash. This is a simplified

¹⁸ Thanks to an anonymous reviewer for the journal for picking up on this and pushing me to comment.

¹⁹ On the distinction between informational and phenomenal persistence, see Coltheart (1980) and Phillips (2011b).

model, but importantly all of the above could be granted without being in any tension with the Duration Claim.

Aside from the studies Prosser and Arstila explicitly discuss, VanRullen and Koch (2003) may be read as an influence behind the DSM. Rather than discussing whether or not what is presented in experience is temporally extended, VanRullen and Koch frame their discussion in terms of whether perceptual experience is discrete or continuous. This is orthogonal to the Duration Claim. The Duration Claim is neutral as to whether what is presented in experience is presented continuously or in discrete pulses. Crick and Koch (2003) might also be read as a further source of support for the DSM, insofar as they claim "... that conscious awareness (for vision) is a series of static snapshots, with motion 'painted' on them." (Crick and Koch, 2003: 122). Note, however, that this is followed immediately by the following claim. "By this we mean that perception occurs in discrete epochs." (Crick and Koch, 2003: 122) As discussed previously, the question of whether perception is discrete or continuous is orthogonal to the question of whether a temporal extent is presented in perceptual experience.

The evidence that Crick and Koch cite in support of their claim (Zihl et al., 1983, and Hess et al., 1989) are clinical discussions of cerebral akinetopsia (visual motion blindness)²⁰. These discussions provide further empirical support for the claim that the visual experience of motion is dissociable from the visual experience of location tracking. Zihl et al. also demonstrate that cerebral akinetopsia cannot be attributed to an impairment in temporal acuity, as other temporal measures – such as the minimum time interval that must separate two visual in order for the perceptual experience of temporal order²¹ – are not diminished. Having already granted that the experience of motion is dissociable from an experience of a change of location, this evidence does not speak

²⁰ See Zeki (1991) for a review of the syndrome.

²¹ This is the critical flicker fusion measure, as discussed by Hirsch and Sherrick (1961).

in favour of either view regarding the temporal extent of what is presented in perceptual experience. Such clinical discussions of visual motion blindness do not provide support for the DSM, at least insofar as this is expressed as a proposal concerning the temporal extent, or lack thereof, of what is presented in perceptual experience.

One final point worth considering is whether the empirical literature might actually provide evidence against the DSM. Such evidence might be read in Alan Johnston's discussion of motion perception, where he appeals to the wagon wheel effect in cinematic representation²². At a frame rate of 24 per second stagecoach wheels can appear to the audience to rotate in the reverse direction to their true direction. This effect is explained by the fact that the shortest path between the spokes in subsequent frames is in the physically reversed direction. In unmediated viewing of rotating wagon wheels there does not appear to be a rate of rotation at which we typically experience such a reverse in direction²³. On this basis, Johnston says: "The idea that our visual experience is made up of a series of instants is not supported, otherwise the experience of the wagon wheel effect would be just as salient and persistent for wheels in the real world as it is for moving wheels seen in the cinema." (Johnston, 2017: 280)²⁴

If the wagon wheel illusion in cinematic representation is to be explained by the fact that the shortest path between the spokes in subsequent frames is in the physically reversed direction, then

²² Johnston says that "measures computed at an instant can provide information about the recent past, present and the future" (Johnston, 2017: 278). Yet he takes this to be a claim about computation and not about the visual representation which results from any such computation, and so does not appear to take this claim to support an appeal to DSMs.

²³ This claim is consistent with evidence that some rotating patterns can appear to reverse their direction of rotation under some conditions. As put by Johnston: "Real wagon wheels do not typically appear to reverse at a particular rate of rotation, so it is unlikely that the retinal image is temporally sampled in any direct sense (Kline *et al.* 2004). However, rotating patterns can appear to reverse their direction of rotation in some conditions (Schouten 1967; Purves *et al.* 1996; VanRullen *et al.* 2005). These reversals are not sustained but rather alternate with periods of forward motion." (Johnston, 2017: 279)

²⁴ VanRullen and Koch say that "motion reversals are difficult to explain without assuming a discrete processing component acting during, or before, the perception of motion." (VanRullen and Koch, 2003: 208) One can accept such an assumption regarding components of the perceptual processing without thereby assuming the Snapshot Claim. As put previously, the Duration Claim is neutral on the issue of whether what is perceptually presented is presented continually or in discrete pulses.

assuming a snapshot model of temporal experience we might expect that in unmediated viewing of rotating wagon wheels there would be a rate of rotation at which the shortest path between the spokes in subsequent perceptual snapshots is in the physically reversed direction. This does not appear to be the case. That there is not a particular rate of rotation at which we typically experience such a reverse in direction in unmediated reviewing reveals an absence of evidence in favour of the DSM where one might expect to find it. While the waterfall illusion is often taken to motivate an appeal to the DSM, the absence of the wagon wheel illusion, in unmediated viewing, appears to weigh against such an appeal²⁵.

Findings arising from the empirical sciences do not support a version of the DSM over an account which endorses the Duration Claim. That there may be two distinct perceptual mechanisms does not tell us how we are to characterise the phenomenology. It does not follow from the claim that a subject can experience motion without experience presenting a stimulus changing its spatial location that a subject can experience motion without experience presenting some temporal extent. If anything, reflection on the phenomenology in cases of perceived motion supports adherence to the Duration Claim; the Snapshot Claim remains unmotivated.

4. Minima Sensibilia: No support from phenomenology

One may wonder whether the DSM is supported by reflection on the phenomenology, if not by the empirical literature. I argue that quite the contrary is true; reflection on the phenomenology reveals an absence of evidence for the Snapshot Claim where one would expect to find it. As a

²⁵ I am grateful to an anonymous reviewer for the journal pushing me to clarify this point.

result, there is no compelling reason, from reflection upon the phenomenology, to posit such experiential snapshots²⁶.

When theorizing about temporal experience, Prosser warns us not to confuse the properties of the stimulus necessary for detection by one's perceptual mechanisms with the properties presented in experience. Although there may need to be a temporally extended stimulus in order for a subject to undergo an experience presenting motion (and plausibly in order for there to be an experience presenting anything, be it a light, a sound, or a tactual sensation), Prosser says that it does not follow that there must be a temporal extent presented in experience. Regardless of whether or not this follows, we might wonder how plausible the alternative is. To demonstrate, consider what we can say about the visuospatial analogue.

The visuospatial variant of Prosser's warning would be that, while there must be a spatially extended stimulus in order for a visual experience of spatial phenomena, it does not follow that experience presents a spatial extent. Rather than holding that a subject has an experience presenting a desk (a spatially extended object), the suggestion could be that a subject has many experiences (at the same time), each presenting no spatial extent. Call this a form of phenomenal atomism²⁷, where together a number of experiences each presenting no spatial extent account for the subject's phenomenology (even if this is pretheoretically described as experiencing a spatially extended desk). Irrespective of whether experience presenting some spatial extent follows from the thought that there must be a spatially extended stimulus in order for an experience of spatial phenomena, what is the motivation for denying that experience presents a spatial extent? It does not appear as though there is any motivation for supposing the alternative picture of phenomenal

²⁶ See, for comparison, Tye's (1992: 160) arguments against positing qualia.

²⁷ I use the terminology of 'phenomenal atomism' to pick out a view on which the experience of some particular thing, spatially or temporally extended (such as the desk, or the wave of a hand), is to be accounted for in virtue of multiple experiences each presenting no positive extent or the extent of the minimum sensible.

atomism. Indeed, there is motivation for not supposing such an alternative, which is evident when we turn to consider the spatial minimum which can be discerned in isolation.

In addition to there being a question concerning the minimum size necessary in order for a stimulus to be detected by a subject's perceptual mechanisms, there is also a question regarding the minimum sensible perceptually *presented* in isolation. We can see objects such as books and desks, these provide a good example of the “moderate-sized specimens of dry goods” – to use Austin's (1962: 8) terminology – that philosophers of perception regularly discuss. Yet (and this is a different claim to that of perceptual acuity) we cannot discern extensionless spatial points/slices in isolation when reflecting on our experience, when visually perceiving a book or desk for example. We are only introspectively aware of such extensionless slices insofar as we are aware of some extended chunk. We can be said to be visually aware of the edge of the desk – taking the edge to be an extensionless line, where the desk stops – but only insofar as we are visually aware of some portion of the desk and some portion of the space beyond this; we are not introspectively aware of the extensionless line in isolation.

Reflecting on the previous example we can make a negative claim in descriptive phenomenology: we are not introspectively aware of anything point-like (or line-like²⁸) in isolation, when we reflect upon our experience. Whatever the minimum sensible is, there is no introspective support for suggesting that it is of *no* spatial extent. Furthermore, it is important to recognize that whatever estimates empirical studies can offer of the extent of the visuospatial minimum sensible, this does **not** lend plausibility to the claim that in visual experience a subject has many experiences (at a time), each presenting this minimum (spatial) sensible. As stressed above, there is no compelling reason to accept the sort of phenomenal atomism which would follow from this claim.

²⁸ As put by Moore, points, lines, and surfaces are not of any extension (see Moore, 2001: 158).

Considering the minimum visuospatial sensible gives us reason **not** to posit experiences presenting no spatial extent; and there is no additional compelling reason to posit experiences each presenting the minimum visuospatial sensible. The simplest hypothesis, consistent with what one experiences and the awareness of one's experience afforded by introspection, is that there is *an* experience presenting something spatially extended – such as a visual experience of the desk. Similar claims hold in the temporal case.

In his *Principles of Psychology* James claims that the strict present – an extensionless instant – is “never realized in sense” (James, 1890: 406); one plausible interpretation of his claim is that an experiencing subject is not experientially aware of an isolated instant²⁹. This is not to claim that some events will be so brief – perhaps instantaneous – that we may not perceive them, it is not a claim about a necessary temporal feature of the stimulus in order for it to be perceived, and it is not a claim about the interval which must separate two events in order for us to experience them as successive (to be able to discriminate between their relative temporal locations). This is the claim that there are lower limits to the temporal resolution of what is presented in perceptual experience. This can be expressed as the following negative claim: we cannot, in introspection upon what is presented in our experience, discern below a certain positive duration in isolation.

The terminology of ‘instant in *isolation*’ is important in what I am claiming. In order to be aware of something in isolation a subject need not be aware of anything else, or anything of a greater extent. On the account to be offered, we need not deny that there is something it is like for a subject at a time, or at a point in space (point of the subject's visual field), as long as we hold that there is only

²⁹ It is also possible to see elements of this view in Hodgson's *Philosophy of Reflection* (1878), which is frequently quoted by James in his section of the perception of time; see Andersen (2017) for discussion.

something it is like at that time, or point, in virtue of what it is like *over* that time, or across that point. This is what I take the DSM (and its spatial analogue) to deny³⁰.

To illustrate the negative claim, and how a proponent of the DSM may respond, we can turn to Phillips' discussion of perceiving constant motion (Phillips, 2011a: 821). (For our purposes, we can cast what he says in terms of perceiving a constant change in location.) It is plausible that one of the changes we can experience is a change in location. That is, in addition to the experience of pure motion, we can also experience a stimulus as constantly changing its spatial location – with the discussion of the waterfall illusion demonstrating that the two are dissociable. If we grant that we can see a clock hand (which sweeps around the clock face, rather than ticking) as constantly changing its location, we can take it from Phillips that it must be that during all sub-periods of its movement we experience it as changing its location.

On the plausible assumption that our powers of discrimination are finite, there are some periods of time over which we see the clock hand sweeping out an angle only just large enough for our powers of visual discrimination to discern³¹. In such a case we cannot perceive finer-grained facts about the change. To put this in Phillips's terms: “the content of our experience at these timescales [below the minimum change we can discern] is of some [change] *continuing to unfold*.” (Phillips, 2011a: 821; *emphasis in original*) In these circumstances, we see the hand changing its location constantly, without perceiving its determinate time-course. It is not that we are aware, at immediately subsequent times, of the stimulus as occupying a determinate discrete location.

³⁰ “According to the dynamic snapshot theory, what is experienced as happening at t is in no part constituted by what is experienced as happening at other times close to t .” (Prosser, 2017: 150).

³¹ It might be thought that reflection on auditory experience weighs against the DSM; that we cannot make sense of any auditory content which does not seem to possess a temporal extent (for example see Judge, 2018: 232). I do not wish to press this point here, as proponents of the DSM do claim that we can appeal to the DSM for other modalities (see Prosser, 2016: 134) and simply denying this claim would result in a dialectical standoff. Another reason not to put too much weight on an appeal to the auditory case is that the proponent of the DSM might claim that it is solely a view concerning vision (see Crick and Koch, 2003, above).

Rather, we are aware of it as constantly changing its location; not determinately occupying a series of discrete, distinct locations.

Faced with such a case, a snapshot theorist would have to either deny that we are so introspectively aware of constant change (in location), taking each experiential snapshot to present a given spatial arrangement of stimuli³², or she would have to appeal to acuity measures in our introspective awareness of our own perceptual experience. On the first response the subject is attributed implausibly fine-grained powers of discrimination, being capable of introspective awareness of some state of affairs at a time (rather than over some minimal interval). On the second, it could be said that perceptual experience consists of a series of experiential snapshots, but in reflecting upon our experience we are only ever aware of some series of such snapshots. As a result, we can be introspectively aware of a stimulus changing its location – revealed over some series of snapshots – even though this is not what is presented in perceptual experience. This avoids attributing subjects with implausibly fine-grained powers of introspective discrimination, but it is not obvious what there is to motivate the drawing of such a distinction between what is presented in experience and our introspective awareness of what is presented in experience, apart from an ad hoc defensive manoeuvre³³.

Prosser appears to take the first route while trying to avoid the attribution of implausibly fine-grained powers of discrimination to experiencing subjects. When it comes to the issue of the temporal minimum a subject can discern, Prosser says: “if Δt is the minimum discriminable duration we should say that all durations shorter than Δt are experienced as being of indeterminate duration within the range between zero and Δt Perhaps, then, we should say that... the

³² It need not follow that the stimuli are presented as determinately located in such an experiential snapshot, but regardless of whether the spatial relations are presented with some degree of indeterminacy, it follows that we cannot perceive a stimulus changing its spatial location.

³³ This would appear to require a distinction between *what it is like* for experiencing subjects, and *what it seems to be like* for them. Against the drawing of such a distinction, see Tye (2009: 260); and Nanay (2010: 268).

experienced present is... an interval of indeterminate duration between zero and Δt ." (Prosser, 2016: 135; also see 145-6). There are two problems with this explanation, one concerning the sub-intervals of the minimum discriminable duration; another concerning the relevance of the minimum discriminable duration when individuating between experiences.

First, it is not clear in the context of Prosser's discussion why Δt is not simply taken to be the temporal minimum sensible. Suggesting that what is presented in experience is an interval of indeterminate duration between zero and Δt appears to bring unnecessary additional commitments. It would appear, on the contrary, as though something must be experienced to be at least of the duration of Δt , or else Δt would not be the minimum discriminable duration. If the phenomenology can speak to there being a change (in position, for example) over Δt – as I have suggested – then this leads us to a rejection of the Snapshot Claim and an endorsement of the Duration Claim. As his argument is presented in the context of a discussion of the specious present (Prosser, 2016: 134-135), Prosser's riposte is to say that such minima do not vindicate appeal to a specious present (which is generally characterised as being of a greater temporal extent than such minima). However, given that there are such temporal-minima, it does not follow that what is presented in perceptual experience is limited to the temporal extent of such minima (compare to how the visual field is not limited to the spatial extent of such visuospatial minima).

Second, building on the previous point, when some subject experiences a temporally extended occurrence, such as the second hand sweeping around the clock-face, we can ask whether there is *an* experience of something temporally extended, or whether there are many experiences (successive in time) each presenting no temporal extent, or presenting the extent of the minimum sensible. Is there a visual experience of the temporally extended movement of the second hand, or a succession of visual experiential snapshots each presenting the second hand at some point in its rotation? In the temporal case there is an absence of introspective evidence for supposing that,

when some subject experiences a temporally extended occurrence, there are many experiences (successive in time) each presenting no temporal extent; this is analogous to the visuospatial case. The simplest hypothesis, consistent with what one experiences and the awareness of one's experience afforded by introspection, is that there is *an* experience presenting something temporally extended – an experience of the temporally extended occurrence.

To summarise: if over Δt , the temporal minimum which we *can* be aware of being presented in isolation, what is presented in experience speaks to there being a change (in position, for example), then this appears to motivate appeal to the Duration Claim (and rejection of the Snapshot Claim). Furthermore, as in the visuospatial case, whatever we say regarding the temporal minimum sensible, this does **not** lend plausibility to the claim that in experiencing a temporally extended occurrence a subject has many experiences (successive in time), each presenting the temporal extent of Δt . There is no more compelling reason from reflection upon the phenomenology to accept this sort of phenomenal atomism in the temporal case than in the spatial case. Reflection on the phenomenology provides no support for the Snapshot Claim.

5. Miller's PPC and PSA: No theoretical pressure

It appears plausible to suggest that those theorists who are disposed to treat snapshot theories as an intuitive starting point in theorising about our experience of time and temporal phenomena are motivated to do so by something more basic than explanations arising out of the empirical sciences. Although I have argued that reflection on the phenomenology does not motivate an appeal to experiential snapshots, one remaining alternative is that theorists feel that there is theoretical pressure which motivates appeal to the Snapshot Claim. In what follows I suggest that there is one place in which theorists might suppose that there is such pressure, but upon closer inspection this pressure dissipates.

Many theorists have found plausible the idea that a subject's experience seems – to the subject – to be concurrent with what it is an experience of. This is often expressed in terms of Miller's (1984) Principle of Presentational Concurrence (PPC). As put originally by Miller: “the duration of a *content* being presented is *concurrent* with the duration of the *act* of presenting it... the time interval occupied by a content which is before the mind is the very same time interval which is occupied by the act of presenting that very same content before the mind.” (Miller, 1984: 107; *emphasis in original*). In experiencing temporally extended phenomena our experiences *seem* concurrent with the temporally extended phenomena they are experiences of (insofar as PPC is a phenomenological claim). Endorsing PPC, a theorist might endorse the claim that at a time some subject experiences what seems, to the subject, to be the case at that time. Note that this is not equivalent to the claim that there are experiential snapshots³⁴. One could accept the former without thereby endorsing the Snapshot Claim³⁵ – for example, if one takes what occurs over temporally extended intervals to have some form of metaphysical and explanatory priority over what occurs at instants falling within those intervals³⁶.

One source of the apparent intuitive pull towards a snapshot theory might be found if we take PPC together with Miller's further notion of The Principle of Simultaneous Awareness (PSA): Miller says, regarding hearing successive tones as forming a melody, that “the continuous occurrence of the aural sensation during [the time over which the melody is experienced] cannot by itself account for my continual awareness of a tone *as enduring* during that interval of time...” (Miller, 1984: 108; *emphasis in original*). This leads Miller to claim that “[a]n awareness of succession derives from simultaneous features of the structure of that awareness.” (Miller, 1984: 109). His

³⁴ Though it may be that some theorists slide in their reasoning here, supposing that we must have something like an experiential snapshot, at a time, which presents something which *seems* concurrent with the experience. This is to assume that a characterisation of how things are for the subject is homogenous down to instants (how things are for the subject over some interval is to be cashed out in terms of how things are for the subject at the instants which fall within the interval); I argued against such an assumption of phenomenal atomism in section 4.

³⁵ This is what extensional theories of temporal consciousness are characterised as claiming (see Dainton, 2010).

³⁶ See Soteriou (2013, esp. chapters 4 and 6) and Phillips (2014).

claim is that a succession of awarenesses cannot on its own account for an awareness of succession; in order to experience some phenomenon *as* a temporally extended phenomenon, we must do so at some moment.

Snapshot theories of temporal experience might be presented in a *prima facie* plausible light because of how they meet *both* of Miller's (1984) claimed data regarding temporal experience: PPC and PSA (and are the only one of the main three³⁷ types of theory of temporal experience to do so). Insofar as theorists are either explicitly or implicitly influenced by PPC and PSA, a view like the snapshot theory can then gain some plausibility from being the position which readily accepts both³⁸, where a momentary experience presents what is the case at a moment. While there may be much to criticise in the rough characterisations of PPC and PSA I have offered, I will keep my comments brief.

Does it positively appear as though the occurrences we experience unfold over the same interval, concurrently and in the same order as our experience of those occurrences? Over longer timescales, an affirmative answer certainly has *prima facie* plausibility. I can recall the ball being kicked and now see it in the goal, and I am fairly confident in saying that I experienced it being kicked and then experienced it in the goal (supposing the latter occurred a second or two after the ball was kicked). Prosser questions what evidence we have for supposing such structural matching over shorter timescales, saying that in such cases “I do not think introspection can be assumed to be reliable. I find I have no clear feeling about the timing of the experiences in cases in which I am aware of the second event before I have had time to react to the first event. One can certainly say which of two events occurred first (provided they occurred at least 30 ms apart); but it is much

³⁷ In Dainton's (2010) terms: extensional, retentional, and cinematic/snapshot theories (the former two endorsing something akin to the Duration Claim). Roughly, extensional theories can be characterised as accepting PPC but rejecting PSA, while retentional theories can be characterised as accepting PSA and rejecting PPC.

³⁸ See Dainton (2010) for an overview of these issues; see Phillips (2014) for a discussion of some of the theoretical problems surrounding the appeal to PSA.

harder to see what one's introspective evidence could be for the claim that one or other experience occurred first." (Prosser, 2016: 146) Prosser's suggestion is that over small timescales we may be perceptually aware of the temporal structure of the occurrence being experienced, but we are not independently aware of the temporal structure of that perceptual awareness. As a result the two cannot be fruitfully compared.

Prosser's suggestion can be supported. In a discussion of the transparency of perceptual experience, Hoerl similarly claims that: it "isn't that both of these locations [the apparent temporal location of the object of perceptual experience and the apparent temporal location of the perceptual experience itself] figure in the phenomenology of experience, and are experienced as being identical, but rather that there is no such thing as the felt temporal location of the experience forming part of the phenomenology of experience. There is just no scope within a description of our experience of temporal properties for a distinction between those experienced properties themselves and a point in time *from which* they are experienced." (Hoerl, 2018: 143) This is to say that we are not in a position to affirm PPC when we are concerned with such short timescales. To make such a positive claim would require an awareness of the temporal properties of our perceptual experience that it is plausible to suggest we lack.

This is not to deny that PPC could be stated in a more plausible form. We could, for example, state it as a negative claim: that we are not aware of any divergence between the temporal structure of the occurrence being perceived and the temporal structure of that perceptual awareness. We might take this to be related to the sense in which "one's perceptual access to an interval of time doesn't seem to one to be perspectival" (Soteriou, 2013: 131), in contrast to one's visual-perceptual access to a region of space. If we construe PPC in these terms, or only take it to be a positive claim

about greater timescales, we need not deny it³⁹. Yet once the PPC is qualified in this way it no longer provides theoretical support for an appeal to the DSM. There is no claim that versions of the three main models of temporal experience couldn't be characterised in such a way as to satisfy such a negative claim. As a result, the DSM does not gain any theoretical plausibility over its competitors by virtue of conforming to the PPC (when so construed).

Concluding Remarks

Temporally extended occurrences are presented as such in experience, rather than instantaneous states of affairs. This is a denial of the core of snapshot theories of temporal experience: the claim that perceptual experience presents no temporal content, or that it presents what is the case at an instant in isolation. Having presented the traditional argument against snapshot theories – that they fail to account for the experience of motion – in the form of an inconsistent triad, I turned to consider Prosser and Arstila who, following Le Poidevin, independently offered DSMs. The DSM is motivated by these theorists, in part, by appeal to temporal illusions such as the waterfall illusion and the role envisaged for two independent perceptual mechanisms, one tracking the spatial location of stimuli and the other detecting motion.

I argued that the findings from cognitive science discussed by the authors do not support the DSM. Firstly, it does not follow from cases such as the waterfall illusion – where there is an experience of motion in the absence of an experience of a change in location – that motion is not

³⁹ An anonymous reviewer points out that one might think that Hoerl's point is entirely general and so may be in tension with my view that such matching can be supported over longer timescales. But note that Hoerl's point here is one concerning perceptual experience. It is entirely consistent with Hoerl's point that at a later time T10, when a subject is perceiving some state of affairs, she can recall what occurred earlier at time T1. When depending upon recollection, she can judge that what she is now perceiving - at T10 - seems to be occurring as she is perceiving it in contrast to what she earlier perceived - at T1 – which she is now recalling. Over such timescales, with an appeal to what one can recall and what one is perceptually aware of, there is a sense in which there seems to be some such matching.

to be characterised as something which is experienced *as occurring over time*. Secondly, because the DSM rules out the very possibility of a change of location being presented in perceptual experience, if the best way to characterise the phenomenology in the waterfall illusion is in terms of a stimulus seeming to be in motion while seeming *to remain in the same spatial location* (as opposed to seeming *to change spatial location* in the veridical case) then the snapshot theory would be poorly placed to account for this – for the very illusion that theorists often use to motivate its introduction.

I have argued that reflection on the phenomenology does not support endorsing the DSM. There is an absence of evidence for supposing that when some subject experiences a temporally extended occurrence there are many experiences – experiential snapshots, successive in time – each presenting no temporal extent. The simplest hypothesis, consistent with what one experiences and the awareness of one's experience afforded by introspection, is that there is *an* experience presenting something temporally extended – an experience of the temporally extended occurrence. I ended by arguing that considerations from theoretical claims in the literature do not support an appeal to a snapshot theory of temporal experience either.

I have not, of course, been able to discuss every possible motivation behind an appeal to a snapshot theory. However, I hope to have demonstrated that there is a lack of supporting evidence for such a theory where one would expect to find it. As such, we can dismiss snapshot theories of temporal experience until we are offered good reason to do otherwise. Having argued that we do not have compelling reasons, from reflection upon the phenomenology, for accepting a snapshot theory of temporal experience – arguing that, on the contrary, experience presents a positive temporal extent – this raises the question of whether there is an upper temporal limit to what is presented in experience. This is, however, a question for another time.

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