The Passage of Time and its Enemies: an Introduction to Time and Reality II*

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ABSTRACT
This essay is a critical introduction to the second part of the special issue Time and Reality. The volume contains responses to papers appeared in the first part, as well as many original articles. The aim of this introduction is to frame these works within the general arena of the philosophy of time, highlighting a number of recurrent themes. A central theme that emerges is a difficulty in pinning down the ontological structure underlying dynamicity and passage without postulating a primitive notion of transiency that is conceptually independent from the instantiation of tense properties. I argue that this has far reaching implications.

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Introduction: The reality of time

Is time real? Here are two different ways in which this question has been and is understood and debated in the philosophy of time.

First is the question, hotly debated since the publication of the well-known Leibniz-Clarke correspondence, of whether time should be thought of as a substance existing independently from all the events that occur in it (and their relations thereby), *Substantivalism*, or whether it is nothing over and above these occurrences and relations, *Relationalism*. In this sense of "real" the debate is about whether time exists independently of material objects and of their spatiotemporal relations.

Second, there is the question of whether time is real as opposed to ideal, or mind-dependent. In this sense of "real" the debate is about whether temporal objects, relations or properties exist independently from the existence of minds or not. Temporal realism in this sense comes in degrees.

Some have advocated a radical form of idealism (Berkeley, Kant, McTaggart), according to which *the whole* of temporal reality, in so much that it is temporal, is mind-dependent. This includes not only the so called A-determinations of pastness, presentness and futurity, individual things such as moments or instants of time, and the presumed transient, or dynamical features of temporal reality, but it also includes the B-relations of temporal precedence, simultaneity and subsequence.

More frequently in recent times the debate over the mind-dependence of time focused on selected parts of temporal reality. Prominent among these debates has been the contrast between realism and anti-realism about tense. According to anti-realists (in this sense) our minds contribute to temporal phenomena by providing them with their familiar tensed structure, i.e. by classifying events as past, present or future. According to the realists, on the contrary, tense distinctions in language and thought reflect objective, mind-independent ontological distinctions.

Until recently there has been a tendency among philosophers of all persuasions to presume that time passes in a robust sense, and reality instantiates genuine dynamic characteristics *only* if A-properties are real. If time passes at all, it is widely agreed, it must be in virtue of the continuous drifting of the present towards the future. Arguably this agreement owes

a lot to the *prima facie* plausibility of the view. When we ponder pre-theoretically about the transiency, or dynamicity in which we are involved in our everyday lives, most of us probably think first about the continuous and inexorable becoming past of momentarily present states of affairs.

This thesis, that dynamicity is essentially *A-theoretic* dynamicity, and temporal passage essentially *A-theoretic* passage, was influentially argued for by McTaggart (1908) in the first part of his celebrated paper on the unreality of time. As a consequence of this deeply entrenched and now philosophically respectable intuition, most of those who endorse the view that A-determinations are mind-dependent, conclude that the passage or flow of time is mind-dependent, if not illusory too.

More recently this view has been challenged. It has become increasingly common to recognize that the mere instantiation of A-theoretic properties, whatever these consist of, would not suffice to make the world dynamic, or to make time pass.[1] The debate over the reality of passage has become to some extent disentangled from that over the reality of tense. So much so that it has become increasingly common to encounter self-professed B-theorists affirming that reality is genuinely dynamic and that time passes in a robust sense (see for example the contributions to this volume by Nathan Oaklander, Steven Savitt and Tim Maudlin) and A-theorists contending that reality is passage-free (see for example the contribution by Jonathan Tallant).

In this introduction, as well as presenting the contributions to the special issue, I shall try to show how they fit together in the broader context of the philosophy of time. I shall start by treating the most abstract ontological and metaphysical issues involved in the idea of time as a metaphysical entity (section 1). In sections 2-6 I discuss the ontological grounds of passage and dynamicity. I argue that the notion of dynamicity is inextricably entangled with that of temporal succession. Section 7 is devoted to the problem of change *vis a vis* the objectivity of tense. Section 8 contains a discussion of the metaphysical implications of the phenomenology of passage. In sections 9-10 I discuss the problem of temporal passage in a relativistic world. Section 10, finally, is dedicated to the metaphysical and aesthetical implications of time travel.

[1] Cf. Oaklander 2016 and Boccardi 2015.

A common theme will be seen to emerge. It is a difficulty in pinning down the ontological foundations of dynamicity without postulating a primitive notion of transiency that is conceptually independent from the instantiation of tense properties. I shall argue that this has far reaching implications.

1. Time as a thing

There is a sense in which one could ask whether time is real that has received little if any attention in the literature, and that I have not mentioned in the previous section. It is the question about whether time is a thing at all to start with, quite regardless of what it consists of or how it is structured. *Prima facie*, this third question might seem to be indistinguishable from the first one that I mentioned, that which fuels the debate between substantivalists and relationalists. Substantivalism is often expressed as the doctrine that time is a thing: a substance, the "container" or "arena" of all occurrences. However, as Marcello Oreste Fiocco notes in his contribution to this volume (p. XX), if we unpack these spatial metaphors, we often find that what this "container" supposedly consists of is an array of moments, or instants: a *plurality* of entities and relations, none of which has any claim of being that individual *thing* called time.

In his contribution, Fiocco addresses this question head-on, answering in the positive. His arguments stem from the need to find ontological grounds for two different kinds of differentiations. A distinction which he thinks rests on firm phenomenological grounds:

> The world is thus and (then) so. There are, then, two modes of differentiation in the world. The heterogeneity apparent when it was just thus and the heterogeneity apparent in its being thus and (then) so. The first mode of differentiation can be accounted for simply in terms of the existence of distinct things. This second mode is no less incontrovertible than the first, so it, too, must have an explanation and, hence, an ontological basis.[2]

[2] In this volume, pp. 54-55.

He then concludes that "time makes a contribution to the world that no other natured entity does. It is the ontological basis of an (at least partial) explanation for the second mode of differentiation" (p. 58). Having secured his thesis that time must be construed as a natured entity in its own right, Fiocco then proceeds to enquiry further the question of *what* time is.

Two other contributors to this volume, Jonathan Tallant and Tim Maudlin, are of the opposite advise. Although, as we shall see, they take opposite stances *vis a vis* the reality of passage, they both agree that time is most definitely not a thing. In his contribution to the first part of this issue, Tallant argues against the view that time passes, taking issues with the view to the contrary put forward by Maudlin (2007). One of Tallant's arguments to this effect proceeds precisely from the presupposition that time is not a thing: "to say that *time* passes is to say that there is an entity, time, and that it performs an action: passing. And that is not something that *any* dynamic theorist (that I am aware of) has ever argued" (p. 44).

In his contribution to this volume Maudlin responds to Tallant. He agrees that "no one ever argues that passing is an *action* and time an *entity*" (p. 77). However, he objects that from this it does not follow that time does not pass, but simply that the proper analysis of the claim that time passes does not involve a thing, time, which does the passing:

> The subject/predicate form of "Time passes" or "Time elapses" does not provide a clue, much less a requirement, for the metaphysical analysis of what the sentence asserts. The subject need not refer to a "thing" and the predicate to an "action" in order for the sentence to express a truth.[3]

What is it, then, that we *do* assert when we say that time passes, if not that there is a thing, time, which passes? This brings us to one of the central issues in the philosophy of time: the nature and reality of passage.

[3] In this volume, p. 78.

2. Passage without the A-properties

As I mentioned before, the idea that time passes in more than a metaphorical sense has recently gained consensus also among those who deny that reality is objectively tensed. While early advocates of the B-theory appear to have been quite ready to concede that if A-theoretic distinctions are illusory then so is the passage of time, contemporary views have been more nuanced. In what sense can time be claimed to "pass" if all we're given are apparently changeless relations such as 'earlier than', 'simultaneous with' and 'later than'?

Steven Savitt, also a B-theorist, suggests how this can be done in his contribution to the first part of this volume: "It is true that the picture standardly used to illustrate the B-series or Newtonian spacetime is static; but what this picture depicts is the history of a universe unfolding in time."[4] Analogously, Tim Maudlin (in this volume, p. 78, my emphasis), claims that "[t]he temporal aspect of space-time is dynamical: events along a single worldline occur in *successive* temporal order.".

Maudlin observes that, while the notion that space 'extends' is a symmetrical notion, the idea that time 'passes', or that it elapses, is not: "the time that elapses from 10 AM to noon does not equally elapse from noon to 10 AM".[5] Underlying this irrefragable specificity of temporal expansions, thinks Maudlin, is the unique dynamic characteristic of time to which we allude when we say that time passes.[6]

There seems to be an agreement among these authors that the dynamic feature of reality is contained in the notion of "subsequence", or "successiveness", a relational notion which, following McTaggart, has traditionally been considered as changeless, hence as inherently static. How can statements describing apparently unchanging states of affairs, such as the fact that the French revolution antedates your birth, express the truth that genuine, dynamical changes take place?

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[4] Savitt 2016, p. 87. See also Savitt 2002.

[5] Ibid., p. 78.

[6] See Maudlin 2007 for a detailed defense of the view that time passes in a B-theoretic framework.

Note that the alleged staticity of B-relations was never supposed to reside in their status as relational, as opposed to monadic features of reality. The problem, rather, was seen to reside in the particular propositions which B-statements can afford to express, ones whose truth values can never change. That you were born after the French revolution is not something that appears to have ever been false, or that might one day cease being true. In contrast to this, A-determinations have been traditionally considered as more appropriate to express the transient feature of time, since, unlike B-statements, A-statements have shifting truth values: pastness, presentness and futurity can apparently be acquired and shed. As Baker puts it, "[t]he definitive difference between the A- and B-series is this: A- properties are *transient* and B-relations are not".[7]

There are two presuppositions behind this standard criticism to the B-theory of time. First, it presupposes that only if a sentence's truthvalue changes over time can it refer to a *dynamic* aspect of reality. Second is the assumption that the mere postulation of an objective distinction between pastness, presentness and futurity would suffice to express this dynamic feature. In his contribution to the first part of this issue, Nathan Oaklander takes issue with both of these assumptions:

> 'Earlier than' is a timeless yet dynamic temporal relation. It is timeless because it does not exist in time; as a term of a temporal relation. It is dynamic because it is the ground of our experience of *successively* existing temporal objects that exist TENSElessly, that is, without TENSED A-properties.[8]

We shall return later to the important issue of our experience of dynamicity. For now, let us focus on the view that temporal successions provide the ground for the claim that reality is dynamic and that time passes. In her response to Oaklander's criticism,[9] Lynne Rudder Baker, who advocates a hybrid AB-theory of time, argues that to say that B-

[7] Baker 2007, p. 144, my emphasis.

[8] Oaklander 2016, p. 119, my emphasis.

[9] In the first part of this special issue, pp. 119.

relations are dynamic and that they involve transitions between states "clearly presupposes the A-series" (p. 68). Since I think many important issues in the philosophy of time hinge on this disagreement, let me expand on it.

As I have already mentioned, part of the alleged superiority of the A-theory in making room for genuine dynamic change resides in the presumption that the reality of A-determinations[10] might suffice to make the world dynamic. It can be argued, however, that the mere assumption that some events are past, while other ones present or future is mute as to what aspect of reality makes them genuinely 'transient', or 'shifting'.[11] One may think that it is a conceptual truth that, if an event is (objectively) present, for example - whatever this amounts to -, then it is only *temporarily*, hence *transiently* so. Still, this conceptual entailment does not elucidate the metaphysical grounds of its consequent. What is supposed to ground the *transient* nature of A-determinations?

Notice that the information that a given event, say today, is present does not contain the information that something is chang*ing* (although a proposition to this effect can be arguably inferred from it). One can realize that things are so by noting that both today's (current) presentness and yesterday's (current) pastness can be viewed as simultaneous A-theoretic static "snapshots", since they presuppose that a particular position within the A-series has been already *reached*, and present us with an instantaneous, albeit A-theoretic, representation of reality as seen from that position. How could any instantaneous snapshot of reality represent the fact that time passes? As Huw Price put it in commenting A-theoretic accounts of passage:

> we seem to have lost the materials for a realist view of passage, change or temporal transition. All of these notions seem to involve

[10] Note that Baker's view is not that A-determinations are real in the sense of being mind-independent, objective features of reality. Nevertheless, she claims, reality does contain objective A-theoretic distinctions in as far as it contains conscious subjects.

[11] Cf. Oaklander 2016, Savitt 2016 and Boccardi 2015.

> a relation between equals, a *passing of the bato*n between one state of affairs an another.[12]

It is tempting to think that, whatever grounds transiency in an A-world is the same thing which grounds the fact that different times acquire presentness *in succession*, whatever the latter turns out to be. This analysis, however, would dangerously reverse the order of explanation proposed by the A-theorist. The conceptual burden of making reality *dynamic*, in this case, would lie full weight on the independent irreducible notion of *succession*. If this were conceded, however, then it would become hard for the A-theorist not to concede that the succession of events in the B-series, *qua* succession, should count as genuinely dynamic too.

A-theorists have been often tempted to eschew this difficulty by adorning their realist understanding of the claim that certain events are present with the further claim that *other* times have been and will be present too.[13] This maneuver, however, is equally in danger of getting the explanatory order of things upside down. If it is true that certain times (other than the present) have been and will be present in their due turn, this can only be a *consequence* of the passage of time, hence it cannot be held to be *constitutive* of passage itself. Now, if the notion of subsequence, rather than A-properties *per se*, turns out to be responsible alone for the dynamic nature of reality, then it is not clear what unique contribution the postulation of A-determinations could make in this respect.

3. The rate of passage

Another familiar objection raised against the view that time passes stems from the observation that, if it did, it could only pass at a rate of one second per second. Some argue that this is not a rate at all, and on the ground of this conclude that time cannot pass. Some friends of passage concede that time passes at a rate of one second per second, but argue that

[12] Price 2011, p. 279.

[13] See for example Crisp 2007, Craig 2000, Bigelow 1991, Prior 1970, Tooley 1997.

this does not constitute a serious objection to the view. Maudlin (2007), for example, presents a number of cases where similar apparently trivial rates apply by necessity, without incurring in any absurd consequences.

In his "Temporal Passage and the 'No Alternate Possibilities Argument'",[14] Tallant takes issue with Maudlin's stance, defending a variant of this objection which targets not the presumed absurdity of this rate per se, but the fact that there does not appear to be any other possible rate at which time could pass. In his reponse to Tallant,[15] Maudlin rebukes that while it is true that the rate of passage is not contingent (it could not have been different), it is nonetheless perfectly intelligible, given the nature of the rate at issue:

> it is contingent whether anyone is as tall as his or her father, but not contingent whether anyone is as tall as him- or herself. The reason for the contingency of the one and the necessity of the other is evident. Does that make the claim that John is as tall as himself controversial? Similarly, the reason why this particular rate is necessary while others are contingent is evident, so no suspicion accrues to the latter.[16]

As I have already mentioned at the beginning of this introduction, Maudlin thinks that Tallant's misgivings about the idea of passage stem from his assuming that the conceptually primitive use of the verb 'to pass' is transitive - as in the sentence 'mercury passed in front of the Sun'. This, argues Maudlin, motivates Tallant's contention that "to say that *time* passes is to say that there is an entity, time, and that it performs an action: passing."[17] However, he argues, this understanding of the verb is not forced upon us, as the synonymous use of non-transitive verbs like 'to elapse' illustrates.

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[14] Contained in the first part of this volume, pp. 35-47.

[15] In this volume.

[16] Ibid., p. 77.

[17] Tallant 2016, p. 44. Original emphasis.

4. Transiency, Passage and the Topology of Time

Let me now turn to another potential difficulty for realist accounts of passage. As we have seen, the dynamic or transient ingredient of B-theoretic (realist) accounts of passage is contained in the relational notion of succession. "The essence of time", writes Maudlin in his contribution, for example, "is successiveness, one thing happening after another in a fixed order"[18]. "Temporal relations", writes Oaklander, "are unique in that they involve a process or transition or succession from one term to the next.".[19] Even one of the staunchest deniers of transiency and passage appears to concede that, if passage were not an illusion, presentness would flow from one moment to the next: "we are immediately and poignantly involved in the […] felt flow of one moment into the next". [20]

Now, these expressions appear to bring with them potentially unwanted topological presuppositions, to the effect that the series of events ordered by the B-relations can only be discrete. While the 'earlier than' and 'later than' relations are clearly not 'next' relations, and are at home equally well with discrete, countable or uncountable series of events, the relations of 'succession', or 'nextness' invoked by these B-theoretical accounts of passage might give rise to suspicion. How are we to understand these transitions, or successions from one time to the other if the series of events is supposed to have the structure of the real line, as it is standardly supposed to have?

Criticizing Oaklander's version of this account, for example, Baker complains:

> This understanding of temporality clearly presupposes the A-series. Physical time (B-series) is dense; between any two events there is another event. Hence, on the B-theory, there is no next event.[21]

[18] In this issue, p. 78, my emphasis.

[19] Oaklander, 2012, p.13, my emphasis.

[20] Williams 1951: 466. My emphasis.

[21] In this volume, p. 68.

This observation raises several interesting questions. Given the scope of this introduction, I shall not be able to touch on all of them here: I shall content myself with making a few remarks.

First, notice that B-theorists, given their ontological parsimony, are not forced to assume that events form a continuous series of exstensionless elements. The successions invoked by these theories, in fact, are typically thought to relate *concrete* events, not abstract 'times', as substantivalists assume. It is true that B-theorists who subscribe to a fourdimensional picture of reality typically treat temporal relations as holding between *momentary* slices of 4D objects, and are therefore committed to a dense ordering of times. Baker is surely right that in these scenarios there is no room for a notion of transition which involves a *passing of the baton* from one event to *the* next.

But this ontology is not forced upon the B-theorist. Faced with a similar objection, the B-theoretic friend of passage may therefore argue that the very fact that these scenarios don't make room for dynamic transitions is a pitfall of the substantivalist interpretation of the B-theory, rather than an inconsistency in the idea that dynamicity is grounded in transiency.[22]

Secondly, as I have already discussed above, it is not clear that the A-theorist can afford to keep the promise of making room for dynamicity without postulating a primitive notion of transiency that is conceptually independent from the instantiation of tense properties. As Savitt has observed in his contribution to the first part of this volume: "[t]he tensed facts, of the form t is now, if they are to ensure the reality of the successive nows or presents, must themselves obtain or occur *successively* and so must also have the structure of the real line".[23] If so, whatever misgivings one may have about the possibility of transiency in a dense series of events ordered by B-relations, one should also have about the possibility of transiency in a dense series of *subsequent* instantiations of presentness.

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[22] Notice that this response needs not be taken as forgoing momentary events altogether, since these can be understood as suitable abstractions out of extended events in a familiar way.

[23] Savitt 2016, p. 86, my emphasis.

A related difficulty stems from the observation that an instant of time can become present only after each previous instant ceased being present in its due turn. It follows that, if times were to acquire presentness (or become present) in succession, like the A-theorist should think, then the passage of time would involve the performance of a *hypertask* (an uncountably infinite number of operations that occur *sequentially* within a finite interval of time); something which many find impossible.[24]

Perhaps what Baker has in mind is that the A-theory, unlike the B-theory, is not committed to the existence of *any* array of temporal objects, hence in particular not to the existence of a *dense* array of objects. This would explain her contention that Oaklander's worries "clearly presupposes the A-series". As I have argued, however, neither the B-theory is so committed. It might well be that the lesson that we should learn from these considerations is precisely that the structure of the mathematical continuum is not compatible with the occurrence of genuinely temporal successions, whether or not one subscribes to the A-theory.

5. Passage and durationless instants

Surely, the standard formulation of most theories of space and time, and indeed, most contemporary physical theories, feature pointy structures, like Euclidean space and time, or Minkowski's space-time as these are typically represented. But the issue at stake here pertains to the metaphysical interpretation of these structures, and this is clearly open for debate. It might turn out that our preference for pointy structures hinges on merely practical and historical reasons.

The rival view of time, according to which there are no durationless time atoms, has been famously advocated in the last century by Alfred N. Whitehead, who was notoriously acutely aware of the problem of accommodating dynamicity and processuality in a world that only features the instantiation of properties and relations. Alfred Tarski (1929) provided an axiomatic formalization of Whitehead's geometry which he described

[24] See for example Clark & Read 1984.

as "a system of geometry destitute of such geometrical figures as points, lines, and surfaces, and admitting as figures only solids—the intuitive correlates of open (or closed) regular sets of three-dimensional Euclidean geometry".[25]

We shall not here delve into the details of the growing literature on pointless or 'gunky' ontologies of time,[26] but let me just mention in passing a contribution to this volume that is related to this issue. In a recent book Ross Cameron (2015) advanced an argument purported to show that, in a dynamicist world, assuming a pointless (gunky) topology opens the way for cases of "indeterminate existence". Roughly, the gist of the argument is the following. If the world is dynamic (i.e. if the unrestricted domain of existing things is different at different times), then change is underwritten by events of 'coming to be'. Since no event is point-like, this entails that there are extended events of coming to be. Before the beginning of such an event, the entity determinately doesn't exist. After its culmination, it determinately exists. During the event itself, argues Cameron, the entity is in a limbo of indeterminate existence.

In his *Gunky Time and Indeterminate Existence*, Giuseppe Spolaore points at a flaw in this argument. In a nutshell, Spolaore notices that expressions like "event of A's coming to be" are subject to two different readings. If the locution is used to refer to accomplishments (in the sense of Vendler 1957), then A's 'coming to be' is an extended event culminating with a state in which A determinately exists. The event, in these cases is generally thought to bring about (in a causal sense) the culmination of the accomplishment. On the second reading, the expression 'event of coming to be' is to be understood in a disengaged, non-causal sense, as simply describing a difference between what holds true at two abutting intervals of time. In a thick sense of 'event', this is not an event at all: it is not something which literally 'happens', or which can have 'effects' of any kind. Spolaore argues that there is no univocal interpretation of 'event of coming to be' which makes Cameron's argument valid.

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[25] Tarski 1929, p. 24.

[26] Se See Zimmerman 1996 and Arntzenius 2008 for a detailed discussion of this possibility.

6. Successions without successors?

Let me go back to the relation between transiency, succession and enumerability. From a formal point of view, the successor relation is at home only with discrete series, like the natural number series. If we are to make sense of transiency in terms of passing from one stage to the next in any literal sense, we shall have to assume that concrete transitions can be enumerated in the same order in which they occur.

If things are so, it is interesting to ask what it is exactly that the series of events as ordered by genuinely dynamic relations and the series of natural numbers ordered by the successor relation have in common. Notoriously, according to an influential doctrine in the foundations of mathematics inspired by Kantian considerations, intuitionism, the relation between the two is very intimate indeed: it is one of conceptual grounding. Of course, we are not here in the business of assessing any view about the foundation of mathematics, but for our purposes I think it is instructive to consider how such grounding is supposed to work. Here is how L.E.J. Brouwer, the founding father of intuitionism, expresses his own view:

> intuitionistic mathematics is an essentially languageless activity of the mind having its origin in the perception of a move of time. This perception of a move of time may be described as the falling apart of a life moment into two distinct things, one of which gives way to the other, but is retained by memory. If the twoity thus born is divested of all quality, it passes into the empty form of the common substratum of all twoities. And it is this common substratum, this empty form, which is the basic intuition of mathematics.[27]

As I said, for our purposes it is not important to assess this view against its rivals in the debate over the foundations of mathematics. What matters for us is the idea that, if our intuition of temporal relations were to ground our intuitions about mathematics, they would do so by inducing a successor relation.

[27] Brouwer 1981, 4-5.

In his contribution to the first part of this volume, Erwin Tegtmeier, provides an analysis of the relationship between the mathematical notion of order and the temporal notion of succession. He too appears to suggest an intimate relationship between temporal successions and temporal successors (if etymology alone should not suffice for this purpose):

> Thus we find here again the explicit identification of time and serial order which is nowadays made mostly implicit. I think that it is also implicit in the inductive definition of natural numbers which I mentioned already and in the definition of the series of natural numbers by the successor function. In that definition the same function is applied again and thus the series is built up through what is essentially a temporal process. This does not fit into to the general theory of series of set theory since the successor function is not a transitive relation. However, with the successor function the nature of the order is clear: it is temporal while in the general theory of series that nature is evasive.[28]

Another philosopher who appears to have taken this intimate relationship very seriously, on entirely different grounds, is William James. In his critique of the Russellian response to Zeno's paradoxes, he claimed that:

> [he who] actually transverses a continuum, can do so by no process continuous in the mathematical sense. Be it short or long, each point must be occupied *in its due order of succession*; and if the points are necessarily infinite, their end cannot be reached, for the 'remainder', in this kind of process, is just what one cannot 'neglect'. *'Enumeration' is, in short, the sole possible method of occupation of the series of positions implied in the famous race.*[29]

James observed that classes of things come in two varieties: things conceived as *standing*, like space, past times [sic!] and existing beings; and

[28] Tegtmeier 2016, 165, my emphasis.

[29] James, 1902-1910 [1987], p. 1075, my emphasis.

things conceived as *growing,* like motion, change, activity.[30] The trouble with Russell's use of Cantor's theory of infinity to dissolve Zeno's paradox of the race, he thought, is that while Cantor and Weierstrass were in the business of providing a theory of the *standing* (mathematical) variety of infinity, Russell was trying, or should have been trying to give an account of the *growing* variety, which is necessarily involved in the notions of change and motion. "Mr. Russell's statements", he wrote, "dodge the real difficulty, which concerns the 'growing' variety of infinity exclusively, and not the 'standing' variety, which is all that he envisages when *he assumes the race already to have been run* and thinks that the only problem that remains is that of numerically equating the paths. The real difficulty may almost be called physical, for it attends the process of *formation* of the paths.".[31]

As I hoped to have argued, these difficulties are in no way a prerogative of the B-theory of time. As a matter of fact, the B-theorist commitment to Relationalism offers a natural response to them. Philosophers have detected a difficulty with the idea that a dense series can be *transversed* 'one step at the time' since Zeno's celebrated arguments. The foregoing considerations hardly scratch the surface of this intricate issue. As I said, however, it might turn out that, if there are indeed primitive relations of temporal succession that are *genuinely* dynamic, as Oaklander and many others suggested, this would have implicit consequences for the actual topology of temporal reality.

7. Eternalism, Presentism and Persistence

According to some authors (the Eternalists), past, present and future things and states of affairs, while possibly located at different temporal "locations", all (tenselessly) exist on an equal footing. According to their foes (the non-Eternalists), on the contrary, the differences between past, present and future experiences reflect objective *ontological* distinctions. At the end of the spectrum of non-Eternalist views is the doctrine of

[30] Cf. James 1912/1987, p. 1067.

[31] Ibid., p. 1074, my emphasis.

Presentism: the view that, necessarily, it is always true that *only* present objects and states of affairs exist.

One of the chief allures of Presentism is that it promises to make room for temporal passage. We have already discussed the limits of this claim. Another presumed advantage of Presentism is that it promises to provide us with a coherent account of persistence through change. Philosophers of a rationalist bent have glimpsed a contradiction in the idea that things can endure through change since the times of Parmenides. In our times the most celebrated arguments to this effect are McTaggart's argument for the inconsistency of the A-theory and Lewis' argument from temporary intrinsics. One of the claims of presentism is the promise to meet both challenges at a stroke.

Let me briefly sketch how this is supposed to work. The argument from temporary intrinsics, in a nutshell, is this. Suppose an entity could endure through a change in its intrinsic properties, i.e. the properties it has solely in virtue of what *it* is.[32] After the change took place, either it is the same entity as before, or not. If it is the same, then it has not changed (change requires difference); if it is not the same, then no change has taken place, for there is never something of which it is true to say that *it* has changed. Either way, the entity has not changed its intrinsic properties, contrary to the hypothesis. Thus, the assumption that an entity could change its intrinsic properties entails that it could instantiate inconsistently both the properties it has before and those it has after the change.

Let me point out since now that, so formulated, the problem of temporary intrinsics bears a notable structural resemblance with McTaggart's celebrated argument. Notice, in fact, that if the entity in question is an event, and if the intrinsic properties involved in the change are the A-properties of pastness, presentness, and futurity – if, that is, the change in question is the (A-theoretic) passage of time itself -, then the conclusion of the argument is precisely McTaggart's preliminary conclusion: that all events bear all the incompatible properties of pastness, presentness and futurity.

[32] Here the locution "solely in virtue of what it is" is meant to exclude, for example, the properties that an entity has in virtue of standing in (external) relations with other entities.

Notoriously, Lewis envisaged three possible way out of this conundrum, none of which preserves *all* the intuitions we have about the metaphysical nature of change (or passage). Here they are.

The first option - admittedly the first one that comes to mind – is to propose that the entity has incompatible properties only *relative to different times*. However one decides to spell out the details of this option, it clearly contradicts the assumption that the entity in question could change its *intrinsic* properties. Notice that this is also the immediate reaction one has when confronted with McTaggart's argument – to wit, that events never instantiate all A-determinations *at the same time* - and the first one that he goes on to dismiss.

The second option mentioned by Lewis is what we now know as Presentism. The solution is rather simple and it applies just as well (or not) as a response to McTaggart's argument. The inconsistency, according to this option, is avoided by obliterating from existence one of the two incompatible states of affairs. Neither of these is *individually* offending, it is only when both incompatible states of affairs are encompassed within the same reality that they cause trouble. According to Presentism, at each time there only exist facts which make *present* truths true.[33] The facts which *did* make past truths true (when they were present), and which *would* make reality inconsistent if they still existed now, no longer exist.

Many have claimed that Presentism circumvents, by the same token, also McTaggart's argument.[34] The events that were once present, and which *would* make reality inconsistent if they still existed (now that they are past), no longer exist. Problem solved.

The master argument against presentism is the so called *truthmaker problem*. It stems from two assumptions: (1) that all contingent truths have truthmakers and (2) that there are determinate truths about the past and the future. The problem is that, since the states of affairs which made past truths true no longer exist, and those which will make future truths true don't exist yet, there appears to be nothing now – hence, by Presentist

[33] Of course, these may include present (current) past and future tense truths, such as the present truth that the entity *did* instantiate this and that property.

[34] See for example Bourne 2006.

standards, nothing at all - which could make past and future tense truths true.

Most Presentists don't take issues with the premises of the argument. Rather, they offer surrogate truthmakers for past and future truths which are compatible with their ontological diet. Thus, for example, Craig (2000) suggests that truths about past entities, such as Socrates, refer to their 'essences'. These are incorporeal entities which could only be instantiated by their (possibly departed) bearers. Since they do not necessitate the existence of their bearers, however, they can survive their demise. Crisp (2007) advocates an *earsatzist* solution, according to which the truthmakers for past and future truths are abstract representational entities (classes of propositions) whose content corresponds to how things were and will be. Bigelow (1996) opts for a Lucretian strategy, according to which when an event occurs (on earth, say) it leaves a qualitative trace, as it were, by acquiring a persistent, past-directed property, like the property of having once been 3 foot tall.

In his *Challenging the Grounding Objection to Presentism*,[35] Rognvaldur Ingthorsson takes issues with these and similar proposals. In particular, he offers a criticism of all the theories which, like the ones mentioned above, relocate the subject matter of past (and future) tense truths, from the past (and the future) to the present. He calls these "relocation strategies". The upshot of the arguments he offers is this:

> Very briefly, the relocation strategy leads to the postulation of a plethora of ethereal entities that go against the grain of presentism as a very down-to-Earth and concrete sort of view (one that fits our everyday view of the world), and ultimately doesn't answer the grounding objection anyway.[36]

Unlike most other authors, Ingthorsson questions the premises of the argument. Specifically, he takes issues with premise (2): that there are determinate truths about the past and the future. The intuitively unpalatable consequences of this the view, which Ingthorsson defends

[35] In this special issue, pp. 87-107.

[36] Ibid., pp. 88.

from a number of objections, is mitigated by the observation that we can still derive (at least some) information about the past, using our knowledge of the laws of nature: "The laws of nature in turn are perfectly befitting a presentist ontology, because the world instantiates them at any given time" (p. 93).

This view raises a number of interesting questions. To mention just one of them, the claim that the world instantiates the laws of nature "at any given time" must be handled with care. Natural laws are typically expressed by stating suitable relations between events happening at different times. According to Humean views, for example, the laws supervene on the *totality* of non-modal facts. The view under consideration must therefore be paired with an account of laws which complies with the restricted diet of Presentism. Notice that it is not enough to endorse a view of laws that is compatible with the objectivity of tense.[37] One must further ensure that the account doesn't avoid the pitfalls of Humeanism by resorting to inadmissible past entities.

After mentioning the option of Presentism as a response to his argument from temporary intrinsics, Lewis quickly dismisses it in favor of his preferred solution, perdurantism. This is the view that things persist not by being wholly present at each moment of their existence (Endurantism), but by having temporal parts (stages) which bear different intrinsic properties (Perdurantism).

Lewis reasons for rejecting Presentism are too brief to be thoroughly considered. Part of his considerations appear to hint at the truthmaker problem: "In saying that there are no other times, as opposed to false representations thereof, it goes against what we all believe. No man, unless it be at the moment of his execution, believes that he has no future; still less does anyone believe that he has no past".[38] But he also appears to believe that Presentism doesn't even deliver what it promises: an account of how things persist by enduring: "Other times are like false stories...This

[37] See the contributions to the first part of this issue by Francesco Orilia and Marius Backmann for a suggestion as to how this might be done.

[38] Lewis 1986, p. 204.

is a solution that rejects endurance; because it rejects persistence altogether." (ibid.).

As I mentioned, none of the solutions on offer leave *all* our intuitions about change intact. The chief problem with Perdurantism is that it provides a relational account of the identity through time. As Sally Haslanger pointed out:

> Although on his view it is true that there are persisting objects (the perdurers), and it is also true that properties such as shape are genuinely intrinsic (to the stages), there is nothing such that *it* persists through a change in its intrinsic properties. The intrinsic properties of the stages are not properties of the perdurer.[39]

In an attempt to save all of our intuitions about persistence and change, some authors have been tempted to endorse at the same time an Eternalist ontology (which blocks the truthmaker problem) and an Endurantist account of persistence.[40] In his *Time, Fission, Fusion: An Argument against the Block Universe with Endurance*,[41] Yuri Balashov claims to have raised the cost of these hybrid views.

His arguments have as their point of departure the phenomenological datum that our experiences are always uniquely confined to one particular time. Thus, for example, if the Eternalist block contains both one's experience of happiness on Tuesday and one's depression on Wednesday, it appears arbitrary which of these one should uniquely experience, given that they are both equally part of reality:

> Despite the drastic difference in their phenomenal character they are ontologically on par and have equal claims to represent my perspective on the Block Universe; after all, there is only one me in the Block Universe, but many times and many experiences. I believe, however, that I am viewing the Block Universe exclusively from the Wednesday perspective (tainted with depression), and not

[39] Haslanger 1989, p. 119.

[40] See for example Merricks 1995.

[41] In this volume.

> from the Tuesday perspective. This belief may or may not be true, but I have it, and it needs to be explained. However, the Block Universe with eNdurance (BUN) lacks the resources to do so.[42]

While, as Balashov acknowledges, all the arguments he offers pertain to experience and personal identity through time, and are therefore not applicable to non-sentient beings, like inanimate objects and events, they still raise uncharted issues both about the problem of persistence through change and about that of personal identity.

8. Is passage an illusion?

We have discussed at length many of the difficulties which a realist understanding of dynamicity and passage must face. These difficulties, together with the presumed incompatibility of the A-theory of time with the theory of relativity (to be discussed in the next section), constitute the main reason for endorsing the B-theory. The main source of resistance to this move is the alleged incompatibility of the B-theory with our experience of temporal reality. The A-theory, it has often been claimed, is uniquely capable of making sense of our experience of passage. I have expressed a number of reservations about this claim in the first sections of this paper.[43] However, B-theorists who are unpersuaded by these reservations must answer to the question of how we could experience time as flowing if A-theoretic distinctions don't cut the nature of temporal reality at its joints. Arguments to the effect that only if the A-theory is true could we experience time as we do, are collectively known as the *argument from experience*.

The standard response to this worry has been to claim that one needs not assume that our experiences *themselves* instantiate genuinely dynamic features in order for them to (mis)represent the world as

[42] Ibid. pp. 111-112.

[43] For a more detailed expression of these worries, see my Boccardi 2016 and 2015.

dynamic. As Steven Savitt aptly put it: "we don't need an animated picture to have a picture of animation".[44]

However, those B-theorists who, unlike Savitt himself, Oaklander or Maudlin, deny that reality instantiates genuine dynamic features at all, face a grave difficulty. In claiming that we misrepresent reality as dynamic, in fact, they must be careful not to concede too much.

To see what I mean by "conceding too much", consider again Lynne Baker's position on the matter. On the one hand, she sides with the deniers of passage in claiming that passage is mind-dependent: "I say that an event's occurring now depends on someone's being judgmentally aware of it now".[45] However, she also believes that this awareness itself entails the instantiation of (real) A-theoretic properties: "it is *constitutive* of our conscious lives that they are ordered by the A-series' ongoing nows. […] It is also part of the nature of time that any self-conscious experience has—must have—A-properties".[46]

On a similar vein, Hermann Weyl famously maintained that "the objective world simply is, it does not happen. Only to the gaze of my consciousness, crawling upward along the life line of my body, does a section of this world come to life as a fleeting image in space which continuously changes in time".[47]

These observations grant too much to make the case for the *illusory* nature of passage. Sure, if Baker and Weyl were right, the experience of passage would be illusory in the wider sense that it would mistakenly ascribe genuine dynamic features to the *external* reality; but it would not be illusory in the sense needed by the absolute denier of passage. In Baker's view, the experience of passage faithfully represents some dynamic features of reality: those instantiated within our 'mental show'. The austere denier of passage, instead, needs to claim that the content of the experience of passage is *never* true of the actual world, not even of that

[44] Savitt 2002, p. 163.

[45] Baker 2007, p. 150.

[46] Ibid. p. 152.

[47] Weyl 1949, p. 116.

portion of the actual world which contains the interactions between conscious experiences and their contents: "the dynamic character of our immediate experience does not require time itself to be dynamic" (Dainton 2011: 391).

In his *Temporal Experience and Metaphysics*,[48] Graham Peebles argues that this desideratum cannot be satisfied. Peebles' point of departure is a criticism of Laury Paul's rebuttal of the argument from experience. According to Paul, our experiences as of dynamicity are "purely phenomenological": they merely possess the "animated character or flow of change".[49] According to Peebles, "[a] natural way to understand a view like this […] is that it is merely a quale that experience has which gives it this impression. A quale with oomph, to use Paul´s term" (p. 160).[50]

Peebles rightly points out that this construal of the argument from experience should be resisted. It is only by adopting a representationalist theory of phenomenal experience, according to which differences in phenomenal character supervene on differences in their representational contents, that one can appreciate the full strength of the argument. Once Representationalism has been taken on board, he claims (rightly, I submit), "at the very least the 'animated' qualia supervene on a representation of a type of change which is distinct from spatial variation" (pp. 161). The paper then proceeds to put forward a detailed amended argument, and to show how it is immune from standard counter-objections.

It may be objected that these observations misinterpret the thrust of Paul's response. While it is true that she repeatedly talks of 'qualia with oomph' and of the mind 'filling in' dynamic features that are not out there in reality, she also warns the reader that these locutions should not be taken too literally. After making one of these remarks about the mind 'filling in' dynamic features that are absent from reality, she claimed: "Not

[48] In this volume.

[49] Paul 2010, p. 334.

[50] On a similar vein, Crick and Koch propose that we account for the experience of motion by suggesting that instantaneous experiential snapshots be equipped with a vector-like phenomenal character: "think of motion painted onto each snapshot" (Koch 2004: 264).

literally. It just gives the impression of being filled in. There is no 'figment,' as Dennett would say".[51]

According to this view, the error does not involve a *misperception* of the static block, but rather a *misdescription* of the content of perceptual experience; in short, it only *seems* to us that we perceive the world as dynamic, but in fact we don't; rather, we only have *wrong beliefs* about what the representational content of our perceptions really is.[52]

However, it is not clear that this really evades Peebles' argument. Firstly, the view flies in the face of a plausible account of experience, according to which we are transparently aware of the content of our perceptions. In particular, we are arguably aware of whether our experiences should count as perceptions or not. The examples of experiences that do not possess a representational content that one finds in the literature (such as hunches or states of anxiety) are also typically experiences that we would not mistake for perceptions.

Worse still, the proponents of these accounts must be very careful in expressing what feature it is exactly that we would (mistakenly) describe our experiences of time as 'filling in'. The misdescription error theorist must tell us what feature incompatible with the B-theory our perceptions represent the world as instantiating. Analogously, the misdescription theorist must tell us what perception it is (hence which content) that our phenomenological description wrongly ascribes to us. Either way, Peebles is right to claim that the type of change represented by these 'animated' qualia must be different from spatial variation.

As I have already pointed out, it remains to be seen whether such aspect of reality "distinct from spatial variation" can be accommodated within a moderately realist B-theoretic account of passage or not. All that has been said in this regard, however, does nothing to ease the worry raised by the argument from experience, which strictly applies only to those views that claim that dynamicity and passage are *entirely* illusory.

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[51] Paul 2010, note 33.

[52] Variants of this response can be found also in Le Poidevin 2007 (ch. 5), Dennett 1991 and Prosser 2012.

9. Time, Passage and Relativity

Let me now turn to one of the worst nightmares for the A-theory of time: relativity. After Minkowski's 1908 speech in Cologne, it became clear that relativistic space-time is highly inhospitable to the idea that time can flow, as its geometry does not admit a unique partitioning into sets of simultaneous events. Since most philosophers on both sides of the debate agree that time passes only if the A-theory is true, this has immediately been perceived as a problem (cf. Putnam 1967). This predicament was further aggravated after Gödel proved that Einstein's equations admit of a solution for which not only the choice of a foliation (a divisions into exclusive time-slices) is frame-dependent, but unavailable.

These worlds, call them Gödel worlds, famously contain closed time-like curves. The mere possibility of these scenarios, as Gödel himself noticed, is in tension with the view that "reality consists in an infinity of layers of "now" which come into existence *successively*",[53] since, he thought, the essence of the idea that time lapses "is that only the present really exists".[54] In short, Gödel aligns himself with those who think, like McTaggart, that only the A-theory is compatible with the idea that time passes. We have already discussed how this view has been challenged. Thus, for example, in his contribution to this volume, Maudlin claimed that "[t]he temporal aspect of space-time is dynamical: events along a single worldline occur in successive temporal order. *Even in Relativity, time passes.*" (p. 78, my emphasis).

Here, instead, we shall be concerned with how A-theorists may respond to this challenge. In his *A and B Theories of Closed Time*, Phil Dowe argues that both the A- and the B-theory face the same problems when it comes to closed time, and that both are amenable to 'local' solutions. The problem, as Dowe sees it, is the following:

> The prima facie problem is that for neither A nor B theories will the 'time-like' dimension in any alleged case of closed time actually

[53] Gödel 1949b, p. 558, my emphasis.

[54] Ibid. p. 558, n. 4.

> count as time. For the A-theory, at any point on a closed curve we take to be time, every point on that curve will be both future and past. Events do not stop being future when they become present or past. And they don't become past since they are already past (Dowe 2009). So there is no change in events from future to present to past, so there is no time.[55]

There have been attempts to make general relativity compatible with the A-theory. One such attempt (Stein 1968) is based on a deflation of becoming which relativizes the notion of reality to space-time points. According to this view, known as Possibilism, reality (relative to a space-time point p) only holds for p and all points in p's backward lightcone. The rest of the space-time structure is merely possible (relative to p).

Admittedly, the notion that reality itself could be relative to space-time points is at best baffling, if not unintelligible. However, similar views have sporadically made appearance in the literature, often as mere conceptual possibilities, rather than as serious metaphysical doctrines. Fine 2005, for example, considers the possibility of a non-standard versions of tense realism (he calls *external relativism*) according which a fact is part of reality (or not) only relative to a temporal standpoint. Fine further considers how this view can be exploited in a tense realist friendly interpretation of relativity.

In his *Fine's McTaggart: Reloaded*, Roberto Loss puts forward an analysis of Kit Fine's version of McTaggart's argument which highlights a number of previously unnoticed possibilities. In particular, a new form of external relativism which he labels *hyper-presentism*. According to hyper-presentists, not only do facts constitute reality only relative to a certain temporal standpoint, but facts about temporally-relative constitution can themselves change: "for hyper-presentists it is thus possible that f presently constitutes reality at time t and that either it will not be the case or it wasn't the case that f constitutes reality at time t" (p. 219).

While this and similar views can help to cast new light on the possible interpretations of Fine's non-standard realisms, one is left wondering what

[55] This volume, p. XX.

philosophical motivations one might have to endorse them.[56] Noticing the obvious inconsistency of Stein's relativist view with standard intuitions about what reality amounts to, Steven Savitt (2005) proposed an amended theory which Dowe calls 'local presentism':

> Local Presentism: 'Present for space-time point *p*' is defined as the region containing *p*, an earlier event *q*, and the overlap of *p*'s backward with *q*'s forward light cones, where the distance between *q* and *p* is the measure of a minimum time of conscious experience.[57]

Dowe objects to this proposal on the grounds that it does not work in closed time. The problem, he thinks, is that "in closed time the present [so construed] for any point becomes all of spacetime." ibid. After introducing a 'proximally before' relation (p. 192), he then proceeds to put forward a version of local presentism that, he claims, is immune from this objection. According to it, the entire set of currently obtaining paired metrically tensed facts gives a metric, and fixes that time is closed." (p. 194).

In his response to Dowe (this volume), Savitt advances a number of criticisms and makes a number of concessions. Dowe's version of local presentism requires that 'it is possible to partition the Gödel world into mutually exclusive jointly exhaustive hypersurfaces…" (p. 186). As Savitt notices, however, this is not so. As Gödel noticed in commenting the properties of his worlds, "there exist no three-spaces which are everywhere space-like and intersect each world line of matter in one point." (p. 198). Savitt notes that this observation contradicts Dowe's claim, and threatens his solution: "this mistake is philosophically critical, because it is precisely the successive occurrence of hypersurfaces (or slices) that, in Gödel's view, constitutes the objective lapsing or passing of time."[58]

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[56] As a matter of fact, Fine 2005 gives reasons to prefer his other non-standard version of tense realism: *Fragmentalism*.

[57] In this volume, p. 193.

[58] Savitt, this volume, p. 199.

Thus, Savitt concedes to Dowe that his Local Presentism fails in anomalous cases, like in Gödel's worlds. He further adds that the mere existence of these nomically possible worlds "might make one feel quite uncomfortable with the notion of an objectively lapsing time in any spacetime." (p. 199). However, Savitt retains the main thrust of his view: "I thought (and still do think) that the passage of time in relativistic spacetimes can be thought of as the succession of causal diamonds along a timelike line" (p. 200).

Once again, it appears that the A- and the B-theory of time must face the severe tribunal of passage together.

10. Relativity and the conventionality of simultaneity

In his *Einstein's physical Chronogeometry* (this volume) Mario Bacelar Valente tackles the issue of the status of Einstein's physical chronogeometry. According to Einstein, contrary to what Poicaré had maintained, the geometry of space and the uniformity of time should be taken to be non-conventional. Geometry, he thought, is physical geometry, not an abstract piece of "pure mathematics". Bacelar contends that, given Einstein's synchronization procedure, this view cannot be upheld.

Roughly, the worry is this. In order for the clocks to be in phase in an inertial frame, light signals must be exchanged. In the standard procedure, the one-way speed of light in each direction is assumed to be the same. But the determination of the one-way speed of light, in turn, requires that there be a time coordinate associated to the inertial reference frame, i.e. it circularly requires that the clocks be in phase. Thus, the author argues, "The conventionality in the synchronization procedure – or gauge freedom in the setting of the metric, leads to physically equivalent isotropic or anisotropic Minkowski space-times" (p. 261).

Expanding on this, Bacelar observes that a result by Giannoni (1978) ensures that there exists an anisotropic version of electrodynamics which is consistent with an anisotropic Minkowski space-time, and which are jointly physically equivalent to the isotropic formulations. We are thus

faced with a tangible manifestation of the conventionality of chronogeometry.

To obviate to this, Bacelor proceeds to put forward a synchronization procedure which is similar in spirit to Einstein's, but which, crucially, does not make use of the light postulate.

11. Closed time, time travel and the value of works of art

Storrs McCall (2010) proposed an argument devised to show that backward time travel is impossible, even in circumstances that do not involve changing the past. The argument proceeds from contemplating an imaginary scenario in which a renowned artist copies his paintings from reproductions of his own future paintings. McCall notes that in such a scenario there is no room for the role of the artist's creativity. But since "the aesthetic value of a work of art […] lies in the artistic creativity that produces it",[59] he concludes that time travel is not possible after all.

In their contribution to the first part of this issue, Emily Caddick Bourne and Craig Bourne, offered a solution to McCall's puzzle which allows us to maintain that the value of works of art is related to the creative process which produced them, while making room for the possibility of time travel. Their solution involves questioning the assumption that, in the envisaged scenario, there would be no room for creativity.

The authors argue that McCall's story does not raise any substantially new issue for the possibility of time travel:

> The role which artworks play in McCall's story would not raise any question we could not already ask about, for instance, the plans for a time machine in a version of the information paradox in which the time traveler delivers the plans for her time machine to her younger self, who uses the plans to build the time machine which is used to deliver them. No act of designing the plans

[59] McCall 2010, p. 647.

> takes place, which raises the question: what brings the plans into existence?[60]

In the introduction to a collection of his papers, McCall offered a prize for a solution to his puzzle. "We eagerly await our fortune", concluded the authors in their response. In his counter-response to the authors, McCall denies that his puzzle has been adequately addressed. In essence, his point is that the authors left out the most distinctive aspect of this conundrum, creativity: "The role of artworks in my article is crucial. The creation of a genuine artwork, as opposed to plans for a time machine, requires artistic creativity. And where is this to be found in the Bournes' example?" (p. 280).

In their contribution to this volume Emily Caddick Bourne and Craig Bourne respond to this objection, and expand on their solution. They argue that the failure to constitute a genuinely novel paradox is not due to their reconstruction of the argument, but to McCall's own formulation of it:

> The crucial point is that our suggestion was not that the answer to McCall's puzzle lies in considering an example of the plans for a time machine. On the contrary, our interest in the example was to identify how McCall's case differs. In McCall's original paper (2010) there is no explanation of why artistic creativity would introduce a further puzzle not contained in traditional examples of backwards time travel. Our original paper provided this.[61]

The authors conclude that McCall's puzzled does pose a novel problem for time-travelling, which has to do with the notion of value. They still claim to have provided a solution to it. The gist of their response is that copying from another's work is a defeater of positive judgement is that the admiration is mistakenly bestowed on the copier rather than on the person from which they copied. But, they argue, in McCall's example, "the critic's work from which the artist copied is itself a copy of the very

[60] In the first parto f this special issue, p. 137.

[61] Ibid. p. 283.

work the artist is making by copying it, the admiration owed to the critic from whom the artist copied is in turn owed to the artist from whom the critic copied, and so on (and vice versa)."[62]

12. Conclusions

In this critical survey of the contributions to this issue I have highlighted a recurrent theme related to the ontological structure underlying dynamicity and passage. It emerged that it is not clear how the A-theorist can afford to keep the promise of making room for dynamicity without postulating a primitive notion of transiency that is conceptually independent from the instantiation of tense properties. Whatever misgivings one may have about the possibility of transiency in a B-world, one should also have about the possibility of transiency in a world set in motion by *subsequent* instantiations of presentness.

[62] Ibid. p. 286.

References

ARNTZENIUS, F. Gunk, Topology, and Measure, In: Oxford Studies in Metaphysics. Ed. by Dean Zimmermann. Oxford University Press, pp. 225–247, 2008.

BAKER, L. R. *The Metaphysics of Everyday Life*. Cambridge: University Press, 2007.

BIGELOW, J. Presentism and Properties, *Noûs* 30, Supplement: Philosophical Perspectives 10, Metaphysics: 35–52, 1996.

BOCCARDI, E. New Trends in the Philosophy of Time: an Introduction to Time and Reality I, Special Issue of Manuscrito: Time and Reality I, edited by Emiliano Boccardi, 39 (4), pp. 305-313, 2016.

_____ If It Ain't Moving It Shall Not be Moved, Topoi 34 (1): 171-185, 2015.

BOURNE, C. A Future for Presentism, Oxford University Press, 2006.

BROUWER, L. E. J. Brouwer's Cambridge lectures on intuitionism, D. van Dalen (ed.), Cambridge: Cambridge University Press, Cambridge, 1981.

CADDICK BOURNE, E. & BOURNE, C. The Art of Time Travel: An 'Insoluble' Problem Solved, Special Issue of Manuscrito: Time and Reality I, edited by Emiliano Boccardi, 39 (4), pp. 305-313, 2016.

CAMERON, R. *The Moving Spotlight*. Oxford: Oxford University Press, 2015.

CLARK, P. & READ, S. Hypertasks, Synthese 61 (3): 387-390, 1984.

CRAIG, W. L. *The Tensed Theory of Time: A Critical Examination*. Synthese Library: Studies in Epistemology, Logic, Methodology, and Philosophy of Science, vol. 293. Dordrecht: Kluwer Academic Publishers. 2000.

CRISP, T. M. Presentism and the Grounding Objection, *Noûs* 41: 90–109, 2007.

DAINTON, B. Time and Temporal Experience, in A. Bardon (ed.), pp.123-148, 2012.

DENNETT D. *Consciousness explained*, London: Allen Lane, 1991.

FINE, K. Tense and Reality, in Kit Fine (ed.), Modality and Tense: Philosophical Papers (Oxford: Oxford University Press): 261–320, 2005.

GIANNONI, C. Relativistic mechanics and electrodynamics without one-way velocity assumptions. Philosophy of science 45, 17-46, 1978.

GÖDEL, K. An Example of a New Type of Cosmological Solutions of Einstein's Field Equations of Gravitation, Reviews of Modern Physics 21: 447-450. Reprinted in Gödel's Collected Papers, vol. II, Feferman, S. et al. ed., 1949a.

_____ A Remark about the Relationship between Relativity Theory and Idealistic Philosophy, in P. A. Schilpp, ed., Albert Einstein: Philosopher-Scientist. La Salle, Illinois: Open Court, 1949b.

GRÜNBAUM, A. The Meaning of Time, In Eugene Friedman and Wilfrid Sellars (eds.), pp. 193-228, 1971.

HASLANGER, S. Endurance and Temporary Intrinsics, Analysis, Vol. 49(3), pp. 119-125, 1989.

JAMES, W. Writings 1902-1910, Literary Classics of the United States inc., New York, NY, 1987.

KOCH, C. The Quest for Consciousness, Roberts: Colorado, 2004.

LEWIS, D. *On the Plurality of Worlds*, Oxford: Oxford University Press, 1986.

LE POIDEVIN, R. *The Images of* Time, Oxford, Oxford Univ. Press, 2007.

MAUDLIN, T. *The Metaphysics Within Physics*, Oxford: OUP, 2007.

MCCALL, S. An Insoluble Problem. Analysis, 70, pp. 647-48, 2010.

MCTAGGART, J. M. E. The Unreality of Time, Mind 18: 457-84, 1908.

MERRICKS, T. On the Incompatibility of Enduring and Perduring Entities, *Mind* 104: 523–531, 1995.

OAKLANDER, N. Common Sense, Ontology and Time: A Critique of Lynne Rudder Baker's View of Temporal Reality, Special Issue of Manuscrito: Time and Reality I, edited by Emiliano Boccardi, 39 (4), pp. 305-313, 2016.

_____ Temporal Realism and the R-Theory, in Defending Realism: Ontological and Epistemological Investigations, edited by Guido Bonino, Greg Jesson, Javier Campa, Boston: De Gruyter, 123-139, 2014.

_____ The A-, B- and R-theories of Time: A Debate, In *The Future of the Philosophy of Time*, edited by Adrian Bardon, 1-24. New York: Routledge, 2012.

PAUL, L. Temporal Experience, The Journal of Philosophy, 107:333-59, 2010.

PRICE, H. The Flow of Time, in Callender, C. ed. *The Oxford Handbook of Philosophy of Time*, Oxford: OUP, 276-311, 2011.

PRIOR, A. N. The Notion of the Present, Studium Generale 23: 245-48, 1970.

PROSSER, S. Why Does Time Seem to Pass? *Philosophy and Phenomenological Research* 85 (1):92-116, 2012.

PUTNAM, H. Time and Physical Geometry, Journal of Philosophy 64: 240–247, 1967.

SAVITT, S. Time Travel and Becoming, The Monist 88: 413-22, 2005.

_____ On Absolute Becoming and the Myth of Passage, in C. Callender, ed., Time, Reality & Experience. Cambridge: Cambridge University Press, 2002.

STEIN, H. On Einstein-Minkowski Space-Time, *Journal of Philosophy,* 65:5-23, 1968.

TALLANT, J. Temporal Passage and the 'no alternate possibilities' argument, Special Issue of Manuscrito: Time and Reality I, edited by Emiliano Boccardi, 39 (4), pp. 305-313, 2016.

TEGTMEIER, E. Time and Order, Special Issue of Manuscrito: Time and Reality I, edited by Emiliano Boccardi, 39 (4): 157-168, 2016.

TOOLEY, M. *Time, Tense, and Causation*, Oxford University Press, 1997.

VENDLER, Z. Verbs and Times. *Philosophical Review*. 66(2): 143–160, 1957.

WHITEHEAD, A. N. Process and Reality: An Essay in Cosmology, New York: Macmillan. Critical edition by D. R. Griffin and D. W. Sherbourne, New York: Macmillan, 1929.

ZIMMERMAN, D. Indivisible Parts and Extended Objects: Some Philosophical Episodes from Topology's Prehistory, In: *Monist* 79(1): 148–180, 1996.