

Time, perspective and semantic representation¹

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ABSTRACT

I discuss the perspectival nature of temporality in discourse and argue that the human concept of time can no more be dissociated from the perspectival thought than the concept of the self can. The corollary of this observation is that perspectival temporality can no more be excluded from the semantic representation than the notion of the self can: neither can be reduced to the bare referent for the purpose of semantic representation if the latter is to retain cognitive plausibility. I present such a semantic *qua* conceptual approach to temporal reference developed within my theory of Default Semantics. I build upon my theory of time as epistemic modality according to which, on the level of conceptual *qua* semantic building blocks, temporality reduces to degrees of detachment from the certainty of the HERE and the NOW. I also address the questions of temporal asymmetry between the past and the future, and the relation between metaphysical time (time_M), psychological time (time_E , where ‘E’ marks the domain of epistemological enquiry), and time in natural language (time_L), concluding that the perspective-infused time_E and time_L are compatible with time_M of mathematical models of spacetime: all are definable through possibility and perspectivity.

KEYWORDS: time_M , time_E , time_L , epistemic modality, Default Semantics, A-theory of time, B-theory of time, Perspective, Indexicals, Direct-Quantitative View, Modal-Contextualist View.

“Sometimes I feel that life is passing me by, not slowly either, but with ropes of steam and spark-spattered wheels and a hoarse roar of power or terror. It’s passing, yet I’m the one who is doing all the moving. I’m not the station, I’m not the stop: I’m the train. I’m the train.”

Martin Amis, *Money*, 1984, p. 112.

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1. Introduction: the essence of temporality

The human experience of time relies on many contributing factors. To name a few, it is shaped by the structure and operations of the human brain upon which our conceptualization of reality is conditional; by the socio-cultural environment that makes us partition time in a certain way and adopt one or another perspective on the passing of time; by the awareness of the finiteness of the human life; and, arguably, it is also reliant, at least on the level of communicated thoughts, upon the language in which we obtain and convey information. There is an endless list of pertinent questions we can pose concerning the nature of the human concept of time, as well as the nature of time itself. In what follows I will focus on a small subset of these, centred round what I want to call here the essence, or the core, of the human concept of time as it is represented in natural-language discourse. In particular, I will explore the relation between objectivity and perspective-taking, in that humans, in conveying information, while striving for objectivity, cannot avoid adopting a perspective. The latter is what indexicality in language allows us to do; in ascribing temporal reference, we adopt a perspective. The consequence of this is that the human concept of time can no more be dissociated from the perspectival thought than the concept of the self can. The corollary of this observation is that perspectival temporality can no more be excluded from the semantic representation than the notion of the self can: neither can be reduced to the bare referent for the purpose of semantic representation if the latter is to retain cognitive plausibility. In what follows, I will present such a semantic *qua* conceptual approach to temporal reference developed within my theory of Default Semantics (Jaszczolt 2005, 2010, 2016a) – a radical contextualist approach that allows for an unconstrained independence of the semantic representation from the logical form of the uttered sentence whenever the goal of representing the primary meaning intended by the speaker and recovered by the addressee calls for it. In doing so, I build upon my theory of time as epistemic modality developed in Jaszczolt (2009a, 2013, 2016b), according to which, on the level of conceptual *qua* semantic building blocks, temporality disappears: instead, there are degrees of detachment from the certainty of the HERE and the NOW into which the concept of time is reducible. In other words, temporality is a complex concept that can be broken down into simple, primitive, atomic concepts, and these are modal in nature. They are also scalar, pertaining to degrees of epistemic modality. I also address the question of temporal asymmetry between the past and the future that my scalar account throws up, and move on to the next seminal question of this paper, namely the relation between metaphysical time (called here time_M), psychological time (time_E , where ‘E’ marks the domain of epistemological enquiry), and time in natural language (time_L), concluding that the perspective-infused time_E and time_L are compatible with time_M of

mathematical models of spacetime: all are definable through possibility and perspectivity.

The structure of my investigation is as follows. First, in the remainder of this section, I introduce two vintage approaches to metaphysical time, the so-called A- and B-theories which, although both somewhat flawed, have given rise to the vast majority of the current vivid debates in the philosophy of time, and which have informed semantic approaches to temporal reference. Having adopted a complex stance that uses essentially B-theoretic devices appropriate for time_M but yields conceptual representations where A-theoretic time emerges by appealing to the perspective of the speaker (time_E), I then move in Section 2 to some examples of cross-linguistic differences in how temporal reference is expressed in natural languages, pointing out that these differences can easily be accounted for by what I call *LEXICON/GRAMMAR/PRAGMATICS TRADE-OFFS*. I take on board the significance of tenseless languages, as well as the phenomenon of time–tense mismatches and the associated problems with accounts based on grammatical tense.

Throughout this paper, ‘tense’ is used in three ways: in the sense of a predicate pertaining to grammatical categories (linguistic tense, or ‘ tense_L ’); in the sense in which it is used in metaphysics when philosophers talk about ‘tensed reality’ (metaphysical tense, or ‘ tense_M ’; see, e.g., Ludlow, 1999, 2013, and McTaggart, 1908, on A-theory); and, finally for the concept of time as the past, the present, and the future that does not necessarily correspond to the linguistic tense and that I call epistemic tense, or tense_E . Tense_E is introduced here in order to capture the multifarious provenance of information about temporal reference of eventualities that is then represented in conceptual *qua* semantic, but not necessarily *qua* structural-linguistic, representations.² The concept *tense* will only be relevant when I consider the question as to whether reality, thought, and language are themselves tensed; that is, affected by the distinctions between the past, the present, and the future (leaving aside the question of their reality). When I discuss time on the level of metaphysical time, psychological time, and time in language (in its lexicon, grammar, as well as pragmatics), I use the analogous distinction between time_M , time_E , and time_L . The indices will also sometimes be applied to the labels ‘past’, ‘present’, and ‘future’, in an analogous way.

Next, in Section 3, I move to the subjectivity imposed by the speaker’s perspective and to the role of context in providing the perspective that, in radical

[2] See my earlier comment that Default Semantics represents primary meanings, or primary speech acts, irrespective of their relation to the structure (logical form) or the uttered sentence. Since these acts are very often indirect, then so is the relation between the logical form and the semantic/conceptual representation. An example of a representation is given in Section 4.3.

cases, can lead to the conclusion that even the past can change. In Section 4, I briefly present the theory of temporality as epistemic modality developed within Default Semantics (Section 4.1), also attending to the question of the asymmetry of the past and the future that is seemingly irreconcilable with a degree-based modal account (Section 4.2), followed by a representation of an example of a tense–time mismatch in Default Semantics (Section 4.3). In Section 5, I move to addressing the question of how deeply rooted the modality of time is and what it suggests about the compatibility between the L, E, and M levels. In other words, I consider the meaning of modality vis-à-vis the $\text{time}_L/\text{time}_E/\text{time}_M$ distinction. Section 6 concludes with a general discussion of the inalienable essence of time on the dimensions of experience and representation. I conclude that basic epistemic modal concepts together with the *de se* perspective allow us to represent reality as if it was tensed_M , but only so because time_M of spacetime models is itself intrinsically metaphysically modal.

Most current debates concerning the metaphysics of time stem from the argument for unreality of time proposed over a century ago by McTaggart (1908). He put forward two views on time, found them both flawed, and concluded as a result that time is unreal. According to the first view, called by him the ‘A-theory’, time passing is real: reality is tensed_M , there is change in the world. In metaphysics, the stance that time passing is real, called **TENSISM**, is an umbrella term for four views, differentiated by what parts of the temporal spectrum are considered real: (i) the past, the present, and the future; (ii) only the past and the present; (iii) only the present and the future, in the sense that only these two have the property of existence; and finally, probably the most popular stance in this camp, (iv) only the present exists – the view called **PRESENTISM**. According to the alternative view, ‘B-theory’, reality is tenseless_M , and time_M does not flow. Events are real and are ordered according to the earlier than / later than relation, but there is no past_M , present_M , or future_M as their real attributes. Now, using the A-series we are able to represent change, but the series itself is flawed in that temporality in it is irreducible, which leads to circularity: on the one hand, an event cannot be simultaneously past, present, and future, and on the other, when one removes the qualifier ‘simultaneously’, one presupposes the existence of time and introduces circularity. Next, using the B-series we are able to represent the ordering of events, but the series is flawed in that in order to make use of the earlier-than / later-than relations in the first place, we have to presuppose the existence of time. Without time we would have just a timeless ordering on a meaningless scale which McTaggart calls the ‘C-series’. McTaggart therefore concludes that the past, the present, and the future are properties not of reality but rather of human experience. Humans remember events, perceive them, or anticipate them, which produces the experience of time and of the passage of time. But this also leads him to conclude that time itself is unreal.

Nevertheless, there is a clear sense that time is real: events that took place cannot be ‘undone’; they belong to collective memory and to historical accounts irrespective of the experience of one particular individual; memories may differ somewhat or may fade completely, but there is some ‘reality’ beyond them that is composed of what (with some approximation) various groups, societies, and nations choose to call historical facts. In a different way, time also appears to be real for scientists working with spacetime models and for those laymen for whom spacetime with the associated corollaries predicted by mathematical models constitutes a concept actively employed in reasoning. Basic understanding of the ideas underlying Einstein’s theory of relativity results in the belief – or knowledge, depending on the degree of understanding – that time is not absolute and that it varies with the velocity of the moving object. Here B-theory comes up trumps. But there is a conceptually opposing force in human folk thought, founded on an accepted conviction that events can be placed on a pretty much fixed timeline, and characterized as past, present, or future, as they are in A-theory. The latter reflects the classical Aristotelian conception of time, adopted in Isaac Newton’s *Principia Mathematica*: time can be represented as a horizontal line extending infinitely in both directions, into the past and into the future. But just as the simplicity of the picture is appealing, so the evidence, collected even at that time, was disturbing. It was observed that the time of the eclipses of the moons of Jupiter appeared, when observed from the Earth, to be related to the distance of the moon. Henri Poincaré’s and subsequently Albert Einstein’s view that time is not absolute follow as a natural consequence. What we have now is the special and the general theory of relativity that can still feel at odds with intuitions.³

Versions of A-theory fare better with intuitions but encounter problems with truth-makers, especially for the temporal location that is denied existence: presentism, for example, has a problem with truth-makers for the past and the future and has to resolve to theoretical tricks which have dubious metaphysical support.⁴ They also appear to be incompatible with Einstein’s special relativity. For example, special relativity extends to relativity of simultaneity, while presentism is founded on the ontology of times with

[3] Followers of B-theory include Reichenbach (1948), Mellor (1998), Mozersky (2001, 2015), and Le Poidevin (2007), among many others. It is also the foundation of the representation of temporal reference in Discourse Representation Theory (Kamp & Reyle, 1993) and most other formal representations of time in language. A-theory can be traced to St Augustine and more recently has been represented by, e.g., Prior (e.g., 1967, 1968, 2003), Smith (1993), and Ludlow (1999, 2013).

[4] See, e.g., Baron (2015) on tensed truth-maker principles; see Dummett (2006) on justificationism and the symmetry of the future and the past, but also Dummett (2004) on the reality of the past, where he concludes that only those past events are true that have present truth-makers in the form of memories or other records.

unique properties arranged on a scale (see Einstein, 1920/2010, and, e.g., White, 2015).⁵ On the other hand, the human experience of time as $tense_E$ can be dissociated from the properties of real time when we accept that the flow of time is an illusion caused by the experience of living in time where events can be experienced as happening NOW and can be linked by causation. In other words, time can still be real but not flow (Mellor, 1998). This is the view compatible with the multidimensional view on spacetime in mathematical models of contemporary physics. In the terminology adopted here, we would have $tense_E$ but no $tense_M$: reality has $time_M$ as some of its multiple dimensions but does not have pastness, the NOW , or the future. It is the *de se* perspective that allows us to think of $time_M$ as if it was $tense_M$. In Section 3 we will link this stance with perspective-taking and with expressing time as an aspect of expressing the self, using evidence from a domain that is not normally used for this purpose: the lexicon/grammar/pragmatics trade-offs in discourse as they are reflected in a variety of natural languages.

2. Temporal reference: from $time_L$ to $time_E$

The ways languages express temporal reference point clearly in the direction of some form of $tense_E$ but away from universal $tense_L$ and also away from $tense_M$. They also reveal the existence of tense–time mismatches. In other words,

- (i) languages have no difficulty with expressing the human concepts of the past, the present, and the future ($tense_E$);
- (ii) not all natural languages have grammatical tense ($tense_L$); when they do, $tense_L$ need not correlate with $tense_E$.

We will add to this the following:

- (iii) (iii.a) the perspectival and egocentric representation of temporal distinctions, as well as (iii.b) the epistemic-modal building blocks of temporal concepts that (iii.c) in themselves exhibit perspectivity strongly suggest that the property ‘tensed’ emerges on the level of human conceptualization rather than being traceable to ontology ($tense_M$).

[5] Einstein’s thought experiment aims at explaining the relativity of time to the frame of reference. Imagine a train travelling with certain velocity along an embankment. Two flashes of lightning that appear simultaneous to an observer on the embankment will not appear simultaneous to an observer on the train who moves towards one of the sources of lightning. In general,

“Events which are simultaneous with reference to the embankment are not simultaneous with respect to the train, and *vice versa* (relativity of simultaneity). Every reference-body (co-ordinate system) has its own particular time; unless we are told the reference-body to which the statement of time refers, there is no meaning in a statement of the time of an event.” (Einstein, 1920/2010, p. 26)

In this section I will attend to (i) and (ii), leaving (iii.a) for Section 3, (iii.b) for Section 4, and (iii.c) for Section 5, which will complete the argument.

Although grammatical tense (tense_L) by its very raison d'être externalizes the concept of temporal reference, the distinctions within this category can be more, or less, finely grained. Matses, a Panoan language of the Amazon region, has three past tenses: recent, distant, and remote. When the sentence concerns a past eventuality reported on the basis of inferential evidence, the source of information has to be overtly specified using its evidential system. It has to be stated overtly, by means of inflection called *DOUBLE TENSE* (Fleck, 2007), (i) how long ago the eventuality took place and (ii) how long ago the speaker obtained this evidence, which results in categories such as 'distant past inferential' plus 'recent past experiential', or 'distant past experiential' plus 'recent past inferential', adding up to nine markers for the past-time reference (see also Aikhenvald, 2012, p. 181). Central Pomo, a native American language spoken in California, distinguishes between two kinds of future: *realis* and *irrealis*, used in accordance with the speaker's judgement about the degree of probability of the eventuality. Next, while we may think that *realis/irrealis* is a distinction subsidiary to the temporal one, Caddo, another native American language, expresses the future as *realis* (de Haan, 2006, pp. 41–42). St'át'imcets (Lillooet Salish) spoken in British Columbia has only the future/non-future distinction. However, since the marker of futurity *kehl* can also be used for the future in the past, akin to the English *will/would*, arguably the language is not inherently tenseless: the marker can be theoretically analyzed as combining with a phonologically empty, or unarticulated, tense morpheme (Matthewson, 2006). Present- and past-time reference are expressed by potentially ambiguous temporally unmarked constructions where the aspectual class triggers the default reading: present for states and past for accomplishments and activities. Arguably, some overtly tenseless languages yield better to a tensed semantics with a null TENSE morpheme, while others, like Paraguayan Guaraní (Tupí-Guaraní), are 'inherently' tenseless: analyzing them using TENSE would not work (see Tonhauser, 2011). In Tupí-Guaraní, future-time reference is expressed by using aspectual, modal, and mood markers such as desiderative/hortative, prospective, or possibility. Generally, in Tupí-Guaraní and Arawak languages, aspect, modality, and mood are expressed (optionally) through inflections on the verb, while temporal distinctions are expressed through the lexicon (see Aikhenvald, 2012, p. 180). To compare, Yucatec Maya makes use neither of tenses nor of temporal adverbials: temporality has to be gleaned from the aspectual marking through a default pragmatic interpretation (see Bohmeyer, 2002). Languages with optional tense and aspect, such as Thai (see Srioutai, 2006), often make use of the same strategy, with no loss of informativeness or clarity.

Considered from an extra-theoretic perspective, this means that, although a language may not have grammatical tenses, the way temporality is realized can still be closer to, or further from, the meaning of the devices present in the system of the language itself: sometimes the lexicon provides the necessary adverbials of temporal location, which means that we can still glean regularities from the system itself, while at other times resorting to context used in pragmatic inference or in conversational defaults⁶ is the only way of analyzing temporal reference. While we cannot yet at this point address the question of universality or relativity of the human concept of time (time_E) and the concepts of temporal reference (tense_E), we are able to use this extensive evidence to argue in favour of the equivalence between grammatical, lexical, and pragmatic means of expressing these concepts, as well as their interaction – a process that I call elsewhere the grammar/lexicon/pragmatics trade-offs (Jaszczolt, 2012). In this vein, Bittner (2005), for example, analyzes West Greenlandic (Kalaallisut), an Eskimo-Aleut tenseless language, emphasizing the precision with which temporality can be expressed in it. Tense–time mismatches in English, where, for example, the continuous or simple present can be used for future eventualities to signal their planned or predetermined status (‘futurate progressive’ and ‘tenseless future’, respectively), or for the past to enhance the interest value of narration (‘past of narration’), demonstrate how the trade-offs can work: a temporal adverbial and the context, sometimes in conspiracy with the aspectual class, combine with information that is associated with the grammatical category to yield the exact required effect.^{7,8}

Next, in addition to the differences in the granularity of the distinctions within the past, present, and future categories, ranging from null to several temporal subclasses, there are orthogonal concepts: consecutive tense in Swahili, for example, is orthogonal to the past/present/future distinction; there is a grammatical marker signalling the ‘and then’ relation (Givón, 2005, p. 154). There is also the issue of the orientation of the speaker vis-à-vis the arrow of time that is amply discussed in the cognitive semantic literature. Maori, for example, points to the conceptualization where the speaker faces the past: the past is known and as such is spread in front of the speaker’s eyes

[6] By conversational defaults I mean here default interpretations as they are defined in Default Semantics: automatic, effortlessly arrived at interpretations assumed for the context by a Model Speaker and retrieved by a Model Addressee. ‘Default’ on this construal does not mean context-free meaning but an automatic interpretation in a given context.

[7] For semantic analyses of tense–time mismatches see, e.g., Jaszczolt (2009a) and Section 4.3 below.

[8] The ‘conspiracy’ with the aspectual classes is an important topic in its own right that deserves a separate in-depth analysis. It will not be pursued in detail in the current investigation.

(Thornton, 1987). To repeat, we are not yet in a position at this stage in our argument to draw conclusions concerning the relative or universal status of temporal concepts: this question will have to wait until Section 4. However, what we can conclude is that, since it is fairly incontrovertible to assume a correlation between concepts and linguistic expressions, different aspects of temporality are brought to salience in different natural languages, and it would take much more than our lexicon/grammar/pragmatics trade-offs to explain them because languages differ not only with respect to which of the three kinds of devices they employ for expressing a concept, but also with respect to what their speakers choose to conceptualize. There is much more to $time_L$ than $tense_L$, but when $time_L$ is construed in this contextualist way it maps onto $time_E$. It remains to be seen what this construal tells us about the question of the relevant conceptual universals. The route we will follow here goes through the question of the interaction between expressing temporality and the *de se* perspective, followed by the question of the complexity of temporal concepts as reflected in natural language lexicons and grammars. The methodology of this move is as follows. The assumed trade-offs allow us to go beyond $tense_L$; it is an investigation of $time_L$ that will allow us to enquire about the complexity of $time_E$ and the associated $tense_E$ (in the sense of $past_E$, $present_E$, and $future_E$). But instead of assuming that $time_E$ gives us an insight into $time_M$, as it is done in the so-called descriptive metaphysics,⁹ we will reverse the order of explanation, ask whether $time_M$ plays a part in the construal of $time_E$, and enquire about the foundations for their compatibility.

3. Time, perspective, and expressing the self

Theories of psychological time invariably draw on experience and on the understanding of experience. For Kant, Husserl, or Heidegger, time is founded on retaining images. Husserl (1928) distinguishes the APPARENT TIME pertaining to external objects and the INTERNAL TIME pertaining to mental acts. Cognition is permeated with the properties of mental states that at best (but not always, depending on the version of intentionality adopted in a particular phenomenological approach) are directed at an external object, so it is the internal time that we ought to focus on: time comes into being as part of consciousness. It is imposed on our experiences and only through them indirectly on real eventualities. External time only matters insofar as it is reflected in experiences (for the present), memories (for the past), and anticipations (for the future). The present, the past, and the future of the external time are reanalyzed in this way as properties of consciousness:

[9] Strawson (1959) and below Sections 4.2 and 5.

primal impression (from perception of the present moment), retention (from memory of the past), and protention (from the expectation of the future).¹⁰

Now, since internal time is constituted by consciousness, it follows that understanding time is part of understanding the ego. Just as human life is bounded by the events of one's birth and death, so is the human concept of time (see Heidegger, 1953); just as human life is composed of experiences perceived, remembered, and anticipated, so is the human concept of time composed of the present, the past, and the future. As was exemplified in the previous section, some of these concepts in this three-way distinction make it into the grammar and/or the lexicon of natural languages – others do not, but as conceptual correlates of experiences they are always salient.

In this picture, the three-way distinction in the domain of temporal reference into past_E, present_E, and future_E acquires the status of a conceptual universal. By theoretical assumption, for us, it will also acquire the status of a semantic universal, irrespective of what the syntax and the lexicon of the particular language choose to externalize, in that on our contextualist construal semantic representations capture the meanings conveyed in discourse irrespective of their relation to the logical form of the sentence, in agreement with the lexicon/grammar/pragmatics trade-offs.¹¹

At this level of generality, the three-way distinction making up tense_E exhibits obvious parallelism with that of tense_M: we need not assume a flow of time, or the present, the past, or the future on the level of tense_M in order to uphold it. In metaphysical spacetime, in the second law of thermodynamics the 'arrow of time' points in one direction where the entropy (disorder) of a closed system always increases in the world and what has happened, happened irreversibly. Likewise, in cosmological explanations of time, the universe is progressively expanding (see, e.g., Hawking, 1988, p. 144), and analogously, in psychological time, the future always becomes the present and the present always becomes the past.

But when we enquire into the linguistic representations of past-, present-, and future-time reference actually performed by interlocutors in discourse, even in one particular language, we can see considerable variety of conceptualization and a considerable degree of choice. Combining temporal, modal (including evidential),¹² and aspectual resources allows the speakers to represent eventualities with a different degree of inherent detail and with a

[10] See also Kelly (2005).

[11] See Sections 4.1 and 4.3 on Default Semantics.

[12] I adopt the view that evidentiality is a category within epistemic modality. See Jaszczolt (2009a, p. 39), after van der Auwera and Plungian (1998).

different degree of commitment. For example, past events can be reported in English using regular past tense, as in (1):

(1) He went to London and met the Mayor;

past of narration, as in (2):

(2) This is what happened yesterday: He goes to London and meets the Mayor;

epistemic necessity past, as in (3):

(3) He is not here; he must have gone to London to meet the Mayor;

or epistemic possibility past, as in (4):

(4) I wonder why he is not here; he may have gone to London to meet the Mayor.

The present and the future also allow for considerable variation – free variation with respect to temporal reference but often more constrained, principled variation from the point of view of epistemic commitment and considerations to do with informativeness, social and cultural appropriateness, and so forth. For example, focusing on the internal structure of the event, one could represent it as protracted; focusing on evidence, one could use the evidential conditional. These are well-known facts of the grammar and pragmatics of English and we will not rehearse them here. What is of interest to us is the fact that this availability of a relatively free choice suggests that reporting on events is permeated with the *de se* perspective: just as in $tense_E$ time is only of interest where it translates into the properties of human experiences, so in $tense_L$ time is intertwined with perspective, including commitment, and the level of detail with which the eventuality is presented. Further variation can be ascribed to the perception of causal links between events and to what is conceptualized as a unique event in the first place. The literature on the individuation of events is vast and philosophical discussions are ample. Suffice to say here that the question of the granularity of events applies not merely to units that correspond to propositional thought but at a higher level as well: William James' *SPECIOUS PRESENT*, for example, is a concept constructed in order to capture the intuition that we are in direct contact not only with what is happening *NOW*, but also with what immediately preceded and will immediately follow the *NOW*; in other words, the intuition is that we directly perceive not only the present, but also chunks of the past and the future, and they all form one experiential unit.

Bringing together perspective, the self, and the properties of temporal reference appears indispensable when we attend to questions pursued in the philosophical literature concerning the role of change as a seminal definitional

characteristic of time. Barlassina and Del Prete (2015) discuss the following actual situation. Lance Armstrong won the Tour de France in the year 2000. Hence, the proposition expressed in (5) is true:

(5) Lance Armstrong won the Tour de France in 2000.

(from Barlassina & Del Prete, 2015, p. 61). But in 2012 it was discovered that Lance Armstrong had used illegal substances and his title of winner was withdrawn. Barlassina and Del Prete assume that, after this event, (5) becomes false, even when it is uttered by the same speaker who, in addition, may not be aware of the withdrawal of the title. They say, "... in moving from Context A to Context B, *the past* (of the actual world) *has changed*" (p. 61). When we think of events as properties of time (Montague, 1960), then the year 2000 ceases to have the property of winning the Tour de France by Armstrong.¹³ In order to solve the problem they try to employ contextualism, on which winning the Tour de France is a context-sensitive predicate, or relationalism, on which 'winning the Tour de France' is a relational predicate that relates a person and a predication in a context, concluding that neither will work because (6) would acquire a wrong analysis:

(6) It is no longer the case that Lance Armstrong won the Tour de France in 2000.

(from Barlassina & Del Prete, 2015, p. 65). They take it for granted that (6) is intuitively true when uttered in 2012 and that contextualism and relationalism both require that the meaning of (5) AS EMBEDDED IN (6) is tied, respectively in one way or the other, to the context relevant at the time of uttering (6).

Now, if we follow them in accepting their first assumption, namely that (6) is intuitively true, then there is indeed a problem with implementing a contextualist or a relativist analysis, at least on their version of the accounts. We would either have to resort to minimalism and the conclusion that the past has changed, or tweak the contextualist or relativist accounts in such a way that they are made to conform to the authors' intuitions about (6). Another way out consists of denying the intuitive plausibility of (6), for example by claiming that intuitively it is indeed the case that Lance Armstrong did win the Tour de France in 2000 but, say, that the event of winning and the property of being a winner have different characteristics: he won in 2000, tout court, but he was a winner in 2000 and is no longer a winner in 2012. We can easily tweak the linguistic descriptions and avoid a puzzle. If (6) is false, we have the desired result.

But let us go along with the authors on the plausibility of (6) and see how we can tweak a contextualist account to accommodate it. In order to accept the intuition that (6) is true, we would have to attend to its problematic

[13] Their analysis makes use of the development of Montague's idea found in Partee (1973).

structure. And since it is precisely the structure and the associated scoping that leads the authors to the formulation of the alleged puzzle, unravelling the structure is likely to annihilate the puzzle itself. In order to agree with the speaker who truthfully utters (6) we would have to make it mean something to the effect of (7), where p stands for (5).

(7) It is no longer the case that what was true in 2000, namely p , is true in 2012.

(7) is equivalent to (8):

(8) It is no longer true that what was true in 2000, namely p , is true in 2012.

Then, (8) reanalyzes as (9):

(9) p was true in 2000 and p is no longer true in 2012.

In virtue of the content of (5), (9) reduces to (10):

(10) p and it is no longer true in 2012 that p .

It is apparent that the problem is strictly intra-theoretic and is triggered only on the account on which events are taken to be properties of time. But this is a rather peculiar way of posing the problem. It is true that Montague (1960) and following him Partee (1973) adopted the construct of events as event types and as such properties of time, but several decades later one would have to have a good independent reason to adopt this construal of events. As such one can present nothing more than an intra-theoretic puzzle constructed merely for its own sake. In the past several decades ample analyses and arguments put forward in formal semantics have demonstrated clear explanatory advantages of construing events as particulars, to wit Davidson (1970), Higginbotham (1985), or Parsons (1990), followed by the formal treatment of temporality in dynamic semantics such as Discourse Representation Theory (Kamp & Reyle, 1993).

If we step outside Barlassina and Del Prete's (2015) 'puzzle for the puzzle's sake', what we have here is a fairly straightforward and unproblematic scoping: at $t_1(e)$ and at t_2 (at $t_1(e)$). It is straightforward because we can now, for example, plug in a speech-act-theoretic account and treat 'at $t_1(e)$ ' and 'at t_2 (at $t_1(e))$ ' as assertions where truth of an eventuality is relativized to times, resulting in 'at t_1 (at $t_1(e))$ ' and 'at t_2 (at $t_1(e))$ ', respectively. What was presented as a puzzle about the past now appears to be merely the fact that the structure of natural-language sentences is itself to be analyzed in a contextualist manner since it is the context that allows pragmatic, syntactic, and lexical means of expressing meaning to mix and to work together in producing utterance meaning.

Now, having rejected the intra-theoretic problem with contextualism with respect to the logical form of (6) by pointing out the overwhelming preference

for a construal of events as particulars in formal semantics, we can move full steam to the benefits of a contextualist outlook. There is something intuitively appealing in saying that the past has changed: after all, (7)–(10) are all true, and if so, then the past HAS changed, although not in the sense in which Barlassina and Del Prete (2015) use this term. The past has changed because the contents of the speech acts captured in ‘at t_1 (at $t_1(e)$)’ and ‘at t_2 (at $t_1(e)$)’ are different. These contents are relativized to the perspective: either the perspectives of different speakers, or, as was suggested above, even the same speaker, ignorant of the revoking of the title, on two different occasions. What appeared to be a puzzle now appears to be the standard state of affairs calling for an equally standard contextualist analysis: speakers alter their view and alter their judgement, or the subject of their judgement may change if someone else fills a given role. In the latter case the puzzle becomes just another version of the pseudo-puzzle associated with roles and reference exemplified in (11) and (12a)–(12b).

(11) The President of the United States changes every four years.

(12) a. The President was assassinated in Dallas in 1963.

vs.

b. Barack Obama was assassinated in Dallas in 1963.

These are pseudo-puzzles indeed, and in addition well-mulled-over ones.

The intuitive folk conclusion is then this: the past has changed because the speaker’s perspective, attitude, knowledge of the past, have changed, and these are essential for the representation of the past. On the account developed here, past-time reference is built out of attitudes to events that are in the epistemic sense remote from the self, and it is precisely the variation in this remoteness that changes.¹⁴ It seems that in languages such as Matses discussed in Section 2, where double tense would be used for the purpose of (5) and (6), combining, say, distant past inferential and recent past experiential, the problem would not arise: the combinations of tenses and evidential markers distinguish between different takes the speakers adopt on p , and result in appropriate semantic representations.

All in all, time_E and time_L are permeated with perspective. First, they are perspectival in the sense that the eventuality is portrayed from the vantage point of the speaker, and as such it is presented as tensed experience, with different degree of attention to different aspects of the situation and, what will have particular importance for the next section, with different degrees of epistemic commitment. Next, they are inherently perspectival in the sense of temporal anaphora, namely that changing vantage point can alter the future to,

[14] See Section 4.1.

say, future in the past, or the present into the future. This is well known from the need for distinguishing between event time, speaker time, and reference time proposed by Reichenbach (1948). It has to be remembered that the vantage point can change as discourse progresses, as is exemplified in (13):

- (13) On Sunday I thought I would spend the day reading *War and Peace*.
 I was going to have coffee in bed and read. I started reading but then
 I remembered I had to go to a wedding and got up speedily.

Arguably, every instance of a use of grammatical tense reflects a perspective when the perspective is understood as a creation of ‘deictic consciousness’ (see de Saussure, 2013, and his discussion of *origo*) pertaining to (i.a) the speaker, or (i.b) shifted to somebody else, or sometimes (i.c) generalized to a greater or lesser extent (as in the case of, say, analytic truth on the one hand and physical laws on the other), and analogously to (ii.a) the speech time, or (ii.b) shifted away to the past or the future, or (ii.c) generalized over time.

This phenomenon is not unlike the phenomenon of the reference shift in the case of some indexicals such as *I*, *you*, *here*, or *now* discussed in the philosophical literature. According to Kaplan (1989), the semantic value of an indexical is fixed in the context of the current speech act, except for its use in direct quotation. ‘Monster contexts’ are contexts that would violate this rule. But in the past few years, following Schlenker’s (2003) observation that Amharic allows for the displacement of *I*, as in (14), linguists have engaged in a hunt for languages that allow for such ‘monsters’.¹⁵ In (14), ‘me’ refers to the speaker and ‘I’ refers to the speaker’s brother, and the shift of reference cannot be attributed to quotation: the Amharic sentence is not quotative. Instead, what we have is a narration from two different perspectives, where the choice depends on which perspective is chosen as more relevant and salient.

- (14) wändemme käne gar albälam alä
 my-brother “with-me I-will-not-eat”, he said
 ‘My brother refused to eat with me.’

(from Leslau, 1995, p. 778). While this phenomenon has normally been analyzed as a case of ‘context shift’, it seems more appropriate to describe it as the case of focusing on the semantically prominent perspective. In the spirit of Lewis’s (1979) centered worlds, Roberts (2014) uses for this purpose the concept of ‘doxastic centers’, and Mount (2015, p. 20) ‘mutually-accepted perspectives of interlocutors’. It appears that such mutually

[15] See Roberts (2014), and on monster contexts, e.g., Predelli (2014) and Jaszczolt and Huang (in press).

accepted perspectives also provide a theoretical solution to temporal reference: the vantage point, the degree of epistemic commitment, the aspect of the eventuality that the speaker chooses to bring to focus all testify to the fact that perspective and time_E are inherently interconnected. This will become important in the following section when we descend to the conceptual building blocks of the concept of time. We are now in a position to move to the properties of time_E itself and to address the question of the complexity and universality of the concept.

4. Time_E as degrees of acceptability

4.1. MODAL SUPERVENIENCE OF TIME

The explanation of time that I find plausible relies on answers to such questions as (i) whether temporality is a primitive concept or whether it can be broken down into more basic components, and, if the latter, then (ii) what these components are. Guided by theoretical arguments and cross-linguistic evidence presented extensively elsewhere (Jaszczolt, 2009a, 2012, 2013, 2016b), according to the theory I propose the human concept of time is inherently modal: on the level of basic conceptual building blocks it reduces to epistemic modality. Likewise, the concepts of the past, the present, and the future depend, in terms of their definitional characteristics, on the concepts of human knowledge and degrees of belief associated with epistemic modality, where the latter is itself a gradable concept, theoretically explicable as degrees of commitment to the proposition that stands for the eventuality. In other words, temporality logically SUPERVENES on epistemic modality.¹⁶ Gradable modal concepts, externalized in natural languages in lexical, grammatical, and pragmatic means of expressing the degree of epistemic commitment (or, equally, the degree of epistemic detachment), form a continuum. Even if we focus only on grammatical means of expressing temporality in English, we can find the following clines. For the past, regular past (*he went*) or past of narration (*he goes*) come with a relatively strong degree of commitment, which then reduces with epistemic necessity past (*he must have gone*) and progressively with epistemic possibility past (*he may/might have gone*). Analogously, for the present, regular present, epistemic necessity present, and epistemic possibility present form a cline. To this we can add the interaction with aspect and with temporal and modal adverbials and information recovered from the context, in the spirit of the

[16] "A set of properties T supervenes on a set of properties M iff things cannot differ with respect to properties T without also differing with respect to M properties: there cannot be a T-difference without an M-difference." The definition is adapted from McLaughlin and Bennett (2005, p. 1). For the purpose at hand, I used 'T' for 'temporal properties' and 'M' for 'modal properties'.

lexicon/grammar/pragmatics trade-offs discussed above, to form a fuller picture of such clines with more finely grained distinctions.¹⁷

For the concept of the future, this theory comes, so to speak, ‘for free’ if one accepts that the human concept of the future (future_E) is open and undetermined and as such essentially modal. But even if one is committed to future_E as having essentially the same underlying characteristics as past_E and present_E, the theory of modal building blocks stares one in the eye in virtue of the sheer abundance, when viewed cross-linguistically, of what on this view we would call dual-purpose grammatical forms (*will, shall*), that is, forms that can act as markers of future tense or of epistemic modality. The cline for future-time reference is then rich indeed; to wit, we start with strong commitment expressed with the so-called ‘tenseless future’ (*He goes to London tomorrow*), through the so-called futurate progressive (*He is going to London tomorrow*), both of which additionally convey a notion of a pre-planned activity, moving to periphrastic future (*He is going to go to London tomorrow*), through regular future, epistemic necessity future, and epistemic possibility future, analogous to the clines for the past and the present proposed above.

The idea of conceptual building blocks is essentially the one adopted in neo-Whorfianism (Levinson, 2003), according to which lexical meanings often correspond to complex concepts called by Levinson (p. 300) ‘high-level molar concepts’ that are composed of ‘low-level concepts’. In neo-Whorfianism, cross-linguistic differences on the level of complex lexical meanings are offset by the universality of the conceptual atoms which they contain. For the purpose of our theory of the modal foundations of temporality, this means that language-specific distinctions within the domain of temporal reference, examples of which I presented in Section 2, rest on an inventory of universal epistemic modal concepts that stand for degrees of commitment to the eventuality referred to in discourse. On the level of thought, the differences either disappear or are easy to neutralize through the ‘unpacking’ of these primitive concepts. Naturally, we cannot assume that all of these modal conceptual building blocks will always have their lexical or grammatical counterparts;¹⁸ neither can we assume that the lexical or grammatical means of expressing modality are always bi-uniquely correlated with primitive concepts. But there is sufficient evidence from the interrelation between temporal and modal expressions to suggest that what we can find underneath time_L is essentially epistemic modality.

[17] We obtain a continuum because (i) lexically and grammatically conveyed detachment is not fixed but rather is influenced by contextual factors and (ii) context-specific pragmatically recovered information forms one of the three sources, viz. the lexicon/grammar/pragmatics trade-offs.

[18] Note this difference between these primitives and Wierzbicka’s (e.g., 1996) semantic primes.

In a nutshell, linguistic evidence for the modal conceptual underpinnings of temporality, that is evidence from time_L for time_E , comes from the facts that referring to the temporal location allows for such tense/modality clines representing degrees of commitment; that relevant forms double up as temporal and modal markers; as well as from the fact that tense, aspect, and evidentiality seem to rely on the same conceptual primitives.¹⁹ Supporting arguments from the quantitative essence of modality and from time_M for this degree semantics are discussed in Sections 4.2 and 5, respectively.

4.2. THE DIRECT-QUANTITATIVE VIEW

There is a question that remains to be addressed in order to complete this view of modal supervenience of time. Since we find degrees of commitment in the domains of all three types of temporal location – the past, the present, and the future – then the degrees of commitment will not help us explain the fact that we experience the past as fixed, the present as most vivid, and the future as uncertain. In other words, the degrees of commitment should also reflect the fact that we are most certain of the factual status of what we experience here and now, fairly certain of what we did experience in the past and have retained in memories, and relatively uncertain of what the future will bring. In other words again, the cline of commitment does not go from the past through the present and to the future, analogous to the arrow of psychological time (time_E); we cannot transpose this arrow of time onto some analogous but more finely grained arrow with degrees of modality marked on it. So, it appears that if we accept the theory of modal supervenience, we must either deny that there is any essential qualitative difference between the future_E, the present_E, and the past_E (they are all modal and they all allow for degrees), or we have to dig a little deeper into (a) the properties of their modal building blocks on the one hand, and (b) the exact nature of the relation between these building blocks and the resulting complex temporal concepts on the other. The answer could in principle be found along either of these routes.

The most pressing question here is that of explaining the experienced asymmetry between the future and the past. Now, if we pursue path (a), we can venture a hypothesis that the differences between the three temporal locations, and a fortiori the asymmetry between the future and the past, are underlyingly quantitative, and as such can be found in the properties of the conceptual atoms. This is what I call the Direct-Quantitative View (DQ).

[19] See, e.g., Aikhenvald (2012) on the languages of the Amazon, Steedman (1997) on Hopi, and Section 2 above.

On the other hand, if we opt for a search for a solution along path (b), we can retain the intuitive view that the differences between the three temporal orientations are qualitative. But we can only do so with the proviso that the mapping between quantitative distinctions on the level of (modal) conceptual atoms and the qualitative distinctions on the level of (temporal) conceptual complexes has to be explained by some form of systematic, formally traceable (and as such compositional on the level of conceptual structures) construction of meaning. This option I call the Modal-Contextualist View (MC; Jaszczolt, 2013, 2016a).

Let us begin with DQ. This is how one might proceed. Let us assume for this purpose the intuitive stance of eternalism, according to which, by definition, all times are equally real. We have seen that time_E results in tense_E conceptualized as past_E , present_E , and future_E , in that humans think of time in terms of memories, experiences, and anticipations. Hence, eternalism is an intuitively plausible stance to adopt. Next, we borrow the observation advanced in the philosophical literature that eternalism is analogous to possibilism: in other words, assuming the reality of the three temporal orientations is analogous to assuming the reality of possible worlds (cf. Noonan, 2013). Now, as we know from the history of possible-worlds semantics, possibilism can be weakened to a form on which possible worlds are not endowed with metaphysical reality but merely with reality pertaining to useful theoretical constructs. This we will call ‘linguistic possibilism’. Another way to look at linguistic possibilism is then to acknowledge that such possible worlds are reflected in linguistic expressions of possibility – and, as we have discussed above, these come in different degrees of detachment and allow for a cline. Next, in terms of Lewis (1979), there are centered possible worlds that allow for representing the *de se* perspective. Or, more recently, in terms of Roberts (2014), there are doxastic centres.²⁰ My modal theory of temporality fits well in this picture in that degrees of modal detachment correspond to such degrees of detachment from the doxastic centre. Such clines of relevant modal expressions point to what we call linguistic degree possibilism. Now, on the level of complex concepts, linguistic degree possibilism corresponds to linguistic degree eternalism: degrees of epistemic modal commitment are parallel to the degrees of commitment to a temporally located eventuality as assessed from a doxastic centre (*de se* perspective).

In the previous version of this argument (Jaszczolt, 2016b) I did not attend to the *de se* perspective. I also used a short-cut which I now think ought to be avoided. In order to proceed further in the defence of DQ, I made the following

[20] After Quine. See also the discussion in Stalnaker (1981).

assumption. I adopted a version of descriptive metaphysics (Strawson, 1959): the assumption that properties of reality (ontological distinctions) can be accessed through the analysis of the ways of speaking about them. Then, in terms of my contextualist ideology, this would mean that metaphysics can be read of lexical, grammatical, and pragmatic means of speaking about reality (which I call *PRAGMATICISED DESCRIPTIVE METAPHYSICS*). In terms of the current discussion, this would be a view that the ways we speak about reality reveal the concepts we form of reality, which in turn reveal properties of reality itself (viz. $time_L$ illuminating $time_E$ illuminating $time_M$). This allowed me to propose that once we have provided an argument for the degree-based analysis of $time_L$, we can proceed to the degree-based $time_M$ in that the degree-based linguistic expression of psychological time ($time_E$) takes us straight to the degree-based reality of time and as such to DQ. And this would conclude the proof: $time_M$ is graded just as $time_L$ is graded.

This argument uses some intuitively as well as theoretically plausible assumptions. In addition, since it ends up with quantitative differences between temporal orientations, it is compatible with B-theory for ‘real time’ ($time_M$) and as such with the special theory of relativity. But this is not the path we will take in the current analysis. We have accepted that $time_E$ can be read off $time_L$ with the proviso that the latter is understood in terms of the lexicon/grammar/pragmatics trade-offs. But with respect to $time_E$ and $time_M$, we will reverse the direction of analysis and assume that it is $time_M$ as understood by modern physics that has to be the starting point, precisely in order to see whether $time_E$ reflects its properties.

To repeat, at this point of our argument we have to address the question: Is there a path from degree possibilism to degree eternalism, where the latter (by our initial assumption) would allow us to assume gradability of time reference as it is proposed in DQ? A simple solution would be to say that one of the contributing factors for grading possibilities is their time: events remote in time are more likely to be poorly remembered or forgotten, events planned for the remote future can be planned with a higher degree of vagueness and lower predictability, and so forth. Although this temporal factor in the acceptability of events will interact with other factors, it is a factor nevertheless and is clearly graded. If so, then we end up with the same conclusion: degree-based temporal reference (for the purpose of our argument portrayed here as degree eternalism) can be read off degree-possibilism and DQ is upheld without invoking the properties of $time_M$.

But having now reversed the explanans and the explanandum and settled for proceeding from $time_M$ to $time_E$, analogous to the common practice of proceeding from $time_L$ to $time_E$, we can do more than merely replace one step in our argument with a new independent one. We can also actively use this reversal in order to see how far it takes us. While any detailed scientific discussion

of time_M lies beyond the remits of this paper and beyond the expertise of its author, the topic is touched upon in Section 5, where we discuss the meaning of modality vis-à-vis the $\text{time}_L/\text{time}_E/\text{time}_M$ distinction.

The next step is to ask whether DQ and MC enjoy equal theoretical status. If we discover that there is a possibility of reducing one to the other through logical argumentation, then we obtain our desired result: one, well-justified theory of temporal reference in language and in thought. To repeat, the putative MC relegates to the composition of meaning in context the entire task of the mapping of the quantitative differences (in modality) on the level of conceptual atoms onto the qualitative (temporal) differences on the level of conceptual complexes. This would have to mean that while we think in terms of qualitatively different concepts of the past, the present, and the future, these are underlyingly just degrees of modality that information from the situation to which temporal reference is indexed converts, so to speak, into such concepts. How this influence of contextual information executes this categorization remains relegated to a mysterious ‘magic box’. We could possibly use the move we employed in the revised argument for DQ that took us away from descriptive metaphysics and argue that time_M provides the foundation for time_E . In particular, the direction of time_M , notably the entropy of the closed system, paralleled by the direction of time_E , notably the fact that what is anticipated becomes experienced and then is retained as remembered (that is, that the future becomes the present and then the past), point towards the lack of symmetry between the past and the future: time is equally asymmetrical on the metaphysical and the epistemic level. However, the asymmetry does not yet mean that we ought to accept MC. It merely means that in DQ it is the value associated with the degrees that will surface on the level of complex concepts as the values ‘past’, ‘present’, or ‘future’ (as well as various conceptual subcategorizations thereof, evidence of which we found in natural languages and exemplified in Section 2). Looked at from this perspective, MC appears to be easily reducible to DQ: just as in MC we have to invoke some pragmatics-rich composition of meaning to perform the ‘magic box’ classification of what looks quantitative on the level of conceptual atoms into three different qualities, so, in DQ, we have to invoke the lexicon, grammar, and the context to specify the value of the index on the quality of the commitment. In other words, in DQ, it is the lexicon, grammar, or pragmatics that provide the value which corresponds to the qualities. In the following section I show how my modal theory achieves this for the purpose of semantic representation of temporal reference.

4.3. REPRESENTATION OF TEMPORAL REFERENCE

In order to formally represent temporal reference performed through the employment of lexical, grammatical, or pragmatic means, I employ an adapted version of a sentential operator of Acceptability proposed by Grice (2001),

who used it in his unfinished attempt to subsume different kinds of modality under one concept and offer to them a uniform semantic analysis. In the version adopted in my theory of Default Semantics (DS), it is an operator on so-called merger representations: proposition-like constructs that have the status of mental representations. Merger representations are representations of the meaning of the main, intended primary speech act of a Model Speaker as recovered by the Model Addressee.²¹ Since this primary meaning can be conveyed directly or indirectly, merger representations are not restricted by the logical form of the uttered sentence but instead build on information provided by various linguistic and non-linguistic sources of meaning identified in the theory – information that is processed through the interaction of various types of processes identified in the theory. Meaning so understood often goes beyond the meaning conveyed by the sentence but, unlike on less radical contextualist accounts, it is not restricted to the development or modification of its logical form: in some contexts it overrides it. Merger representations thus have the status of semantic representations that enjoy psychological reality. Such merger representations *qua* conceptual structures are compositional by methodological assumption, but compositionality is not predicated here of linguistic structures or even of modified (developed, enriched, modulated, and so forth) linguistic structures, but rather of conceptual entities. Temporality is accounted for by means of an acceptability operator on these structures. My modified acceptability operator is indexed for the degree of commitment to the situation captured by the merger representation. This degree is reflected in the subscript Δ , annotated for the value that comes from the grammatical, lexical, or pragmatic indicators of time – as in the DQ solution summarized above. All in all, this gives us the representation such as $\text{ACC}_{\Delta}^{\text{TP}} \vdash \Sigma$ that reads ‘it is acceptable to the degree pertaining to the regular past that it is the case that Σ ’, where Σ stands for a merger representation.

Where tense and temporality coincide, DS adopts the referential analysis of tense used in DS’s mother theory, DRT (Kamp & Reyle, 1993, after Partee, 1973). But since the objective of DRT is to represent sentences in discourse (albeit accounting for pragmatic presupposition and other pragmatics-driven information), while DS models speech acts, DRT relies on grammatical tense to a much greater extent than DS, which shifts the assumption of compositionality to the level of conceptual structures. Since DS represents temporality on the level of the conceptual *qua* semantic structure where time is tensed, it appears to be compatible, on the level of information, with the

[21] Default Semantics models discourse meaning that is processed according to rules of conversational interaction and as such does not account for cases of miscommunication caused by a faulty assumption or faulty recognition of intention pertaining to one or more of the sources of information. See Jaszczolt (2005, 2010, 2016a).

operator analysis of time (Prior, 1967): our acceptability operator on merger representation indexed for tense_E (which may but need not coincide with tense_L) has obvious conceptual parallels with Prior’s sentential operators for the past and the future. It presents the outcome of the processing of temporality to be recovered from different aspects of the situation of discourse, and as such belongs to the surface, molecular level where time, rather than its conceptual modal epistemic building blocks, emerges as a complex concept.

Figure 1 contains a merger representation for the sentence *The Prime Minister resigns* in the context as in (15), selected in order to demonstrate how the DS-theoretic analysis caters for tense–time mismatches. As in DRT, on whose language the language of DS is modelled, the first row contains discourse referents and the subsequent rows discourse conditions. In DS, square brackets contain the material on which the type of process indicated by the index that follows the bracket operates.

- (15) This is what happened last week. People go to the polls. The results of the referendum are announced. The Prime Minister resigns. ...

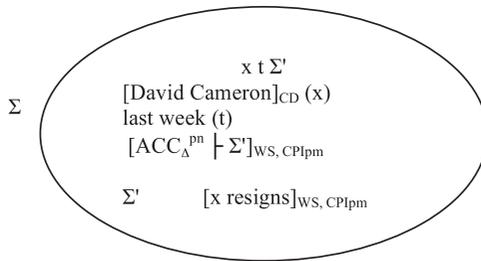


Fig. 1. Σ for ‘The Prime Minister resigns’ as uttered in the context of (15).

CD stands for cognitive default: the process that attends to the information coming from the strength of intentionality of the mental state corresponding to the utterance, translated as the level of informativeness associated with the construct. For example, a definite description has, in virtue of CD alone, a referential interpretation (here: David Cameron), unless other sources and processes intervene. WS stands for ‘word meaning and sentence structure’, that is, information coming from the linguistic construct, and CPI_{pm} for Gricean inference – called here conscious pragmatic inference indexed for primary meaning.²² It is CPI_{pm} that overrides the default present-time reference of the present tense in this context.

[22] Note that in DS, the primary/secondary meaning distinction cuts across the explicit/implicit distinction in that primary meaning can be conveyed indirectly. CPI can thus be active in deriving primary (CPI_{pm}) as well as secondary meanings (CPI_{sm}). On arguments for this construal see Jaszczolt (2009b).

To sum up, in this section I have presented the core characteristics of the DS-theoretic approach to representing time_E as expressed through time_L . They consist of the theory of temporality as supervenient on epistemic modality, leading to the assumption of the universality of the conceptual modal building blocks, the DQ view of the relation between the building blocks and the complex temporal concepts, and the semantic representation of temporal reference using an acceptability operator on merger representations indexed for degrees and annotated with a value coming from the lexicon/grammar/pragmatic consortium. I exemplified this radically contextualist semantic analysis with an utterance that displays a tense–time mismatch where reference to different types of processes that cooperate in producing a merger representation accounts for this mismatch. What remains is to address the question of this modal supervenience vis-à-vis the M, E, and L levels on which time has been discussed here and for which a degree-based theory was defended.

5. L, E, M, and detachment

In Section 4.2 we made a methodological decision to reject descriptive metaphysics and instead treat (i) expressing temporal reference in natural language (time_L) and real time as understood in mathematical models of spacetime (time_M) as sources of independent evidence for the concept of time (time_E). The rationale behind this assumption is that there is substantial evidence that the way we speak about an aspect of reality is strongly correlated with the concepts that speakers of a language form – to wit extensive research on the surface relativity (i.e., relativity in the neo-Whorfian sense adopted in Section 3) in the conceptualization of space.²³ We have seen that the degrees of epistemic detachment can be read off linguistic expressions as they are externalized there through the lexicon, grammar, or context-driven pragmatic inference and defaults. But what is the ultimate cause of this modality? Is it merely the egocentric perspective on temporality imposed by the observer? Or is there an equivalent in time_M with which time can be correlated? A simple but negative answer would be to follow the terms of the A-/B-theoretic construal and maintain, as we did in Section 2, that reality itself is B-theoretic while the concept of time is tensed, tout court. But this is not the whole answer.

In order to attempt a fuller answer, we ought to ask first whether time_M is perspectival and as such indexical in any relevant sense of these labels.

[23] See, e.g., Pederson, Danziger, Wilkins, Levinson, Kita, and Senft (1998); Levinson (2003); Levinson, Meira, and The Language and Cognition Group (2003); Levinson and Burenhult (2009).

Can the perspectivity and indexicality of time_L and time_E be reconciled with the characteristics of time_M ?

First, we have to remember that perspectivity affects not merely complex temporal concepts but their modal building blocks as well. Just as time is egocentric and indexical, so is the degree of commitment to the truth of a given proposition about an eventuality. The fact that the property of perspectivity is preserved all the way down allows us to shift the discussion of the correlation between the E and the M domains to the level of modal building blocks because the relevant properties are not lost: modal supervenience of time guarantees by definition that both detachment and egocentric perspective belong to the definitional characteristics of time_E .

Now we are in a position to ask about the correlates of graded detachment and perspectivity within the domain of time_M . In the most general terms, the correlate of epistemic modality is metaphysical modality: propositions are known or believed just as eventualities must or can happen. The correlate of the gradation of epistemic possibility would then be the gradation of metaphysical possibility. The latter obeys certain physical laws such as the law of increasing entropy predicted by the second law of thermodynamics. It is also restricted by mathematical models of spacetime where time cannot be explained by a fixed ordering of its units: simultaneity, for example, is on this model relative; events that appear simultaneous from one perspective may appear not synchronized when we vary the movement of the observer.²⁴ In this general sense, time_M is modal, and it is also perspectival in the sense of fitting within the constraints of a mathematical model of spacetime.

The next question to ask is whether the degree-based epistemology is compatible with a degree-based metaphysics. There is no tense_M and no passage of time_M (Mellor, 1998; Le Poidevin, 2007). In order to answer this question one would have to stipulate what the M correlate of such degrees ought to mean. To follow this up would require a different kind of enquiry and very different expertise, but suffice it to say that the cosmological ‘arrow of time’ is a quantifiable concept: the universe expands and expansion can be measured and explained in mathematical terms.

This construal leaves us with two kinds of reductionism. First, in DS, we have performed conceptual reductionism where we reduced semantics to epistemology in awarding semantic status to mental representations.²⁵

[24] See Einstein’s (1920/2010, pp. 25–27) thought experiment summarized in fn 5.

[25] Conceptual reductionism means an analysis of propositions in order to establish which ones “could serve as epistemic warrant” (Sklar, 1981, p. 126). Then, as Sklar points out, naturalistic reductionism draws on conceptual reductionism: “... much of the transition from space and time to relativistic spacetime proceeds by just such an epistemically motivated ‘reductionist’ critique”.

Now we have the option of saying that the concept of time and the reality of time are interconnected in such a way that $time_E$, with its egocentric, perspectival degrees, maps onto $time_M$ with its degrees assigned by the physics of spacetime. Perspectivity can be written into the L and the M levels without disturbing the correlation: on the E level it comes from the egocentric construal of time, and on the M level from the models of spacetime. And where we have the correlation, we can look for further reduction to the level of properties of reality. But while we can be fairly certain that the correlation between concepts and their linguistic expression ($time_E$ and $time_L$) has the same source, to complete the reductionism we would have to say that the source of this conceptualization is the reality itself: the human concept of time is what it is because real time is what it is. By rejecting descriptive metaphysics we opened up this issue for discussion. But by focusing on egocentric perspectivity we pointed out that the issue is not so simple: memories, experiences, anticipations, and the strength of commitment are likely to have their sources both in reality and in the temporally finite human ego. Phenomenologists emphasized the latter but less has been done in philosophy of time by way of a search for correlations between the egocentric perspective and the cosmological perspective. The latter is worthy of more attention because finiteness of the human life and human mental architecture are, after all, part of a bigger picture. The theory of temporality as modality presented here may have its roots at a deeper level than the well-researched $time_L/time_E$ interface would suggest. But, while flagging the possibility of reductionism, we are far from having a theory of this kind of supervenience.

6. Conclusion: in search for the inalienable essence of time

In human life, time passes; humans have a vivid, useful, and productive concept of passing time. I put forward a view that this concept of time is not primitive but rather is composed of simple, atomic concepts that reflect knowledge and beliefs – degrees of epistemic modality. I have also argued that this degree-based view is compatible with the metaphysics of time on which there is no time passage. If we pursue neo-Whorfianism about time further, we have to admit that the modal building blocks of the temporal concepts are either salient or can be brought to salience. Does it mean that the inalienable essence of the concept of time is the detachment from certainty? In the domain of the REPRESENTATION of time, the degree-based modal concepts do indeed constitute the inalienable essence. However, by virtue of the optional surfacing in consciousness, they cannot be assigned this status in the domain of the EXPERIENCE of time. But they are fairly robust there, as we can glean from the clines of commitment, lexicalized or grammaticalized

in language, with which we talk about not only future but also past and present events. They are also robust when we consider that the experience of duration is subjective and varies with emotions and evaluation of events among other factors; that we have the aptitude to juggle different timelines associated with different roles we play in life; and add to it the synthetic rather than analytic view that humans have of their lives: we are not able to partition life into objectively delineated events, nor are we able to say where the present moment begins or ends – to wit the important role that has to be assigned to the concept of the specious present. Next, it also appears that some form of modality permeates all three relevant levels: L, E, as well as M. The overall tentative conclusion then has to be that basic epistemic modal concepts together with the *de se* perspective allow us to represent reality as if it was tensed_M, but only so because time_M of spacetime models is itself intrinsically metaphysically modal.

I will conclude with a quotation from a great historical novel, *War and Peace*. In his analysis of causes and effects of the Napoleonic wars, Leo Tolstoy observes that one method of analyzing historical change

“... consists in taking an arbitrary series of continuous events and examining it separately from others, whereas there is not and cannot be a beginning to any event, but one event always continuously follows another.” (Tolstoy, 1869/2007, p. 822)

This leads historians to investigate smaller and smaller units in striving for truth. But, he continues, varying the size of the event comes with varying the perspective from which it is observed; the degree to which perspective permeates the account is inversely proportional to the generalization over individuals, until we reach the entirely egocentric perspective on events. The fact that we can opt for more finely grained or more coarsely grained perspectives means that the perspectives and the fineness of grain are, as Tolstoy emphasizes, arbitrary. It also means that what we see as a causal link can in fact only be superimposed when this arbitrary partitioning into events is already decided upon. In reality, we are “in the middle of a shifting series of events” where “[i]mperceptibly, moment by moment, an event is carved into its meaning” (p. 825).

Leaving aside debates over the adequacy of different visions of history, what matters for us here is the importance of the perspective from which temporality is predicated: this perspective appears to be invariably dynamic and arbitrarily varying with respect to the unit of time, and (as it appears) a fortiori varying on the scale from the individual to the collective. In short, time and perspective, where the latter manifests itself in the construction of units and the assignment of properties and attitudes to them as captured by our $ACC_{\Delta}^n \vdash \Sigma$, are intrinsically linked on the level of linguistic and conceptual structure – and so, arguably, on the DS-theoretic account adopted

here, on the level of semantic *qua* conceptual structure, all without any adverse effect on what we would have to take metaphysical time itself to be. Epistemic modal building blocks appear to be an adequate and justified way to understand both this complex concept and what it stands for.

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