**Temporal Phenomenology: Phenomenological Illusion vs Cognitive Error**

**Abstract**

Temporal non-dynamists hold that there is no temporal passage, but concede that many of us judge that *it seems* as though time passes. Phenomenal Illusionists suppose that things *do* *seem* this way, even though things are not this way. They attempt to explain how it is that we are subject to a pervasive phenomenal illusion. More recently, Cognitive Error Theorists have argued that our experiences do not seem that way; rather, we are subject to an error that leads us mistakenly to *believe* that our experiences seem that way. Cognitive Error Theory is a relatively new view and little has been said to explain why we make such an error, or where, in the cognitive architecture, such an error might creep in. In this paper we remedy this by offering a number of hypotheses about the source of error. In so doing we aim to show that Cognitive Error Theory is a plausible competitor to Phenomenal Illusion Theory.

**1. Introduction**

Temporal dynamists[[1]](#footnote-2) hold that there exists temporal passage; they hold that a single set of objects, properties, and events, are objectively present, and that temporal passage consists in a change in which objects, properties, and events these are.[[2]](#footnote-3) One motivation for such a view comes from the apparent character of our temporal phenomenology. Here, we use ‘temporal phenomenology’ to pick out the phenomenal character of our temporal experiences, whatever exactly that phenomenal character, and hence as neutral between different views about that character. Nevertheless, to get a sense of the target phenomena, we take temporal phenomenology to include at the very least the experience as of events occurring in a particular order, and the experience as of temporal succession (which is often taken to be distinct from the experience of mere order), as well the experience as of temporal duration. Temporal dynamists think that, in addition, our temporal phenomenology includes *passage* phenomenology. That is, they think that it seems to us as though time passes. It is this particular aspect of temporal phenomenology with which we shall principally be interested. Since we want to be neutral about whether this narrower phenomenology really is phenomenology as of passage, we will call this phenomenology our *purported passage phenomenology*. This is the phenomenology—*whatever its content*—which dynamists (and others besides) *describe* as being phenomenology as of passage. We take the dynamist’s claim to be that the phenomenal character of our purported passage phenomenology has certain *representational* content: it represents that things are *as if* there is temporal passage.[[3]](#footnote-4) So for the temporal dynamist our *purported* passage phenomenology is just passage phenomenology: it’s content is as of there being temporal passage. We make the assumption that our purported passage phenomenology and our temporal phenomenology more generally have representational content because we suppose said phenomenology to be perceptual. That is, unlike, say, imaginings, our temporal phenomenology presents to us as being *about* the world, and as being sensitive to the way the world is. We see this in the following descriptions of, or claims about, this phenomenology.

We are not only aware of [the passage of time] when we reflect on our memories of what has happened. We just *see* time passing in front of us, in the movement of a second hand around a clock, or the falling of sand through an hourglass, or indeed any motion or change at all. (Le Poidevin, 2007: 76, our emphasis).

….the flow of time, or passage, as it is known, is given in experience, that it is as indubitable an aspect of our *perception* of the world *as the sights and sounds that come in upon us,* even though it is not the peculiar property of a special sense. (Schuster 1986: 695, our emphasis)

Does our impression of the flow of time, or the division of time into past, present and future, tell us nothing at all about how time is as opposed to how it merely *appears* to us muddle-headed humans?. (Davies 1995: 275, our emphasis).

Indeed, one motivation for temporal dynamism comes from inferring that the world contains passage on the basis that this is the best explanation for our having the temporal phenomenology we do.[[4]](#footnote-5) That only makes sense if it seems to us that the *world* is a certain way, rather than it merely seeming to us that we are having certain experiences. We will express this as the claim that our purported passage phenomenology has content *as of* (temporal) passage (or just is as of passage and hence that our temporal phenomenology more generally includes this content).

Non-dynamists[[5]](#footnote-6) reject the existence of temporal passage. They suppose all objects, properties and events—past, present, and future—to be equally real, with no set of those selected out as being special in some way: as being, for instance, objectively present. The non-dynamist therefore has an explanatory burden: she needs to offer an explanation for our temporal phenomenology that is empirically adequate, and ideally, as good[[6]](#footnote-7) as that offered by the dynamist, who can simply say that our phenomenology is veridical. Two broad explanatory strategies have emerged over the last few years, beginning with Paul (2010). The first we call the Phenomenal Illusion Theory. According to this view, our purported passage phenomenology is as of passage (Prosser 2007; 2012; 2013; Callender 2008; Le Poidevin 2007; Dainton 2011 p 405). Since there is no temporal passage, that phenomenology is illusory (leaving open, of course, that most of the rest of our temporal phenomenology is not illusory).

A recent alternative holds that our purported passage phenomenology is not as of passage. It is not that we are subject to *phenomenal* error, rather, we are subject to *cognitive* error: namely a false belief about the content of our phenomenology. We call this view Cognitive Error Theory. According to Cognitive Error Theorists, when we say that our purported passage phenomenology is as of passage we express a false belief (Hoerl, 2014; Torrengo, forthcoming; Braddon-Mitchell, 2013; Deng 2017; Bardon 2013 p 95; Baron et al 2015).[[7]](#footnote-8)

Our aim, in this paper, is modest. We will not argue that Cognitive Error Theory is preferable to Phenomenal Illusion Theory. We attempt to show only that Cognitive Error Theory is a worthy competitor to Phenomenal Illusion Theory. The difficulty for the Cognitive Error Theorist lies in making it plausible that we could be so very wrong about our own phenomenology: that we could mistakenly come to believe that the world seems a way that it does not seem. In what follows we aim to shed light on some potential sources of this cognitive error, and, by doing so, make it more plausible that we are subject to such an error. This is important since Phenomenal Illusionism faces its own difficulties: namely offering an account of how and why we are subject to a pervasive illusion.

We begin, in section 2, by outlining two different schematic explanations of the source of cognitive error: the Misdescriptionist and the Inferentialist. According to the Misdescriptionist we *misdescribe* our purported passage phenomenology as being as of passage, and this results in us believing that said phenomenology is as of passage. By contrast, according to the Inferentialist we mistakenly believe our purported passage phenomenology is the basis of our belief that there is passage, and we (sub-personally) infer from this that said phenomenology actually is of passage. In sections 3 and 4 we fill out, and offer empirical support in favour of, each of these schematic explanations. Finally, in section 5 we outline potential future empirical research that would allow us to determine which of Phenomenal Illusionism or Cognitive Error Theory is more plausible, and then go on to consider ways in which the dispute between Misdescriptionists and Inferentialists might be made empirically tractable.

**2. Sources of Error**

In what follows we assume that people typically *believe* that they have phenomenology as of passage. As far as we know there is no empirical data on this issue. If people do not have this belief about their own phenomenology then the non-dynamist should not embark on the explanatory task she has set herself: namely to explain *why* we believe that our temporal phenomenology is as of passage. We assume that people do believe they have phenomenology as of passage. Phenomenal Illusionists think this belief is true, so their task is to explain why we are subject to a pervasive phenomenal illusion. Cognitive Error Theorists think this belief is false. Their task is to explain why we have this false belief.

In answering this question we might want to know the *reasons* we believe that our phenomenology is as of passage, or we might want to know what *causes* us to believe that our phenomenology is as of passage. In what follows we are interested in elucidating the cognitive mechanisms responsible for our having this false belief. So we take ourselves principally to be in the business of providing a causal explanation for our having said belief.

We distinguish two broad explanatory strategies the Cognitive Error Theorist might pursue. According to the first, Misdescriptionist strategy, what explains why we believe that our purported passage phenomenology is as of passage is that we misdescribe our phenomenology, and our misdescribing said phenomenology causes us to come to believe that its content is as of passage There are various ways the Misdescriptionist could explain why we misdescribe the content of our phenomenology, but we suggest that a promising avenue is to posit the existence of a mechanism that is a common cause of both our belief that time passes, and our description of our purported passage phenomenology as being as of passage. We explore this route in this paper.

The second strategy is the Inferentialist strategy. According to the Inferentialist we form the belief that our purported passage phenomenology is as of passage on the basis of a sub-personal inference from one belief to another. First, we believe that the *reason* we believe that time passes is on the basis of our temporal phenomenology. We then sub-personally *infer* from this belief, to the belief that our purported passage phenomenology is as of passage.

In what follows we outline each strategy and describe empirical evidence that we have the kind of cognitive mechanisms that could be responsible for both Misdescriptionist and Inferentialist Cognitive Error. Our aim is to show that Cognitive Error Theory can proffer a plausible explanation for us falsely believing that our phenomenology is as of passage, and thus to show that this view is a plausible competitor to Illusionism.

1. **Misdescriptionism**

Here is the Misdescriptionist strategy, in broad brushstrokes:

1. Our temporal phenomenology includes, as a component, purported passage phenomenology.
2. There is some mechanism, M, which leads us both to (a) believe there is temporal passage and (b) describe our purported passage phenomenology as being as of passage.
3. Misdescribing our purported passage phenomenology as being as of passage causes us to form the (false) belief that our purported passage phenomenology is as of passage.

It is worth noting that the versions of Misdescriptionism and Inferentialism we consider appeal to our belief that there is temporal passage (though this is not essential to either strategy). We assume that amongst non-philosophers there is a (tacit) belief that there is temporal passage. This assumption is fairly widespread, even amongst non-dynamists, who typically concede that it is most natural to think about the world in broadly dynamical ways (see Callender 2008 for instance). Notably, however, there is no direct research on this issue (a lacuna that would be nice to fill).

There are various ways the Misdescriptionist might fill out (1) through (3). We focus on one such way. We begin with the thought that human agents conceptualise time (perhaps tacitly) as having a *direction*, and that this is reflected in certain natural language constructions and expressions. There is then a very natural and easy shift from language that is ‘direction friendly’ to language that is ‘passage friendly’. Passage friendly language is a common cause for us both misdescribing our temporal phenomenology as being as of passage, and for us coming to believe that there is passage.

Let’s consider the first step in this explanation: that we tend to conceptualise time as having a direction. We won’t spend a lot of time defending this claim, since we take it to be relatively uncontroversial. Non-dynamical theorists might say that this is because time really does have a direction, though it does not flow, or they might say that time has no direction, but due to certain local features of things in time, it appears to do so. For our purposes all that matters is that around here, and in our evolutionary history, we have occupied regions of spacetime in which there are many temporally asymmetric phenomena. Entropy has tended to increase in one direction (what we call the future); causes have tended to precede their effects; we have tended to know more about the past than the future; we have tended to deliberate about the future, and not the past, and so on. Whether time *itself* is directed or not, it has been advantageous to treat one direction along the temporal axis differently from the other direction along that axis. In treating the two directions along the axis differently, individuals will likely (at least tacitly) conceptualise time as having a direction. That is because it is very natural to suppose that the direction along which entropy increases, and towards which we deliberate, and about which we know less, is *the direction of time*, rather than simply that time is anisotropic and, as it happens, certain processes around here, that matter to us, lead us to orient ourselves along that anisotropic dimension in a certain manner.[[8]](#footnote-9)

Given that some of our core features as agents, such as deliberation, the capacity to reason causally and to causally manipulate the world, are bound up in our treating one direction along the temporal axis differently from the other direction along that axis, we should expect our (possibly tacit) belief that time has a direction to show up in the way we express claims about the world. We should expect natural languages to be ‘direction friendly’: to include grammar, vocabulary, and expressions that reflect, and make it easy to express, a conception of time as directed. And, indeed, we have terms such as ‘past’ and ‘future’. We have expressions whose assertibility conditions are temporally asymmetric: we can regret past actions, but not future ones; we can anticipate future states of the word, but not past one; we can deliberate about future events, but not past ones, and so on. We have tenses (at least in many natural languages) that make it easy to distinguish what has been the case from what is the case, and what will be the case. These three designations are, often, built into the very language we use.

In addition to all this, we inhabit what Ismael (2012) calls a temporally embedded perspective[[9]](#footnote-10). According to Ismael each of us has a temporally embedded point of view: a representation of time relativised to particular moment in a psychological history. The temporally embedded perspective is an individual’s representation of its history; its memories of memories, its anticipations, its memories of anticipations, and so on. Partly in virtue of the apparent (or actual) directedness of time, the past, and particularly past decisions, are represented as decided. So our beliefs about our past decisions are formed on the same basis as our beliefs about any other past event: by gaining evidence. By contrast, from her temporally embedded perspective, the individual represents future decisions as as-yet undecided. Individuals’ beliefs about their own future decisions are not formed by consulting evidence, they are formed by deliberating, and making a decision about what to do. As Ismael puts it, the only sure way of arriving at true beliefs about what I will do, is to let the decision process runs its course and to *decide* what I will do. From each temporally embedded perspective there is an asymmetry with respect to how we represent, and come to know about, past and future decisions.

In addition to each temporally embedded perspective there is what Ismael calls *a temporally evolving view*. The temporally evolving view is obtained by stringing together the temporally embedded snapshots in the right order. As Ismael puts it, the temporally evolving view is a “kind of moving image that represents the progress of history as one of resolution of possibility into actuality given by an image of the open fan of future possibilities resolving with the passage of time into the thin line of hard fact. (p 164).” Importantly, though this way of characterising the view, with its talk of a moving image, almost seems to presuppose the existence of temporal passage, in fact we can describe the view with no such presuppositions. The temporally evolving view is simply an ordered set of embedded perspectives, such that at each embedded perspective more of the past has been represented, and some of what were previously open future decisions are represented, later in the ordering, as fixed past decisions.

A popular framework in recent years for large-scale theories of the mind and the brain are based on hierarchical Bayesian inference (Clark, 2013). Hohwy, Paton, and Palmer (2015) have cast elements of Ismael’s view in this framework.[[10]](#footnote-11) Conscious perception is determined by whatever hypothesis about the cause of sensory input has the highest posterior probability—the ‘winning’ perceptual hypothesis. Winning perceptual hypotheses only have a limited lifespan, and a perceptual hypothesis only counts as the winning one for a short period of time. This is because as soon as our perceptual system settles on a winning hypothesis it begins decreasing the probability of that hypothesis, *distrusting it* (as Hohwy et al. put it), as the best account of our current sensory input. The perceptual system does this because the external world changes, and the best perceptual hypothesis to explain the incoming sensory stimuli at one time is less likely to be the best hypothesis about incoming sensory stimuli at later times. As a result of our perceptual system ‘distrusting the present’ or, as we prefer to put, distrusting the current perceptual hypothesis, it seeks out alternative perceptual hypotheses to explain incoming sensory input. These alternative hypotheses are hypotheses about some state of affairs which may or may not be occurring simultaneously with that very hypothesis. Our perceptual system is, at each time, placing the winning perceptual hypothesis head-to-head with alternative hypotheses about what is happening simultaneously with that very hypothesis. According to Hohwy et al. our temporal phenomenology is caused by the perceptual system predicting that the world is a changing place, which leads it to distrust the current perceptual hypothesis. As a result, at each time the perceptual system generates new alternative perceptual hypotheses that next best explain the current incoming sensory input.[[11]](#footnote-12)

According to both Ismael and Howhy et al, there is apparent ‘movement’ whereby future decisions become present, and then past, relative to different embedded perspectives. But this movement is merely apparent, as really all we have is an ordered series of times, and mental representations at those times, whose content includes both representations of earlier times and decisions at said times, and representations of future times are deliberations about decisions at those times (Ismael) or hypotheses about the present time (Howhy) which are updated at later times as different sensory information is available at those times.

We suggest that the Misdescriptionist should explore the possibility that the presence of these representational states results in us deploying what we call *passage friendly language*. The idea is not that we conceptualise the world as containing passage (even tacitly) and then come to use passage friendly language. Rather, the idea is that we only come to tacitly conceptualise the world as containing passage—and hence to believe that it does—once we come to deploy passage-laden language: for it is in deploying this language that we come to conceptualise the world in ways that are more consistent with an implicit dynamical theory than with an implicit non-dynamical theory. Conceptualising the world in this way not only causes us to come to *believe* that time passes, but also to *describe* our temporal phenomenology using the passage-friendly expressions found in natural language.

To be adequately expressive a language needs the resources to express the way things are from the standpoint of each embedded perspective. To do so, a language must be able to express claims about the order of events; it needs to distinguish past from future events and it needs a way to mark the location and perspective of each embedded perspective. The most straightforward way to do this is via grammatical tense and deictic adverbs like ‘tomorrow’ or ‘yesterday’ and nominal temporal landmarks such as ‘next Christmas’ alongside the use of a marker such as ‘present’. In fact, that is what we largely find. As far as is known, all languages denote presentness in one way or other (Gell, 1992) and although there are languages without tense (such as Chinese), all languages have some set of deictic adverbials that indicate gradations of pastness and futurity of events with respect to the time of utterances (Sinha and Gardenfors 2014). We call such languages *minimally passage-friendly*. That's because although minimally passage-friendly languages are consistent with a non-dynamical conception of time, they still sit better with a dynamical view.

As far as we know, all actual languages are minimally passage-friendly. So far then, this picture is consistent with the idea that despite some cultural and linguistic differences in the ways in which people talk and represent time, there are fundamental commonalities that everyone shares (Callender 2017). In addition to being minimally passage-friendly, languages can also be *substantially* *passage-friendly* (or not) depending on the extent to which they include one (or both) of what are known as moving time or moving ego metaphors (Sinha and Gardenfors 2014). The moving time metaphor includes a whole suite of expressions which suggest that time itself moves, while the moving ego metaphor includes a suite of expressions which suggest that the ego moves through time. In both cases, the relevant expressions employ motion verbs such as ‘his birthday is *approaching* (moving time metaphor) or ‘he is *nearing* his birthday’ (moving ego metaphor).

The use of moving time and moving ego metaphors is not surprising given the existence of a sequence of temporally embedded perspectives. One way of expressing claims about the sequence of these perspectives from the perspective of any such embedded perspective is in terms either of the ego itself moving through time (and hence occupying the series of perspectives) or in terms of time itself moving over the ego, and hence the ego occupying a series of perspectives. While we have reason to think all actual languages are minimally passage-friendly, it is less clear that they are all substantially passage-friendly. While English, Japanese, Chinese and the Niger-Congo language Wolof contain moving time expressions (Evans, 2003, 14) Whorf (1950) (now controversially) argued that Hopi Indian does not contain any moving time expressions. More recently, Sinha and Gardenfors (2014) have argued that the presence of moving time or moving ego metaphors is not universal, noting that Amondawa and Y´eli lack both kinds of metaphor. While we do not know of studies that connect the presence of moving time or moving ego metaphors with explicit beliefs about the existence of temporal passage, or with descriptions of putative passage phenomenology as having content as of passage, if what we suggest is right then we should expect more misdescription of putative passage phenomenology in linguistic communities that have *substantially* passage-friend language than in those that have merely minimal passage phenomenology. Even absent such empirical work, however, the fact that there is variation in passage-friendly language, but that there is universal minimal passage-friendly language provides to the Misdescriptionist the resources to explain how we come to believe that there is temporal passage, and why we misdescribe our putative passage phenomenology. It is to that aspect of the proposal that we now turn.

Why think that the use of passage-friendly language, and particularly substantially passage-friendly language, will cause us to believe that time passes, and to describe our temporal phenomenology as being as of passage?

There is evidence that the way linguistic communities speak about time, and write and read language, is correlated with the way that they conceptualize time. For instance, native Mandarin speakers (some of whom sometimes write vertically) are much more likely than native English speakers to use a vertical axis when mapping out time (Boroditsky 2008) and while both English and Mandarin speakers appear to represent time as running along a left-to-right axis, Mandarin speakers also show evidence of a vertical arrangement of time, with earlier events represented higher. Native English speakers show no such pattern (Boroditsky, Fuhrman, McCormick 2010). Moreover, participants who are bilingual in both Mandarin and English show a bias in favour of the language in which they are most proficient. That is, those who are most proficient in Mandarin are more likely to arrange time vertically, and those who are more proficient in English are more likely to arrange time horizontally. Further, when tested in English, bilingual participants are more likely to arrange a sequence horizontally, and more likely to arrange it vertically when tested in Mandarin (Fuhrman, McCormick, Chen, Jiang, Shu, Mao, & Boroditsky 2011). Furthermore, Mandarin speakers possess far more vertical metaphors than English speakers (Chen 2007; Boroditsky 2001), suggesting that there is relation between the way in which a language is represented in written form, the metaphors speakers of the language deploy, and the way in which speakers represent the temporal dimension.

Further evidence for this comes from studies in which participants were asked to make rapid temporal order judgment responses for pairs of images (and then decide whether the second image came earlier or later than the event in the first image). English speakers make more rapid ‘earlier’ judgments, when the response was mapped onto a left-response key, and more delayed ‘earlier’ judgments, when the response was mapped onto the right-response key. Hebrew speakers show the reverse pattern, making faster responses when ‘earlier’ than judgments were mapped to the right-response key, and more delayed ‘earlier’ judgments, when the response was mapped onto the left-response key (Fuhrman & Boroditsky, 2010). The behavioural pattern of facilitation and interference for participant judgments was consistent with English speakers spatially representing the past-to-future as running from left-to-right, and Hebrew speakers spatially representing the past-to-future as running from right-to-left.

More recently, a pair of studies was undertaken on Dutch speakers. Participants saw past-oriented phrases and future oriented phrases (i.e. a day before; a year after and so on). As soon as the phrase appeared participants pressed one of two coloured buttons located on the left or right hand side of a keyboard. Past research has shown that participants (who read from left to right) are quicker to respond with a left-key press for past-oriented phrases and right-key press for future-oriented phrases. This study replicated that result, but also showed that when participants were exposed to a mirror reversal of the phrases participants were quicker to respond to past-oriented phrases with a right-press, and future oriented with a left-key press (Casasanto & Bottini, 2014). Experimentally manipulating reading direction therefore appears to change the way people spatially represent the running of time from past-to-future. Thus, with no training, Dutch speakers can reliably be brought to respond in a manner consistent with them spatially representing the past-to-future as running from right to left.

We think that this literature is compatible with the idea that the direction of influence goes from language to conceptualisation rather than the other way around. Since the representation of written language is conventional, it is not unexpected that it varies across cultures. So it is plausible that this expected variation is responsible for the variation in the way individuals conceptualise the temporal dimension. It is somewhat less plausible to suppose that different communities conceptualise the temporal dimension differently, and that this, in turn, causes them to take up different conventions with regard to, say, the direction in which they write.

Then the proposal is that in using or hearing certain phrases and thereby coming to token certain concepts, individuals will first entertain representations of the world and their location in it, in ways that are most consistent with there being temporal passage. Further, having *entertained* such representations, individuals will frequently come to *believe* such representations. Here is why. There is good evidence that an effective way to induce false beliefs is to require people to process misinformation. That this is effective is rather trivial when people have no basis for believing an alternative. However, the extent to which misinformation can succeed in overturning or suppressing other, even true beliefs, may be surprising. The phenomenon was famously shown in an experiment by Elizabeth Loftus and John Palmer. Loftus & Palmer (1974) showed students a video of a car accident and later referred to the accident as one in which the cars “smashed” into each other. To another set of students the cars were described as having “hit” each other. Students in the “smashed” group were much more likely than those in the “hit” group to recall having seen broken glass in the video. Yet there was no broken glass in the video. Further, experiments show that people, by being repeatedly exposed to false statements, will come to believe those statements even when they contradict their previous knowledge (Fazio, Brashier, Payne, & Marsh, 2015). Repetition of a statement is a potent force for inducing belief (Hasher, Goldstein, & Toppino, 1977). Gilbert (1991) argued that people believe that statements they are given are true because “unbelieving” requires a second, resource-demanding step. Moreover, people often do not recall the source of the information that served as evidence for their beliefs, even when they learned the information very recently (e.g. Tulving, 1972). Together, this research indicates that given the powerful embedding of passage friendly expressions in natural language, many individuals will, as a result of *entertaining* the idea that time passes, come to *subscribe* to the view.

So far we have made the case that embedded passage-friendly language can result in us conceptualising the world in ways that are most consistent with an implicit dynamical theory. To show that step (2) in the Misdescriptionist’s strategy is plausible, however, we also have to show that embedding passage-friendly language in this way is liable to lead us to (mis)describe aspects of our temporal phenomenology as being as of passage. Why think this is so?

Well, to get the ball rolling, notice that most people describe sunrise as just that: the rising of the sun. No doubt if pressed they would say that it seems to them as though the earth stands still, and the sun rises. Although most of us know that in fact it is the earth that is rotating and not the sun that is moving, this knowledge hasn’t shown up in our natural language expressions. We still talk about sunrise and sunset. The implicit theory that the earth stands still and the sun moves is embedded in natural language. Plausibly, it is this embedding that ensures that we *describe* our experiences in this way. After all, we could have the very same experiences and describe them as experiences as of the earth rotating.

Of course, for the Misdescription strategy to be plausible it needs to be that whatever exactly the content of our putative passage phenomenology, it *could* mistakenly be described as being as of passage. Plausibly, however, the phenomenology we do have—the phenomenology that issues from, say occupying a sequence of temporally embedded perspectives—*could* be mistaken for phenomenology as of passage. Moreover, if our putative passage phenomenology is sufficiently amorphous, or difficult to describe, it could be that when our natural language is imbued with passage-friendly expressions that make it easy to conceptualise the world in terms of passage, we will describe our putative passage phenomenology in those terms. Furthermore, there is evidence that the way people describe the content of a phenomenological state is highly dependent on their beliefs about the cause of that state. Functionalist about emotion interpret certain experiments as showing that subjects can be brought to describe a phenomenological state with essentially the same phenomenal character as being anger, love, or fear, depending on the context in which the state is elicited and depending on what subjects believed to be the cause of that state (e.g., Barrett, 2012; Quigley & Barrett, 2014)**.** On this way of interpreting the evidence, different beliefs about the cause of some phenomenal state bring it about that the state is described as being, say, love, rather than fear. At the very least there is evidence that different background beliefs can affect the way we describe the self-same phenomenology, and, indeed, that the very same phenomenology can be described *very* differently.

That is the Misdescriptionist’s strategy for explaining the source of cognitive error. In what follows we outline an Inferentialist strategy.

**4. Inferentialism**

In broad brushstrokes, the Inferentialist offers the following explanation for the source of cognitive error:

1. Our temporal phenomenology includes, as a component, purported passage phenomenology.
2. We believe that there is temporal passage.
3. We believe that the *reason* we believe that there is temporal passage is on the basis of our purported passage phenomenology.
4. We infer, from (3), that our purported passage phenomenology has content as of passage and so come to believe that purported passage phenomenology has content as of passage.

Inferentialists hold that we infer, likely sub-personally, that our temporal phenomenology is as of passage on the basis of *believing* that our temporal phenomenology is the reason that we believe that time passes. We set aside (1) as in no need of defence for present purposes. We will also take *that* we believe there is temporal passage (i.e. (2)) to be in no need of defence. So the burden for the Inferentialist is to defend (3) and (4). Nevertheless, since the Inferentialist aims to show that the order of explanation is reversed—that we believe that our purported passage phenomenology is in fact as of passage because we believe there is temporal passage—she will need some explanation of why we believe there is temporal passage which does not itself appeal to our having phenomenology as of passage. There are various options to explain why we have such a belief, absent a phenomenology as of passage, but we think the most obvious is for her to appeal to the explanation already provided by the Misdescriptionist. The Misdescriptionist, recall, holds that there is some mechanism which leads us both to (a) believe there is temporal passage and (b) describe our purported passage phenomenology as being as of passage. The Inferentialist can reject (b), but accept (a). In particular, she can suggest that in virtue of the existence of a sequence of temporally embedded perspectives language will be at least minimally passage-friendly and, often, substantially passage friendly. Language being substantially passage friendly causes our coming to believe that there is temporal passage, just as the Misdescriptionist suggests. Since we have already outlined the way in which this process works, we will leave (2) aside and focus on (3) and (4).

(3) is a plausible hypothesis. First, notice that our cognitive system must frequently move from the fact that it is having a perception as of P, to the conclusion that P. In the absence of defeaters, our cognitive system supposes that if it seems to us that we are seeing P, then we are seeing P. Without this inference we would be unable to navigate the world. Moreover, we typically suppose that the way the world looks, smells, tastes, and so on, provides us with a reason (albeit defeasible) to believe that the world is that way.

Our temporal phenomenology, including our purported passage phenomenology, is perceptual: it involves the presentation as of mind-independent features of the world (distinct from features of our experience) in such a way that our phenomenology seems to be immediately responsive to the things in the world that it represents. Given this, it is plausible that we would think that the reason we believe that time passes is the presence of this perceptual phenomenology. For our phenomenology seems to be of exactly the kind that typically provides us with reasons for beliefs about the world. In addition, there are no other obvious contenders that could provide us with reasons to believe that time passes. We don’t seem to come by the belief via testimony, or inference from other things we know, or inference to the best explanation. So, as we will see shortly, since we often infer that something is a reason for our belief when there is no other good candidate (that we know of) to be such a reason, it makes good sense that we would think that the reason we have the belief that time passes is on the basis of our temporal phenomenology.

According to the Inferentialist, though, our purported passage phenomenology is not the basis for our belief that time passes. So the reason we take ourselves to believe that time passes is not the real reason we believe that time passes. So as well as explaining the sub-personal inference involved in (4), she needs to explain how it could be that we are wrong about the reasons we take ourselves to have.

In fact there is plenty of evidence that individuals are sometimes wrong about their own reasons. For instance, Wade and colleagues doctored an image to show participants on a hot air balloon ride. Over the course of three interviews, which included guided-imagery exercises, 50% of participants acquired partial or complete fake autobiographical memories of having had a hot-air balloon ride as a child (Wade, Garry, Read, & Lindsay, 2002). Likewise, 25% of participants who were asked to imagine spilling a bowl of punch at a wedding as a child came to have a partial or full autobiographical memory of the event (Hyman & Pentland, 1996). Finally, when participants were mailed a booklet that contained 4 short stories from their childhood provided by an older relative, three of which were true and one was a false story about being lost at the mall, 25% of participants reported partial or full details for the false autobiographical event of being lost at the mall (Loftus & Pickrell, 1995). While riding in a hot-air balloon or being lost in the mall or spilling punch at a wedding are events that subjects could have experienced, subjects can even come to recollect autobiographical events, which, as a matter of fact, could never have occurred (given the location of the subjects) such as a nurse in England taking a routine skin sample from their little finger (Mazzoni & Memon, 2003) or meeting Bugs Bunny at Disney Land (Braun, Ellis, & Loftus, 2005). Yet in all these cases it is plausible that, if asked, these participants would report that the reason they had (apparent) memories of those events was because they had experienced said events. Yet that is false in all these cases. Individuals have false beliefs about their own reasons. We will consider, shortly, some of the conditions under which individuals are prone to cite false reasons.

First, however, let us consider (4), which says that we infer from the fact that we believe that the reason we believe that there is temporal passage is on the basis of our temporal phenomenology, to its being the case that our temporal phenomenology has content as of passage. Let’s start by setting aside the details of this case, and focus on the question of whether we make sub-personal inferences such as those we are positing in (4). The answer is yes.

One source of evidence for such inferences comes from the literature on cognitive biases. Cognitive biases are taken to result from an automatic sub-personal inferential mechanism or process that need not be triggered by the environment. So, for instance, people tend to rank as highly accurate personality descriptions that they *believe* are tailored to them, even though the descriptions are so general they could apply to almost everyone (Forer, 1949). People infer that the descriptions are accurate because they have been told that they are individually tailored, and therefore come to believe that they are accurate. This is a cornerstone of the astrology industry. Stereotype bias reveals a related pattern of sub-personal inference. Research shows that we have a tendency to believe that an individual possesses certain traits even when almost nothing is known of that individual apart from the fact that they belong to some particular group. We infer, and then come to believe, based on stereotypes of people in the group, that the individual in question has certain traits. For instance, Stone and colleagues reported that white subjects performed significantly worse than black subjects when it was suggested to them that a golf putting task relied on natural sports ability (black stereotype), while the reverse was seen when instead it was suggested that the task relied on athletic intelligence (white stereotype)[[12]](#footnote-13) (Stone, Lynch, Sjomeling, & Darley, 1999). Thus, white subjects in the natural ability condition came to believe they had poorer skill as a result of being told the stereotype.

If we believe that the reason we believe that time passes is because we have certain temporal phenomenology, will we really infer that our temporal phenomenology is as of passage? *Prima facie* this is plausible. If our phenomenology were not as of passage, we wouldn’t have any reason to believe that there is passage. But we do think there is passage and (so we think) we believe this on the basis of our phenomenology. But is there any reason to think that individuals make inferences like *that* and that they can come to false beliefs about the contents of their own phenomenology? As we will see, the answer to that question is yes; particularly when we would expect the phenomenology to be ambiguous (or open to interpretation) in just the way we might expect our temporal phenomenology to be ambiguous or open to interpretation.

We see patterns of response like this in cases where the stimuli are ambiguous in some way. Morrot, Brochet, & Dubourdieu (2001) gave a panel of 54 wine tasters white wine, dyed red. The scent of the resulting ambiguous stimuli (white wine that appeared to be red) was described by the wine tasters using terms typically used to describe red wine. That is, the wine tasters believed that their wine-phenomenology was olfactorily as of red-wine. Plausibly, the wine tasters believed that the wine was red on the basis of their visual perception, and because of that they came to *believe* that their olfactory wine phenomenology was as of smelling red wine. Hence subjects believed that their olfactory phenomenology was (at least part of) the *reason* for their beliefs about the kind of wine they were smelling. Subjects falsely believed they were smelling red wine. On the basis of this, we hypothesise, they made a sub-personal inference that their olfactory phenomenology had the content as of smelling of red wine, and hence they came to believe that their phenomenology was as of red-wine smelling. Again, this inferential pattern is just like that proposed by the Inferentialist.

One might object that this study is consistent with an Illusionist interpretation according to which the wine drinkers actually had *different* olfactory wine phenomenology given that they believed the wine was red wine, than they would have had, had they (truly) believed it was white wine. If so, they did not have a mistaken belief about the content of their phenomenology, they had a true belief about an illusory red-wine phenomenology. It is noteworthy that there is a non-standard version of Illusionism that says something similar in the case of temporal phenomenology. Such a view reverses the direction of explanation. Rather than supposing that we have illusory temporal phenomenology, and in virtue of this, we come to form the false belief that time passes, instead, this version of Illusionism holds that we first develop the belief that time passes, and this causes our temporal phenomenology to be as of passage, in just the say way that the false belief that the wine is red, brings it about that the wine smellers have an illusory phenomenology as of red-wine. Such a version of Illusionism is closer to Cognitive Error Theory in terms of the order of explanation, but is still, of course, Illusionist. We think these views have been given insufficient attention, but will not further consider them here.

Nevertheless, despite it being consistent with phenomenal illusion, we think this case is better interpreted as one of cognitive error. Firestone & Scholl (2015) provide a broad review of research purporting to show that cognitive beliefs can affect perception, and conclude that the evidence is weak. Although scents in the absence of other indicators can be ambiguous for humans, the aromatic profile of white wine and red wine are different enough that experts and novices alike categorize wine odour as white or red very accurately (Ballester et al., 2009). That’s why the descriptive terms used to describe the smell of red wine are usually completely different from those used to describe white wine. There was no change to the chemical base underlying the scent profile of the wine (the dye was established to be odourless). The only remaining manipulation was the visual information available. It would be remarkable if changing the colour of the liquid served to induce an illusory experience of a red wine’s scent profile, as opposed to a false belief about the content of the olfactory experience. Hence, we think this is best interpreted as a case of cognitive error of just the sort the Inferentialist posits.

There is also some evidence of cognitive error even where the stimulus is in no way ambiguous. In a classic conformity task Asch (1951) asked 50 participants to make judgments about the lengths of certain lines. As part of the experiment, all the members of the group other than the participant were confederates who were asked to give mistaken judgments. The aim was to determine to what extent other members of the group would ‘go along’ with these mistaken judgments and conform to the group. Of participants who made false reports about the relative lengths of the lines, while most said that they knew the judgments were false, but wanted to conform, a very small percentage maintained that the group was right about the length of the lines: they maintained that the obviously wrong answer was correct. That is, these subjects maintained that the lines *seemed* to them (phenomenologically) to be the lengths the group reported, and that is why they report the lines being the length that they do. As Asch et al note (p 42) it is very unlikely that such subjects actually experienced a phenomenal illusion (i.e. experienced distorted perception). Instead, Asch et al suppose that these subjects come to have false beliefs about the length of the lines and this leads them to form another false belief: that it *seems* to them as though the lines have the lengths they reported them to have. Moreover, these subjects believe that the reason they judge the lines to be the length they do, is because they seem to be that length. (However, as this was only a very small percentage of subjects, it is hard to draw robust conclusions about it).

In both cases we find a paradigmatic case of Cognitive Error of just the sort the Inferentialists thinks is at play.

Under what circumstances do individuals make these sorts of inferences and come to have false beliefs about their own phenomenology? Recall we earlier noted that functionalists about emotion hold that subjects can be brought to describe a phenomenological state with essentially the same phenomenal character as being anger, love, or fear, depending on the context in which the state is elicited and depending on what subjects believed to be the cause of that state (e.g., Barrett, 2012; Quigley & Barrett, 2014)**.** Here is a related kind of case. Dutton and Aron (1974) had an attractive female experimenter stand at one end of either a safe bridge or an anxiety inducing bridge. After subjects walked across the bridge the experimenter asked them to fill in a questionnaire and gave them her phone number should they have any further questions. Men who walked across the anxiety inducing bridge were more likely to call the women than those who did not. Similarly, Meston and Frohlich (2003) showed subjects a photo of a member of the opposite sex and asked them to rate their attractiveness and desirability for dating, either while they were waiting for, or had just exited, a roller coaster ride. For both men and women, attractiveness and dating desirability for the person in the photo was higher when subjects had just exited the ride, than when they were waiting for the ride.

Both of these cases involve the misattribution of reasons. In each case subjects would cite the attractiveness of the experimenter/photo as the reason for their behaviour (phoning the experimenter or rating the photo as more attractive), rather than heightened arousal as the result of the swaying bridge or the roller coaster ride. Importantly, these seem to be cases in which a false belief (that the phenomenology, to wit, the heightened arousal) is caused by the experimenter/photo, plausibly, in turn it leads subjects to believe that their phenomenology is *as of* the experimenter/photo being attractive. Again, this is much like the inference the Inferentialist posits. Interestingly, however, in the second experiment no effect was detected for individuals who were waiting for, or riding the roller-coaster with, their romantic partner. Presumably this was because in those case the subject could not attribute the arousal to the photo (either because the partner was present, or because it was attributed to the partner and not the photo). What is important about this is just that the inference about the content of the phenomenology only occurred when there was a plausible candidate to which to attribute the arousal (namely the photo) and where other avenues of attribution were removed.

We see a similar effect in Zanna and Cooper’s (1974) study in which participants were required to write an essay on why free speech should be banned on their university’s campus, a position that was counter to what they believed. Participants were divided into 3 groups. One third were given a placebo pill and told that it would make them feel tense, one third were given a placebo pill and told it would make them feel relaxed, and the final third were given no pill at all. Participants who were able to attribute their feeling of dissonance (as the result of writing the essay) to the placebo pill (i.e. those who were told the pill would make them feel tense) did not change their attitude toward free speech on campus. Individuals who were unable to attribute their cognitive dissonance to the placebo pill (those who received no pill, or who were told it would relax them) showed attitude change toward free speech on campus. Here, subjects falsely believed that the reason they felt tense was due to the pill rather than the cognitive dissonance. But they did so only where there was scope for said misattribution. This scope for misattribution, however, is exactly what we would expect to find in the case of temporal phenomenology where there is plenty of scope for misattribution. It is entirely straightforward for individuals to come to (falsely) believe that the reason they believe there is temporal passage is on the basis of their temporal phenomenology —nothing at all competes with this attribution. Moreover, it is straightforward for individuals to then infer that their temporal phenomenology is as of passage. Again, nothing competes with this inference.

Ultimately, we think that both the Misdescriptionist and the Inferentialist strategies are plausible, and that each is a worthy competitor to Phenomenal Illusionism. Which is preferable? It is to this question that we now turn.

**5. Cognitive Error, Phenomenal Illusion, and Empirical Tractability**

We hope to have shown that Cognitive Error Theory is a plausible rival to the Phenomenal Illusionist Theory. Of course, what distinguishes the Phenomenal Illusionist from the Cognitive Error Theorist is not whether or not the mechanism *responsible* for the error is cognitive in the sense of loosely involved in thought, representation, or the manipulation thereof or not, but rather, whether the error is an error in phenomenology or an error in belief. Given the source of their disagreement, the Phenomenal Illusionist and the Cognitive Error Theorist might *agree* about which *mechanism or process* is responsible for the error, but disagree about which error the mechanism produces. So one might worry that the dispute between the two views will not prove empirically tractable. We are a little more optimistic than this.

One way to characterise the difference between Misdescriptionism, Inferentialism and Phenomenal Illusionism is in terms of the *likely* level of the mechanism that supports the error. Likely, Misdescriptionists will hold that the mechanism is at a relatively high cognitive level, (more cognitive, less perceptual), while Inferentialists will hold that it is at a relatively lower cognitive level, and Phenomenal Illusionists will hold that the error is at a still lower, perceptual, level. That is because the versions of Cognitive Error Theory we outlined suppose that the error is the result of learning, while, most likely, Phenomenal Illusionists will think that the illusion is the result of a more innate mechanism. We say this is most likely what the Phenomenal Illusionist will think, since it does not automatically fall out of that view. After all, it *could* *be* that higher-level cognition causes lower level perceptual/phenomenal errors. But this is a less likely hypothesis with which to begin one’s investigation, given what we know about the connection between perceptual mechanisms and higher-level cognition.

Insofar as this is right, there are some tools we can use to determine whether Illusionism or Cognitive Error Theory is a more likely explanation. First, if Illusionism is the right account, we should expect the illusion to be nearly ubiquitous in the population: so testing to see whether this is so will go some way towards arbitrating between Cognitive Error Theory and Illusionism. Second, if there is a low-level mechanism or cluster of mechanisms responsible for the illusion, we ought to be able to find some rare individuals who do not suffer from the illusion due to some disorder of the mechanism(s) in question. So, for instance, a very simple (likely false) account according to which the mechanism that generates the illusion is one associated with motion processing could be tested by looking at subjects who lack this mechanism (those suffering akinetopsia) to determine whether the illusion is absent, or, at least, altered in some manner. Third, since cognitive error is acquired developmentally, the Illusionist should suppose young children to suffer phenomenal illusion, while Cognitive Error Theorists should suppose young children not to suffer cognitive error. Whether this would lead to testable predictions is at this stage unclear.

That brings us to the question of whether the dispute between kinds of Cognitive Error Theory—Misdescriptionism and Inferentialism—is empirically tractable.

A first thing to note is that since the versions of Misdescriptionism and Inferentialism we explore both explain the presence of beliefs in temporal passage in the same manner—in terms of (substantially) passage-friendly language—we would expect them to make some of the same predictions. Since both appeal to the belief that there is passage as part of their explanation for why we believe our purported passage phenomenology is as of passage, and because it is likely that there is variation in beliefs between cultures, both should predict some cross-cultural variability in the extent to which individuals report that their phenomenology is as of passage. They should also both predict a correlation between individuals’ reporting that their phenomenology is as of passage, and the language those individuals speak being more passage-friendly.

There are, however, some respects in which we would expect their predictions to vary. The Inferentialist will predict that if we can manipulate peoples’ beliefs so that they no longer believe in temporal passage, this ought, in turn, to eliminate their belief that they have passage phenomenology. Many Misdescriptionist accounts will not predict this, since, for instance, even if we come to believe that there is no temporal passage, if our language is still passage-friendly we will still describe our phenomenology in passage-imbued ways.

It is also likely that the Misdescriptionist and Inferentialist will make different predictions about the effects of certain kinds of cognitive loading. For the Misdescriptionist, there is some mechanism, M, which leads us both to (a) believe there is temporal passage and (b) describe our temporal phenomenology as being as of passage. Conditional on us having a specific hypothesis about the nature of M, the Misdescriptionist should expect cognitive loading—giving individuals a task that is taxing for the mechanism—to produce a reduction both in our belief that there is passage, and in the use of passage-imbued description to describe our putative passage phenomenology. Because cognitive loading might impair all subjective reports, a key finding would be a greater reduction in description of passage-related phenomenology than in other aspects of temporal phenomenology. By contrast, the Inferentialist should expect that said cognitive loading will have no such effect, since once the belief that there is temporal passage is present in individuals, what matters is the sub-personal inferential system that links this belief to beliefs about the content of the phenomenology. Tests such as this could be used to test a number of possible M candidates. Finally, it is worth noting that Misdescriptionism and Inferentialism are not mutually exclusive. It could be that both play some role in explaining why we mistakenly believe that our phenomenology is as of passage.

While we are not, yet, in a position to say much about which version of Cognitive Error Theory is most plausible, we hope to have at least pointed the way towards empirical research that could speak to this issue. We also hope to have shown that Cognitive Error Theories, in general, are worthy competitors to Phenomenal Illusion Theories.

**References:**

Asch, S. E. (1951). Effects of group pressure upon the modification and distortion of judgment. In H. Guetzkow (ed.) Groups, leadership and men. Pittsburgh, PA: Carnegie Press.

Barrett, L. F. (2012). Emotions Are Real. *Emotion*, *12*(3), 413-429.

Baron, S., Cusbert, J., Farr, M., Kon, M, & Miller, K (2015). Temporal Experience, Temporal Passage and the Cognitive Sciences. *Philosophy Compass.* 10 (8): 56—571.

Boroditsky L. (2001). Does language shape thought? English and Mandarin speakers’ conceptions of time. *Cognitive Psychology*, *43*, 1–22.

Boroditsky, L., Fuhrman, O., & McCormick, K. (2011). Do English and Mandarin speakers think about time differently? *Cognition*, *118*, 123–129.

Braddon-Mitchell, D (2013). Against the Illusion Theory of Temporal Phenomenology. *CAPE studies in Applied Ethics volume 2* 211-233.

Braun, K.A., Ellis, R., and Loftus, E.F. 2002. Make my memory: How advertising can change our memories of the past. *Psychology & Marketing*, *19*, 1-23.

Callender, C. (2017). *What Makes Time Special?*

Cameron, R. (2015). *The Moving Spotlight: an essay on time and ontology*, Oxford: Oxford University Press.

Casasanto, D., & Bottini, R. (2014). Mirror reading can reverse the flow of time. *Journal of Experimental Psychology: General*, *143*, 473–479.

Chen, J. Y. (2007). Do Chinese and English speakers think about time differently? Failure of replicating Boroditsky (2001). *Cognition*, *104*, 427–436.

Clifford, C. W. G., Webster M. A., Stanley, G. B., Stocker, A. A., Kohn, A., Sharpee, T.O., & Schwartz, O. (2007). Visual adaptation: neural, psychological and computational aspects, *Vision Research, 47*, 3125-3131.

Davies, P. (1995). About Time: Einstein’s Unfinished Revolution. Harmondsworth: Penguin.

Dutton, D.G. & Aaron, A. P. (1974). Some evidence for heightened sexual attraction under conditions of high anxiety. *Journal of Personality and Social Psychology*, *30*, 510–517.

[Dyke, H., & Maclaurin, J. (2002). 'Thank Goodness That's Over': The Evolutionary Story.](http://philpapers.org/rec/DYKTGT) *Ratio* 15 (3):276–292.

Dylan B. (1970). ‘Time Passes Slowly’. Lyrics © BOB DYLAN MUSIC CO

Evans. V. (2003). *The structure of time: Language, meaning and temporal cognition* John Benjamins Publishing.

Fazio, L. K., Brashier, N. M., Payne, B. K., & Marsh, E. J. (2015). Knowledge Does Not Protect Against Illusory Truth. *Journal of Experimental Psychology: General*, 144(5), 993–1002.

[Feinberg, G., Lavine, S., & Albert, D. (1992). Knowledge of the Past and Future.](http://philpapers.org/rec/FEIKOT) *Journal of Philosophy* 89 (12):607-642.

Forer, B.R. (1949). The fallacy of personal validation: A classroom demonstration of gullibility. *Journal of Abnormal and Social Psychology*, *44*, 118-123.

Fuhrman, O. & Boroditsky, L. (2010). Cross-cultural differences in mental representations of time: Evidence from an implicit non-linguistic task. *Cognitive Science*, *34*, 1430–145.

Fuhrman, O., McCormick, K., Chen, E., Jiang, H., Shu, D., Mao, S., et al. (2011). How linguistic and cultural forces shape conceptions of time: English and Mandarin time in 3D. *Cognitive Science*, *35*, 1305–1328.

Gell, A. (1992). *The Anthropology of Time: Cultural Constructions of Temporal Maps and Images*. Oxford: Berg

Gilbert, D. T. (1991). How mental systems believe. *American Psychologist, 46,* 107–119.

Hasher, L., Goldstein, D., & Toppino, T. (1977). Frequency and the conference of referential validity. *Journal of Verbal Learning & Verbal Behavior, 16,* 107–112.

Hoerl, C. (2014), Do we (seem to) perceive passage? Philosophical Explorations, 17, 188–202.

Hohwy, J. (2013). The predictive mind. Oxford, Oxford University Press.

Hohwy, J., Paton, B., Palmer, C. (2015). Distrusting the Present. Phenomenology and the Cognitive Sciences 15(3): 315-335. DOI: 10.1007/s11097-015-9439-6.

Hyman I. E., & Pentland J. (1996). The role of mental imagery in the creation of false childhood memories. *Journal of Memory and Language*, *35*, 101–17.

Ismael, J. (2010). Temporal Experience. In C. Callender (Ed.), Oxford Handbook on Time (pp. 460–482). Oxford University Press.

Ismael, J. (2012). Decision and the Open Future. In *The Future of the Philosophy of Time,* edited by A Bardon, Routledge: 149-169.

[Kutach, D. (2011). The Asymmetry of Inﬂuence.](http://philpapers.org/rec/KUTTAO) In Craig Callender (ed.), [*Oxford Handbook of Philosophy of Time*](http://philpapers.org/rec/CALTOH-2). Oxford University Press.

Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. University of Chicago Press.

Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of Verbal Learning and Verbal Behavior*, *13*, 585-589.

Mazzoni, G., & Memon, A. (2003). Imagination can create false autobiographical memories. *Psychological Science*, *14*, 186–188.

Mellor, D. H. (1998) *Real time II*, London and New York: Routledge.

Meston, C. M., & Frolich, P. F. (2003). Love at first fright: Partner salience moderates roller-coaster-induced excitation transfer. *Archives of Sexual Behavior*, *32*, 537–544.

Morrot, G., Brochet, F., & Dubourdieu, D. (2001). The color of odors. *Brain & Language*, *79*, 309–320.

Le Poidevin, R. (2007). The images of time: an essay on temporal representation, Oxford: Oxford University Press.

Paul, L. A. (2010). Temporal experience. *Journal of Philosophy*, 107, 333–359.

Price, H. (1996), *Time’s Arrow and Archimedes’ Point: New Directions for the Physics of Time*, Oxford: Oxford University Press.

Prosser, S. (2007). Could we experience the passage of time? *Ratio*, 20, 75–90.

Prosser, S. (2012). Why does time seem to pass? *Philosophy and Phenomenological Research*, 85, 92–116.

Prosser, S. (2013). Passage and perception. Noûs , 47, 69–84.

Quigley, K. S., & Barrett, L. F. (2014). Is there consistency and specificity of autonomic changes during emotional episodes? Guidance from the Conceptual Act Theory and psychophysiology. *Biological Psychology*, *98*, 82-94.

Ross, L.; Lepper, M.; Ward, A., [History of Social Psychology: Insights, Challenges, and Contributions to Theory and Application](http://onlinelibrary.wiley.com/doi/10.1002/9780470561119.socpsy001001/full). In Fiske, S. T., Gilbert, D. T., Lindzey, G., & Jongsma, A. E. (2010). *Handbook of Social Psychology*. *Vol.1.* Hoboken, N.J: Wiley.

Schuster, M. M. (1986). ‘Is the Flow of Time Subjective?’, The Review of Metaphysics, 39, 695–714.

Sinha, C and P Gardenfors (2014). “Time, space, and events in language and cognition: a comparative view” *Annals of the New York Academy of Sciences*. *Issue: Flow of Time* 40: 1-10.

Stone, J., Lynch, C. I., Sjomeling, M., & Darley, J. M. (1999). Stereotype threat effects on Black and White athletic performance. *Journal of Personality and Social Psychology*, *77*, 1213-1227.

Tallant, J. (2012). (Existence) Presentism and the A-theory. *Analysis*, 72.

Tooley, M. (1997). *Time, Tense, and Causation*. Clarendon Press.

Torrengo, G. (forthcoming). “Feeling the passing of time”. *The Journal of Philosophy.*

Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.), *Organization of memory* (pp. 381–402). New York, NY: Academic Press.

Wade, K. A., Garry, M., Read, J. D., & Lindsay, D. S. (2002). A picture is worth a thousand lies. *Psychonomic Bulletin and Review*, *9*, 597–603.

Waldmann, M. R., & Holyoak, K. J. (1992). Predictive and diagnostic learning within causal models: asymmetries in cue competition. *Journal of Experimental Psychology: General*, 121(2), 222.

Whorf, B.L. 1950. “An American Indian model of the universe.” I.J.A.L. 16: 67–72.

Winwood, S. (1986). ‘The Finer Things’ Lyrics © Warner/Chappell Music, Inc., Universal Music Publishing Group, Kobalt Music Publishing Ltd.

Yu, X. (2013). Theory and Practice in Language Studies, Vol. 3, No. 8, pp. 1467-1472.

Zanna, M. P., & Cooper, J. (1974). Dissonance and the pill: An attribution approach to studying the arousal properties of dissonance. *Journal of Personality and Social Psychology*, *29*, 703–709.

1. Also known as A-theorists. For a defense of the A-theory in its various guises see Cameron (2015); Tallant (2012); Tooley (1997). [↑](#footnote-ref-2)
2. Models of temporal passage therefore include presentism, the growing block, and the moving spotlight. [↑](#footnote-ref-3)
3. Of course, if representationalism is true then phenomenal character just is representational content. While we are amenable to such a view, we make no such assumption here. [↑](#footnote-ref-4)
4. See Baron et al. (2015). [↑](#footnote-ref-5)
5. i.e. B-theorists or C-theorists. [↑](#footnote-ref-6)
6. Perhaps it need not be as good since non-dynamist’s views might have other theoretical virtues lacked by dynamist views. [↑](#footnote-ref-7)
7. Following Baron et al (2015) this view is sometimes also known as veridicalism, since it holds that our phenomenology has veridical, not illusory, content, it is just that said content is not as of passage. [↑](#footnote-ref-8)
8. Price (1996); Callender (2008), Dyke and McLaurin (2002); Feinberg, Levine, and Albert (1992); Kutach (2011). [↑](#footnote-ref-9)
9. Ismael’s goal is to explain why the world (mistakenly) seems to us to have an open future. Interestingly, Ismael moves between Phenomenal Illusion and Cognitive Error regarding the phenomenology of future openness. She notes that “It is the discovery that what happens depends on our will, and the fact that we cannot experience the activity of our own wills passively, that makes the world itself appear to be in process,” which suggests a phenomenal illusion. She also writes that we “reify features of the embedded point of view and regard them as aspects of time itself” (p.164), which suggests that although we do not have a phenomenology of openness, we mistakenly come to believe we do. [↑](#footnote-ref-10)
10. Though for somewhat different purposes; Hohwy et al aim to explain why our temporal phenomenology is *as of* passage, though they use the phrase ‘*temporal flow*’ instead of *‘temporal passage’*. [↑](#footnote-ref-11)
11. At least some aspects of phenomenology that Hohwy point to can be explained by mechanisms other than their particular hierarchical Bayesian account of perception. So one arguably need not suppose that a Bayesian account of perception is the correct one. For example, the changing perceptual experience of the present is traditionally attributed to the fact that we are organisms with a sensory register that is near-constantly receiving new information (Hartle, 2008). Hohwy et al. suggest that this is insufficient to explain why perception changes even when the sensory input is constant. That aspect of perception is traditionally explained by the concept of perceptual adaptation (Clifford et al., 2007), without invoking Bayesian inference. [↑](#footnote-ref-12)
12. However, a recent meta-analysis has raised the prospect that the evidence for such “stereotype threat” effects is not as strong as it seems (Flore & Wicherts, 2015) [↑](#footnote-ref-13)