

## *Philosophy of time: A slightly opinionated introduction*



FLORIAN FISCHER

There are several intertwined debates in the area of contemporary philosophy of time. One field of inquiry is the nature of time itself. *Presentists* think that only the present moment exists whereas *eternalists* believe that all of (space-)time exists on a par. The second main field of inquiry is the question of how objects persist through time. The *endurantist* claims that objects are three-dimensional wholes, which persist by being wholly<sup>1</sup> present, whereas the *perdurantist* thinks that objects are four-dimensional and that their temporal parts are the bearers of properties. The third debate in the field of contemporary philosophy of time is about tense- versus tenseless theory. *Tensers* are at odds with *detensers* about the status of the linguistic reference to the present moment. These are only very crude characterizations and it is even disputed by some advocates of the corresponding positions that they are accurate. However this very sketchy picture already reveals a fundamental difference: The eternalism/presentism and endurance/perdurantism discussions belong to the field of metaphysics, whereas tense is in the first instance a linguistic phenomenon.

Among the many fields of philosophy, there are two that are more intimately interconnected than most but whose practitioners have too long pursued relatively independent paths. On the one hand, there are philosophers of language, who have devoted much attention to indexicals ('now', etc.), temporal operators ('it has been the case that', etc.), and tensed sentences. On the other hand, there are the philosophers of tensed and tenseless time (also called A-time or B-time, dynamic time or static time, etc.). [27, p. 1]

Jokic and Smith's claim can be generalized for philosophy of time as a whole: There are prima facie distinct debates about the nature of time, the persistence of objects and the reference to the present moment. However these debates are interrelated and the position held regarding one of them may have implications upon the options for the other debates.

And even if systematic links between the debates have to be rejected, the choices in one debate often *de facto* mirror the choices in the others: ‘the line between philosophy of language and metaphysics is blurred and, one is tempted to view them instead as a continuum’ [27, p. 3–4].

This introduction proceeds as follows: In section 1 the debate between eternalists and presentists is depicted. Section 2 then introduces the problem of change and the alleged solutions by the perdurantist and endurantist. The positions of the tense and tenseless theoreticians are presented in section 3. Lastly some inter-theoretical links and various *package-deals* are presented in section 4.

## 1 *Eternalism/Presentism*

Eternalists and presentists debate about the nature of time.<sup>2</sup> While presentists think that the present is ontologically outstanding, eternalists hold that the whole (space-)time<sup>3</sup> is ontologically on a par or, put differently, ‘according to the presentist, only present entities exist; according to the eternalist, past and future entities also exist’ [63, p. 256]. Main works of eternalists include David Lewis’s *On the Plurality of Worlds* [32], Willard Van Orman Quine’s *Word & Object* [57] and Ted Sider’s *Four-Dimensionalism* [59]. Seminal contributions to the debate by presentists include Bigelow’s *Presentism and Properties* [5], Ned Markosian’s *A Defence of Presentism* [35], Trenton Merricks’ *Persistence, Parts, and Presentism* [43] and Dean Zimmerman’s *Temporary Intrinsic and Presentism* [67].

Eternalism and presentism come in different kinds of formulations. They can be formulated concerning time itself or the occupants of time. I will not discuss here whether these formulations are equivalent since for our introductory purpose it suffices to sketch the big picture. In the time-formulation, Ted Sider, an eternalist, characterises presentism as ‘the doctrine that only the present is real’ [60, p. 325]. Here he is talking about time itself, so according to Sider’s presentist every non-present time is not real. The future is *not yet* real and the past *not anymore*, one might want to add. When formulated with the occupants in mind, the debate is about ‘what there is’ or ‘about the range of things to which we’re ontologically committed’ [11, p. 211]. Sider writes: ‘A presentist thinks that everything is present; more generally, that, necessarily, it is always true that everything is (then) present’ [60, p. 326]. Here the contrasting class does not consist of the other times (future and past times), but of the non-present objects. Dinosaurs do not belong to ‘everything’ since

they are not present, according to Sider's presentist.

Phrasing it in slightly more formal terms, the 'everything' suggests a general quantifier  $\forall$ . Together with the mantra that 'to be is to be the value of a bound variable' [56] [54] we can characterise presentism in the way Ned Markosian did: 'According to Presentism, if we were to make an accurate list of all the things that exist – i. e. a list of all the things that our most unrestricted quantifiers range over – there would be not a single non-present object on the list' [36].

As some have argued that the presentist cannot even articulate her own view consistently<sup>4</sup>, formulations matter a great deal here. Note that Sider speaks of 'real' while Markosian uses 'exists'. Asked whether Socrates exists, the presentist could give the (plausible) answer 'No, he existed'. The presentist thus could acknowledge that Socrates is presently not existing. However this denial does not imply that Socrates is on a par with Santa according to the presentist. In contrast to Santa, Socrates, as far as we know, existed. 'Socrates exists' used to be true, while 'Santa exists' was never true. The presentist thus neither has to bulldoze the difference between Socrates and Angela Merkel nor the difference between Socrates and Santa. In contrast to this, it sounds much more implausible to say that Socrates is not *real*, just because he is not present. We leave the matter be and turn to the presentist's antagonist eternalism.

Eternalism states that 'there are such things as merely past and future<sup>5</sup> entities' [60, p. 326]. You may have noticed that this is the occupants-formulation and that with 'there is' we have an existential quantifier  $\exists$ . Sider's formulation is quite careful. The 'merely' excludes entities which are *also* present, entities with which the presentist (in Sider's fashion) would not have a problem. Furthermore, the existential quantifier is very modest: One (merely) past entity suffices to make 'there are such things as merely past and future entities' true. Thus even at the last moment of time, where there are no future entities, Sider's formulation could still differentiate presentism from eternalism.

Trenton Merricks supplies a time-formulation of eternalism: 'Eternalism says that all times are equally real.' [42, p. 103]. The presentist could actually agree *in wording* to this, if not in spirit, of course. For the presentist the 'all' will range over the present only. It is thus trivially true for her that all times are equally real, as there is only one time. The *idea* behind the time-formulation of eternalism is clear however. There are times other than the present and these are as real as the present. It is not the case that the future and the past subsist, while only the present exists. Even my earlier formulation that the eternalists believe 'that all of

(space-)time exists on a par' is not enough to define eternalism, since all of (space-)time could be unreal. Then it would be 'on a par' but not in the way the eternalist wants. The formulation may suffice to distinguish presentism from eternalism, however.

Merricks also offers a different characterisation of eternalism: 'Objects existing at past times and objects existing at future times are just as real as objects existing at the present.' [42, p. 103]. This is the occupants formulation, obviously. Once again I would query that the presentist must not deny the *reality* of (merely – which Merricks doesn't mention) past and future objects but maybe non-existing real entities seem strange. Let's fight squalidness with abundance and hear another characterisation of eternalism, this time from David Lewis:

'There is nothing so far away from us as not to be part of our world. Anything at any distance at all is to be included. Likewise the world is inclusive in time. No long-gone ancient Romans, no long-gone pterodactyls, no long-gone primordial clouds of plasma are too far in the past, nor are the dead dark stars too far in the future to be part of this same world.'  
[32, p. 1]

Lewis', admittedly rhetorically brilliant, quote nicely captures the egalitarian tendencies of the eternalist. All times are part of 'this same world' and time is like space. The former we have heard before, while the latter offers a new aspect of eternalism. Eternalists often overemphasize that time is just one dimension of space-time and thus hold that time and space are alike, or at least that 'time is very much like the dimensions of space' [36]. They believe that ' $x$  is later than  $y$ ' is just another transitive, irreflexive, asymmetrical relation, like ' $x$  is left of  $y$ '.

Eternalists 'would like to stand in thought outside the whole temporal process and describe the world from a point which has no temporal perspective at all, but surveys all temporal positions at a single glance. [...] The different points of time have a relation of temporal precedence between themselves, but no temporal relation to the viewpoint of the description.' [14, p. 369]. Dummett's quote hints at the fear of the eternalist that the presentist's ontological prioritisation of the present as the point of view of description deprives presentism of objectivity. Perhaps this fear is justified, perhaps not.<sup>6</sup>

Of course we cannot end the (eternal?) battle of presentists and eternalists in this meagre introduction. Let us listen to some allegedly soothing tunes instead: 'These two ways of thinking, the way of time and

history and the way of eternity and of timelessness, are both part of man's effort to comprehend the world in which he lives. Neither is comprehended in the other nor reducible to it.' [49, p. 69]. This quote by Oppenheimer can be used to challenge the very foundation of the eternalist/presentist debate. Maybe they are not two mutually exclusive alternatives. Maybe they could even be combined: 'Hybrid views acknowledge that the world may be thought of as an existent four-dimensional entity, [...] but retain the idea that there is something special about present times' [10, p. 590] – with this, Craig Callender hints at a possible combination of eternalism and presentism.

Another way to question the classical eternalism/presentism distinction is to say that it is not exhaustive. Presentists hold the present dear, while eternalists believe all of (space-)time to be ontologically homogeneous. What of the people who want to distinguish between the past and the future? You believe the past to be settled, while the future holds a variety of possible developments? Maybe then the 'growing block' theory is something for you. According to its proponents 'only objects that are either past or present – but not objects that are future – exist.' [36]. According to this theory, the past and present are on a par while the future is differentiated from them. The present just happens to be the 'edge of existence', i. e. the border of the block. And this block is *growing*, because 'the universe is always increasing in size, as more and more things are added on to the front end (temporally speaking)' [36]. This *growing of the block* is supposed to be the reason why the present always differs in content.

We can distinguish the question whether the present is ontologically special or not from the question whether what exists changes over time or not. Following Cord Friebe's [23, p. 43] terminology, we call a view according to which existence is time relative 'dynamic' and one where this is not the case 'static'. Classic eternalism is static, as neither the present is distinguished nor *what there is* changes over time. On the other end of the spectrum we have classic presentism where the present is so special that all there is, is present. One might think that presentism is the only dynamic theory but the recently mentioned 'growing block' is dynamic as well, at least according to Friebe [23, p. 44]. A static theory besides classical eternalism is the so-called 'moving spotlight' theory.

According to the moving spotlight theory, the present is like a spotlight (hence the name) which 'sheds its light' on the present point in time. It moves (yes!) alongside the time line, thus always rendering a different time present. You may be wondering now with which speed the present moves,

or how it moves at all, if the ‘time line’ is supposed to be time. Well, of course the spotlight-present moves in meta-time. If you find ‘meta-time’ suspicious and suspect that ‘movement in meta-time’ needs ‘meta-meta-time’ to be explicated, then you are in the midst of McTaggart’s argument [37]: ‘Tense realism is the tenet that tensed determinations, such as being past, present, or future, are among the ingredients of temporal reality. Famously, McTaggart maintained that the reality of time implies tense realism, but argued that tense realism is incoherent’ [66, p. 281]. The literature on McTaggart’s alleged [34] proof of the ‘unreality of time’ is legion, and we can’t go into it here, but note that his *contradiction charge* is alive and kicking.

These problems of a relatively moving present hint at why the presentist *cannot* take the whole of (space-)time as ontologically prior and then distinguish the present: this would lead right into the contradictory arms of McTaggart! The presentist must think of the present as ontologically prior and of the (space-)time as derivative (Cf. [22]). This does not imply a denial of the reality of the non-present parts of (space-)time, like the presentist must not deny the *reality* of dinosaurs. Be that as it may, we now have to go on and turn to the question of persistence.

## 2 Endurance/Perdurance

The endurance/perdurance debate is about the persistence of objects through (space-)time.<sup>7</sup> It revolves around the so-called ‘problem of identity through time’ [32, p. 202]: There is an imminent contradiction with Leibniz’ Law for changing objects. To see this, we must first get a grip on the concept ‘change’.

A theory of change is necessarily concerned with the persistence of objects or systems through time and thus a criterion for change is that *something* persists through the change. It is a different situation whether a red ball is replaced with a blue one, or whether a red ball *turns* blue. So, one benchmark for a theory of change is to distinguish change from exchange.<sup>8</sup> Call this ‘continuity’.<sup>9</sup>

A second benchmark for a theory of change is – which sounds almost trivial – that there needs to be a *change*. I call this, neutrally, ‘difference’ as it may consist in a something else. For example, for Kant a persisting substance changes by exchanging (‘Wechsel’) its properties, meaning that the change of one entity can consist in the ceasing and beginning of other entities [29, A187 B231]. However, there is more to ‘difference’: The properties which are exchanged must also be incompatible in order for

there be change. If something is first red and then square, it does not amount to change.<sup>10</sup>

As we have sketched out, ‘change needs identity as well as difference’ [41, p. 89]. On the face of it, incompatible properties account for the difference, while the continuity is ensured by the (numerical) identity of the persisting object, but here the problem of persistence has its systematic roots. According to Leibniz’ Law of indiscernibility of identicals<sup>11</sup>, things which are identical have the same properties:  $\forall x \forall y [x = y \rightarrow \forall F (Fx \rightarrow Fy)]$ . This is in tension with the very idea of change, according to which one and the same persisting object is supposed to have different, even incompatible, properties.

### 2.1 The problem of persistence

During the rise of the new analytical metaphysics the question of the nature of change was formulated anew by David Lewis. The possible solutions to the problem of change he discusses are, till today, the base for the accounts of persistence. These modern accounts fall into two camps, which have their own ways of dealing with the imminent contradiction with Leibniz’ Law.<sup>12</sup>

Let us say that something persists iff, somehow or other, it exists at various times; this is the neutral word. Something perdures iff it persists by having different temporal parts, or stages, at different times, though no one part of it is wholly present at more than one time; whereas it endures iff it persists by being wholly present at more than one time [32, p. 202]

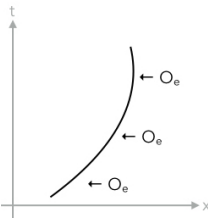


Figure 1: Endurantism

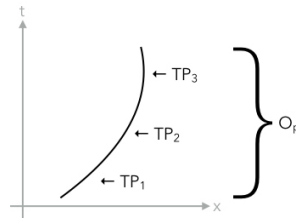


Figure 2: Perdurantism

**Perdurantism:** One possible solution is perdurantism, which describes objects as extended in time. Perduring objects do not only have spatial extension, but also temporal extension. The things we interact with in our everyday life are, according to perdurantism, three-dimensional parts of actually four-dimensional objects. This is a dissolution of the contradiction, as the properties are instantiated by different temporal parts. A ball which is first red and then blue thus changes by having a red and a blue temporal part. The red temporal part is not identical to the blue temporal part and hence the incompatible properties can be instantiated without contradiction. This alleged solution of the problem of change comes with the price that, contrary to our intuitions, objects are four-dimensional space-time entities. ‘We perdure; we are made up of temporal parts, and our temporary intrinsics are properties of these parts, wherein they differ one from another. There is no problem at all about how different things can differ in their intrinsic properties.’ [32, p. 204].

What constitutes continuity for the perdurantist? If there are just different objects instantiating different properties, how can the perdurantist distinguish change from exchange? The obvious answer is that the objects in question are temporal *parts*. Thus, there is a whole of which they are part, so that the continuity is supplied by the parthood relation.

Ted Sider endorses a variant of perdurantism called the *stage view*, ‘which identifies continuants with the stages themselves’ [61, p. 84] and not the four-dimensional whole. Here the three dimensional entities, located at their respective moments of time, are called stages and not temporal parts, precisely because they are not *parts* of a four-dimensional whole. ‘Strictly speaking, the stages [...] are only momentary entities but they are nevertheless said to persist through time by having counterparts at other times’ [4, p. 91]. In contrast to enduring objects the stages are not multi-located. Identity cannot be the continuity-maker, since the ‘counterpart of something [...] is never identical with the thing itself’ [30, p. 45]. The stages do not persist themselves, as they are confined to their respective temporal location but the stage view is nevertheless an account of persistence, since the counterpart relation establishes continuity.<sup>13</sup>

One could launch a version of the famous *Humphrey objection*<sup>14</sup> against ‘Perdurantism<sub>Counterpart</sub>’: If the ‘continuants of our everyday ontology’ [61, p. 84] are stages and these only have the temporal properties of their respective points in time, then it is hard to see how I can have any non-present properties. Sider answers to this with a variant of Lewis’ reply to the original *Humphrey objection*: ‘I do have various tensed



properties, such as the property of futrely being not straight. But this is no more a lack of straightness than is being possibly not straight' [61, p. 85].

Notably, David Lewis, who holds a counterpart theory for cross-world identification, does not posit a counterpart relation between the three-dimensional one-time located perdurantistic property bearers. Without arguments, however, it would be *ad hominem* to ignore it as a possible unifier. Lewis states: 'Perdurance, which I favour for the temporal case, is closer to the counterpart theory which I favour for the modal case.' [32, p. 203] - and, sure, perdurance is *closer than* endurance, but counterparts would be even closer. Lewis gives us a hint of why he rejects counterpart-perdurantism: 'counterpart theory concentrates on the parts and ignores the [...] individual composed of them.' [32, p. 203]. Thus it is questionable whether the inner-world-counterpart account in spirit really is a perdurantistic solution or if it should better be pigeon-holed as an endurantistic account. Let's have a closer look at endurantism, then.

**Endurantism:** Endurantism respects the every day intuition that objects are three-dimensional entities. Thus, enduring objects are multi-located, as they are located at every time of their existence. The endurantist takes the, allegedly, more intuitive route of three-dimensional objects, therefore the solution of the perdurantist is not possible for him. Perdurantism can be understood as time-indexing the object. Parallel to this the alleged solution of the endurantist can be depicted as temporally indexing the predicates. Call this view *indexicalism*. Object *o* being *F* at  $t_1$  is reinterpreted by the indexicalist as '*o* is  $F_{t_1}$ ' or ' $F_{t_1}(o)$ '. This is not satisfactory, because an object which remains red would always instantiate different properties ( $red_{t_1}$ ,  $red_{t_2}$ ,  $red_{t_3}$ , ...). In light of this criticism *adverbialism* was invented. Here the copula 'is' is amended with a temporal index, or a temporal adverb (hence the name *adverbialism*) is added to the sentence. So either 'The ball is $_{t_1}$  red' or 'The ball is  $t_1$ -ly red'. In the debate the name 'adverbialism' is used for both versions, but sometimes the temporal-adverb-variant is taken to be the stronger one. Without taking a stance on this, I will name the indexed-copula-variant 'copularism'. It may turn out that metaphysically there is no difference between the two or that copularism is a subspecies of adverbialism; still, it helps to have the conceptual resources to distinguish them.

Lewis depicts endurantism differently: Contrary to the surface appearance, intrinsic properties, like shapes are *not* really properties. They are 'disguised relations' [32, p. 204]. Object *o* stands, say, in the *F*-relation to time  $t_1$  and in the *G*-relation to time  $t_2$ . I call this variant 'relationalism'

and add it to our lists of solution candidates for the ‘problem of change’.

An additional alleged solution – in fact one that Lewis discusses in [32, p. 203] – is presentism. Presentism is in so much a solution, as there is ever only one moment of time (i. e. the present) and thus never are any incompatible properties instantiated. As Presentism is *not* on a par with the other options – it’s an account about the nature of time and not the persistence through time – it is hard to depict it in the same fashion as the other alleged solutions.<sup>15</sup> One way to presentists represent change is with temporal operators: when the object *o* is *G* ‘*G(o)*’ it was the case that it was *F*: ‘*PF(o)*’<sup>16</sup>, because ‘[w]hile the eternalist can give the truth conditions [...] in terms of quantification over past objects [...] the presentist has to resort to irreducible tensed operators, which she does not take to commit her to the existence of past objects’ [65, p. 2062].

According to Lewis, however, presentism ‘rejects endurance; because it rejects persistence altogether’ [32, p. 203]. Lewis thinks that for a presentist other times are on a par with fictions and that she thus does not give an account of persistence. But, at least according to her own claim, the presentist can distinguish between dinosaurs and unicorns. Only the former *have been present*, while the latter – sadly – will never have been present. True, ‘[o]pponents of presentism have often argued that the presentist has difficulty in accounting for what makes (presently) true past-tensed propositions [...] true in a way that is compatible with her metaphysical view of time and reality’ [65, p. 2047]. So, I merely want to note that Lewis’ argument is a *non sequitur*: From the presentists denial that the present is on a par with other times, it just doesn’t follow that other times are on a par with fictions.

A further possibility is to take the relation of property exemplification (*E*) as dependent on time:  $E_{t1}(o, f)$ . This solution takes shapes to be (index-free) properties and accepts the existence of points in time besides the present – just like Lewis’ own solution. It is in no need, however, of *temporal parts*. It goes back to a proposal by Uwe Meixner [39, p. 95]. Actually Meixner presents a slightly different version with a three-place relation of property exemplification  $E^3$  which relates an object, a time and a property:  $E^3(o, t_1, f)$ . I call this proposals in honour of their – as far as I know – inventor ‘Meixnerism $_{E_{tn}}$ ’ and ‘Meixnerism $_{E^3}$ ’.

For both versions the relation can either be one of second order logic, if its relatum is a property (like ‘*F*’ or ‘*G*’) or it can also be formalized in first order logic taking the corresponding singular terminus (‘redness’ corresponding to the property of ‘being red’ – so, ‘*f*’ or ‘*g*’). I take no sides here. Maybe the choice is between logical simplicity and metaphysical

dubiousness, maybe it doesn't matter. Note that Meixner himself takes 'f' as a proper name for an universal.

Let us sum up:

<b>Name</b>	<b>Account</b>	<b>Continuity</b>
Perdurantism	$F(o_{t_1}) \wedge G(o_{t_2})$	Parthood
Perdurantism <sub>Counterpart</sub>	$F(s_{t_1}) \wedge G(s_{t_2})$	Counterpart
Indexicalism	$F_{t_1}(o) \wedge G_{t_2}(o)$	Multi location
Copularism	$O \text{ is}_{t_1} F \text{ and } O \text{ is}_{t_2} G$	Multi location
Adverbialism	$O \text{ is } t_1\text{-ly } F \text{ and } O \text{ is } t_2\text{-ly } G$	Multi location
Relationism	$F(o, t_1) \wedge G(o, t_2)$	Multi location
Presentism	$PF(o) \wedge G(o)$	Identity
Meixnerism <sub>E<sub>tn</sub></sub>	$E_{t_1}(o, f) \wedge E_{t_2}(o, g)$	Identity
Meixnerism <sub>E<sup>3</sup></sub>	$E^3(o, t_1, f) \wedge E^3(o, t_2, g)$	Identity

### 3 *Tense/Tenseless*

Now we turn to the controversy about the status of tense.<sup>17</sup> This debate started out within the philosophy of language. The old B-theoreticians contested the relevance of the reference to the present moment. They thought linguistic phenomena like tense and aspect and words like 'now' or 'tomorrow' belong only to the surface structure of sentences and 'in fashioning canonical notations it is usual to drop tense distinctions.' [57, p. 170]. The idea is that our messy language obstructs the access to its own semantical or logical structure and deviation from the surface structure helps to clear things up. Thus, the core of the old B-theory is the 'enterprise of paraphrasing statements so as to isolate their logical structures' [55, p. 44].

#### 3.1 *The old B-theory and the belief in unrestricted translatability*

Eternalism denies an objective reference to the present moment and thus tensed sentences must have tenseless truth conditions. According to the eternalist the surface structure of a tensed sentence does not correspond to an objective feature in the world. The simple correspondence theory of truth states that a sentence like 'Paris is the capital of France' is true just in case the corresponding state of affairs holds true, i. e. Paris really is the capital of France. Likewise 'It is raining now' should be true just in case it is raining now.<sup>18</sup> An objective reference to the present moment (now) leads to an objective truth value. As the eternalist drops this objective reference to the present moment, she must come up with

an ersatz truth-maker, otherwise he would have to deny that tensed sentences have a truth value at all.

The old B-theoreticians<sup>19</sup> believed in *translatability*: All tensed sentences are translatable without a loss of meaning into tenseless sentences. There were different accounts on the market of how this translation should look like in detail. Gottlob Frege [21, p. 297] voted for a *date indication analysis*: a tensed sentence like ( $S_1$ ) ‘It is raining now’ actually means something along the lines of ‘it is raining at Thursday the 13th May 2014’. Bertrand Russell’s *token-reflexive analysis* [58, p. 108] in contrast states that the sentence should be translated into ‘It is raining at the point in time that is co-temporal with this utterance’.

### 3.2 Prior and Perry on now

Arthur Prior has famously argued for the irreducibility of tense. Tensed sentences and beliefs are not translatable into tenseless ones, according to Prior. However, they are important for our actions. In [53] Prior’s example is the joy we feel after an important test is over. Sentences we utter at such occasion cannot be understood tenselessly and only tensed beliefs explain our actions and change of emotions (i. e. from stressed to relieved).

One says, e.g. “Thank goodness that’s over!”, and not only is this, when said, quite clear without any date appended, but it says something which it is impossible that any use of a tenseless copula with a date should convey.’ [53, p. 17].

Prior was very explicit about the non-translatability of tensed sentences and claimed that the attempt of the old B-theoreticians to substitute indexicals like ‘now’ with a date and time indication failed. What causes our joy after the important test is not that the test is over at, say, 4 pm. We would have known *that* before hand. Also the tenseless relation of earlier/later does not help in this case. It is tenselessly true that 4.15 pm is later than 4 pm (on the same day). Neither the tenseless fact that the test lasts till 4 pm, nor the tenseless fact that 4.15 pm is later than 4 pm explains our joy and even both together are not sufficient. It is the fact that it is 4.15 pm *now* that gives meaning to the sentence ‘Thank goodness that’s over!’ and that explains our feelings of joy and our actions (celebrating). ‘Thank goodness that’s over!’ has an implicit reference to the present moment and stands for ‘Thank goodness that’s over *now*!’:

It certainly doesn't mean the same as, e. g. "Thank goodness the date of the conclusion of that thing is Friday, June 15, 1954", even if it be said then. (Nor, for that matter, does it mean 'Thank goodness the conclusion of that thing is contemporaneous with this utterance'. Why should anyone thank goodness for that?). [53, p. 17]

Neither the translation strategy of the old B-theory nor the token reflexive strategy were able to capture the meaning of the tensed sentence "Thank goodness that's over!" according to Prior. Prior was chiefly concerned with matters of time and thus his paper focused on the indexical 'now', which is also our topic here. John Perry made a more general claim concerning indexicals. Perry's 1979 paper [50] featured three examples of which I would like to introduce the one starring the *tardy professor*:

[A] professor, who desires to attend the department meeting on time, and believes correctly that it begins at noon, sits motionless in his office at that time. Suddenly he begins to move. What explains his action? A change in belief. He believed all along that the department meeting starts at noon; he came to believe, as he would have put it, that it starts *now*. [50, p. 4]

Perry called beliefs which contain indexicals like 'I', 'here' and 'now' *locating beliefs*. Locating beliefs are necessary for actions, since the corresponding tenseless beliefs do not explain the sudden movement of the tardy professor. Perry's conclusion was that we believe the same thing, but in different ways:

As time passes, I go from the state corresponding to 'The meeting will begin' to the one corresponding to 'The meeting is beginning' and finally to 'The meeting has begun'. All along I believe of noon that it is when the meeting begins. But I believe it in different ways. And to these different ways of believing the same thing, different actions are appropriate: preparation, movement, apology. [50, p. 19]

Since we are not concerned with beliefs here the details of Perry's account do not matter. We can, however, state that Perry puts forward a strong argument against the translatability of tensed sentences into tenseless ones. After Prior and Perry it has generally been accepted that tensed sentences and beliefs are necessary for our actions and that they cannot be translated without a loss of meaning into tenseless ones.

### 3.3 The New Tenseless Theory of Time

The New Tenseless Theory of Time (NTT) differs from the old B-theories by acknowledging the irreducibility of tensed sentences. So even B-theories accept that there are sentences whose truth values depend on time. The NTT thus incorporates more dynamics, as one would expect. But still the NTT is an eternalistic theory, i. e. every point in time is ontologically on a par and there is no objective reference to the present moment. So, how does a non-tensed world view go alongside with irreducible tensed sentences?

The NTT exploits the fact that the surface structure of a sentence can deviate from the structure of the truth-maker of this sentence.<sup>20</sup> According to the old B-theory, tensed sentences could, or even should, be translated into tenseless ones, but after Prior and Perry this thesis must be dropped. ‘[R]ecent defenders of the tenseless view have come to embrace the thesis that tensed sentences cannot be translated by tenseless ones without loss of meaning.’ [48, p. 58]. The new B-theoreticians still call their view tenseless, but this tenselessness now concerns the structure of the world.<sup>21</sup> With the NTT the link between metaphysics and language became much tighter. One can only truly be called a B-theoretician nowadays if one holds a tenseless **world** view.<sup>22</sup> ‘Tensed discourse is indeed necessary for timely action, but tensed facts are not’ [48, p. 58].

Tensed beliefs *can* vary in their truth value but tenseless ones *do not* change their truth value.<sup>23</sup> Tenseless truth conditions can be given for every tensed belief, according to the NTT.

Tensed sentences may have different truth values and thus must have different truth conditions. This is at odds with the plausible claim that any sentence, and thus also a tensed sentence, has *the same* meaning in every context. The champion of the NTT, David Hugh Mellor himself, agrees that ‘truth conditions must surely supervene on meanings’ [41, p. 6]. A sentence like ‘it is raining now’ has the same meaning always and everywhere. But it seems that according to the NTT the sentence must change its truth conditions, since it must be made true by different tenseless facts at every time. Only a tensed theoretician can maintain that ‘it is raining now’ has the same *tensed* truth conditions in every context, namely that it is true if the tensed fact *that it is raining now* occurs.

At first glance it seemed that the B-theoretician could just posit a different reduction strategy to acknowledge Prior’s and Perry’s arguments. Instead of translating the tensed sentence she claims that there are

different tenseless truth conditions for every token of the sentence. As we have seen, however, this contradicts the claim that a sentence has the same meaning at every time and that truth conditions supervene on meaning.

Mellor's NTT from *Real Time II* is supposed to solve this problem. Mellor claims that a token of a tensed sentence is tenselessly true and has only one truth condition. This acknowledges the variability of the truth value on the type level. If a token of a tensed sentence is true, then it is a-temporally true, made true by a tenseless fact. With this distinction between type and token in place, Mellor can account for the stable meaning of a tensed sentence. In his first attempt, *Real Time* [40], Mellor understood the meaning of a tensed sentence as a function from utterances to truth conditions. Due to strong critique [48] he changed his position and in *Real Time II* [41] he understands the meaning of a tensed sentence as a function from 'B-times to B-truth conditions' [41, p. 59]. Meaning is concerned with sentence types, according to Mellor. Tenseless sentences have constant functions as their meaning, while the functions of tensed sentences can be non-constant. The possibility of variation in the truth conditions (the co-domain of the function) allows for the variability in the truth value.<sup>24</sup>

#### 4 Packages

We have introduced the dynamic/static distinction in the context of the presentism/eternalism debate (sec. 1). A quick reminder: a view is 'dynamic' iff existence is time relative, otherwise 'static'. In section 3 we have introduced the distinction between A- and B-theory.<sup>25</sup> Combining both leads to four *time-reality combinations*:

- |    | time     | reality |
|----|----------|---------|
| 1. | B-theory | static  |
| 2. | B-theory | dynamic |
| 3. | A-theory | static  |
| 4. | A-theory | dynamic |

Classical eternalism is a static B-theory and classical presentism is a dynamic A-theory. The moving spotlight theory states that existence is not time relative, but the present is nevertheless ontologically distinguished and thus it's a static A-theory, while the 'growing block' theory is – at least allegedly – a dynamic B-theory.

Presentists are virtually always endurantists. Many may even think

that presentism and perdurantism are inconsistent. At least Sider holds that ‘no contemporary philosopher defends the combination of presentism and perdurance.’ [59, p. 68]. Contrary to that, Berit Brogaard does not only think that presentism and perdurantism are compatible, but develops a *Presentist Four-Dimensionalism* in [7]. Jorgen Hansen builds his *Stage View Presentism* on this which he claims to be ‘an appealing alternative for presentists who remain impartial to both the endurantist and the worm theories of persistence’ [26].

In the debate about persistence, eternalism is (often) presupposed. This hints at a *prima facie* compatibility of both endurantism and perdurantism with eternalism. This is plausible. Given eternalism the disagreement is about what the world-line represents: perdurantist think this is the whole object, whereas endurantists believe the world-line to represent the history of the object. Figure 1 shows the object  $O_e$  multilocated, while in figure 2 the object  $O_p$  is the whole world-line and at each point in space-time there is ‘only’ a part (like  $TP_1, TP_2, \dots$ ). So, perdurantism seems to come pack and parcel with eternalism: ‘It is certainly true that most if not all four-dimensionalists presuppose eternalism.’ [59, p. 71]. The endurantist is, at least *prima facie*, free to choose, however. The combination of eternalism and perdurantism is called ‘manifold theory’ [59, p. 69]. The deal might be even more inclusive for the perdurantist, as it may include the tenseless theory (see section 3.3).

The other way around is quite inclusive as well: ‘Reductionists about tense, then, are invariably eternalists.’ [59, p. 14]. So, If you are a de-tenser, you almost *have* to be an eternalist. Most probably you are then also a perdurantist, but this is not necessary: You may be a de-tensing, eternalistic endurantist – for whatever reason.

Arthur Prior compiled the other ‘one-click-bundle’ available on the market: He advocates the combination of tensed theory, endurantism and presentism. Besides arguing for presentism [59, p. 18], Prior states: ‘it is not the case that one part of me was a boy in New Zealand while another part of me is a man in England; it is I who was that boy, and I - the same I - who am the man’ [51, p.183] - hence endurantism. He further believes that ‘It is raining’ actually means ‘It is raining now’ [46, p. 23].

There seems to be a tendency here: On the one hand, the perdurantism/tenseless theory/eternalism package fits well and is often bought in one. Endurantism, tensed theory, and presentism, on the other hand, are not so tightly interwoven. The mentioned packages offer only a glimpse



at the various links between the debates. So, even if the three debates – about the nature of time, the persistence through time, and the reference to the present moment – start out independently, a satisfactory account in the philosophy of time may very well need to take all three fields<sup>26</sup> and their prerequisites into consideration.<sup>27</sup>

### *Acknowledgements*

I would like to thank the audience at the 2016 *Time and Change* workshop in Bonn, where I presented the persistence part of this introduction, for a useful and at the same time pleasant discussion. The way I see the philosophy of time – which might be in some areas non-standard; hence ‘A slightly *opinionated* introduction’ – has developed over the last couple of years. I cannot list all the people with which I had talked about the topic during this period, but you know who you are (you are all self-identical). I would like to thank the members of the SPoT (at least those, with which I am not self-identical) for the incredible time. Especially I want to thank Dan Deasy, Sonja Deppe, Jesse Mulder, Thorben Petersen, Alastair Wilson and Pamela Zinn who have read this text and helped to improve it a great deal.

### *Notes*

- 1 Objects endure, if they persist by being wholly present. ‘Thus to say that Socrates persists is just to say that the whole of him is present at each times of existence.’ [8, p. 883]. Numerically one object can be completely present at  $t_1$  and  $t_2$ . When it is present at  $t_1$ , however, it can neither be present at  $t_2$  nor can a part of it be present at  $t_2$ . The worldline of an enduring object represents its history through space and time (or space-time). This suffices as a rough characterization but it is quite controversial how to capture ‘wholly present’ exactly. ‘[W]hat is it for something to be “wholly present” at a time? It’s surprisingly difficult to say’ [12, p. 318].
- 2 Kit Fine distinguishes between ontic and factive presentism: ‘Ontic presentism is an ontological position; it is a view about what there is. Factive presentism, on the other hand, is a metaphysical rather than an ontological position; it is view about how things are, quite apart from what there is’ [16, p. 299]. Ontic presentism can be associated with what I will call the occupants-formulation of presentism. The, in my terminology, time-formulation does not correspond to Fine’s factive presentism, however. The time-formulation and the occupants-formulation may turn out to be equivalent, while Fine argues for a substantial difference between factive and ontic presentism, as, for example, ‘[i]t is readily possible for a factive presentist not to be an ontic presentist’ [16, p. 299]. Fine’s factive presentism is compatible with ontic eternalism, as, as Giuliano Torrenco puts it, the ‘presentist here is exploiting the metaphysical view of the A-theory of time to solve the

- contradiction, rather than her ontology restricted to presently existing entities' [64, p. 255].
- 3 It is important to speak of *space-time* rather than only *time*, as it is sometimes argued that modern physical theories, especially the SRT and ART, supply a posteriori arguments for the philosophy of time. See the contribution of Cord Friebe [22] in this volume, for an argument – completely contrary of what is otherwise assumed – that only presentism can cope with the peculiarities of the ART, namely the closed timelike curves of, so-called, Gödel universes.
  - 4 Presentism, it is argued, is either trivial or clearly false (Cf. [44, p. 214–216]). The 'exists' in the presentist's claim that 'only what is present exists', must be understood either tensed or tenseless, according to the critics. It is trivially true that only present entities exist *now*, while it is clearly false that only present things exist *simpliciter* (just think about Socrates). Harold Noonan answers to this charge: 'Likewise, I suggest, it is neither trivially true nor obviously false that everything (simpliciter) which is temporally locatable is presently existent.' [47].
  - 5 Perhaps it is even too much of a concession towards presentism to speak of 'past' and 'future' entities. 'Future' and 'past' only make sense in reference to the present. Maybe the hardcore eternalist should say that all times/entities are ontologically on a par. He should stick with the tenseless relations of 'earlier' and 'later' and completely shun talk of 'present', 'future' and 'past'.
  - 6 See [22] in this volume for a discussion of objectivity of presentism in the ART.
  - 7 Also here talk of *space-time* instead of *time* might be important, as it is sometimes argued that perdurantism has an advantage over endurantism regarding compatibility with the SRT (e. g. [2] and [3]). There Yuri Balashov argues that the endurantist, and only she, is committed to claims containing tensed determinations, which are allegedly incompatible with the SRT. See my [20] for the attempt of a rebuttal of Balashov's originally asymmetry thesis.
  - 8 Arguably already Aristotle has distinguished change from exchange, as he clearly distinguishes change from the processes of coming to be and passing away, according to Thomas Buchheim [9, p. XVII]. Coming to be and passing away are not just changes of some always existing entity
  - 9 I have chosen the term 'continuity' in order to not pre-decide the debate. The alleged unifier might be 'identity' or 'parthood' or 'multilocation' or something else.
  - 10 Change needs *at least* continuity and difference. See [19] for a longer introduction of alleged characteristics of change. There I list: difference, identity, incompatibility, irreversibility and succession.
  - 11 'Identity looms large in Leibniz's philosophy. He is responsible for articulating two principles that, he claims, are constitutive of identity. The first, more controversial, of these, called the identity of indiscernibles, says that qualitative indiscernibility implies identity. The second, often referred to as Leibniz's Law or the Indiscernibility of Identicals, says that identity implies qualitative indiscernibility. According to Leibniz's Law, if a is identical with b, every quality of a will be a quality of b.' [24].
  - 12 The contenders of the modern debate seem to be content with a removal of the logical contradiction with Leibniz' law. This, however, is not a solution of the problem of change, but merely a precondition: Every theory which doesn't address the lurking contradiction is a non-starter. (As argued in [18].)

- 
- 13 Uwe Meixner [38] also presents a view – which he does not endorse – with a temporal counterpart relation, called *supereternalism*. Meixner claims that with it ‘one can have change, although no object whatever changes in the sense that it ever has any other properties appropriate for change than those it has now.’ [38, p. 432]. Both views seem quite similar to me.
- 14 For David Lewis your counterparts ‘are not really you. For each of them is in his own world, and only you are here in the actual world. Indeed we might say, speaking casually, that your counterparts are you in other worlds that they and you are the same; but this sameness is no more a literal identity than the sameness between you today and you tomorrow. It would be better to say that your counterparts are men you would have been, had the world been otherwise’ [31, p. 114–115]. Kripke finds this absurd and has launched his, now famous, *Humphrey objection* against it: ‘Thus, if we say ‘Humphrey might have won the election (if only he had done such-and-such)’, we are not talking about something that might have happened to Humphrey but to someone else, a ‘counterpart’. Probably, however, Humphrey could not care less whether someone else, no matter how much resembling him, would have been victorious in another possible world [30, p. 45].
- 15 See the contribution of Jesse Mulder [45] in this volume, for an attempt of ‘Defining Original Presentism’. There Mulder agrees with Jonathan Tallard [62], that eternalism and presentism need to be differentiated on a much more fundamental level, then usually attempted.
- 16 See e.g. [25, p. 50] for an introduction to temporal logic. See [46] for a detailed reconstruction and further development of Prior’s tense logic.
- 17 There are several related debates. Giuliano Torrenco offers the following, helpful, classification: ‘The distinction between A-theory and B-theory is metaphysical. According to the A-theory, the passage of time is real, and, thus, tense determinations (such as being present, past, and future) are genuine features of reality. According to the B-theory tense determinations are reducible to relations between a perceiver and a position in time. The distinction between the presentist and the eternalist is ontological. According to the presentist, in our most unrestricted domain of quantification we find only presently existing entities, whereas according to the eternalist also past and future entities exist. The distinction between the serious tensor and the de-tensor is semantic. According to the serious tensor tensed sentences express tensed propositions, namely propositions that are temporally undetermined (their truth-value being possibly variable through time), whereas according to the de-tensor tensed sentences express tenseless propositions, namely propositions that are temporally determined (bearing a determined truth-value regardless of time)’ [64, p. 253]. However, the terminology is far from homogeneous in this area of philosophy. So, in this introduction I will switch freely between the terms ‘tensed theory’, ‘tensors’, and ‘A-theory’ (as well as their counterparts) if no a specific linguistic or ontological reading is necessary. Otherwise I make this explicit.
- 18 [28] provides an overview of the semantics of the word ‘now’ in ordinary language and discusses formal systems, drawing heavily on the work of Arthur Prior [52].
- 19 ‘Following McTaggart (1908), tensed and tenseless temporal judgments are often called A-judgments and B-judgments, respectively. The concepts now, was, will, and the like are called A-concepts, whereas the concepts before, after, and related concepts are called B-concepts’ [59, p. 12].

- 20 We can have, for example, definite truth values for disjunctive sentences, without positing disjunctive facts in the world.
- 21 Sonja Deppe [13], however, questions the claim of the tenseless theorists that the relational structure of earlier/later is a metaphysical feature of time itself. With the help of Henry Bergson – a philosopher who is, sadly and wrongly, under-represented in the contemporary debate – she tries to show that this relational structure is part of our intellectual engagement with temporal phenomena instead.
- 22 See my paper [17] in this volume. There I argue that the NTT may be too metaphysical for some philosophers. Arguably Rudolf Carnap belongs in the camp of the old B-theory, but cannot make the transition to the NTT, because this contradicts his *inter-translatability thesis* and *metaphysical neutrality thesis*.
- 23 It is sometimes stated that tenseless sentences are always true if they are sometimes true, but this is only one half of the story. There are two ways to negate the variation in truth value. A sentence can either always have a truth value (omni-temporal) or not in a timely sense at all (a-temporal). ‘5 is a prime number’ is an example for an a-temporal truth [23, p. 60]. This sentence is a-temporal because it is meaningless to ask ‘When is 5 a prime number?’. A-temporal sentences do not vary in their truth value because *conceptually* they simply cannot. Omni-temporal sentences *could* vary, because they are located in time but, for some reason or other, just do not.
- 24 One possible critique is that this approach might not work if nature is *too* complex. If time and space are continua, as for example Aristotle [1, ch. 5] has famously argued, then there are at least uncountably many items in the domain of the function. I don’t want to claim, however, that this attack is successful or promising, I’m merely mentioning it.
- 25 See [45, p. 14] in this volume for a more ‘Fine’-grained characterisation, where Jesse Mulder, following Kit Fine, distinguishes three versions of A-theory.
- 26 Of course, there might be even more debates which have to be taken into account, as the epistemology of time or the history of philosophy. See the contribution of Pamela Zinn [68] in this volume, which analyses Lucretius’ account of time in his *De rerum natura*, focusing precisely *not* only on the nature of time but also on its perception.
- 27 If you disagree with something, dear reader, then I’m satisfied. I would be glad if you could prove me wrong and present your work on one of our SPoT-meetings: <http://s-p-o-t.weebly.com> - please feel welcome to!

*Florian Fischer*

*University of Bonn*

*Institut für Philosophie*

*Am Hof 3 - 5*

*53113 Bonn*

<[fischerf@uni-bonn.de](mailto:fischerf@uni-bonn.de)>

<<http://science-of-deduction.de>>

## References

- [1] Aristoteles. *Physik*. Ed. by H. G. Zekl. Vol. V-VIII. Hamburg: Meiner, 1988.
- [2] Yuri Balashov. “Enduring and Perduring Objects in Minkowski Space-Time”. In: *Philosophical Studies* 99 (2000), pp. 129–166.
- [3] Yuri Balashov. “Special Relativity, Coexistence and Temporal Parts: A Reply to Gilmore”. In: *Philosophical Studies* 125 (2005), pp. 1–40.
- [4] Jiri Benovsky. *Persistence Through Time and Across Possible Worlds*. Ontos Verlag, 2006.
- [5] John Bigelow. “Presentism and Properties”. In: *Philosophical Perspectives* 10. *Metaphysics* (1996), pp. 35–52.
- [6] Andrea Bottani, Massimiliano Carrara, and Daniele Giaretta. *Individuals, Essence, and Identity. Themes of Analytic Metaphysics*. Kluwer, 2002.
- [7] Berit Brogaard. “Presentist Four-Dimensionalism”. In: *The Monist* 83.3 (2000), pp. 341–356.
- [8] Jeffrey E. Brower. “Aristotelian Endurantism: A New Solution to the Problem of Temporary Intrinsics”. In: *Mind* 119.476 (2010), pp. 883–905.
- [9] Thomas Buchheim, ed. *Über Werden und Vergehen - De generatione et corruptione*. Hamburg: Meiner, 2011.
- [10] Craig Callender. “Shedding Light on Time”. In: *Philosophy of Science* 67.3 (2000), p. 599.
- [11] Thomas M. Crisp. “Presentism”. In: *The Oxford Handbook of Metaphysics*. Ed. by Michael J. Loux and Dean W. Zimmerman. Oxford University Press, 2003.
- [12] Thomas M. Crisp and Donald P. Smith. “‘Wholly Present’ Defined”. In: *Philosophy and Phenomenological Research* 71.2 (2005), pp. 318–344.
- [13] Sonja Deppe. “The Mind-Dependence of the Relational Structure of Time (or: What Henri Bergson Would Say to B-theorists)”. In: *New Developments in Philosophy of Time*. Ed. by Florian Fischer. *Kriterion – Journal of Philosophy*, 2016.

- [14] Michael A. E. Dummett. “The Reality of the Past”. In: *Truth and Other Enigmas*. Harvard University Press, 1978.
- [15] Michael A. E. Dummett. *Truth and Other Enigmas*. Harvard University Press, 1978.
- [16] Kit Fine. “Tense and Reality”. In: *Modality and Tense*. Oxford: Oxford University Press, 2006.
- [17] Florian Fischer. “Carnap’s Logic of Science and Reference to the Present Moment”. In: *New Developments in Philosophy of Time*. Ed. by Florian Fischer. Kriterion – Journal of Philosophy, 2016.
- [18] Florian Fischer. “Das Problem der Persistenz”. In: *Proceedings of ‘XXII. Kongress der Deutschen Gesellschaft für Philosophie’*. 2011.
- [19] Florian Fischer. “Limit Deciding Dispositions”. In: *Vivarium* ((forthcoming)).
- [20] Florian Fischer. “On the Asymmetry of Endurantistic and Perdurantistic Coexistence in Special Relativity”. In: *Philosophia Naturalis* 49.1 (2012), pp. 43–61.
- [21] Gottlob Frege. “The Thought: A Logical Inquiry”. In: *Mind* 65.256 (1956). Ed. by Peter Geach, pp. 289–311.
- [22] Cord Friebe. “Time Order, Time Direction, and the Presentist’s View on Spacetime”. In: *New Developments in Philosophy of Time*. Ed. by Florian Fischer. Kriterion – Journal of Philosophy, 2016.
- [23] Cord Friebe. *Zeit – Wirklichkeit – Persistenz. Eine präsentistische Deutung der Raumzeit*. Paderborn: Mentis, 2012.
- [24] Andre Gallois. “Identity Over Time”. In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Winter 2015. 2015.
- [25] James W. Garson. *Modal Logic for Philosophers*. Cambridge University Press, 2006.
- [26] Jorgen Hansen. “A Case for Stage View Presentism”. <http://philpapers.org/archive/HANACF>.
- [27] Aleksandar Jokic and Quentin Smith, eds. *Time, Tense, and Reference*. A Bradford Book, 2003.
- [28] Hans Kamp. “Formal Properties of ‘Now’”. In: *Theoria* 37.3 (1971), pp. 227–273.
- [29] Immanuel Kant. *Critique of Pure Reason*. Ed. by P. Guyer and A. Wood. The Cambridge Edition of the Works of Immanuel Kant. Cambridge: Cambridge University Press, 1998.

- 
- [30] Saul A. Kripke. *Naming and Necessity*. Harvard University Press, 1980.
- [31] David K. Lewis. “Counterpart Theory and Quantified Modal Logic”. In: *Journal of Philosophy* 65.5 (1968), pp. 113–126.
- [32] David K. Lewis. *On the Plurality of Worlds*. Blackwell Publishers, 1986.
- [33] Michael J. Loux and Dean W. Zimmerman. *The Oxford Handbook of Metaphysics*. Oxford University Press, 2003.
- [34] E. J. Lowe. “McTaggart’s Paradox Revisited”. In: *Mind* 101.402 (1992), pp. 323–326.
- [35] Ned Markosian. “A Defence of Presentism”. In: *Oxford Studies in Metaphysics* 1.3 (2004), pp. 47–82.
- [36] Ned Markosian. “Time”. In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Spring 2014. 2014.
- [37] J. Ellis McTaggart. “The Unreality of Time”. In: *Mind* 17.68 (1908), pp. 457–474.
- [38] Uwe Meixner. “Change and Change-Ersatz”. In: *Individuals, Essence, and Identity. Themes of Analytic Metaphysics*. Ed. by Andrea Bottani, Massimiliano Carrara, and Daniele Giaretta. Kluwer, 2002.
- [39] Uwe Meixner. *David Lewis*. nachGedacht. Paderborn: Mentis, 2006.
- [40] David Hugh Mellor. *Real Time*. Cambridge: Cambridge University Press, 1985.
- [41] David Hugh Mellor. *Real Time II*. London: Routledge, 1998.
- [42] Trenton Merricks. “Goodby Growing Block”. In: *Oxford Studies in Metaphysics* 2 (2006).
- [43] Trenton Merricks. “Persistence, Parts, and Presentism”. In: *Nous* 33.3 (1999), pp. 421–438.
- [44] Ulrich Meyer. “The Presentist’s Dilemma”. In: *Philosophical Studies* 122.3 (2005), pp. 213–225.
- [45] Jesse M. Mulder. “Defining Original Presentism”. In: *New Developments in Philosophy of Time*. Ed. by Florian Fischer. Kriterion – Journal of Philosophy, 2016.
- [46] Thomas Müller. *Arthur Priors Zeitlogik: Eine problemorientierte Darstellung*. Paderborn: Mentis, 2002.

- [47] Harold Noonan. “Presentism and Eternalism”. In: *Erkenntnis* 78.1 (2013), pp. 219–227.
- [48] Nathan L. Oaklander and Quentin Smith, eds. *The New Theory of Time*. New Haven: Yale University Press, 1994.
- [49] Robert J. Oppenheimer. *Science and the Common Understanding*. New York: Simon & Schuster, 1953.
- [50] John Perry. “The Problem of the Essential Indexical”. In: *Nous* (1979), pp. 3–21.
- [51] A. N. Prior. “Time, Existence and Identity”. In: *Proceedings of the Aristotelian Society* 66 (1965), pp. 183–192.
- [52] Arthur Prior. “‘Now’”. In: *Noûs* 2 (1968), pp. 101–119.
- [53] Arthur N. Prior. “Thank Goodness That’s Over”. In: *Philosophy* 20 (1959), p. 17.
- [54] Willard Van Orman Quine. *From a Logical Point of View*. Harvard University Press, 1953.
- [55] Willard Van Orman Quine. *Methods of Logic*. New York: Holt, Rinehart and Winston, 1950.
- [56] Willard Van Orman Quine. “On What There Is”. In: *The Review of Metaphysics* 2.5 (Sept. 1948), pp. 21–38.
- [57] Willard Van Orman Quine. *Word & Object*. The MIT Press, 1960.
- [58] Bertrand Russell. *An Inquiry into Meaning and Truth*. London: Allen & Unwin, 1950.
- [59] Theodore Sider. *Four Dimensionalism*. Oxford: Oxford University Press, 2002.
- [60] Theodore Sider. “Presentism and Ontological Commitment”. In: *Journal of Philosophy* 96 (1999), pp. 325–347.
- [61] Theodore Sider. “The Stage View and Temporary Intrinsic”. In: *Analysis* 60.1 (2000), pp. 84–88.
- [62] Jonathan Charles Tallant. “Defining Existence Presentism”. In: *Erkenntnis* 79.3 (2014), pp. 479–501.
- [63] Giuliano Torrenco. “Ostrich Presentism”. In: *Philosophical Studies* 170.2 (2014), pp. 255–276.
- [64] Giuliano Torrenco. “Tenseless Time Vs. Tensed Truthmakers”. In: *Proceedings of “Fostering the Ontological Turn, Gustav Bergmann 1906–1087”*. Frankfurt: Ontos Verlag, 2008, pp. 253–260.



- 
- [65] Giuliano Torrenco. “The Grounding Problem and Presentist Explanations”. In: *Synthese* 190.12 (2013), pp. 2047–2063.
- [66] Giuliano Torrenco. “Time, Context, and Cross-Temporal Claims”. In: *Philosophia* 38.2 (2010), pp. 281–296.
- [67] Dean Wallace Zimmerman. “Temporary Intrinsic and Presentism”. In: *Metaphysics: The Big Questions*. Ed. by Peter van Inwagen and Dean Wallace Zimmerman. Wiley-Blackwell, 1998, pp. 206–219.
- [68] Pamela Zinn. “Lucretius On Time and Its Perception”. In: *New Developments in Philosophy of Time*. Ed. by Florian Fischer. *Kriterion – Journal of Philosophy*, 2016.

