

Time-Consciousness and the Present

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DECLARATION

I, Keith A. Wilson, confirm that this dissertation has been composed by myself, is a record of work carried out by myself alone, and has not been accepted in any previous application for any degree.

K. A. W.

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1. Introduction

Throughout everyday experience, we take ourselves to be aware of events as occurring in a certain order or sequence, as having some particular duration, and of progressing from future to present and into the past. Yet such seemingly innocuous temporal phenomena are the source of many philosophical puzzles — not least the question of how such an awareness is possible given that all experience takes place within the present. In this essay I will examine whether a satisfactory account of our experience of time can be given that is consistent with the metaphysical doctrine of *presentism*, the view that only present things exist (§2.2). This position has been thought — e.g. by Dainton (2000; 2001) — unable to account for the phenomenology of time-consciousness on the basis that if only the present exists then it would be impossible to be conscious of the past or future, or that such consciousness would require the existence of instantaneous mental acts, which is implausible (§2.5). I will argue that such conclusions are unwarranted, and that presentism is just as able to account for the nature of time-consciousness as the view that all times are equally real — a doctrine known as *eternalism*. Consequently, whilst philosophers may choose to reject presentism for other reasons, our experience of temporal phenomena should not be amongst them.

This essay will *not* be concerned with other arguments for or against presentism and eternalism — a topic which has been covered extensively elsewhere (see Oaklander & Smith 1994; Butterfield 1999; Callender 2002), but solely with the interaction between our experience of time and our metaphysical outlook. To do this, I will evaluate three different accounts of time-consciousness (§§3–5) along with their metaphysical

implications for the doctrine of presentism. The accounts I have chosen to focus upon — namely the *transverse*, *overlap* and *dynamical* models, expounded by Husserl (1991), Dainton (*op. cit.*) and Varela (1999), respectively — are those that seem to offer the most promising accounts of time-consciousness. Were these to prove incompatible with presentism, and in the absence of any suitable alternative account, presentism must be considered inadequate, since we cannot deny that we do experience temporal sequence and duration (§2.1). Of the three, however, I shall argue that only the overlap model exhibits a potential incompatibility, and that this model is in any case sufficiently problematic to cast doubt upon its own adequacy, rather than that of presentism (§4.4). Provided that mental acts are themselves extended in time — something upon which all three accounts agree — both the transverse and dynamical models (the latter of which is a refinement of the former) can account for the phenomenology of time-consciousness in a way that is fully compatible with both presentism and eternalism. Moreover, if the reality of past and future times is unnecessary to account for time-consciousness, then eternalism cannot be preferred to presentism on the basis of experience alone, but instead only upon purely theoretical grounds. I will begin, however, by presenting a more detailed exposition of the problem and some of the philosophical motivations and constraints that surround it.

2. The Problem

2.1. *The Phenomenology of Time-Consciousness*

In describing their experience of time and change, philosophers and poets alike often appeal to the metaphor of a river or 'stream'. Interestingly, the same term is also applied to the succession of thoughts and experience that constitutes our conscious mental life, as in William James's term *the 'stream of consciousness'* (Gallagher 1998: 8). We seem to be immersed in time, which flows 'through' or 'past' us with events 'approaching from' the future, 'passing through' the present, and 'receding into' the past. Alternatively, we may picture ourselves as moving through time as if it were a spatial dimension. This 'spatialization' of time is partly a consequence of our methods of measuring or representing time — sundials, clocks, calendars, and so on — which map out fixed periods of time onto regions of space, as well as our natural predilection for spatial reasoning (Heidegger 1992: 3). The analogy between temporal passage and movement within a spatial dimension is deeply entrenched in our thought and language through the common root of *the past* and the verb *to pass*. This equivalence between time and space is lent further credibility by physical theories, such as special relativity or string theory, which treat time in the manner of (or as interchangeable with) a dimension of space (Greene 2004), notwithstanding the obvious differences between the two.

Despite such metaphors and theories, however, the precise nature of our experience of time and temporality remains elusive, with philosophers disagreeing upon the nature of the most basic intuitions that underpin our experience of time and temporality. One potential strategy for overcoming this impasse involves using the phenomenological

method to ‘bracket’ the everyday objects of experience — the external world, events, processes, etc. — in order to focus upon the structure of consciousness itself, thereby shedding light upon the experience of time and temporality (Husserl 1973; 1982). The process of phenomenological reflection differs from ordinary introspection in that it is highly systematic, intersubjective and atheoretical due to the nature of the phenomenological reduction, which brackets both empirical and theoretical concerns. The resulting account of subjective or ‘immanent time’ (Husserl 1991: 5) should therefore be differentiated from the objective or ‘clock time’ described by the physical sciences (Heidegger 1992: 18–9), although the precise relation between the two is an issue that I shall return to throughout this essay. As Husserl was aware, such methods run the risk of distorting the very phenomena that one is attempting to study, since they do not analyse *unreflective* experience as it occurs naturally, but rather *consciously attended experience*, which may differ in important respects (Gallagher 1998: 66). I shall later argue that this consideration is essential to understanding the true nature of time-consciousness, which may not be as unified and orderly as it might first appear.

Everyday experience, then, presents us with two closely related but distinct temporal phenomena. The first is that of *qualitative change*. We experience change in both the world around us and within consciousness itself. Through the senses we experience a world undergoing constant alteration, and, at least in some cases such as perceived motion, these changes appear to form part of the immediate contents of experience, rather than being something that we infer by comparing past and present appearances. Similarly, consciousness itself is in a perpetual state of flux, with thoughts, perceptions and experiences arising more or less spontaneously, or in response to internal and external stimuli such as sensory impressions, associations of ideas, or desires. Again, it seems inconceivable that we are aware of such changes solely on the basis of comparing (whether consciously or otherwise) what we are currently thinking or experiencing with what we were thinking or experiencing immediately beforehand. Rather, the continual

replacement and juxtaposition of ‘one damn thing after another’ (to use Whitehead’s memorable phrase) is such an essential part of our mental life that we cannot imagine what it would be like to be conscious without it. In both ‘inner’ and ‘outer’ experience, then, it seems that we have a direct experience of impermanence and change, as opposed to one that is mediate or indirect.

The experience of change also involves events occurring in some particular order or sequence. Without experiencing A as *changing into* B, for example, we would be unable to experience A as occurring *before* B, or B occurring *after* A. Instead, both events would appear to be simultaneous, or occurring ‘at the same time’. Experiences that are not contiguous but separated by some intervening duration are themselves connected by a series of smaller changes down to some minimum discernible degree of separation (§4.3). Time and change thus appear to us as asymmetrical and directed, with events ‘approaching from’ the future and ‘receding into’ the past, thus giving rise to the notion of a temporal order or ‘flow’. This experience of *temporal change*, i.e. the progression of events from future to present and then past, is often conflated (e.g. by McTaggart 1908) with the sort of qualitative change described above (Broad 1938: 302). However, in reflecting upon their phenomenology, it is clear that they exhibit the difference between a change in a *perceived quality* (in the case of qualitative change) and a change in *mode of representation* (in the case of temporal change). It is therefore important to clearly distinguish these two types of change in order to avoid the series of philosophical perplexities that ensue from treating them as equivalent (*ibid.*).

The third and final temporal phenomenon that I wish to consider is that of *persistence*. Even in the absence of qualitative change, we experience objects not as mere static presences, but as persisting or ‘continuing on’, as Dainton (2001: 94) puts it. This phenomenon may well be due to the inherent instability of consciousness or mental ‘flux’ described above as we attend to each aspect of a sensory object, the possibilities it

presents to us, or simply to the passage of our own thoughts (§5.4). Nevertheless, such objects appear to have a solidity, duration and continuity with both past and the future that seems to transcend mere momentary sense impressions. This constitutes an important part of our experience of temporality since even when the world (or our conscious awareness of it) is unchanging, we are still aware of things *being in time*. From a phenomenological point of view, this ‘continuing on’ does not seem to be something that we infer — from the absence of change, for example — but rather part of the fundamental character of experience itself. A successful account of time-consciousness should therefore be able to account for why it is that we experience the world in this way in addition to the basic phenomenology of temporal succession and duration.

2.2. *Presentism and Eternalism*

Setting the experience of time and temporality aside for a moment, perhaps the most fundamental question relating to the metaphysics of time concerns the reality of past and future times. Here we can identify the following basic positions, which differ with regard to whether and which non-present things exist:

- (1) *Presentism*: Only present things exist, and the past and future are unreal.
- (2) *Pastism*: Only present and past things exist, and the future is unreal.
- (3) *Eternalism*: All present, past and future things exist, and are equally real.

According to (1), or *presentism*, ‘reality’ is synonymous with *present reality*, since the past and future either no longer, or do not yet, exist. This does not mean that past and future facts cannot be true or false, but rather that, since the past and future do not (in some non-spatial, non-temporal sense) coexist with the present, such facts are *irreducibly tensed*. On this view, the notion of tense has a metaphysical and not just

linguistic significance that is irreducible to the tenseless notions of ‘before’ and ‘after’ (cf. McTaggart 1908: 464). Indeed, many presentists (e.g. Craig 2000) deny that it is possible to talk tenselessly about existence at all, rendering (1) tautologous.¹

Position (3), or *eternalism*, on the other hand, takes the view that *all* times exist equally, and that the particular time that we ‘inhabit’ is just a matter of our temporal location within the four-dimensional spatiotemporal manifold that constitutes reality. On this view, what makes past and future facts true or false is no different to what makes present facts true or false — namely whether a particular event or events tenselessly exist at certain locations in time and space.² ‘Past’, ‘present’ and ‘future’ are therefore seen as indexical terms whose truth conditions are expressed in terms of the untensed temporal relations, *before*, *after* and *simultaneous with*. Whilst this makes for a more satisfying account of the truthmakers for contingent facts (Armstrong 2004: 145–6), it vastly increases the number of existent entities since not only *present* but also *past* and *future* objects and events fall within the scope of our widest quantifiers (cf. Lewis 2002). Eternalism may therefore be likened to modal realism in that it ‘reifies’ the contents of past and future times (Zimmerman 2002: 76). As with modal realism, this might initially seem implausible since we have no direct epistemological access to other times, and therefore no proof of their existence. Furthermore, the future is often thought to be ‘open’, i.e. mutable or indeterminate, whereas the past and present are thought to be fixed and unalterable (Mayo 1962) — an asymmetry that eternalism is hard pressed to explain.³ Nevertheless, there are other reasons why philosophers have chosen to endorse this view, including a concern for qualitative (as opposed to quantitative) parsimony (cf.

¹ For discussion of whether this represents a genuine problem for presentism, see Crisp (2002) and Ludlow (2002).

² Or in ‘spacetime’ if a relativistic variant of eternalism is employed (Dorato 2002).

³ Markosian (1995) argues that presentism faces a similar dilemma in explaining why the past is fixed rather than open.

Lewis 1998) and compatibility with Einstein's Special Theory of Relativity (Putnam 1967).

Position (2), known as 'pastism' (Armstrong 2004: 145) or 'growing-block theory', combines aspects of (1) in that it gives ontological significance to past, present and future, and (3) in that it admits the existence of non-present entities. It therefore exhibits an unfortunate tendency to inherit the deficiencies and problems of both and may therefore be subsumed under a discussion of (1) and (3) for the purposes of this essay.⁴

2.3. The Durationless Present

Bearing the above distinctions in mind, a further question arises as to whether the present is instantaneous or has some particular duration. Augustine (1948: Bk. XI) famously reasoned that if the present had non-zero duration, then at any given time part of it would lie in the past and part in the future. This is a manifest contradiction since what is present cannot also be past or future, and so, by *reductio*, the present must be durationless. Assuming that time is continuous rather than discrete, this means that reality (as conceived by the presentist) must consist of only what exists at a particular moment *in* time, but is not itself extended *through* time, since it has no duration. Even if time is discrete, however, and there is some minimum interval or 'atom' of time,⁵ assuming that qualitative change may be defined as the alteration in an object's properties between one time and another, the present cannot itself contain any change, since all changes take place over some particular duration and the present has none. The metaphysical (as opposed to psychological) present is therefore the limit or 'interface' at which past and future converge, as described by Aristotle (1968: 20). Augustine went on to conclude that that nature, i.e. mind-independent reality, must be timeless and eternal,

⁴ Indeed, Merricks (2004) argues that presentism and eternalism are the only viable options for a coherent metaphysical account of time.

⁵ Somewhere in the region of the Planck duration, for example (Dainton 2000: 170).

and that time only exists within the mind or soul — a thesis that still resonates with eternalists today (e.g. Mellor 1998; Prosser 2007).

Augustine's notion of the durationless metaphysical present appears to pose a problem in accounting for the nature of time-consciousness. Given the plausible assumption that experience takes place entirely within the present, how can we experience sequence, duration and temporal flow, as described in §2.1, when we are only aware of a single constantly changing durationless instant? Without the ability to experience more than one time 'at once', as it were, it is as though we perceive the world through an infinitely narrow moving 'slit' as a line of constantly changing colours and intensities. Yet what we 'see' is not a line, but a world that is extended in time and in space. It is certainly a mystery how any series of disparate durationless impressions could ever form an apparently unified sequence exhibiting temporal duration and 'flow' when each of its constituents — i.e. the individual momentary experiences — possess neither (Locke 1975: II.xiv.3). This problem is particularly acute for the presentist, who denies that anything other than the current 'line' — i.e. the current moment of time — exists, and consequently that it could ever form an object of experience. However, even under eternalism, it is unclear why we should experience time as occurring in some particular order or sequence — rather than randomly or all at once, for example — something that the indexical account of tense does not explain. Unlike the presentist, however, the eternalist can at least appeal to the timeless nature of reality to explain the phenomenology of succession and duration, although in doing so runs the risk of denying the claim that experience takes place solely within the present (cf. §4.4). In the absence of a suitable alternative account of time-consciousness, however, it seems that eternalism may be the only option, thereby placing presentism at a strong disadvantage in accounting for the nature of time and experience.

2.4. The Specious Present

The notion of the ‘specious present’ was first proposed by amateur philosopher and psychologist ‘E. R. Clay’, a pseudonym of E. Robert Kelly (Andersen & Grush forthcoming) prior to its popularisation by William James (1890) as a way of accounting for the experience of duration and succession within the durationless present. Like Locke and Reid before him, James realised that no succession of momentary experiences could add up to an ‘experience of succession’ (*ibid.*), and that time-consciousness is only possible if each act of awareness relates to an extended time period or duration. James memorably characterised this notion as follows:

In short, the practically cognized present is no knife-edge, but a saddle-back, with a certain breadth of its own on which we sit perched, and from which we look in two directions into time. The unit of composition our perception of time is a *duration*, with a bow and a stern, as it were — a rearward- and a forward-looking end. (1890: 609)⁶

The psychological present is ‘specious’ in that what we normally think of as the present is not actually (i.e. metaphysically) present, but rather stands ‘perpendicular’ (1890: 629) to objective time (Figure 1). Thus, instead of a series of momentary experiences

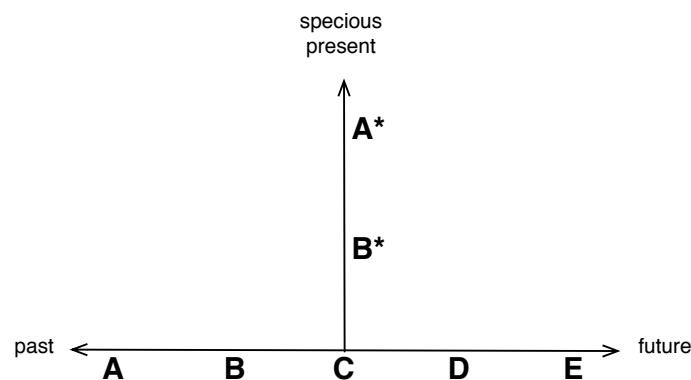


Figure 1: James's notion of the specious present
(Gallagher 1998: 19)

⁶ A similar thought is expressed by Heidegger (1996: 322), who takes the temporality of the experiencing subject to be a necessary condition for ‘*being-in-the-world*’, and thus for the experience of time.

distributed through time, each individual experience involves the awareness of a temporally extended span, or ‘specious present’, ranging from between a fraction of a second to around half a minute.⁷ This enables the experience of succession and duration since both past and future are included within the context of a single mental act, thereby allowing them to be integrated or compared. The ‘slit’ described in §2.3 therefore becomes a ‘window’ through which we experience time — albeit somewhat obliquely — as possessing temporal sequence and duration.

James’s insight may be formalised into what I will call the *Principle of Contemporaneous Awareness* as follows:

(PCA) A sequence or succession is experienced only when an entire temporal spread is apprehended by a single act of consciousness.⁸

This should be clearly distinguished from the stronger and less plausible ‘Lotzean assumption’ (Gallagher 1998: 22) that:

(LA) The perception of succession requires a momentary and indivisible, and therefore durationless act of consciousness. (*ibid.*)

although the two are often conflated; e.g. in Dainton’s interpretation of Miller’s ‘Principle of Simultaneous Awareness’ (1984: 109). The significance of these principles will become clear throughout the course of this essay.

2.5. Mental Representations and Mental Acts

The claim that experience represents the world in one way or another is relatively uncontroversial. The structures and mechanisms involved in such representation,

⁷ The variation between these figures has caused some (e.g. Le Poidevin 2004) to wonder whether there is more than one distinct notion at play.

⁸ Cf. Dainton 2003: 17.

however, is a matter of debate not only amongst philosophers but also cognitive and neuroscientists. A straightforward resemblance theory between mental representations and what they represent was ruled out by Berkeley (1948–57: §8), who thought it absurd to suggest that the thought of a red rose is itself red, or that the mental representation of a figure in space must itself be spatially extended, and so on. Provided that the method of encoding a given representation or experience need not possess the same intrinsic properties as the content of that experience, however, it is possible that various forms of isomorphism do in fact hold between the physical correlates of mental representations (or modes of representation) and what they represent. As Uttal (1979: 286) puts it, within the brain ‘[s]pace can represent time, time can represent space, place can represent quality’, etc. Furthermore, the degree of non-linearity involved in such correlations makes it difficult (if not impossible) to simply ‘read off’ the representational content of the brain from its structure without first applying some kind of mathematical analysis (*ibid.*; Clark 2006: 71), or taking further environmental factors into account (Noë 2004). Given the possibility of such isomorphic covariance, it is therefore important to distinguish between the temporal structures represented *within* consciousness, such as the specious present, and the temporal structure *of consciousness itself* (Dennett 1991: 148).

With this distinction in hand, we can justifiably ask precisely how the mind represents time. The most obvious and straightforward answer to this question is that time is itself represented temporally. That is, the time at which a mental act is subjectively experienced as occurring is just the time (or times) when it is objectively represented within consciousness. One drawback of this account is that it makes time — unlike colour or space, for example — a case in which the method of representation, i.e. time, is identified with its representational content. It also creates problems in explaining how we can represent duration and differing degrees of pastness or futurity given that we can only experience what is present, and not what lies in the past or future (cf. §2.3; §4.3).

Perhaps, however, this latter objection is misguided, since acts of consciousness are surely extended *through time* rather than being literally instantaneous, as per (LA). This becomes especially clear when we consider the nature of an embodied mind in which, given the physical limitations on how fast information can travel, each act of awareness realised within the physically extended body must take place over some definite interval (not to mention the complex chains of cause and effect involved in the perception of any external object). Even on a dualist theory of mind, however, mental acts such as thinking or perceiving must take place over some definite length of time, since consciousness is clearly extended in time if not in space. Consequently, although each of the three models of time-consciousness considered in §§3–5 give a different answer to the question of temporal representation, they all agree that (LA) should be rejected.

A further issue that must be taken into account when considering the temporality of mental acts is whether they form a single unified series at all. Daniel Dennett (1991: 107) has likened the idea of consciousness as an orderly and coherent sequence or narrative to a kind of ‘Cartesian Theatre’⁹ in which unified mental contents are presented to some imaginary internal audience or ‘homunculus’. The obvious problem with such an account is that instead of illuminating the nature of consciousness, it simply defers the problem to another level, since the internal ‘audience’ would need to possess precisely the properties of consciousness itself in order to experience the ‘play’. Although no philosophers seriously endorse this view, its vestiges are still apparent in the notion that conscious experience takes the form of a serial narrative. In place of this outdated Cartesian notion, Dennett offers his own ‘Multiple Drafts model’ in which different regions of the brain are engaged in processing different versions, or ‘drafts’, of an experience that only become integrated into a coherent narrative when accessed via a suitable ‘probe’, such as answering a question about or reflecting upon one’s experience

⁹ Named after Descartes’s (1984: 340) claim that the pineal gland forms the point of interface between the material body and immaterial soul.

(*ibid.* 111). If Dennett's view is correct then it may be a mistake to ask at what point in time any given mental event takes place, since such experiences do not even exist as unified entities until they are reflected upon or remembered, but are rather 'smeared out' over objective time due to the spatially and temporally distributed nature of the embodied mind.

A successful account of time-consciousness must therefore meet a variety of constraints, both metaphysical and psychological, as well as taking a stand upon (or avoiding begging any important questions concerning) the nature of temporal representation and consciousness itself. To see how and whether this can be achieved without requiring the existence of past and future events, I will now consider the first of three accounts of time-consciousness, namely Husserl's (1991) phenomenology of internal time-consciousness.

3. Husserl's Transverse Model

3.1. *The Structure of Awareness*

The transverse model¹⁰ of time-consciousness endorses James's doctrine of the specious present, and therefore (PCA), in that it involves the awareness of an entire temporal span or duration throughout each phase of a given conscious act. However, whilst James presented his theory as a solution to the paradoxes of time-consciousness, Husserl regarded it as a phenomenon requiring explanation its own right (Gallagher 1979: 447; 1998: 36).¹¹ In particular, how is it possible that we are conscious of past, present and future events without experiencing them as occurring simultaneously? Husserl's solution to this problem is both ingenious and subtle, and involves drawing a distinction between what Gallagher (2003: §3) calls the 'structural features of the act of awareness', or *noesis*, and its 'content', or *noema*. (Alternatively, these may be thought of as two different types or 'levels' of representational content, each of which is present in every conscious act, although for simplicity I will retain Husserl's original terminology.) According to Husserl, successive acts of awareness are bound together, or 'structured', in terms of a series of intentional relations¹² towards past and future events, and of which we are not directly aware. The 'content' of experience, on the other hand, is constituted

¹⁰ This term is taken from Husserl's notion of '*Querintentionalität*' (*ibid.* 86), or 'transverse intentionality', and refers to the speciousness of the phenomenal present (§2.4). Dainton also refers to it as the 'retentional' (2008: 9) or 'intentional' model (2003: 59).

¹¹ The extent to which Husserl was influenced by James remains unclear, although he was certainly aware of his work as he cites it on several occasions (Gallagher 1998: 33).

¹² The notion of intentionality comes from Brentano (1977). Intentional relations may be characterised as representational in terms of their establishing contentful relations between mind and world (cf. Tye 1993).

by those objects or representations delivered by the faculties of perception, memory, reason, etc., and of which we are normally aware. As described below, this escapes many of the difficulties of James's doctrine, although whether the awareness–content distinction is itself justified, or even coherent, remains an open question (cf. §4.1, §5.4).

According to Husserl's mature (*circa* 1917) account of time-consciousness, upon which I will be concentrating, each act of awareness may be described as involving three kinds of intentional relations: *primal impression*, *retention* and *protention*. The first of these concerns the presentation of the current content, or *noema*, of a mental act; the pitch, timbre and intensity of a currently sounding musical note, for example. Whilst such contents typically pertain to an act of perception, they are also present in cases of memory and imagination (Gallagher 1979: 454). Retention, on the other hand, sometimes described by Husserl as 'primary memory' (1991: 47) signifies the continuing presence within consciousness of the semantic structure or meaning of past mental acts or perceptions; e.g. the previously heard notes in a musical phrase. Finally, protention relates to the innate sense of anticipation or expectation of future events that arises as a result of past and present experience. Although Husserl says relatively little about protention other than that it provides a future-directed aspect to experience, it is supposed to be less determinate than retention as it relates to events that have yet to be experienced, as opposed to those that have already been experienced. Protention therefore consists of the more or less vague awareness of the direction that events are likely to take, or simply that 'something or other will come' (*ibid.* 111). Together, these three kinds of intentions permeate every phase of a mental act, not as component parts or entities that may be independently isolated or cognized, but as essentially integrated aspects of the act of awareness. Thus, even a single perceptual event, such as seeing a static and unchanging object will be comprised of not just a primal impression, but the retentional and protentional 'fringe' that contributes to its phenomenological and temporal character. This 'fringe', according to the transverse model, both underpins the

fundamental unity of conscious experience (§3.2) and forms the basis for the experience of duration and succession, as described below.

To illustrate how this works, consider a sequence of events — the notes of a melody, or states of a moving object, for example — labelled A, B, C, D, E, F and G, and spread out through objective time, as indicated along the horizontal axes of Figures 2.1 to 2.3. The intentional relations within the subject’s consciousness at a given time may be read off the vertical axis, which indicates the ‘specious present’ of subjective or psychological time, as per James’s original concept (§2.4). At time t_1 (Figure 2.1), the subject’s state of

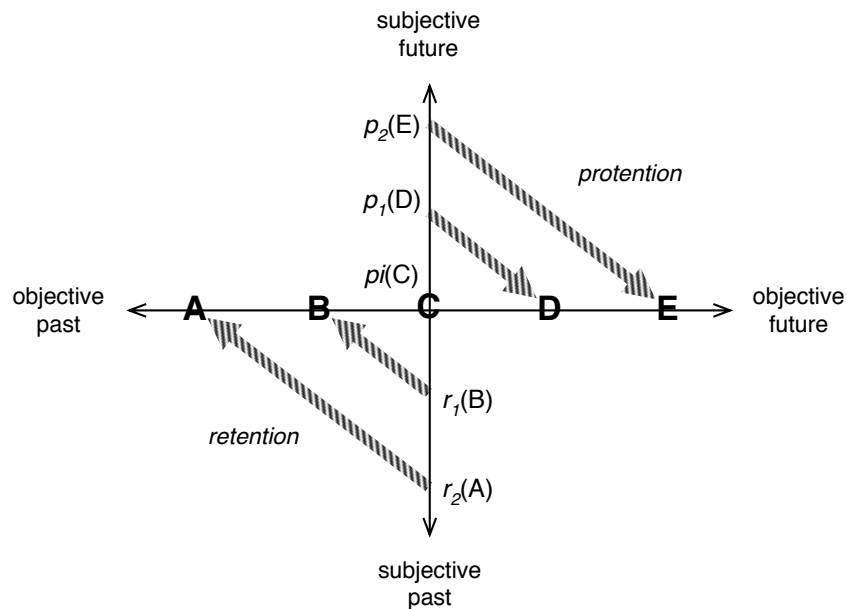


Figure 2.1: the structure of transverse time-consciousness

awareness includes a primal impression of event C, symbolised by $pi(C)$, combined with varying degrees of retentions of A and B, i.e. $r_2(A)$ and $r_1(B)$,¹³ and similarly varying protentions of D and E, i.e. $p_1(D)$ and $p_2(E)$. Note that, since D and E have yet to occur, $p_1(D)$ and $p_2(E)$ signify a merely *anticipatory* or ‘protentional’ awareness, whereas the *actual* meaning or significance of A and B is retained via $r_2(A)$ and $r_1(B)$, thus creating an asymmetry between our experience of future and past events (Gallagher 1979: 456;

¹³ The subscripted numerals refer to the degree of removal from the original sense impression whilst arrows indicate the object of each intentional relation.

Varela 1999: 296). At a subsequent time t_2 (Figure 2.2), $pi(C)$ gives way to $pi(D)$ with corresponding changes in retentional and protentional content, thus yielding $r_2(B)$, $r_1(C)$, $p_1(E)$ and $p_2(F)$, respectively. For simplicity, the retention of A is omitted from the diagram, although in practice its influence will diminish gradually towards zero rather than disappearing altogether (Gallagher 1979: 448). Similarly at t_3 (Figure 2.3), $pi(E)$ is combined with $r_2(C)$, $r_1(D)$, $p_1(F)$ and $p_2(G)$, with the latter replacing the retention of B, whose influence has now become negligible, and so on throughout the series. The progression of events through objective time (right-to-left) is thus mirrored by the progression of protentions, primal and impressions and retentions within consciousness (top-to-bottom), which may be visualised as a vertical ‘spike’ of subjective awareness moving through objective time.

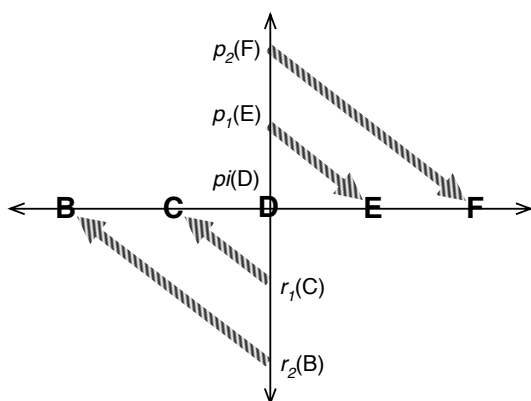


Figure 2.2

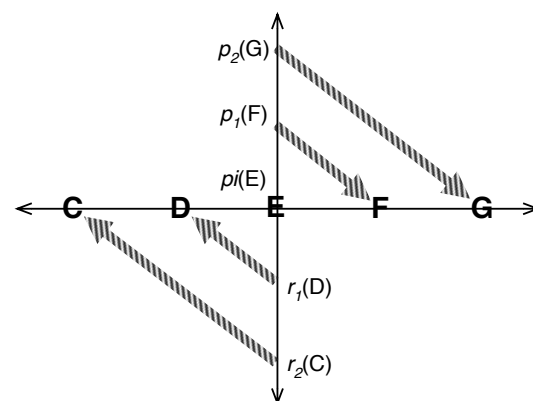


Figure 2.3

It is important to note that the above example is idealised in several respects. Firstly, no account is made of any time lag between the occurrence of an event and the occurrence of the corresponding primal impression even though the physical and cognitive processes involved would undoubtedly take some measurable interval of time (cf. §2.5). This omission is, however, easily incorporated into Husserl’s account without affecting its overall structure. Secondly, the discrete nature of the events, times and relations involved is illustrative only. Husserl repeatedly states that time-consciousness is continuous, rather than momentary, and that one should imagine a continuous arising and diminution of retentions, protentions and primal impressions, rather than a multiplicity

of discrete states (1991: 24, 83, 375).¹⁴ Finally, it is assumed that all of the intentional relations illustrated above are veridical. In the case of protention, this will not always be the case since there are often discrepancies between what a subject protends and the events that subsequently transpire — such as when we encounter a wrong note, or an object that darts off in an unexpected direction. Since protentions do not literally enable us to see the future — a suggestion that would violate the laws of physics — they may, like perceptions, turn out to be illusory. This does not necessarily constitute a defect in Husserl’s account since such errors may also arise in the case of retention and primal impression, and the discontinuities that arise from the dynamic reconfiguration of a stream of consciousness in which such discrepancies are consciously registered may go some way towards explaining the phenomenology of surprise (cf. §5.3).

Husserl’s transverse model thus posits a specious present within which the primal impressions of present events coexist with retentions and protentions of past and future events, but without each of these events being represented as occurring simultaneously. This explains how we are able to experience duration and succession since at any given moment of objective time, we retain an awareness of an extended temporal span, rather than of just one single instant (cf. §2.2). Furthermore, such specious presents need not exhibit a single fixed duration, but may vary in length from one act of awareness to the next according to various environmental and biological factors, just as James predicted. The transverse model therefore posits a clear distinction between *objective* and *subjective time*, explaining how the latter maps onto the former via the intentional relations of retention, protention and primal impression. Indeed, the specious present is not extended through objective time at all, but runs orthogonal to it, with past and future events being only ‘speciously’ — as opposed to metaphysically — present (Gallagher 1979: 458).

¹⁴ In fact, the situation is slightly more complex, as described in §3.2.

3.2. *Retention, Protention and Double-Intentionality*

Whilst it is tempting to identify retention, protention and primal impression with memory, expectation and perception, respectively, this would represent a severe distortion of Husserl's account. In his earlier (*circa* 1905) account of time-consciousness, Husserl characterised the phenomenology of retention and protention as being akin to perception, rather than memory or imagination, in that it has greater immediacy and is not under conscious control (1991: 38, 40–3, 49). As such, we cannot choose what we retain or protend, but rather events are simply presented as being 'just-past' or 'just-future' as part of the structure of each conscious act, as constituted by its intentional relations towards past and future events. This should not be taken to mean that we literally perceive the past or future, but rather that retention, primal impression and protention constitute varying temporal *modes of presentation* by which events are experienced. Furthermore, rather than being 'thematized' as objects of awareness in their own right, as in the case of perception, they combine to form a temporally extended 'field' that delimits the extent of present temporal awareness just as the sensory field delimits the extent of present spatial awareness — in the case of vision, for example (Merleau-Ponty 1962: 60–74). The existence of this 'temporal field' (Husserl 1991: 32) is only revealed indirectly via its effects — in the experience of succession and duration, for example — or via the phenomenological reduction, which brackets the direct objects of conscious awareness in order to reveal the structure of the act of consciousness. It may, however, be helpful to imagine the phenomenology of such peripheral or 'fringe' consciousness as falling somewhere between that of perception on the one hand, and memory or imagination on the other, in that objects are immediately presented (rather 're-presented'), but as being past or future (rather than present) — although Husserl himself is careful to differentiate the two (1991: 47).

The fact that we do not experience retention, protention and primal impression directly prompts Dainton (2000: 158–9) to question whether they have any true

phenomenological significance, or whether they are theoretical posits of the kind that the phenomenological method was supposed to set aside in favour of attending to the phenomena themselves (§2.1). However, as Gallagher argues (2003: §3.3), it is perfectly possible to regard these terms as mere ‘descriptive abstractions’ or approximations of a single underlying phenomenon, rather than as entities in a quasi-empirical theory. On this view, the transverse model represents the minimum conceptual structure required to support a phenomenologically adequate description of time-consciousness. Moreover, such descriptions remain open to reinterpretation and revision as a result of further interdisciplinary analysis — a process of which Husserl himself would no doubt approve, and which is continued by Varela’s dynamical model (1999: 266–7).

Another important aspect of Husserl’s account is that retentions involve not only relations towards past *objects* of experience, but towards *the entire structure of past and future mental acts*, including the retentional and protentional aspects of which they themselves are comprised. This nested structure of intentions — or ‘double-intentionality’ (1991: 84) as it is known — is, according to Husserl, what gives consciousness its essential unity, since each mental act contains implicit references to both past and future acts, and *vice versa*, thereby uniting them into a single ‘stream of consciousness’. Similarly — and perhaps more controversially (Gallagher Gallagher 1979: 456) — protentions relate back to the structure of present conscious acts such that the entire series exhibits a dynamic unity that is continually shifting in focus with the passage of time. Again, it is perhaps better to visualise this as a single continuous motion, or ‘continuum of continua’ (Husserl 1991: 341), in which individual retentions and protentions represent mere ‘cross-sectional views’¹⁵ (Gallagher 1979: 449) of a temporally extended mental act, rather than involving the *post hoc* unification of discrete elements (see §3.3). Precisely how such motion could give rise to the phenomenology of temporal ‘flow’ is unclear, although perhaps the changing structure of consciousness

¹⁵ ‘*Querschnitte*’ (*ibid.* 239).

could itself form an object of experience, in which case the experience of temporal passage could only occur over a period of objective time, and not speciously — a suggestion that is developed in §5.4.

Whilst the transverse model clearly endorses (PCA), it is not necessarily committed to the stronger thesis, (LA), that conscious acts are themselves momentary (Gallagher 2003: §3). As should now be apparent, Husserl himself rejected (LA) — most forcefully in his critique of Brentano — arguing that individual acts of awareness are extended in time and that any talk of what is present in consciousness ‘at a given moment’ is purely schematic (*ibid.* §3.3). Whilst each act of perception (memory, etc.) may itself be divided into a series of ‘act-phases’ spread out through objective time, a purely reflective (as opposed to conceptual) analysis must remain at the level of the temporally extended mental act, which is phenomenologically indivisible. Nevertheless, according to the transverse model, each and every ‘cross-section’ (*Querschnitt*) or ‘phase’ of that mental act will exhibit the intentional relations of protention, retention and double-intentionality, which unite and unify it across objective time. Furthermore, every temporally extended mental act will exhibit similar retentional and protentional ‘fringes’ that in turn unite it with previous and successive acts. Thus, according to the transverse model, retention, protention and primal impression are pervasive structural features *of consciousness*, rather than something that is represented *in consciousness*, as opposed to the conventional notion of representational or linguistic content. I will consider the metaphysical implications of this view in §3.4 below after evaluating some objections to Husserl’s account.

3.3. Dainton’s Critique of the Transverse Model

In his (2000) and (2001), Barry Dainton raises a number of objections to the accounts of time-consciousness given by Husserl (1991) and Broad (1938). The first of these is that the transverse model is phenomenologically inaccurate since we are unaware of the

profusion of ‘lingering contents’ that it predicts (2001: 101). Dainton’s criticism seems to presuppose that retentions are something like fading representations or ‘echoes’ of sensory experiences, which differ from ordinary perceptions only in their ‘degree of presentedness’ (*ibid.*) or ‘force and vivacity’ (Hume 2000: 1.3.5). Whilst this may be true of Husserl’s earlier theory, as well as Broad’s later one, which posits just such a property (1938: 285), it does not apply to Husserl’s mature account in which retention, protention and primal impression form part of the ‘structure’ of a conscious act (*noesis*), rather than its ‘content’ (*noema*) (Gallagher 1998: 45–6). This avoids the alleged ‘clogging of consciousness’ (2000: 156) with a ‘constantly shifting complex of representations of recent experiences’ (2001: 101) because retentions and protentions are not objects of conscious awareness in themselves, but rather differing modes of presentation of such objects — as Dainton himself later admits (2003: 60). Once this erroneous presupposition is dropped, it becomes relatively plausible that we *are* in fact aware of the constantly shifting self-referential structure of experiences, and that this is precisely what gives rise the phenomenon of temporal flow, as described in §3.2. Dainton’s argument is therefore also question-begging since it assumes that representational content must be experienced according to his own ‘Simple Conception’ of experience (§4), as opposed to the awareness–content model that Husserl actually proposes.

Dainton’s second criticism involves the nature of the varying degrees of retention and protention, e.g. $r_1(x)$ and $r_2(x)$, that are posited by the theory (2001: 101–2). Dainton quite rightly argues that mere variations in intensity do not give rise to temporal phenomena, otherwise many perfectly ordinary visual phenomena, such as a line whose intensity varies from black into white (Figure 3), would be perceived as having temporal (as opposed to spatial) character. Of course, the transverse model does not construe varying degrees of retention solely in terms of their variation in intensity, but rather as a variation in temporal mode of presentation. Whilst it is true that the greater the length of time which has elapsed since a given primal impression the less it impinges upon present

consciousness, this diminution in intensity is not what gives rise to temporal phenomenology *per se*. Rather, events are experienced as ‘more past’ or ‘more future’ according to the retentional–protentional structure of the relevant acts of awareness described in §3.2. Dainton’s criticism therefore misses the point. Precisely *why* this correlation should exist is, however, not fully explained by Husserl’s model, although, as I argue in §5.4, a suitable explanation may be given on the basis of the corresponding physical mechanisms within the human brain.



Figure 3: non-temporal variation in intensity

Dainton also claims that the transverse model is ‘profoundly *atomistic*’ (2001: 102), resulting in the fragmentation of consciousness, rather than in its unity. However, as described above, retention, primal impression and protention are intended to be continuous rather than discrete phenomena. The source of Dainton’s objection appears to lie in his (2000: 151) mistaken assumption that the transverse model is committed to (LA), and therefore to the existence of durationless mental acts. This in turn presents the problem of how a potentially infinite numbers of such acts become ‘blended’ together into a single unified ‘stream of consciousness’. Husserl, however, rejects (LA), describing the structural aspects of transverse time-consciousness as momentary abstractions of a single unified continuum (Gallagher 2003: §3.3). Consciousness is instead bound together by the self-referential structure of successive mental acts and their component ‘act-phases’, rather than through the subsequent integration of momentary elements, which are mere artefacts of their diagrammatic representation (e.g. Figure 2.1). Admittedly, it is unclear precisely what the mechanism for this structural

unity is supposed to be, but since the issue of mechanism is arguably even more problematic for Dainton's own account (§4.4), it would be unwise for him to base his rejection of Husserl's approach upon this point.¹⁶

A more serious objection to the transverse model arises from Dainton's allegation that it does not permit the direct experience of succession or duration, but is rather *indirect* or 'anti-realist' (Dainton 2001: 151).¹⁷ Here, the claim is that since Husserl envisages the consciousness of past and future events in *representational* rather than *temporal* terms, it fails to account for the intuition that our consciousness of succession and duration is as direct as that of shape or colour (cf. §2.1). Dainton takes such phenomenological directness to be an unassailable psychological datum, failure to explain which would render the transverse model incomplete or inoperable.¹⁸ As noted above, Dainton's understanding of retention and protention as involving consciously accessible content is itself flawed, but even if this assumption is rejected it seems that there may be a problem for the transverse model. The objection now becomes that the representation of past and future events as merely speciously present, rather than actually extended through objective time, is itself sufficient to make the experience of duration and succession indirect, and is therefore 'anti-realist' to use Dainton's terminology. This is essentially an objection to James's original concept of the specious present, and the reason why Dainton avoids this notion in his own account which abandons the distinction between subjective and objective time altogether in order to provide a fully 'realist' (i.e. non-representational) account of time-consciousness (§4).

Dainton's allegation of phenomenological indirectness is, however, too quick. In the first place, the phenomenology of transverse time-consciousness *is* immediate in the sense

¹⁶ This issue is, in any case, resolved by the dynamical model described in §5.

¹⁷ Dainton's use of this term is somewhat idiosyncratic since the objection has little to do with the objective reality of such phenomena, but rather concerns their immediacy or directness.

¹⁸ Whether this datum is in fact unassailable will be considered in §5.4.

that every temporally extended mental act, or act-phase, involves an awareness of not just present but also past and future events (§3.1). The experience of succession or duration does not therefore require the existence of further acts or act-phases over time, but is built into the very structure of consciousness itself. Furthermore, even if (LA) is rejected, the presence of additional representational or causal intermediaries does not render such experiences mediate or indirect. Here, a comparison may be made with Paul Snowdon's (1992) work on direct perception in which he argues that perceptual directness need not entail the absence of causal or representational intermediaries, but instead is related to a subject's ability to make true judgements about the objects of experience. On this interpretation of directness, provided that retention and protention enable the subject to correctly judge whether an event is past or future, or occurs before or after some other event, it is irrelevant whether such representations are temporally distributed throughout the duration of a conscious act, as per the overlap model, or merely speciously present, as per the transverse model. Just as the presence of visual intermediaries, such as light rays or electrical signals within the optic nerve does not render the visual perception of objects indirect, the presence of representational intermediaries in the form of retentions, protentions and primal impressions does not render the experience of duration or succession indirect, since none of these entities or relations are themselves objects of experience. Instead, provided that these intentional relations enable the veridical experience of genuinely temporal properties, the model may be considered as immediate or 'direct' as Dainton's own account, thereby escaping the objection.

3.4. Metaphysical Considerations

As we have seen, the transverse model explains the unification of consciousness over time in terms of a series of intentional relations between mental acts, past and future events, and past and future act-phases. To avoid Dainton's criticisms, it is necessary to reject (LA), the assumption that mental acts are momentary, in favour of their being

extended through objective time. Whilst this appears relatively unproblematic for the eternalist, who considers all times to be equally real, the situation is less clear for the presentist. According to eternalism, a temporally extended mental act, such as a perceptual episode, is just as real as a momentary one, since even though only one of its temporal parts is (by definition) present at a given time, all of its past and future parts coexist, and are therefore equally real. The reality of a temporally extended act is therefore no more problematic for eternalism than the reality of a temporally extended object, since both are comprised of existent temporal parts (cf. Hawley 2004). For the presentist, on the other hand, although transverse time-consciousness is compatible with the non-existence of past and future events since retentions, primal impressions and protentions are all contained within the present part of a temporally extended act, if only the present part of an act exists then it is unclear whether the act *as a whole* can be considered real, since most of its parts lie in the past or future, and therefore do not exist.

In responding to this concern, it should be noted that the issue of the reality of a temporally extended mental act under presentism is little different to that of the reality of *any* temporally extended process or event. Thus, if presentism is to be at all plausible it must allow for an extended sense of the term ‘reality’ which applies to temporally extended processes, otherwise it would deem all processes unreal, which is absurd.¹⁹ One possible response to this might be that a process is present — and therefore exists — insofar as one of its parts is present; i.e. whilst it is currently occurring. This would render all presently occurring processes ‘real’ and all past and future processes ‘unreal’ in line past and future objects (cf. §2.2). A better response, however, is to deny that talk of existence and reality is appropriate here. This may be defended on the grounds that (outside of philosophical circles) it is very artificial to talk of processes *existing*, since existence is a property of objects and not of events. Rather, it is more appropriate to talk of processes and events *occurring*, by which we mean *presently occurring* (whether

¹⁹ All the worse for presentism, some might say.

speciously or otherwise). On this view, the occurrence of present events and processes is fully compatible with the non-existence of past and future objects since the two belong to different ontological categories. An act of awareness may then be treated as a kind of process, or a succession of states, each of which exhibits the structure of transverse time-consciousness, and from which mental acts as a whole are comprised, but that only *exists* in the derivative sense that it has presently occurring parts. In this way, the presentist may assert the existence of temporally extended mental acts, thereby denying (LA), in terms of each of their individual moments existing *in succession*, as opposed to all of its parts existing tenselessly as in the eternalist account.

In summary, the transverse model is perfectly compatible with both presentism and eternalism, provided that mental acts are not taken to be instantaneous, and that they are treated as processes rather than as objects. The latter point has independent plausibility since the notion that consciousness is an object would seem to be a ‘category mistake’ of the kind described by Ryle (1949). Moreover, since the transverse model is not (*pace* Dainton) a committed to (LA), then the non-existence of past and future objects described by (1) is entirely compatible with the contemporaneous awareness of a temporally extended specious present, as per (PCA). The transverse model does, however, fail to explain the correlation between the degree and intensity of retentional and protentional impressions, as well as why the specious present should exhibit the particular duration (or durations) that it does. Moreover, its relatively complexity and the discrepancy between subjective and objective time that it posits, and which Dainton takes to be tantamount to a kind of ‘anti-realism’, has led some to seek a simpler, more intuitive account of time-consciousness in the form of the *overlap model*.

4. Dainton's Overlap Model

4.1. Diachronic Co-consciousness

As its name suggests, the overlap model²⁰ posits the existence of multiple overlapping acts of awareness spread out through objective time. As such, each mental act represents a particular 'phenomenal present', including an awareness of which events occur before, simultaneously with or after the other during that time period. As with the transverse model, this enables the subject to be directly conscious of both temporal succession and duration, but with several important differences. Firstly, each overlapping 'present' runs *parallel* to objective time, rather than orthogonal to it. Consequently, past and future events are not merely speciously present, but distributed throughout the objective duration of each mental act, effectively dissolving the distinction between subjective and objective time in favour of a single linear time sequence. Secondly, the overlap model abandons the awareness–content distinction of the transverse model (as well as most other orthodox accounts of the mind) in favour of a more unified account of conscious acts. On this view of experience, which Dainton terms the '*Simple Conception*' (2000: 67), representational contents are said to be *inherently conscious*²¹ (2003: 33) with conscious acts being unified by the relation of 'co-consciousness' (2000: 84) both between and at individual times. In the case of 'diachronic co-consciousness' (*ibid.* 113), i.e. co-consciousness over time, we are aware of past, present and future events in virtue of the relevant representations forming temporal parts of the same temporally extended

²⁰ This model is based upon the work of Barry Dainton (2000; 2001) with contributions from C. D. Broad (1938) and John Foster (1982; 1991).

²¹ Thus ruling out higher-order thought (HOT) theories of consciousness such as Rosenthal (1997).

act of awareness. This enables the direct experience of succession and duration, since time is itself represented temporally rather than via some representational intermediary (cf. §3.3). Finally, the overlap model differs in its treatment of future events. This is relatively unproblematic for eternalism, but creates a potential difficulty in accounting for the causal structure of mental acts under presentism, as discussed in section §4.4.

Like the transverse model, the overlap model rejects (LA) and endorses (PCA). Whereas the transverse model explain time-consciousness in terms of the *structure* of conscious acts, however, the overlap model does so in terms of their *content*. According to Dainton (*ibid.* 177), the content of each extended mental act is ‘patterned’ according to the temporal properties of the representations that it contains. This patterning enables us to discern the relations between multiple events within the same phenomenal present, thus causing them to be experienced as being successive, rather than as a single simultaneous block. The experience of motion, for example, would involve multiple representations of the same object in different locations over time within the context of a single act of awareness, thus giving rise to an experience of succession. The time at which each representation is experienced as occurring is just the time (or times) at which it is present in consciousness, which may span the duration more than one mental act. This may be formalised in terms of Miller’s ‘Principle of Presentational Concurrence’:

(PPC) The duration of a content being presented is concurrent with the duration of the act of presenting it. (Miller 1984: 107)

According to (PPC), the temporal properties of the contents of each mental act therefore depend upon the temporal structure *of that very act*.

Dainton’s rejection of the distinction awareness–content distinction also has implications for his account of temporal ‘flow’. In the absence of this distinction, the phenomenal character of temporal passage cannot be explained in terms of the changing structure of

consciousness, since this structure is purely temporal, but must instead be a result of its content. Rather than explaining how this is possible, however, Dainton simply posits that the phenomenal character of temporal flow, as per consciousness itself, is an inherent property of mental representations (2003: 29). This is somewhat surprising given that temporal flow is something that one might expect a theory of time-consciousness to explain, rather than simply posit. Nevertheless, this aspect of Dainton's account may be replaced with an alternative account of the phenomenology of temporal passage, such as the one given by Prosser (forthcoming) in which the phenomenal character of temporal 'flow' is constituted by the presence of contradictory representations within the context of the same mental act. The lack of an awareness–content distinction does, however, cause further problems for the overlap model, as discussed below.

4.2. The Problem of Repeated Contents

Dainton's overlap model is in part motivated by the desire to overcome a problem with Broad's early account of time-consciousness, which also posits multiple overlapping acts of awareness. According to Broad (1923), the representational contents of each mental act relate to an extended time period, or specious present, as per the transverse model. However, since such acts overlap in objective time, the representation of a single event — a flash of light, for example — will be experienced throughout many different mental acts. Instead of experiencing the flash just once (as is actually the case), we should therefore expect to experience it many times — or even as occurring continuously throughout the duration of the specious present; i.e. for around half a second or so. Since this clearly fails to capture the phenomenology of time-consciousness, a further modification is required to explain why we do not experience such 'phenomenal overlap' (Dainton 2000: 142). Dainton rejects Broad's own solution to the problem, in which events are experienced as possessing varying degrees of 'presentedness' as they retreat further into the past, for the reasons given in §3.3. Instead, he adopts John

Foster’s thesis (1991: 249) that the representational contents of experience are not *repeated*, but rather *shared* across multiple acts of awareness, as illustrated in Figure 4.

Here, three acts of awareness — a_1 , a_2 and a_3 — are depicted as occurring over times t_1 to t_5 .²² Act a_1 consists of the temporally ordered representations A, B and C, which correspond to some external events — the notes of a melody, or locations of a moving object, for example. Act a_2 has a representational content of ‘B-C-D’, whilst a_3 consists of representations ‘C-D-E’.²³ Note that B, C and D are not *repeated* in consciousness

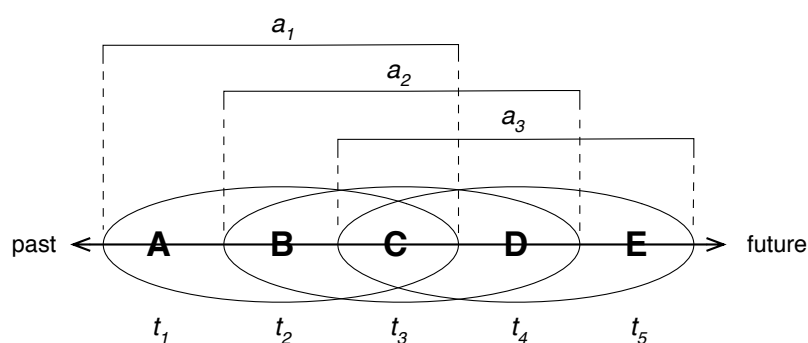


Figure 4: shared representational contents in overlapping acts of awareness
(based on Dainton 2000: 103)

across successive mental acts, but *numerically identical parts* of acts a_1 , a_2 and a_3 . As such, representation B is part of both a_1 and a_2 , D is part of a_2 and a_3 , and C is part of all three acts. Since the same representational content is shared across multiple acts, there is no repeated presentation, thereby avoiding the problem of repeated contents that occurred for Broad’s account. Instead, the relevant contents are sustained across multiple overlapping acts of awareness by the sharing of common parts (Dainton 2000: 165).

Whilst Foster’s approach resolves the immediate problem, Gallagher (2003: §4) argues that it still fails to account for the phenomenology, giving rise to the so-called ‘problem

²² Precisely what individuates each mental act is not specified, but its length corresponds to the maximum duration of which we are co-conscious; e.g. around half a second (Dainton 2000: 171).

²³ In reality each act of awareness would contain many more representations throughout a given time period (cf. §4.3).

of ongoing contents'. On this view, the momentary event occurring at t_3 and represented in Figure 4 by C, would be experienced not only within a_2 , but *throughout the duration of each act of which it forms a part*; i.e. from t_1 to t_5 . Since each act of awareness is itself extended in time, C would therefore be represented in consciousness as occurring throughout the entire duration of a_1 to a_3 , rather than as occurring momentarily at t_3 . Assuming a specious present of around half a second or so, this means that every momentary event should be experienced as having a duration of at least a second (twice the length of the specious present), which is clearly false, thus challenging the adequacy of the model. Dainton, however, denies that this is a problem for the overlap model, claiming that 'Gallagher has misunderstood the way the overlap model is supposed to work' (2003: 20). Whilst Dainton's own response to this problem is somewhat unclear, the source of the misunderstanding appears to be Gallagher's assumption that an act of awareness, e.g. a_2 , represents a given content, e.g. C, as being present throughout its entire duration, i.e. from t_2 to t_4 . Instead, momentary representations are only supposed to be experienced as occurring throughout *part* of each mental act; i.e. at t_3 . This in turn raises the question of how, on the overlap model, this is possible.

There are two obvious solutions to this problem, neither of which Dainton endorses. The first is that each content is represented under a temporal mode of presentation corresponding to the degree of pastness or futurity it possesses within each phenomenal present. Thus, C would be successively presented as being present in a_1 , past in a_2 and more distantly past in a_3 (cf. Gallagher *op. cit.*). Whilst Dainton acknowledges this solution the problem, and that it may even be necessary for his account (2003: 20), he stops short of endorsing it outright, and with good reason. Either such modes of presentation must form part of the representational contents of the relevant acts, or they are aspects of their structure. The first of these options contradicts Foster's thesis that overlapping acts of awareness share common parts, since these contents would need to change between one act and the next in order to reflect their changing temporal mode of

presentation. This is unacceptable as it undermines Dainton's explanation of why such acts are experienced as unified, since they would no longer be numerically identical, leading to a recurrence of the problem of repeated contents that the overlap model was designed to avoid. The latter alternative, however, fares little better since the suggestion that acts of awareness possess structural properties over and above their representational contents reaffirms the awareness–content distinction that Dainton wishes to reject. Thus neither of these options constitutes an acceptable defence of the overlap model given the prior commitments of the theory.

As indicated in §4.1, the option which Dainton himself appears to favour²⁴ is that the temporal properties of representational contents are determined by their temporal position within each act of awareness. Thus, a_1 consists not of the representation 'A-B-C', but of a representation of A *followed by* a representation of B *followed by* a representation of C, thus giving rise to the experience of A occurring *before* B, which in turn occurs *before* C, and so on. Act a_2 , on the other hand, consists of one and the same representations of B and C followed by the new representation D. Here, C is experienced as occurring *before* D, but still *after* B. The fact that it is experienced as having different temporal properties across successive mental acts gives rise to the phenomenon of temporal change (§2.1) by which C is experienced as becoming increasingly 'past' as time progresses. In this way, the overlap model avoids the problem of repeated contents via the sharing of common parts between overlapping acts of awareness whilst enabling the direct experience of duration and succession via the intrinsic temporal structure of successive mental acts.

Dainton's approach does, however, exhibit several difficulties, some of which may be fatal. First, it is unclear how multiple representational contents distributed through objective time can be experienced as one and the same mental act. For this to work, there

²⁴ As demonstrated by his references to 'brief act-phases' and 'content-phases' in his (2003: 21).

must presumably be some sort of causal connection between such representations that binds them together into a unified act of awareness. Whilst Dainton might justifiably regard the details of such a mechanism to fall within the realm of psychology rather than philosophy, his lack of specificity as to how is achieved leaves the relation between a temporally extended mental act and its contents unexplained, thus rendering the overlap model incomplete at best, and at worst incoherent (cf. §3.3). Furthermore, were such a mechanism to be introduced then the resulting account would bear more than a passing resemblance to the transverse model with its retentional and protentional ‘fringes’, as well as reasserting the awareness–content distinction that Dainton wishes to avoid.²⁵ Even worse, the assumption that mental representations are shared across multiple overlapping acts of awareness seems to presuppose something like Dennett’s ‘Cartesian Theatre’ (§2.5) in which consciousness consists of a single unified ‘stream’ or narrative over objective time, rather than ‘multiple drafts’ in which events are merely speciously or subjectively present. This reduces the plausibility of the overlap model as a description of time-consciousness as realised within human neurophysiology when compared to the dynamical model of §5.

4.3. Other Problems for the Overlap Model

Gallagher (*op. cit.*) also objects to the overlap model on grounds of lack of phenomenological evidence for the multiple overlapping phenomenal presents it describes. This criticism is, however, based upon a misunderstanding of the type of overlap involved (Dainton 2003: 20). In his reply to Gallagher, Dainton distinguishes between ‘overlap by superposition’, of the kind that Gallagher envisages, and ‘overlap by sharing of common parts’, which the overlap model endorses (Figure 5). On the latter view, the shared representational contents of multiple mental acts are experienced only once, since they are literally held in common rather than being phenomenologically

²⁵ Such a distinction may, in any case, be implicit in Dainton’s appeal to the temporal structure of conscious acts.

identical duplicates. Thus, whilst individual acts of awareness do indeed overlap in objective time, this need mean that they are phenomenologically detectible. (To this extent, the name of the model may itself be misleading, since consecutive acts of awareness do not just *overlap*, but *intersect* by virtue of sharing numerically identical parts.)

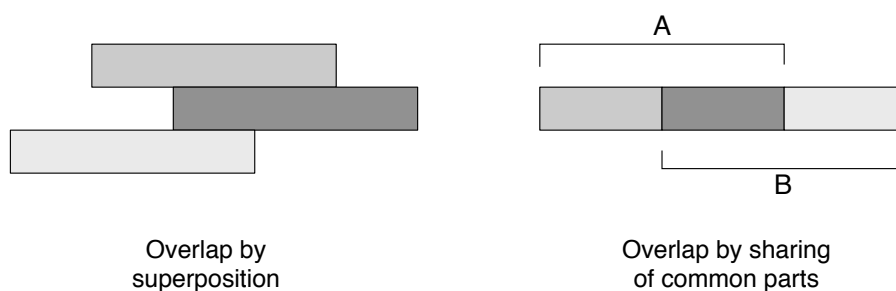


Figure 5: two types of overlap
(Dainton 2003: 23)

A more serious difficulty arises in relation to empirical evidence concerning the experience of simultaneity and succession across different sensory modalities. Although the overlap model does not itself specify the precise length of the phenomenal present, which Dainton (2000: 171) estimates to be around half a second, it is committed to it having some such actual length due to the role that temporally extended mental acts play within the theory. Research by Pöppel (1985), however, indicates that the ‘coincidence threshold’ for discerning simultaneity differs for each of the senses by a factor of up to ten. Sounds, for example, are perceived as being simultaneous if they occur within two to three milliseconds of one another, whilst for visual stimuli this figure increases to 20ms.²⁶ The fact that each sensory modality possesses a different coincidence threshold suggests that the notion of a single phenomenal present which binds them together may be an oversimplification. The alternative view of positing a separate specious present for each sensory modality seems equally unattractive. Interestingly, however, the ‘order threshold’ for discerning succession (as opposed to simultaneity) is longer than all of

²⁶ Touch has an intermediate threshold of about 10ms (*ibid.*).

these durations at some 30ms and does not vary across sensory modalities, meaning that it is possible to perceive events as being non-simultaneous without being able to discern their objective order (Dainton 2003: 170). Whilst this lends some plausibility to the notion of a single phenomenal or specious present through which we discern succession and duration, this time period is still vastly shorter than Dainton's estimate of around half a second or so, making it difficult to draw any firm conclusions.

Based upon Pöppel's data, Dainton goes on to claim that each overlapping present would be separated by the duration of the order threshold (which he takes to be the minimum discernible interval), thus giving a frequency of around 30 phenomenal presents per second. This reasoning is surely, however, invalid since (a) we are able to experience events separated by even shorter intervals — e.g. two or three milliseconds — as non-simultaneous despite their falling below the order threshold, and (b) because it makes the overlap model 'profoundly atomistic' — one of Dainton's own criticisms of the transverse model (§3.3). The alternative would be to posit a continuously sliding 'window' of time through which we experience the world — a view which bears a strong resemblance to Broad's (1938: 277) discredited 'moving spotlight' account, and which is better explained in terms of the transverse model. More generally, Dainton's approach seems to conflate representational contents with method of representation (cf. §2.5). There is no reason why the visual system, for example, cannot represent movement to us directly, thereby enabling the direct experience of qualitative change, without the need for multiple conscious representations spread out over objective time. Similarly, different subsystems within the brain and central nervous system may represent order and simultaneity quite differently, negating the need for a single unified explanation of these phenomena by means of temporally extended conscious acts. The existence of visual illusions such as the waterfall illusion (Crane 1998) in which the same object is experienced as both moving and static lends credibility to this suggestion, enabling the illusion to be explained in terms of conflicting representations of movement and stasis —

something that the overlap model is hard pressed to do. The presupposition that there is any one unified explanation of the phenomenology of time-consciousness may itself be problematic — a suggestion I shall return to in §6.

4.4. A Problem for Presentism?

Assuming that solutions to the above problems can be found and that the overlap model represents a plausible account of time-consciousness in general, there remains the question of its compatibility with metaphysical presentism. Unlike the transverse model, which I argued in §3.4 is compatible with both eternalism and presentism, the overlap model appears to favour eternalism on the basis that conscious acts are not only extended through time but ontologically indivisible. Dainton puts the point like this:

According to the solipsistic presentist, the sum total of reality consists of just one present. If this were so, it would be impossible to directly experience change; since we do directly experience change, we know that reality does not consist of a single (minimal) present. (2001: 107–8)

and later on the same page:

The fact that we directly experience successions, [...], shows that we do not inhabit a reality of this kind. (*ibid.*)

This reasoning is unsound for two reasons. Firstly, in the absence of an explanation of how temporally distributed representations can give rise to the experience of duration or succession within the context of a single mental act (§4.3), then even if eternalism is true it remains to be shown how such experience would be ‘direct’. Assuming that causal relations only occur between temporally proximate events and cannot act at a temporal distance, it is unclear how a temporally extended mental act can take in an entire duration of reality ‘all at once’, as it were. Moreover, if mental events are supposed to be causally efficacious, then it is unclear how an act of awareness that is extended in time

can cause or initiate a physical action, such as a verbal report of its contents. At best, the individual representations from which it is comprised may be causally efficacious, but this approach would appear to make temporally extended acts (which are, after all, supposed to form the basis for the phenomenology of time-consciousness) epiphenomenal and therefore redundant. Such considerations reveal just how radical Dainton's overlap model really is since it effectively requires the traditional sequential model of objective or physical time to be abandoned (at least as far as mental acts are concerned) in favour of a 'block view' in which mental events do not just *supervene upon* but *exist over* a given temporal duration. Alternatively, if the block view is incorrect and mental acts merely supervene upon successive events in objective time (as seems necessary in order to explain their causal basis), then Dainton's conclusion is unwarranted, since such supervenience is also acceptable under presentism, as argued in §3.4, which may also be construed as 'direct' (§3.3).

The second objection to the Dainton's argument is that he simply rejects the wrong thesis. Given the availability of an alternative model of time-consciousness — e.g. Husserl's transverse model — it is not obvious that the direct experience of succession and duration should be taken to refute presentism, or whether the inability of the overlap model to explain such experience within the constraints of presentism instead demonstrates its own inadequacy. Thus, even if we accept that presentism is incompatible with the overlap model, then it should be the latter thesis, not the former, that should go. This argument is made all the more persuasive by the problematic and incomplete nature of the overlap model itself, and which the transverse model manages to avoid with no threat to presentism. Clearly, additional factors need to be taken into account to resolve the issue, since in the absence of compelling evidence either way it is unclear which doctrine should prevail. Moreover, it is conceivable that the direct representation of qualitative change and other temporal phenomena is possible even in the absence of multiple overlapping acts of awareness, as suggested in §4.3, and even the

phenomenological evidence upon which Dainton bases his claim is open to question. What is clear, however, is that presentism seems no worse placed to explain the nature of time-consciousness than eternalism, either on the supervenience variant of Dainton's overlap model (above), or by adopting a version of Husserl's transverse account, such as the dynamical systems model described in the following section.

5. Varela's Dynamical Model

5.1. Naturalising Time-Consciousness

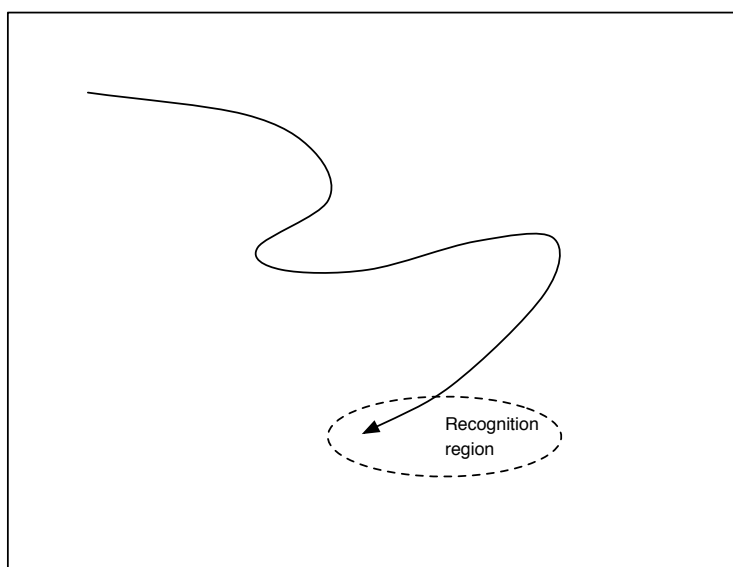
Whilst both the transverse and overlap models explain the apparent unity of consciousness in terms of its intentional structure or by the sharing of common parts, neither offers a compelling explanation of temporal 'flow' or the changing flux of consciousness (§2.1). Furthermore, if Dennett's 'Multiple Drafts' model of consciousness is correct, then the very presupposition that consciousness is fully unified may itself be misguided, since individual conscious acts do not necessarily form a coherent narrative sequence except when subsequently examined via the faculties of reflection or memory (§2.5). A third account is therefore needed that explains both the phenomenology of temporal experience, and how this is realised within the physical medium of the brain, thus providing a fully naturalised theory of time-consciousness that is more comprehensive than either of the above accounts. To this end, Francisco Varela (1999) and Tim van Gelder (1999) have independently proposed a reinterpretation of Husserl's transverse model according to the cognitive science paradigms of *connectionism* and *dynamical systems theory* using a hybrid methodology known as *neurophenomenology* (Varela 1996). The resulting account, which I will refer to as the *dynamical model*, represents perhaps the most plausible and convincing account of time-consciousness developed thus far, and one that, as with Husserl's transverse model, is naturally suited to the metaphysics of presentism.

In contrast to the computational approach to cognitive science, which is based upon the manipulation of symbols according to a strict set of rules or 'program' (see Fodor 1975),

the connectionist paradigm models mental processes in terms of a complex interconnected network of ‘nodes’, whose logical structure mirrors that of neural networks within the human brain. Each node is linked to one or more of its neighbours via a set of connections that stimulate or inhibit that node’s activity to varying degrees. Once the level of stimulation at a given node passes a certain predefined threshold, the node ‘fires’, sending a signal to each of its connected nodes, which in turn — or rather, in parallel — repeat the same process. Once sufficient numbers, or ‘layers’, of nodes are added to the system, complex patterns of activation begin to emerge that closely resemble the patterns of activity within the human brain, as revealed by fMRI and other scanning techniques (Edelman & Tononi 2000: 52). Such networks exhibit a variety of qualities that have proved difficult to replicate with the traditional computational techniques, including an ability for pattern recognition, tolerance of incomplete data or input noise, and ‘graceful degradation’ (as opposed to complete inoperability) in the case of physical hardware failure (Garson 2007: §4).

More recently, cognitive scientists have begun to exploit the temporal properties of connectionist networks in order to further enhance their information processing abilities, resulting in a powerful new conception of the physical basis for consciousness and intelligence (Clark 2006: 72–3). The behaviour of these ‘dynamical networks’ is a function not only of their logical structure, i.e. the set of nodes and connections from which they are comprised, but also their dynamic characteristics, such as how quickly each node responds to stimuli, how long activations take to propagate across the network, etc. The behaviour of such networks may be analysed using the mathematical techniques of dynamical systems theory, which studies how closely interrelated quantities evolve over time (van Gelder 1999: 252). This enables the set of possible states that the system can occupy to be represented as an abstract multi-dimensional ‘phase-space’, each point within which represents just one possible state of the system. The changing state of the system over time may then be represented as a line or

trajectory through this dynamical phase-space (Figure 6), with various regions corresponding to the occurrence of certain events or actions, such as the recognition of a previously encountered stimuli or the production of behavioural outputs, etc.



*Figure 6: a trajectory through dynamical phase-space
(ibid. 254)*

Unlike their computational cousins, dynamical networks are rarely static and will typically cycle around a number of relatively stable ‘attractor’ states, which chain together to form continually changing sequences of state (*ibid.* 255–6). Furthermore, whilst symbolic computation systems are characterised by their relative stability and predictability, dynamical systems exhibit precisely the opposite characteristics, namely instability and non-linearity (Varela 1999: 285, 291). Their instability arises from the fact that the system is dynamically coupled to its environment via a set of constantly changing input parameters, rarely if ever coming to rest or repeating the same pattern twice. Their non-linearity is a result of a sensitivity to small differences in input stimuli, which will often generate disproportionately large changes in the trajectories subsequently traced out by the system in phase-space, thereby impacting upon its future behaviour (*ibid.*). When combined, these properties make dynamical systems an candidate for the physical correlates of mental processes, which exhibit an innate

‘restlessness’ as one state is continually, and often involuntarily, replaced by another (§2.1). One example of this characteristic ‘multistability’ (*ibid.* 285) is the phenomenon of aspect-switching that occurs when viewing an ambiguous figure, such a Necker cube or Jastrow’s (1899) ‘duck-rabbit’, whose appearance seems to ‘flip’ between one stable state and another (Figure 7).

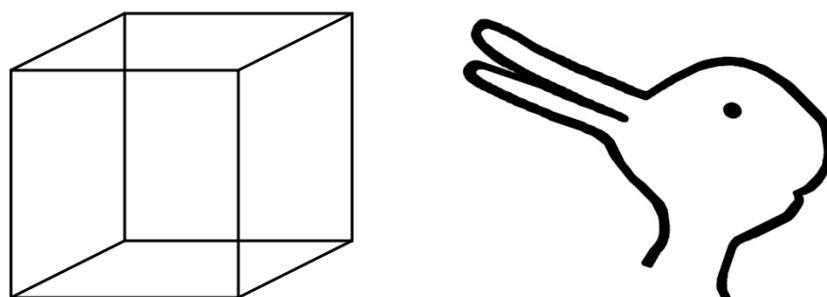


Figure 7: multistable visual figures
(*WikiMedia Commons 2007; Wittgenstein 2001: 166*)

The above characteristics of dynamical connectionist networks are exploited by Anderson (1994) and Port’s (1996) ‘Lexin’ system, which may be trained to recognise auditory patterns, such as a melody. After a training process involving repeated exposure to a set of test stimuli, each note will cause the network to enter a distinct region of its phase-space, around which it will cycle until the next note is encountered (van Gelder 1999: 252–6). Whilst such systems exhibit striking similarities to the dynamic properties of mental processes, their precise capabilities and behaviour remains a matter for ongoing research. They do, however, provide the basis for a plausible neurological interpretation of Husserl’s notions of retention, protention and primal impression — as well as the changing ‘flux’ of consciousness — in terms of the dynamical properties of suitably configured connectionist networks.

5.2. Retention and Protention in the Dynamical Model

The dynamical model relies upon the fact that the current state of a dynamical network — i.e. its position in phase-space — carries information not only about its current inputs (i.e. present stimuli), but also about previous inputs (i.e. past stimuli) and expected inputs (i.e. future stimuli). Since, due to the system's non-linearity (§5.1), even small a fluctuation in the present state of the system has a measurable impact upon the path that it subsequently traces out through phase-space, such information can be said to be 'retained' or encoded as part of its current state. Similarly, since not every state is accessible from every other state, by narrowing the set of possible states that may subsequently be occupied by the system, its current state also carries information about its future trajectory through phase-space. Finally, the geometry or 'shape' of the system's phase-space is itself subject to change, further constraining the subsequent behaviour of the system, as described in §5.3.

The first two of the above characteristics are exhibited by the Lexin system described in §5.1, which is able to recognise previously encountered musical phrases by means of the variations in the trajectory through phase-space that they introduce. Thus, the note C at the end of the sequence A-B-C will result in a different trajectory to the same note when it occurs at the end of the sequence B-A-C due to the alterations in the state of the network introduced by the previously encountered notes. Whilst both sequences result in the system entering the region of phase-space or 'attractor' (*ibid.* 258) that is indicative of its recognising a 'C', the precise location and trajectory of the resulting state will vary according to the order and duration of the previously encountered notes (*ibid.* 260). Similarly, the system's current state and trajectory will vary according to its prior training, which establishes certain 'expectations' as to where the melody will lead. By analogy with human perception we might say that Lexin 'experiences' each note differently according to the notes that preceded it, as well as what it 'expects' to succeed it, in the current sequence. These forward- and backward-looking aspects of the system's

current state are the neurological correlates of protention and retention within the dynamical model that are claimed to be responsible for the phenomenology of time-consciousness (*ibid.* 260–1; Varela 1999).

Of course, Lexin is a relatively simple network designed for a single task for which it requires training by repeated exposure to test stimuli. In a more realistic model, ‘the geometry of phase space [would] be characterized by an infinity of unstable regions’, thereby enabling the system to become more closely attuned to previous, current and future stimuli (*ibid.* 288). Nevertheless, the parallels with the transverse model are striking. As with Husserl’s account, retentions and protentions do not function as objects of awareness in their own right, as signified by distinct regions of phase-space, but rather integral properties of the system of representation as a whole, as realised through the changing dynamical state of the network. Thus, each and every phase of a mental act — i.e. the state of the system across some interval of time — will exhibit retentional and protentional aspects corresponding to the contributions of the (actual) past and (possible) future states that are encoded within its current trajectory through phase-space. Moreover, according to Dretske’s (1994) information theoretic account of intentionality, these aspects of the system’s current state are intentionally related to external events or sensory impressions, by virtue of their causally co-varying with them.²⁷ They are, quite literally, *about* these events, without which the system would not have entered its present state or be able to trace out precisely the same trajectory. According to the dynamical model, then, the past and future are implicitly encoded within the present state of consciousness — albeit in a form that is not consciously accessible — thus enabling the representation of a temporally extended specious present, as per (PCA).

²⁷ On Dretske’s view, protentions would be intentionally related to *past* experiences, since they cannot be causally connected to events that have not yet occurred. They would still, however, be ‘direct’ on Snowdon’s use of this term (§3.3).

Whilst the transverse model posits a further series of intentional relations between past and future retentions, protentions, primal impressions and act-structures (Husserl's notion of 'double-intentionality' — §3.2), the same mechanism that is responsible for retention and protention in the dynamical model also accounts for the existence of the retentional and protentional 'continua' by which such acts are bound together (Varela 1999: 295). Just as the present state of a dynamical system encodes information concerning its previous states in the form of variations in the system's position and trajectory through phase-space, each of those former states will itself have encoded information about still former states that continues to manifest itself in the form of alterations to the system's present state. As Varela (*ibid.* 283) puts it, 'each emergence is still present in its successor' due to the current state of the system determining the parameters for each subsequent transition through phase-space. In this way, provided that a dynamical system is capable of generating a sufficiently large number of finely differentiated states, and that it exhibits a suitable level of instability and non-linearity (*ibid.* 288), the protentional and retentional continua of double-intentionality will emerge as a natural consequence of the causal structure of the network.²⁸ The dynamical model is therefore able to explain protention, retention and double-intentionality in terms of just a single continuously varying quantity: the current location of the system within geometrical phase-space. This confirms Husserl's thesis that retention, protention and primal impression are not discrete phenomena, but rather part of a single continuous process of conscious awareness, and which only become separated when describing the functional role that each plays within our everyday conscious experience.²⁹

²⁸ Whether and how time is experienced *as such* will of course depend upon the physical and conceptual capacities of the organism in question.

²⁹ The same argument applies to the 'structure' and 'content' distinction of §3.1.

5.3. Emotional Tone and the Flow of Consciousness

In addition to the contribution that the current state of a dynamical network makes to its protentional capacity, Varela also considers the role played by ‘emotional tone’ or *affect* (1999: 300).³⁰ In contrast to simple first-generation AI networks (Clark 2006), the phase-space of a neurobiological network is not fixed but varies according to the presence of neurotransmitters and chemicals within the brain. These factors in turn alter the ‘shape’ of the phase-space that determines the behaviour of the system (van Gelder 1999: 255). Changes in mood, such as hope, anticipation or depression, can therefore have a dramatic effect upon the system’s dynamical properties, thereby affecting its capacity for protention and retention (Varela 1999: 301).³¹ The protentional aspects of the system, as encoded within its present state, are thus modified and conditioned by affective factors, which in turn contribute to the system’s ability to stand in intentional relations towards future events. The sense of expectation accompanying the perception of a melody or a visual movement, for example, is encoded both within the present state of the system *and* in its underlying emotional tone. This explains why time seems to run ‘more slowly’ when one is bored or in situations of extreme danger, for example, or ‘more quickly’ when one is excited or engaged in conscious activity. Further evidence for the relation between time-consciousness and affect is given by Gallagher and Varela (2001), who argue that cases of schizophrenics experiencing certain thoughts as having been ‘inserted’ into their consciousness, rather than as belonging to themselves, may also be linked to a failure of protention.

In addition to describing the neurological correlates of retention, protention and primal impression within the framework of dynamical systems theory, Varela also offers an

³⁰ A similar link between time and emotion is made in Heidegger’s (1996: §§29–30) analysis of ‘attunement’.

³¹ In fact, Varela identifies three different levels of affect, which he terms *emotion*, *affect* and *mood*, corresponding to three different timescales within his dynamical model (*ibid.*).

explanation of the phenomenological ‘now’ of experience (1999: 282–3). He attributes this to the integration–relaxation cycles of large assemblies of interconnected neurons, which fire in synchrony over significant fractions of a second, as is known to occur in the brains of many animals. The inherent instability of such patterns means that they quickly give way to successive assemblies, which in turn fire synchronously, and so on throughout the life of the system. Varela identifies this constant replacement of one pattern of activation by another as the neurological correlate of the changing ‘now’, since even in the absence of external stimuli the system will undergo a series of more or less spontaneous transitions from one state to the next (*ibid.* 288). Whilst it is unclear why a constantly changing state should give rise to an experience of change, since the former is a method of representation and the latter a representational content, this phenomenon might explain the phenomenal character of the changing ‘flux’ of consciousness in which one thought is constantly replaced by another (§2.1). The significance of this for the phenomenology of temporal flow is discussed in §5.4 below.

5.4. Evaluating the Dynamical Model

Husserl’s transverse model (§3) was complicated by the interrelated and continuous nature of the intentional relations that it posits. Both issues are, however, made intelligible by the dynamical model which, understood in terms of a system’s continuously varying location in phase-space, offers a unified account of the protentional and retentional aspects of consciousness at the level of both act-phases and temporally extended mental acts (§5.2). As described above, this process involves both the current pattern of activations within the underlying connectionist network (as represented by its position in phase-space) plus various levels of affect which govern the shape of that phase-space, and therefore its capacity for retention and protention (§5.3). Moreover, since these are continuously varying rather than discrete quantities, the transitions between protention, primal impression and retention are explained in terms of a single smooth progression, rather than a series of steps, just as Husserl envisaged. The tripartite

structure of time-consciousness only emerges when these fundamentally interrelated aspects of the system's state are analysed in terms of their functional roles within consciousness, since both, according to the dynamical model, are unified at the level of mechanism. The dynamical model thus integrates the apparent complexity and discontinuity of the transverse model into a single causally efficacious system of intentional representation that unfolds over objective time, and which enables the experience of a temporally extended specious present. As with Husserl's original account, this changing 'dynamical present' explains the experience of succession and duration by way of representations of events spread out in subjective (rather than objective) time, thereby explaining how the experience of time and change is possible. Furthermore, the awareness-content distinction to which Dainton objects is only present at the level of analysis, rather than being built into the structure of the system, since both types or 'levels' of representation are unified within the dynamical model (cf. §3.1).

It is important to note that the representational properties of the dynamical model are not a result of mere theoretical posits — one of Dainton's allegations against Husserl (§3.2) — but from the inherent properties of dynamical connectionist networks, whether they be of biological origin or otherwise. Furthermore, unlike the overlap model, which fails to account for the internal causal structure of mental acts, the dynamical model describes how the traces of previous impressions (sensory, mnemonic, etc.) impact upon subsequent experience in a way that is compatible with the causality efficacy of mental acts (cf. §4.4). And, unlike the transverse model, it is also able to explain why retention and protention only extend a short distance into the past or future, since the impact of former states upon the present trajectory of the system will naturally diminish as their effects become diluted by successive transitions through phase-space (cf. van Gelder 1999: 262). A more extreme example of this phenomenon may be found during episodes of deep meditation in which subjects report an almost complete absence of temporal phenomena, which is exactly what the dynamical model predicts due to the diminution

of protentional and retentional capacity in what is perhaps the closest thing to a steady state attainable by the human mind.

By identifying the neurological correlate of the changing ‘flux’ of consciousness, Varela’s dynamical model also offers an intriguing explanation of why we experience time as ‘flowing’ even in the absence of qualitative change. On this view, the phenomenology of temporal flow is a result of the network cycling between successive multistable states within dynamical phase-space (§5.3). Such cycles manifest themselves as certain well-documented rhythms within the brain which, rather than acting as a kind of ‘inner clock’, are emergent properties of the dynamical network as a whole (cf. Treisman 1999). Across the duration of a temporally extended mental act, these periodic fluctuations, in conjunction with retentional and protentional continua, give rise to the phenomenal character that we associate with ‘temporal passage’. Thus, even in the absence of external stimuli, the constantly fluctuating nature of consciousness generates the familiar feeling that time is passing, or of things ‘continuing on’ (cf. §2.1). Here, the objection might once again be raised that changes in the means of representation do not constitute the representation of change (cf. Locke *op. cit.*). However, given that the dynamical model already explains the experience of *qualitative* change, i.e. change *over* time, in terms of protention, retention and the specious present, it only remains to be shown that there is some neurological basis for the phenomenal character of *temporal* change, i.e. change *of* time. Assuming that the phenomenal character of each mental act supervenes upon what occurs throughout its entire duration, as argued by Dainton (2000: 216–19), then it is plausible that the phenomenology of temporal flow is a result of the changing ‘flux’ of consciousness throughout the duration of each mental act, rather than a separate phenomenon in its own right.³² That the dynamical account is able to explain the diverse nature of temporal experience within a single unified framework is itself a

³² This is very close to Husserl’s own account, which also posits the notion of ‘flux’ (*Fluss*) to account for the phenomenology of temporal passage (1991: 302–3).

considerable point in its favour, although there are good reasons to think that such an explanation may yet be overly simplistic (cf. §4.3).

The above qualities of the dynamical model also help to defend it against Dennett's 'Cartesian Theatre' objection (§2.5). Whereas the transverse and overlap models posit a single specious or phenomenal present that applies across all sensory modalities, thus requiring experience to be fully integrated before its appearance upon the 'stage' of consciousness, the dynamical model can be applied at many different levels of abstraction. In Dennett's 'Multiple Drafts model', for example, each draft will presumably be realised within a dynamically configured subnetwork of the brain. As a complex dynamical system in its own right, each such subnetwork will possess its own retentional and protentional continua independently and in addition to those of the competing 'drafts' that occur in parallel to it. Each draft therefore carries its own 'specious present' without the need for them to be integrated into some kind of overarching narrative at the level of consciousness. Should such integration subsequently occur via conscious reflection or memory, however, the retentional–protentional continua of these drafts will in turn contribute to those of the resulting mental act, which may itself be described in terms of a higher level dynamical system. Thus, dynamical time-consciousness occurs not only at the level of each individual subnetwork — e.g. multiple competing drafts or different sensory modalities — but at the level of the brain as a whole, which comprises a single highly complex dynamical system. The state of the mind as a whole, as described in terms of a single exceedingly complex phase-space, will therefore naturally incorporate contributions from each of its independent subnetworks, but without the need for them to be integrated into a single 'stream of consciousness' as per the Cartesian Theatre.

Whilst the details of the above process are admittedly somewhat sketchy, the fact that the dynamical model is sufficiently flexible to account for time-consciousness within

Dennett's Multiple Drafts model without the need for further *ad hoc* modification is another point in its favour. Whilst a similar move may be made on behalf of the transverse and overlap models, the resulting theories would fail to explain how such 'local' specious/phenomenal presents relate to one another, or to the phenomenon of time-consciousness more generally. On the dynamical model, however, such a 'multi-layered' account is a natural consequence of the different levels at which the behaviour of the system may be analysed, thus making it intelligible how apparently unconnected 'drafts' could contribute to an apparently unified sense of time.

Finally, the dynamical model, as per the transverse model, is entirely compatible with presentism since the protentional-retentional structure of each act-phase is comprised entirely of its present state and emotional tone. In contrast to the overlap model, the temporal properties of events are not spread out in objective time, but present throughout each and every phase of a temporally extended mental act. The dynamical model therefore endorses (PCA) and is compatible with the rejection of (LA), as per Husserl's transverse model. Whilst the dynamical model is also fully compatible with eternalism, the fact that it explains the phenomenology of time-consciousness without reference to any non-present entities offers no motivation for supporting eternalism over presentism — the latter of which it may be thought to be more naturally suited. Conversely, the existence of a relatively sophisticated account of time-consciousness that overcomes many of the problems inherent to the transverse and overlap models, including Dennett's 'Theatre of Consciousness' objection, means that eternalism can no longer claim any advantage over presentism, at least as far as the issue of time-consciousness is concerned, although many other areas for disagreement remain. Indeed, given some common-sense assumptions concerning the link between the concepts of *presentness* and *existence*, along with the dynamical model's agnosticism towards the existence of past and future times, one might reasonably take the burden of proof to be entirely the other way round.

6. Conclusion

I have argued that the doctrine of metaphysical presentism (in which only present things exist) is at no significant disadvantage to eternalism (in which all things at all times exist) in accounting for our experience of time. Of the accounts considered above, both Varela's dynamical model and Husserl's transverse model (upon which the dynamical model is largely based) are compatible with both presentism and eternalism. The remaining account — Barry Dainton's overlap model — may or may not be compatible with presentism depending upon precisely how the underlying mechanism by which temporally distributed contents may be experienced within the same act of awareness is spelled out. Any explanation that rules out presentism, however, will be equally problematic for eternalism, since it either has to allow for causation at a temporal distance in order to account for the causal efficacy of mental acts, which is implausible, or else endorse some form of epiphenomenalism, which is equally unattractive (§4.3). Moreover, the incompatibility of the overlap model, which presupposes the fundamental unity of consciousness, with Dennett's 'Multiple Drafts' account, which denies it, as well as its tendency to conflate method of representation with representational content (i.e. time) suggests that the overlap model should in any case be abandoned in favour of the more sophisticated transverse or dynamical accounts. Presentists and eternalists alike would therefore be well advised to adopt the latter, which not only explains the neurological basis for a range of time-related phenomena, but is well grounded in both the empirical and phenomenological evidence.

More generally, the arguments presented above suggest that the assumption that there is one unified and complete account of the phenomenology of time-consciousness may itself be misguided. Instead, time and change may be represented within consciousness by any number of mechanisms — direct representation of qualitative change via the senses, conscious and unconscious inference, temporally distributed representations, etc. — of which dynamical time-consciousness forms just a part. Moreover, the methods employed by philosophers to address these issues may themselves distort the nature of the very phenomena they are intended to study. In consciously reflecting upon our experience, we thereby make it into a unified ‘stream of consciousness’, rather than the piecemeal jumble of events and impressions that constitutes most of our everyday experience. The resulting unity may conceal as much as it reveals since, as Dennett argues, it is highly improbable that our entire conscious life consists of a single coherent and unified narrative within the ‘Cartesian Theatre’ (§2.5). Thus, if time is to be described as a river or ‘stream’, it is not a simple linear flow but comprised of many branching tributaries, which diverge, recombine and run in parallel in accordance with the ‘multiple drafts’ of non- or pre-reflective consciousness. This complex structure is underpinned and unified by the intentional relations of dynamical time-consciousness, which creates the sense of a temporally extended ‘specious present’, and the changing ‘flux’ of consciousness itself, which together combine to produce the distinctive phenomenology of time and temporal passage. Although it is doubtful whether this tells us anything about the metaphysics of time, since such an account is compatible with the existence or non-existence of past and future times, it reveals a vast difference between the nature of subjective and objective time, and the two notions of the present — specious and metaphysical — that arise out of them.

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