

Presentism and the experience of time¹

M. Dorato

Dept. of Philosophy, Communication and media Studies

Via Ostiense 234, 00146, Rome, Italy

dorato@uniroma3.it

Forthcoming in TOPOI

Abstract: Presentists have typically argued that the Block View is incapable of explaining our experience of time. In this paper I argue that the phenomenology of our experience of time is, on the contrary, against presentism. My argument is based on a dilemma: presentists must either assume that the *metaphysical* present has no temporal extension, or that it is temporally extended. The former horn leads to phenomenological problems. The latter renders presentism metaphysically incoherent, unless one posits a discrete present that, however, suffers from the same difficulties that the instantaneous present is prone to. After introducing the main phenomenological models of our experience of time that are discussed in the literature, I show that none of them favors presentism. I conclude by arguing that if even the phenomenology (besides the physics) of time sides against presentism, the latter metaphysical theory has no scientific evidence in its favor and ought to be dropped.

Key words: presentism; eternalism; the block view; becoming; the relativistic present; phenomenology of time; extensional models, retentional models; protentions.

1. Introduction

The dispute between presentists and eternalists² has often considered the physics of relativity as *the* only a posteriori test to adjudicate the debate, eternalists having the edge in virtue of the relativity of simultaneity (Putnam 1967, Sider 2001, Saunders 2002, Gibson and Pooley 2008).³ On the other hand, many A theorists have protested that the block theory of the universe, according to which past present and future events exist on a par, is not capable of explaining our dynamical experience of the passage of time, and that this is a decisive argument against the B theory. For instance, the physicist Paul Davies claims that our experience of passage is evidence that physics so far has overlooked a temporal aspect of the

¹ Thanks to the anonymous referee for her precious comments and criticism.

² Without going into more details, I take presentism to be the view that only presently existing events are real, and eternalism to be the view that past present and future events are equally real.

³ Also in the general theory of relativity, which is more fundamental than the special theory, the contingency of cosmic time and its statistical nature have led logicians and philosophers to object to the possibility of using it to ground the existence of an objective now (Gödel 1949, Dieks 2006). Belot points out that symmetric cosmological models in which cosmic time is definable are not “typical” in the space of solutions of Einstein’s field equations (2005, p. 264-6).

world that is of great significance (Davies 1995, p. 275)⁴, while Craig argues that “[experience] is defeater-defeater that overwhelms any B-theoretic argument against the reality of tense” (Craig 2000, p.138). See also Skow: “I cannot survey all the motivations philosophers have had for the moving spotlight theory. But the motivation that I like best appeals to the nature of our conscious experience. Of all the experiences I will ever have, some of them are special. Those are the ones that I am having NOW” (Skow 2009, p. 677).⁵

However, strangely enough, the phenomenology of time has not entered the dispute, and B theorists have not used it to turn the presentists’ weapon against their position.⁶ In this paper I will argue that the phenomenological evidence is against presentism: if even the phenomenology (besides the physics) of time sides against presentism, then the latter position seems to be in a bad predicament.⁷

The argument, in a nutshell, is based on the following dilemma: presentists must either assume that the metaphysical present is temporally extended (Temporally Extended Present or TEP for short) or that it has no temporal extension (Temporally Unextended Present or TUP). The former horn turns presentism into a metaphysically incoherent view (modulo a discretization of time), the latter leads to explanatory difficulty *vis à vis* the phenomenology of our consciousness of time. In a word, my main claim is that in view of this dilemma, the typical argument in favor of presentism (namely, that it is closer to our experience) does not work, because we do not perceive an indivisible present moment (whether instantaneous or having a discrete length).

The plan of the paper is as follows. In the next section (2), I will discuss the dilemma in some more detail by discussing and evaluating a possible *tertium quid* between the two horns. In section (3), I will first show that presentism is committed to a temporally indivisible present moment (i.e., either TUP or discrete), and I will then present a first significant difficulty that the two forms of presentism encounter in explaining our experience of time.

In (4), I will introduce the main models of our experience of time, by focusing on the cinemematical, retentional and extensional models (Dainton 2010a), and on their empirical and philosophical/phenomenological evidence. In section 5 I will focus on the possible accounts

⁴ Davies strictly speaking is no presentist, but he certainly argues that the block view is incompatible with our experience of time. *Ditto* for Maudlin (2002).

⁵ Skow, strictly speaking, is not a presentist, even though he argues that for each instant of time, there is an absolute present event illuminated by a spotlight moving on a supertime.

⁶ For notable exceptions, see Dainton (2010a, chapter 7), Dainton (2011), and Le Poidevin (2007). For related strategies not relying on phenomenology, see Callender (2008) and Prosser (2013).

⁷ I will assume that the dispute between presentism and eternalism is *genuine*. For the view that the dispute is not well-posed see, among others, Sider (2001) and Meyer (2013). For a contrary view, see Dolev (2006), Savitt (2006) and Dorato (2006).

of our experience of time that a discrete-time theorist and a TUP theorist might offer. In 6 I will finally show that in both models of the present, presentism, which is typically regarded as the metaphysical theory closer to common sense and to our consciousness of time, fails to give an account of the phenomenology of our experience of time.⁸

2 The presentist's dilemmas

Let me note at the outset that here I will leave aside the tough question of establishing which of the various versions of presentism is the right one. What matters for my purpose is to note that both more typical forms of presentism and theories like the moving spotlight (Skow 2009) – which are committed to some sort eternalism – share the view that there is a moment that is ontologically privileged. Let us begin by supposing that the metaphysical present is temporally extended (TEP) and has a finite duration, so that it is divisible into smaller parts (it is at least dense). This hypothesis immediately seems to imply that there *are* past and future components of the present moment, since in principle its finite duration can always either be measured by some clock or in any case be further divided. If there is a temporal succession in the metaphysical present, presentism becomes inconsistent: if the real coincides with the present, at least those past and future events that are proper parts of the temporally extended present must be assumed to be real. If the presentists insisted, with an *ad hoc* move, that only *some* future and past events are real (those that are *not* contained in the present) while all the others are not, the obvious retort could be: how can one refuse to regard *all* of the events (or none of them) as real (respectively, unreal) without begging the question?⁹ The same conclusion seems to hold if each present moment has a “negligible” though not instantaneous duration, provided that each “negligibly long” present can be further divided. The assumption of achronality (lack of any temporal separation within the spatiotemporal region that we regard as present) seems to be part of the very notion of being present (Savitt 2001), or so I will assume in the remainder of the paper.

This conclusion suggests a possible escape from the outright contradiction of a temporal extended present, which could consist in claiming that time is composed by finite-sized,

⁸ Once again, this is not meant to be a defense of eternalism, since this depends on the assumptions that the two positions are clearly distinguishable, a claim that here I will not discuss.

⁹ The unreal part of course depends on the thesis that past and future events are unreal, which then would reduce the present to a point.

discrete blocks, the various presents, each of which possesses a finite temporal duration that cannot be further divided. If temporal atoms existed (Kragh and Carazza 1994, van Bengedem 2011, Mazzola 2014), time would be discrete, since between one temporal unit (the present) and the next there couldn't be any intermediate time. In fact, if overlaps existed, the non-empty intersecting regions would divide the temporal atom, against our hypothesis. It follows that any finite interval of time can only have a finite number of proper subintervals (the so-called "chronons").

If we suppose – for the sake of argument – that the option of discrete time is logically, scientifically and metaphysically coherent, the dilemma between TUP and TEP is transformed into a new dilemma, that between an instantaneous, temporally unextended present (TUP) and a **D**iscrete, finite-sized but indivisible **P**resent (DP for short).

3 TUP and DP presentism, and a first difficulty in accounting for our experience of time

In the previous section we have established that in order to avoid inconsistencies leading into eternalism, the metaphysical now, the present regarded as a mind-independent feature of reality, cannot be further divisible.¹⁰ This unavoidable conclusion brings with itself a first argument against the thesis that our experience of time favors presentism.

Let us begin by supposing that the metaphysical present is instantaneous (TUP). In this hypothesis, presentists and eternalists alike would have to admit that we could not perceive *directly* the present, since light signals emitted from the objects around us take time: as it is standardly assumed in the special theory of relativity, light is a limiting signal. Consequently, strictly speaking we always perceive what has already occurred, namely the past of any object and event that is around us.¹¹ The relativistic constraint about our perceiving only past events (luminous information arrives to our eyes from the past light cone) implies that it is only *our experience* of the event that is present, not the events themselves that cause our perceptions. This seems to bring an important piece of evidence in favor of the thesis that the present has something to do only with our conscious *experience* and not with objective properties of a presentist world, as Davies and Craig would have it (see section 1), at least if the vague term "experience" means "direct experience or direct perception".

This conclusion is reinforced by the fact that it is independent of the various possible

¹⁰ This holds for both TUP and DP.

¹¹ As explained by Butterfield (1984) this temporal lag does not cause difficulties in our interaction with earth-bound objects, since their properties are temporally rather stable, in the sense that they don't change during the negligible time that is necessary for light to reach our eyes from their location.

ways to find a “physical counterpart” of a metaphysical TUP in the structure of Minkowski spacetime. Within special relativity in fact, by considering only achronal regions as TUP requires,¹² the relativistic temporally unextended present must be regarded as coinciding either with a hyperplane of simultaneity relative to an inertial observer or with a pointlike event. In the former option, due to finite speed of light, we cannot perceive *any* simultaneous events (and therefore we cannot perceive *the* present identified with such an hyperplane); in the latter, we must recall that around any pointlike event there is a region of spacelike-related causally non-connectible events. In both options, presentists and eternalists alike must concede that we don’t directly perceive or experience the present.

Of course, the presentists can retort that this scientific fact does not in the least jeopardize her view: the instantaneous present must in fact be regarded as a theoretical, metaphysical posit going beyond our direct perception, but necessary to *explain* it. A given succession of non-denumerably many temporally unextended present moments must then be used to *explain* the phenomenological fact that what we perceive *appears* to be temporally extended, and in continuous, flowing change (see Llyod 2004). Such a *prima facie* plausible inference to the best explanation will be discussed by bringing to bear different models of our experience of time. For now it is essential to note that if the hypothesis adopted by the presentist is that the metaphysical present is durationless, we must conclude that have no *direct* experience of it.

These relativistic considerations can be extended to the discrete model of the metaphysical present (DP). Even if it were possible to formulate a discrete model of Minkowski spacetime, which has the structure of four copies of the real line R plus a metric, the relativistic constraint implied by the limiting velocity of light would hold also in this case. Furthermore, if we posited that temporal reality is constituted by a succession of discrete, present events (DP), exactly as in the previous case presentists and eternalists would concur that we are not *directly* conscious of, and we don’t experience, such metaphysical posits. And as in the previous case, our experience is all but in accord with TUP and DP, since our consciousness of time reveals contents that are in continuous flow, with no discretization of segments of it. This fact does not have undesirable consequences for the eternalists, but constitute a challenge to which presentists must respond. If the reply is that metaphysical theses cannot in any case be supported by our perception or experience of the world (Prosser

¹² This assumption excludes the region of spacelike-separated events, that of the lightlike-separated events, and that of the recently proposed “diamonds”. A “diamond” relative to a timelike line L of arbitrary length is the (non-achronal) set of events that can be either causes or effect of any point on the line: see Arthur (2006) and Savitt (2009) for a defense of this conception of the present in Minkowski spacetime. A forceful reply to a criticism by Dorato (2011) is in Savitt (draft or this issues?).

2013) why do presentist argue that their view is supported by the latter?

A relevant difference between DP and the previous hypothesis TUP must however be noted. Neurophysiological findings concerning the minimal duration that the various sensory modalities need in order to detect that *one* signal (auditory, tactile or visual as it might be) is *before* another set an upper bound to the duration of the “metaphysical chronons” (see Pöppel 1988 and 1994, Wittmann et. al. 2008). Consequently, the duration of the **Discrete Presents** cannot exceed such perceptual thresholds, comprised between 20 and 60 ms, on pain of contradicting our experience even more strikingly. The reason should be obvious: since the chronons are indivisible quantum of time, our capacity of perceiving a temporal succession *within* such quantum would falsify the theory directly!

In a word, the DP model suggests the idea that reality consists of static photograms (the chronons) that are presented to us with a certain speed: our impression of change and motion in the content of our experience is caused by the rapid motion of the film reel, transforming something static and discrete into something dynamical.

However, what does the motion of the reel correspond to or is analogous with the metaphysics of presentism?

This interrogative should not be regarded as extravagant or question-begging, or raised by a metaphor that shouldn't be taken seriously. First of all, as we are about to see, this model has been discussed in the phenomenological literature, and is known precisely as “the cinematological model”. Secondly, the above is important because within both the TUP and the DP model no change is possible *within* the present moments, *because both instantaneous moments and chronons have no parts*. It follows that the presentist's real change (not that just perceived by, or appearing to, us) can only be possible if “reality is constituted by the successive coming into being of nows” (Gödel 1949), where the change in question is not the qualitative change in an object acquiring and then losing one of its properties, but an absolute change in what exists.

As a consequence of this explication of the presentist's passage of time (or equivalently, of temporal becoming), the passage of time would entail or be constituted by the *successive* occurrence of present moments or events (Broad (1923), Savitt (2001), Dorato (2006) Dieks (2006)), no matter whether the nows are unextended or discrete indivisible chronons. Consequently, the explanation of our experience on the part of the presentist must presuppose that we either have instantaneous sets of present events (TUP) occurring one after the other (that is, coming into existence in succession) or discrete, temporally extended present blocks that come into existence in succession (DP). The whole problem with this account is that the

relation of temporal succession in the presentist metaphysics is nothing more than a metaphor. So, on the one hand, in order to make room for change, the presentist must invoke the passage of time regarded as an absolute succession of present events, on the other she must self-contradictorily deny that temporal succession is a real property of the universe.

In sum, since we don't experience the TUP or DP directly, but only a succession of constantly changing and continuously flowing events persisting in time, presentism has no direct phenomenological evidence in its favor and its only force can come from its explanatory power. Note in fact that a possible way out of the DP or the TUP presentist, consisting in declaring that our temporal experience is illusory, would be mill for my grind anyway, since such an experience would have no authority on what the metaphysical nature of time is. A conclusion that would be contrary to the standard argument of the presentist's descriptive metaphysics, that insists that we should not abandon common sense unless we are really forced to.

In order to further inquire into the explanatory power of TUP and DP metaphysics issue, it is appropriate to introduce the different models of our experience of time that are often discussed in the literature.

4 Dainton's three models of our experience of time and four questions about them

In order to introduce what Dainton has called the three models of temporal awareness (Dainton 2010a), it is useful to distinguish, at least initially, between the *act* of consciousness that represents temporal aspects of reality and what is represented by the act, its intentional *content*.

On this basis, Dainton distinguishes three possibilities. Either both the conscious act and the content of consciousness are instantaneous (he calls this the *cinematic* model, and I will refer to this model as (M₁), or the act is instantaneous but the content isn't (he refers to this as the *retentional* model, (M₂) or both the act and the content have some finite duration (the *extensional* model, (M₃). See Table 1 below:

	Conscious Act	Content of the act
Cinematic Model (M ₁)	Temporally Unextended	Temporally Unextended
Retentional Model (M ₂)	Temporally Unextended	Temporally Extended
Extensional Model (M ₃)	Temporally Extended	Temporally Extended

Antiretentional model (M ₄)	Temporally Extended	Temporally Unextended
Retentional+protentional (M ₅)	Temporally Extended	Temporally Extended

Table 1

When referred to acts and contents of consciousness, “instantaneous” means either literally instantaneous or quasi-instantaneous, that is, characterized by a very brief or insignificant duration (Dainton 2010a p.5).

As anticipated above, the perception of change and passage in the *cinematical* model is explained by supposing that the rapid succession of continuous snapshots of reality that are registered by very brief acts of consciousness generate together an experience of continuous passage, as in photograms of movies. The *retentional* model presupposes that the immediate past is “retained” within the instantaneous consciousness of the present, so that we are directly aware of a finite-duration succession of events generating our impression of motion, change and passage. The *extensional* model attributes a finite duration to both the acts and the contents of consciousness.¹³ Consequently, in M₃ the relation “earlier than” holding between the content of the acts of consciousness is the same relation as that holding between the latter.

Here I will briefly raise four related questions, the first three of which are meant to set the stage for a discussion of the last:

Q.1) Can these three models be regarded as exhaustive?

Q.2) Are there reasons coming from the philosophy of perception to prefer one or some models to the others?

Q.3) What role could experimental data (i.e., data that are not merely phenomenological in character) play in adjudicating among these models? And, finally

Q.4) Does any of these models exclude or bring evidence in favor of presentism?

Since in the next two sections I will concentrate on Q.3 and Q.4 respectively, in this section I will discuss the first two questions, which can be dealt with quite concisely.

Q.1) Taking for granted the distinction between acts of experience (episodes of experience, as Dainton calls them, or the mental *events* necessary for our experience of some temporal relations) and what is represented by the experiences (their content), it seems that

¹³ This view was clearly formulated already by Husserl: “it is evident that the perception of a temporal object itself has temporality, that the perception of duration itself presupposes the duration of perception, that the perception of any temporal form itself has the phenomenological temporality that belongs to its irreducible essence” (Husserl 1991, p.24).

the three models cannot be regarded as exhaustive, since at least two more options need to be considered. A fourth possible option suggests that we could have temporally extended acts or episodes of consciousness whose content is however temporally unextended, a possibility that Dainton does not discuss, but that seems *prima facie* well-suited for a presentist metaphysics relying on a TUP. For simplicity, let me refer to this fourth model as the anti-retentionalist model, or (M₄): see table 1.

Finally, a fifth possibility is that the retentional model, in which the content of our experience is extended, is characterized by a more complex structure, involving acts of consciousness that are not only extended in time as in the extensional model, but also contain *retentions* of the past (as in M₂) as well as *anticipations* of the future. This model therefore is not just a combination of (M₂) and (M₃): even though the latter model could in principle make room for the more complex structure of (M₅), in his classification Dainton does not explicitly consider this possibility. And yet (M₅) seems more faithful to the phenomenology of temporal experience, a thesis that had been convincingly defended already by Husserl in 1928, and more recently by Lloyd (2004), Gallagher and Zahavi (2008) and Gallagher (2011).

Q.2) One of the essential presuppositions of the models discussed by Dainton is their reliance on the notions of “content” and “act”. The former notion, however, is certainly in need of additional clarifications: for instance, is it mental or physical? In his 2010b, for example, Dainton first defends the extensional model, and then, as a consequence of this choice proposes an identification of act and content: “in place of a two-level view of experience, we can adopt a one-level and *simple* view, according to which phenomenal contents (such as sounds, colors, pains) are intrinsically conscious items: they do not need to be apprehended by a separate awareness to be experienced, the contents themselves are experiences in their own right.” (2010b, p.114).

This quotation seems to presuppose that the notion of content is in general essentially *mental*, so that Dainton’s proposal of unifying act and content (coming after his defense of the extensional model) seems legitimate. However, one could maintain that more generally, and therefore quite independently of the phenomenology of qualia, there is *no distinction* between the act of awareness and what is represented by the act (its content). If this were the case, the retentional model M₂ and its dual, the fourth model M₄ referred to above would be out of the game: by eliminating the act/content distinction in fact, the difference in the duration of acts and contents postulated by these two models would also be eliminated. Consequently, we would have only three competitors left, the cinematocal model M₁, the extensional model M₃, and the retentional/protentional model M₅. However, what if the notion of content were

understood in a different way, so that the content of perceptions involving time were not mental but were rather about a physical or a mind-independent entity?

This question raises an interesting point: since our temporal *experience* certainly includes *perceptions* of temporal relations, it is possible to apply the act/content distinction to perceptions and place our discussion of the above models within one of the key debates in the philosophy of perception. That is, it becomes natural to ask whether the content of our acts of temporal perceptions is itself something mental (and therefore refers to the external world only *indirectly*) or whether we perceive temporal aspects of a mind-independent world *directly*.

In a word, it has not been sufficiently noticed that a stance on the distinction between act and content in the context of phenomenological models of temporal perceptions also depends on how one defines the notion of content, and therefore on questions that are typically debated in the philosophy of perception. If the contents of our perceptions are phenomenal or egocentric, as in *indirect-realist* views of perception, we never perceive directly a physical object, but only a representation of it (Crane 2001 and Smith 2002). But then the contents of all our perceptions, and a fortiori of our temporal perceptions, are *sense data*, possibly acting as a veil between our representations and the external world. In such a philosophical view of perception, *prima facie* we seem to have three ingredients: an act of consciousness (i.e., a conscious representation), what is represented (i.e. the *mental* content of the representing act), and the unattainable but existing physical world.¹⁴

However, a reduction of the complexity of this three-level view is still possible also in indirect-realist theories of (temporal) perceptions, in the same sense in which in phenomenological models of time one can identify the acts and mental contents of our temporal experiences. Recall the position defended by Dainton in the previous quotation, when he explicitly claims that the content of our temporal experience is itself mental: not only is it not clear what function plays the duplication of act and content within a view that claims that our conscious representation are about sense data; but also the acts of temporal awareness could not be regarded as phenomenologically given, as the phenomenological tradition assumes, if they were identical with what one is conscious of. We see that also in the context of the philosophy of perception we rediscover the result presented above: given the identification of act and content, indirect-realist theories of perception would reject any view of temporal experience that assigns to acts and contents significantly different temporal

¹⁴ The view is called “realistic”, given that an external world is still presupposed.

durations. Both M_2 and M_4 would be automatically ruled out.

On the other hand, if – as in direct-realist view of experience (Putnam 1999, McDowell 1994) – what we perceive, or are directly conscious of in perception, are physical objects, these can be regarded as the *contents* of our conscious experiences. It would then seem outlandish to claim that my enduring laptop (the physical object which is now the content of my conscious representation) coincides with my persisting conscious representation of it. Consequently, in direct realist views of perceptions, one needs a radical distinction between mental act and physical content. It follows that according to this direct-realism hypothesis, there would be room for a discrepancy between the duration of conscious acts and that of their contents. Unlike what happens with the indirect-realist views, M_1 and M_3 can be admitted, but M_2 and M_4 would not be ruled out a priori. Evidently, the fact that in direct realists theories of perception there is room for discrepancies on the temporal duration of act and content, need not entail that there *must be* such a disagreement. Unlike the indirect-realist views, the direct realist views do not cut ice between our models, but this is further evidence about the importance to consider questions in the philosophy of perception.¹⁵

Here I will not try to adjudicate the difficult debates about the nature of the content of our perceptions (with the accompanying) and then, on this basis, try to defend a particular model of our experience of time. The purpose of the previous paragraphs is more limited. First, I wanted to point out the somewhat neglected connection between the models proposed by Dainton and the dispute between direct realist and indirect realists, as well as the importance that phenomenologists of time confront themselves with it.¹⁶ Second, and more importantly, given the purpose of this paper, there is a sense in which both presentists and eternalists, *qua* defenders of a metaphysical thesis about the nature of time, should prefer direct realism about all of our perceptions, *so as to include perceptions of temporal relations and more generally our experience of time*. One cannot rely on arguments claiming that the phenomenology of our experience of time favors (or is against) presentism if one doesn't abandon indirect realism. If our awareness of time were only about mental entities, as in indirect realist views, or if we suspended any judgment about the nature of content, the phenomenology of our temporal experience would be totally disconnected, or at least rather remote, from the metaphysical considerations to which we are interested. In this case in fact, the present

¹⁵ It might be possible to overcome the direct-realist indirect-realist debate by distinguishing between *real* and *intentional* elements of our consciousness. As a consequence the external objects that we perceive would not be “in our mind”, even though what we are aware of in our perceptions would be always an intentional object, that is, an object as it appears from a certain “perspective” (see Gallagher 2003).

¹⁶ Dainton and the other phenomenologists of time are of course well aware of the literature on the nature of our perceptions.

moment, intended as a metaphysical entity, could be never experienced: this is not what those presentists¹⁷ insisting that our experience (and therefore our perception) of time favors their view should aim for.

Before discussing the possibility that the metaphysical posit of an indivisible present has a purely explanatory force, as suggested in the previous section, as promised we must raise question Q3: can we select among these models by using non-phenomenological data?

5. Dainton's models and the lack of empirical evidence

Traditionally, the stress of the literature on our perception of time has been phenomenological (from Lotze to James and onward) and only in the recent years has a good amount of attention been dedicated to the interconnection between phenomenology and neurology. As of now, we still know too little about the brain's mechanisms that are responsible for the processing of temporal information to bring empirical evidence to bear on the phenomenology of temporal experience.¹⁸ In particular, our increasing knowledge about the brain mechanisms that are responsible for

(5.1) the perception of succession and

(5.2) the estimation of the duration of phenomena

still do not help us to understand how the succession of experiences is integrated in the single experience of succession characterizing the specious present. Yet, it remains to be seen in which sense data coming from neurophysiology could be relevant for the "empirical testing" of our five models. Let us briefly review these two points in succession, in order to show that while none of the five models can be definitively ruled out by current neurophysiological findings, some empirical facts *do* favor the protentional model M_5 .

5.1 As to the mechanism underlying our perception of temporal succession, we know that *brain processing of temporal data takes time*. As hinted above in presenting DP, we have a good amount of evidence that our capacity of discriminating auditory or visual stimuli has precise thresholds, that are measured in milliseconds (Pöppel 1988), and that differ for different sensory modalities. For instance, for visual stimula presented on a screen, our brain can perceive succession only when the interval between two successive light signals is

¹⁷ See section 1.

¹⁸ For an attempt in this direction, see Gallagher and Zahavi (2008) and their reference to the theory of dynamical systems. This is just one example: the avenues explored are numerous and progress in connecting the neurophysiology and the phenomenology of time is remarkable. For an interesting review of one aspect, see Holcombe 2013.

approximately 40 ms, while the threshold is inferior for acoustic signals. Are data of this kind relevant to select among the models above?

An identity theorist might claim that the unmatched temporal properties of the neural/physical events and the mental events (the former temporally extended, the latter unextended) may seem to render rather implausible the models M_1 and M_2 . If the brain events involved in the perception of succession are temporally extended, the mental events to which these brain events are identical to should better be temporally extended as well. Since the cinemal and the retentional model assume that the mental act is durationless, an identity theorist should favor the other models.

However, this claim turns out to be ungrounded, and not just because the identity theory could be false. Even if it were right, it might be the case that an instantaneous act of consciousness simultaneously synthesizes physical/neural events that are temporally extended and temporally successive to one another, constituted as in M_1 by a non-denumerable succession of instantaneous events. Therefore, even within a mind-body identity theory, mental events corresponding to acts of awareness need not mirror the temporal duration of brain events, so that a single, instantaneous type of mental event could be identical to a temporally extended series of brain events.

In sum, on the one hand, it can be recognized that, in view of the temporal duration of brain events processing temporal information, the extensional model M_3 and the retentional/protentional model M_5 seem more “natural” than any other model that regards the mental processes produced, caused by, or supervenient upon, temporally extended brain processes as temporally unextended. On the other hand, however, “threshold studies” on the duration of those brain processes that are responsible for our perceiving succession don’t seem to be able to support one of the five models over the others.

5.2 As to the perception of duration, Wittmann argues, rather plausibly, that “millisecond timing is governed by different processes than time perception in the seconds or multiple-seconds range” and that “over the last years there have been variants of a pacemaker accumulator clock where an oscillator produces a series of pulses and the number of pulses recorded over a given time span *represents* experienced duration” (Wittman et al. 2008, Wittman 2013, my emphasis). In such a pacemaker model, “represents” is attributed to the brain process, which means, charitably, that it is thanks to this oscillatory activity that there is a conscious evaluation of duration.¹⁹ Of course, the “represents” could also be interpreted as

¹⁹ The estimation of duration depends on many other causes, involving for example the emotional state. For a popular exposition of this fact, see Hammond 2013.

“causes”, so that it is not unconceivable that temporally extended brain processes could produce an instantaneous mental state. However, one could at the same time argue that, at least in identity theories, it is the temporally extended character of the brain processes (the neural ticks of the pacemaker accumulation clock) that create a correspondence with the extended nature of the content of our experience. In a word, also in this case, we must conclude that a connection between the five phenomenological models and data coming from neurophysiology so far seem rather weak, so that the models need to be evaluated in terms of their internal coherence and faithfulness with respect to our experience. This faithfulness needs also to be connected, given my project, to the alleged explanatory power of the presentist’s ontological assumptions (TUP or DP).

Before engaging this task in the next section, however, it should be added that by considering questions of faithfulness to our experience, as well as our actual knowledge about the anticipatory and enactive character of perception and experience (see for example Noë 2004), we ought to conclude in favor of a model that incorporates also protentions besides retentions, that is, a model that, like M₅, advocates Husserl’s three-partite view of our temporal consciousness (Husserl 1991, Miller 1984, Gallagher 2011).

As an illustration, think of well-known, everyday life examples involving the motor schemas that enable us to catch a ball. In these cases we automatically calculate the time of arrival and anticipate our catching the ball by moving our arm *beforehand*. Our experience of the present includes the future event in such a way that the retained events, the primary impression and the anticipated event cannot be sharply separated, and differ only on the vivacity with which they are presented to us: this happens when we listen to music and anticipate a note, or when we suggest a word to someone who is speaking to us and does not know how to finish the sentence. And so on.

6 Presentism and the five phenomenological models of our experience of time

In what follows I will regard as uncontroversial (and shared by presentists and eternalists) that *we are directly aware* of the following three facts: (i) the content of our experience, however one conceives of it, appears to change and “flows” continuously; (ii) such a change is accompanied and constituted by an experience of succession (a B-theoretic, tenseless aspect of the content of our experience); (iii) the succession of experiences (of the acts of consciousness) also changes continuously and is in good sync with their content.

Here I would like to argue that such aspects are not just compatible with eternalism, but even support eternalism better than presentism. In order to do so, let me first suppose that in order to explain the three features above, one ought to assume that the content of our experience is stretched out in time (as M_2 , M_3 and M_5 have it). Later in the section I will discuss the remaining possibility that presentists embrace the other two phenomenological models, advocating a durationless content, and will conclude that none of the five models support presentism.

6.1 Assuming extended content for our experience of time

On the hypothesis of (i) direct perceptual realism (the content *is* the object) or of (ii) weaker forms of indirect realism, in which our perceptions of time are about an external world that is always perceived from a certain mentally construed perspective²⁰ or of (iii) partially isomorphic relations of succession between the real events and the experiential contents thereof, one automatically rules out the consistency between M_2 , M_3 , M_5 and TUP and DP presentism. The gist of the argument crucially depends on the assumption that the temporally extended contents of our experience are structured by the directly perceivable *relation of temporal succession*, and on the conceptual point that the existence of a real relation presupposes the existence of the relata.

If the content is extended in time, such an extension necessarily entails *an experience of succession*, possibly within a single, durationless or quasi-simultaneous act of experience (as in Dainton's retentional M_2). In *direct-realistic* view of experience, however, we perceive events structured by real relations of temporal succession. If we perceive duration, motion and change, we also perceive a temporal *relation* between the immediate past and the present, and therefore we experience something that presupposes *the existence of both relata*, namely the (immediately) past events and the present events (the primal impressions), despite the fact that the event is past. The direct experience of the relations implies the reality of at least the immediately past events – and of the immediately future, in the case of M_5 . However, if *some* past (future) event, even though perceived in a single act of consciousness, is related to present event, which are later than the former, then they are also real.²¹ It then follows that if *some* past events are real, there is no reason not to concede reality to *all* past events, even

²⁰ See note 13.

²¹ A similar conclusion is reached by Le Poidevin (2007) by considering the role of truth-makers in assertions based on memory.

those that are not part of the temporally extended, “specious” present. The mere fact that we experience directly a temporal separation between events implies that they are both real. Analogous reasoning holds for the future in models that, like M_5 , admit of *protentions*: as soon as we experience duration (directly or indirectly), we perceive succession, and the experience of succession entails not just the reality of present events, but also that of the events (past or future as it may be) that are the *relata* of relation.

In addition, even if the contents of our temporal perceptions were partially phenomenal, as in indirect-realist theories of perceptions, the fact that the order of the experienced events is in the vast majority of cases also the order of the events they are about in the real world – a fact that must be admitted also by presentists – implies in its turn that, by assuming M_2 , the perception of a temporally extended succession of events implies the reality of the past. However, since it is reasonable to suppose that M_5 is more faithful to our experience (see the previous section), one should attribute reality to *all* past and future events, which is exactly the thesis that eternalists invoke. The phenomenology of time favors eternalism, not presentism.

It might be retorted that granting reality to those past events that are part of the specious present is not sufficient to reject presentism. After all, retentions and protentions *are* “present” because they are part of the extended *phenomenological* present, while retentions and protentions ought to be regarded as *not* being part of the *metaphysical* present, which reduces to a point or to an indivisibly finite and discrete block, as in TUP and DP metaphysical theories of the present respectively.

Unfortunately for the presentist, this objection does not work. Notice that for a rebuttal of TUP or DP presentism, it is sufficient to prove that at least *one* non-present event is real. The fact that a retention is or is not a present event is not a merely terminological question. As long as a distinction between two temporally successive events in our experience can be drawn – so that a retention and the primal impression of a moving object differ in our experience – there is also a clear sense in which such a phenomenal difference *must* correspond to a physical/metaphysical relation of temporal precedence, at least in direct-realist theories of temporal perception. Otherwise, what would a retention of a past note in the present experience be a retention *of*? At least the appearance of a retention (or of a protentions) must be a *real* appearance. If our experience of time has a temporally extended content, presentists must paradoxically *explain away* – with cinematic metaphors or some other trick – the very fact that characterizes essentially our temporal experience, that very experience that is usually invoked by them to defend their view.

In a word, while it is true that according to M_2 we experience directly only the past belonging to a speciously present, temporally extended event, it is also true that we perceive indirectly (or directly) two temporally separated physical events, and therefore a past and a present event, or the past and future stages of a continuous process. In a word, the perception of a succession (even within the experience of a specious present) implies eternalism.

Eternalist defenders of an ontically privileged moment might retort that our perception of succession entails no more than the moving spotlight view of time (Skow 2009).²² It follows that the retentive and protentive aspects of our experience could be admitted also in an eternalist, A-theoretical metaphysics, in which one changing instant is anyway privileged, a fact that might convincingly explain our experience of succession. Leaving aside “Orwellian” difficulties of a view in which “all events are real but one is more real than the others” – so that one event is *absolutely* present only *relatively* to points moving outside time – in our context the moving spotlight seems to be committed to the following dilemma. It either opts for a sharp separation between what is before and what is after the moving spotlight (as in TUP and DP), or for a view of an extended present in which some events are more vividly illuminated than others. In the latter option, there would be no sharp boundaries between the events of 3D space that are illuminated by the spotlights and those that are in complete darkness. While Skow is not explicit about which of the options is appropriate, some passages may lead one to think that he is also open to the latter option: “the vivid experiences are the ones the spotlight shines upon. As the spotlight moves, there are changes in which experiences are vivid (Skow 2009, p.677).

This passage might be used to explain our experience of succession, in which there are no sharp temporal boundaries, but which contains some elements that have more vividness than others. The problem with this option however, is that shadowy areas of presentness cannot be admitted by the spotlight view, since the absoluteness of the present moment that this view advocates cannot admit of degrees. It then remains to discuss the former option, which, by favoring a sharp light/darkness opposition, is committed to a TUP or to DP. For this reason – even though in virtue of its eternalist ontology the spotlight view is *not* subject to the objections to presentism raised above – it seems nevertheless closer to the cinematic or antiretentional models, which I now pass to discuss.

6.2 Assuming instantaneous contents for our temporal experience

²² I owe this objection to the anonymous referee.

Given that presentism is ruled out by phenomenological models defending a temporally extended content, presentists are forced to adopt the remaining two models. They may not perceive this move as a difficulty and may even welcome it, given that they believe that only one time exist. By embracing these two phenomenological models, the M_1 and M_4 presentist, as well as the spotlight theorist, may in fact claim that we have a direct experience of a temporally unextended present, a fact that lend support to their metaphysical assumptions.

Unfortunately this claim seems to be defeated by the fact that such models are *not* true to our *direct* experience of change, motion and succession, which presupposes a certain, non-negligible duration of the contents of our consciousness of time: we have already seen why, at least in this respect, the other phenomenological models fare better. Without assuming that we experience directly or indirectly (in the sense specified above) a temporally extended content, our perception of motion, our understanding a sentence in any language or our perceiving a melody rather than a staccato series of independent notes would not be possible (see Lloyd (2004) and Gallagher and Zahavi (2008), Gallagher (2011)). An analogous conclusion holds for DP, since discrete, partless chunks of metaphysical presents are not directly experienced.

In a word, *pace* some of the authors quoted in the first section, presentism, being forced to endorse M_1 or M_4 , cannot receive support from our *direct* or *indirect* experience of time, since the latter is obviously incompatible with the two models we are considering in this subsection. The same conclusion holds for spotlight theorists that commit themselves – something that for their view is unnecessary – to the claim that we can directly experience a temporally unextended spotlight.

In sum, on the hypothesis that these five models are somewhat exhaustive models of our phenomenological experience, we can conclude not only that we don't need presentism to explain our experience (as B theorists have often argued) but that eternalism may even be in a better position to explain or account for our subjective experience and our sense of the passage of time.

6.3 Coda on spotlight theories of the passage of time

Recall that spotlight theorists support a form of eternalism, and are committed together with “standard” eternalism to reject temporally unextended phenomenological models of our experience of time. Would it be reasonable to claim that the “motion” of a spotlight on a

supertime explains of our experience of time better than tenseless theories of becoming that do not suppose such a motion? Also this claims seems rather dubious.

On the one hand, the phenomenological models claiming that the content of our experience is extended, and therefore capable of embodying change, seems sufficient to explain our experience of passage, without having to postulate additional metaphysical speculations. In fact, a model like M_5 enables us to compare the temporal perspectives in which we anticipated certain events with those in which those events are directly perceived and later with those in which the events in question are remembered. Phenomena like the fading of the working memory, which must be considered in addition to the shorter integration windows postulated by M_5 , provide additional, merely psychological explanations of our experience of the passage of time,²³ with no need of postulating the controversial metaphysics of a moving spotlight.

It might be retorted that standard tenseless views of reality cannot admit of becoming or the passage of time by definition. How can an eternalist justify the change of temporal perspectives mentioned above? The answer has been already provided in the previous section: recall that objective becoming has been defined as the mind-independent, successive *occurrence* of events. Within this minimalist approach to the passage of time, eternalists rejecting a moving spotlight can help themselves with the view that events become in an *absolute* sense simply by succeeding one other in time (see Broad 1923, Savitt 2001, Dieks 2006, Dorato 2006b).²⁴ In fact, the *being* of events constituting the ontology of any spacetime theories consists purely and solely in their *occurring*: occurring is what events “do” by definition of “event”. It follows a relational, *tenseless* view of becoming, according to which if one observer or physical system is located in the block universe at a spacetime event P , causally successive events Q tenselessly become relatively to P simply by *occurring* or happening at their later, time-like related, location. As of P , later events Q are not “*already*” given, since this thesis would presuppose that what is still future as of P (that is, later than P in the block) has already occurred as of P , which is contradictory. Once again this explanation seems better and simpler than views requiring a supertime: after all, we are located in spacetime, and there is no reason to assume a viewpoint external to it in order to justify our experience of passage.

²³ See Dorato and Wittman, forthcoming.

²⁴ Savitt (2001) must be credited with the merit of having rediscovered the important contribution that Broad gave to the debate, by distinguish absolute change (the “coming to pass”, as Broad called it, the occurring of events) from qualitative change (an object possessing two incompatible properties at different times).

Clearly, one may object that this tenseless, deflationary form of becoming, is not worth-having: Earman, for example, refers to this view as a “thin and yawn-inducing” approach to becoming (2008, p. 159).²⁵ Of course, a refutation of this criticism must be left to another paper.

References

- Arthur R. (2006), “Minkowski spacetime and Dimensions of the Present”, in: Dennis Dieks (Ed.), *The Ontology of Spacetime*, Elsevier Amsterdam, (2006), pp.129-155.
- Belot G. (2005), Dust Time and Symmetry, *British Journal for Philosophy of Science*, 56 (2): 255-291.
- Broad C.D. (1923), *Scientific Thought*, London: Kegan Paul.
- Butterfield J. (1984), Seeing the Present, *Mind*, XCIII, vol 56, pp.161-176.
- Callender C. (ed.). (2002), *Time, Reality and Experience*, Cambridge: Cambridge University Press.
- Callender C. (2008), “The common now”, *Philosophical Issues* 18 (1): 339-361.
- Craig W.L. (2000), *The Tensed Theory of Time: A critical Examination*. Dordrecht, Kluwer Academic Publishers.
- Crane, T. (2001), *Elements of Mind*, Oxford University Press, Oxford.
- Dainton B. (2010a) "Temporal Consciousness", *The Stanford Encyclopedia of Philosophy* (Fall 2010 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/fall2010/entries/consciousness-temporal/>>.
- Dainton B. (2010b), *Time and Space*, McGill Queen’s University Press, New York, 2nd edition.
- Dainton B. (2011) “Temporal experience”, in C. Callender (ed.) *The Oxford Handbook of Philosophy of Time*, Oxford University Press, Oxford, pp.420-438.
- Dainton B. (2012) *The Phenomenological Self*, Oxford University Press.
- Davies P. (1995), *About Time: Einstein’s Unfinished Revolution*. Harmondsworth, Penguin.
- Dieks D (2006), (ed.) *The Ontology of Spacetime*; Amsterdam, Elsevier 2006
- Dieks D. (2006), “Becoming, Relativity and Locality” in Dieks D. (2006), *The Ontology of Spacetime*, Vol. 1, pp.157-176.
- Dolev, Y. (2006), “How to Square a Non Localized Present with Special Relativity, in Dieks D. (2006), pp. 177-190.
- Dorato M. (2006a), “The irrelevance of the presentism eternalism debate for the ontology of Minkowski spacetime”, in Dieks D. (ed.) *The Ontology of Spacetime*; Amsterdam, Elsevier 2006, pp. 93-109.
- Dorato M. (2006b), “Absolute Becoming, Relational Becoming and the Arrow of time”, in *Studies in History and Philosophy of Modern Physics*: 37, 559–576.
- Dorato M. (2011), The Alexandroff present and Minkowski spacetime: why it cannot do what it has been asked to do, in D.Dieks, W. Gonzales, S. Hartmann, T. Ubel, M. Weber (eds.), *Explanation Prediction and Confirmation. New trends and old ones considered*. Springer, 2011, pp. 379-394.
- Dorato M. and Wittman M. manuscript.
- Earman, J. (2008). “Reassessing the prospects for a growing block model of the Universe”. *International Studies in the Philosophy of Science*, 22, pp. 135-164.
- Gallagher S. (2003), “Sync-Ing in the Stream of Experience”, *Psyche*, 9 (10), pp.1-20.
- Gallagher S. and Zahavi D. (2008), *The Phenomenological Mind*, Routledge.
- Gallagher S. (2011), “Time in Action”, in Callender C. (ed), *The Oxford Handbook of Philosophy of Time*, Oxford University Press, Oxford, pp. 382-419.
- Gödel, K. (1949), ‘A Remark About the Relationship Between Relativity Theory and the Idealistic Philosophy’, in (Schilpp, 1949: 557–562).
- Gibson, I., and Pooley, O. (2008), ‘Relativistic Persistence’, *Philosophical Perspectives*, Vol. 20 (*Metaphysics*): pp.157-198.
- Hammond C. (2013), *Time warps: unlocking the mysteries of time perception*, Edinburgh, Canongate.
- Holcombe A. (2013), “The temporal organization of perceptions”, forthcoming in J. Wagemans (ed.) *The Oxford Handbook in perceptual organization*, Oxford, Oxford University Press.

²⁵ Maudlin (2002) posits a primitive form of passage. Among others, also Pooley (2013) defends a more robust approach to passage.

- Husserl, E. (1966). *Zur Phaenomenologie des inneren Zeitbewusstseins (1893-1917)*, ed. R. Boehm. Husserliana X. Haag: Nijhoff.
- Husserl, E. (1991). *On the Phenomenology of the Consciousness of Internal Time (1893-1917)*, trans. J. Brough. Collected Works IV. Dordrecht: Kluwer Academic; translation
- Kragh, H. and Carazza B. (1994). From Time Atoms to Space-Time Quantization: The Idea of Discrete Time, ca 1925-1936, *Studies in History and Philosophy of Science* 25: 437 – 462.
- Le Poidevin R. (2007), *The Images of Time* Oxford University Press.
- Lloyd D. (2004), *Radiant Cool*, Harvard Mass, The MIT Press.
- Maudlin T. (2002), Remarks on the Passage of Time, *Proceedings of the Aristotelian Society*, 102, pp. 237-252.
- Mazzola C. (2014), Can Discrete Time Make Continuous Space Look Discrete? in *European Journal for Philosophy of Science*, 1, pp.19-38, DOI 10.1007/s13194-013-0072-3.
- McDowell, J. (1994), *Mind and World*, Harvard University Press, Cambridge.
- Miller, I. (1984). *Husserl, Perception, and Temporal Awareness*. Cambridge: MIT Press.
- Meyer U. (2013), *The Nature of Time*, Oxford University Press.
- Noë A. (2004), *Action in Perception*, Harvard Mass. The Mit Press.
- Pooley O. (2013), “Relativity, the Open Future and the Passage of Time”, *Proceedings of the aristotelian society* 113 (3pt3), pp.321-363.
- Pöppel E. (1988), *Mindwork: Time and Conscious Experience*, Boston: Harcourt Brace Jovanovich.
- Pöppel E. (1994), “Temporal mechanism in perceptions”, *International Review of Neurobiology*, 37: 185-202.
- Prosser S. (2013), “Passage and Perception”, *Nôus*, 47, pp.69-84.
- Putnam, H. (1967), “Time and Physical Geometry”, *Journal of Philosophy* 64: 240–247.
- Putnam, H. (1999), *The Threefold Cord*, Columbia University Press, New York.
- Saunders, S. (2002), ‘How Relativity Contradicts Presentism’, in (Callender, 2002: 277–292).
- Savitt S. (2000), “There is no time like the present in Minkowski spacetime”, *Philosophy of Science* 67 (3), pp. 563-574.
- Savitt, S., (2001). “A Limited Defense of Passage,” *American Philosophical Quarterly*, 38: 261–270.
- Savitt S. (2006), “Presentism and Eternalism in perspective”, in Dieks D. (ed), *The Ontology of Spacetime*; Amsterdam, Elsevier, pp.111-128.
- Savitt S. (2009), “The Transient nows”, in: Wayne C. Myrvold, Joy Christian (Eds.), *Quantum Reality, Relativistic Causality, and Closing the Epistemic Circle*, The Western Ontario Series in Philosophy of Science 74, Amsterdam: Springer 2009, pp. 339-352
- Savitt, S. draft, Why I love diamonds.
- Schilpp, P. A. (ed.). (1949), *Albert Einstein: Philosopher - Scientist* (New York: Tudor).
- Sider T. (2001), *Fourdimensionalism*, Oxford, Oxford University Press.
- Smith, A. D. (2002), *The Problem of Perception*, Cambridge, MA: Harvard University Press.
- Skow B. (2009), “Relativity and the moving spotlight”, *The Journal of Philosophy* 106 (2009): 666-678.
- Van Bengelem J.P. (2011), “The Possibility of Discrete Time”, in Callender C. (2011) (ed), *The Oxford Handbook of Philosophy of Time*, Oxford University Press, Oxford, pp.145-162.
- Wittmann M. Simmons A., Aron J. Jennifer L. 2, Paulus M. (2008), “Accumulation of Neural Activity in the Posterior Insula Encodes the Passage of Time”, *Nature Proceedings*: hdl:10101/npre.2008.2062.1.
- Wittman (2013), “The inner sense of time: how the brain creates a representation of duration”, *Nature reviews, Neuroscience*, 14 march: 217-222.