

for: P. Stalmaszczyk and K. Kosecki (eds). *Philosophy of Language and Linguistics: The Cognitive Turn*. Frankfurt: Ontos Verlag.

## Time as degree of epistemic commitment<sup>1</sup>

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*Abstract:* The article addresses the question as to whether *time* is a primitive concept or rather is composed out of conceptually more basic building blocks. After a brief analysis of tense-time mismatches with examples from English, Polish, Thai and Swahili, I present a hypothesis that time is conceptualized in terms of degrees of epistemic modality. Expressions with future, present and past reference are ordered on scales of epistemic commitment. I demonstrate that the theory of Default Semantics has no difficulty with representing tense-time mismatches in that it reflects the fact that information about temporality is conveyed via a variety of processes, some of them pertaining not to the processing of the lexicon or grammar but even to pragmatic inference. The theory also gives support to the thesis of time as modal detachment.

*Keywords:* temporality, conceptualization of time, epistemic modality, contextualism, Default Semantics

### 1. The concept of time: Basic questions

The human concept of time has intrigued philosophers and linguists probably ever since philosophy began and yet it is still a controversial issue. One of the fundamental questions is whether *time* is a primitive concept or rather is composed out of conceptually more basic building blocks. In what follows I address this question at some length and proceed to a proposal of a semantic representation of temporal expressions that supports my hypothesis of the modal basis of temporality.

Linguistic semantic theories of temporality, as well as temporal logics, are usually classified by referring to the distinction between the so-called A theory and B theory proposed over a century ago by a Cambridge philosopher J. E. McTaggart (1908). According to the A theory, events themselves are characterised by temporality; they move, so to speak, from the future to the present and from the present to the past and there is real, genuine change in the world. According to the alternative view, called B theory, there is no real change and time is only a psychological category. Events are all equally real and are ordered on the earlier-than/later-than axis. In other words, on the B theory, time is the property of the observer rather than the events. McTaggart presents these two options in terms of the A- and B-series:

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<sup>1</sup> This paper further develops the ideas first published in my *Representing Time* (Jaszczolt 2009a). I owe thanks to the participants of the PhiLang 2009 conference held at the University of Łódź for their comments on my talk and to Tadeusz Ciecierski for our follow-up discussion on supervenience.

‘...I shall speak of the series of positions running from the far past through the near past to the present, and then from the present to the near future and the far future, as the A series. The series of positions which runs from earlier to later I shall call the B series. The contents of a position in time are called events.’

McTaggart (1908: 111).

Arthur Prior’s (e.g. 1967, 1968, 2003) tense logic is founded on the A theory, and so are some current cutting edge philosophical and semantic accounts of temporality (see Ludlow 1999 and in progress; Smith 1993; Brogaard 2006; also Parsons 2002, 2003, and for discussion Tallant 2007; Farkas 2008). However, the majority of formal semantic accounts espouse the B series whereby time, or passing of time, is not a property of the world but of the perception of relations between events, to mention only Reichenbach’s (1948) seminal and widely employed (e.g. by Steedman 1997) account in terms of speech time, event time and reference time; recent approach by Le Poidevin (2007) benefitting from Mellor (1998); or the temporal relations in Discourse Representation Theory (Kamp and Reyle 1993; Kamp *et al.* forthcoming) and its offshoots (e.g. Asher and Lascarides 2003; Jaszczolt 2005, 2009b).<sup>2</sup>

McTaggart states that both theories lead to the conclusion that time is unreal: if time is a property of events, we still have to *assume time* in order to say that events move ‘in time’, i.e. from the future towards the past. Moreover, no event can be at the same time future, present and past, so time has to be assumed. If time is a property of observers, it is unreal in virtue of being a psychological entity and, moreover, the concepts *earlier-than* and *later-than* themselves presuppose time. Be that as it may, time is unreal *tout court*. Perhaps, we could say after Husserl (1928), time is a form of, or a property of, consciousness: we remember events, experience or perceive them, and anticipate them – or, in Husserl’s terms, there is retention (memory), primal impression (perception), and protention (anticipation). Or, to refer to McTaggart again,

‘Why do we believe that events are to be distinguished as past, present, and future? I conceive that the belief arises from distinctions in our own experience.

At any moment I have certain perceptions, I have also the memory of certain other perceptions, and the anticipation of others again. The direct perception itself is a mental state qualitatively different from the memory or the anticipation of perceptions.’

McTaggart (1908: 127).

This view of psychological time is clearly associated with the finiteness of human life – the idea developed later in Heidegger’s *Being and Time* (1953): we are all born and we all die, and these events mark the boundaries of the human experience of time.

At this juncture, it is pertinent to ask: if this line of reasoning is to be adopted and time is unreal, that is there is no *real*, ontological time in the sense of flow and change, and all there is, is human *experience* of time, then how are we to begin to describe this experience, or how are we to define the concept of time? Is it a primitive, innate, indefinable concept, or is it a complex concept which is theoretically reducible to other simple, primitive concepts? In the terms of properties of consciousness, we can formulate this question using *supervenience* discussed in Section 4: can there be a

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<sup>2</sup> For philosophical arguments in favour of the B theory see e.g. Mozersky 2001 and Oaklander and White 2007. For a selection of views on the philosophy of time see Le Poidevin and MacBeath 1993.

supervenience relation between the temporal properties and some other, more basic properties? Is there evidence for such a reduction in the domain of epistemology?

Evidence pertaining to epistemology is likely to come from natural language semantics and this is where we begin. To put it simply: if there is evidence that humans speak about time using inherently non-temporal terms, then there is thereby substantial evidence in support of the thesis that humans think about time in terms of more basic concepts. Lexicalised and grammaticalised concepts are the best place to start – but we shall not shun ‘pragmaticised’ concepts either, that is evidence from pragmatic inference in discourse.

## 2. Language/concept mismatches<sup>3</sup>

Under the label ‘language-concept mismatches’ we shall look at examples of tense/time mismatches, examples where there is no overt marking of time, such as tense, aspect or temporal adverbial, in a sentence, and finally we shall look at the expression of temporality in a contrastive, cross-linguistic perspective and address and tackle some interesting language-specific temporal markers, addressing the question of the underlying conceptualization.

It is a common feature of discourse across a variety of languages that a seemingly inappropriate tense is used to mark temporal reference, often seemingly clashing with the temporal adverbial. For example, a future event can be referred to by means of present tense forms in English, as in (1) and (2), where the use of the forms is called respectively ‘tenseless future’ (after Dowty 1979) and ‘furate progressive’.

- (1) Tom plays football tomorrow afternoon.  
 (2) Tom is playing football tomorrow afternoon.

Similarly, in Polish, we can express futurity by means of present tense forms as in (3) which is a translation of (1) or (2).<sup>4</sup>

- (3) Jutro            po            południu            Tomek            gra            w  
 tomorrow        after        noon            Tom            play 3SgPres    in  
  
 piłkę.  
 ball

These forms are not used to fill the gap in the system; futurity-marked equivalents in (4)-(6) are readily available and also in common use.

- (4) Tom will play football tomorrow afternoon.  
 (5) Tom will be playing football tomorrow afternoon.  
 (6) Jutro            po            południu            Tomek            będzie grał    w  
 tomorrow        after        noon            Tom            be+play 3SgFut in  
  
 piłkę.  
 ball

<sup>3</sup> Throughout this section, I use ‘time’ to mean the human concept of time.

<sup>4</sup> Throughout this paper, in the word-for-word translation I provide grammatical information only where it is relevant for the discussion.



put them on a flat board,

- c. wa-**ka**-ya-telemesha maji-ni kwa utaratibu w-ote...  
*3Pl-Cons-3Pl-lower* water-*Loc* with order *3Pl-all*

and lowered them steadily into the water...'

(from Givón 2005: 154).

- (18) Ni-**ta**-kwenda soko-ni, ni-**ka**-nunua ndizi.  
*1Sg-Fut-go* market-*Loc* *1Sg-Cons-buy* bananas.

'I will go to the market and/to buy some bananas.'

(from L. Marten, *p.c.*).

When *-ka-* follows a present or past tense form, it is translated as a marker of the order of narration (which, of course, by a general rule of rational conversational behavior mirrors the order of events<sup>7</sup>), normally *and*, as in (17). When it follows a future-tense marker, it may acquire an additional sense of causation: *so as to*, *in order to*, *so that*, as in (18). In each case it is a, so to speak, 'chameleon' expression, adjusting its temporal reference to that of the preceding temporal marker. The closest we come to this phenomenon in English is probably the use of Past Perfect to mark the relation of temporal precedence. This phenomenon exemplifies yet another type of a mismatch: this time it is a mismatch between the seemingly universal concept of consecutivity and the devices used to render it in different languages, ranging from a fully independent consecutive sense in Swahili, through the, so to speak, 'temporally ordered past' in English, to no marker in, for example, contemporary Polish:

- (19) Tomek studiował w Warszawie zanim podjął pracę w  
 Tom study *3SgPast* in Warsaw before accept *3SgPast* job in  
 Poznaniu.  
 Poznań

But sequence marking is more complex than tense marking for one simple reason: while we can safely assume that time is a universal category, although some languages or some constructions in some languages fail to mark it overtly, consecutivity is a less obvious candidate for a universal concept. So, while in the case of Thai we can safely claim that there is a concept/expression mismatch, in the case of consecutive tense we could perhaps equally plausibly appeal to linguistic relativity. On the other hand, perhaps, we could not: let us remember that the order of events can also be conveyed lexically (*and then*, *next*, *later*, *subsequently*,...) or left to pragmatic inference – be it from a Gricean maxim (Grice 1975: 27) 'Be orderly', Levinsonian heuristic (Levinson 2000: 32) 'What is simply described is stereotypically exemplified', or the rhetorical structure rule of *Narration* from Segmented Discourse

<sup>7</sup> See Grice 1975; Asher and Lascares 2003.

Representation Theory (Asher and Lascarides 2003: 7) which says that ‘the event described by the first proposition temporally precedes that of the second’. In virtue of this reasoning, its claim to universality is considerable; the concept is normally lexicalized, sometimes grammaticalized as in Swahili, and, arguably, in the cases where there is no overt marking, it is always inferable pragmatically as the default interpretation.

To sum up, it is diaphanous from this set of examples that time can be expressed in natural languages in a variety of ways, and on a most general distinction, it can be expressed lexically, grammatically, or through pragmatic inference. Under the latter category we also allow the possibility of default interpretations where conscious inference does not in fact take place. We can also see that various properties of temporality are brought to the forefront: temporal location with reference to the speaker, temporal relation inherent between events, complemented by, on a different typology, the degree of probability or epistemic commitment on the part of the speaker. These interim conclusions will become our premises (P) for further argumentation. This is, on a very rough sketch, how it will proceed: (P1) time does not exhibit a one-to-one correspondence with temporal expressions in natural languages; (P2) time seems to be interwoven with degree of commitment; (P3) primitive concepts are not expected to exhibit mismatches or such interdependence; hence tentative conclusion (TC) Time is not likely to be a primitive concept; and a useful directive (D) the relation between time and degrees of epistemic commitment should be further investigated. The latter is the task to which I now turn, with an aim in view to shed more light on TC.

### 3. Temporal expressions: A motivated choice

It is common knowledge that in English, like in many other languages, there exist different means to convey each of the three temporal locations, namely the past, the present, and the future. For example, each of (20)-(25) conveys pastness, using different grammatical solutions to do so.

- (20) Lidia went to a concert yesterday.  
(*regular past*)
- (21) This is what happened yesterday. Lidia goes to a concert, meets her school friend and tells her...  
(*past of narration*)
- (22) Lidia would have gone to a concert (then).  
(*epistemic necessity past*)
- (23) Lidia must have gone to a concert (yesterday).  
(*epistemic necessity past*)
- (24) Lidia may have gone to a concert (yesterday).  
(*epistemic possibility past*)
- (25) Lidia might have gone to a concert (yesterday).  
(*epistemic possibility past*)

The language system does not suffer from redundancy though: the choice of types of expressions to refer to the past is triggered by the choice of the degree of probability that the speaker intends to convey. In other words, it is triggered by the degree of epistemic commitment to the eventuality (on our classification: state or event) that the sentence concerns. As I argued in detail in e.g. Jaszczolt 2009a, these degrees form a

cline which, depicted as the decreasing order of commitment, can be graphically represented as in Fig. 1. We are interested here in relative degrees and hence no attempt at providing numerical values and exact marking on the scale is made.<sup>8</sup> The abbreviations *rp*, *pn*, *enp*, and *epp* stand for regular past, past of narration, epistemic necessity past, and epistemic possibility past respectively.

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<sup>8</sup> The viability for such numerical values would have to be tested independently through corpus-based analyses but this task is tangential to our current theoretical objective.

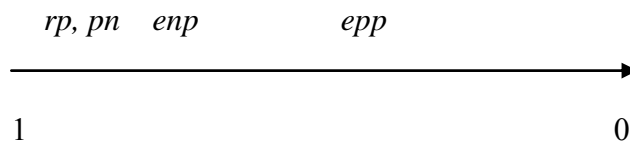


Fig. 1: Cline of epistemic commitment for selected types of expressions with past-time reference

Analogously, sentences (26)-(30) exemplify ways of referring to the present in English and Fig. 2 graphically represents the degrees of epistemic commitment they convey. Letter *n* in *rn*, *enn* and *epn* stands for *now* (in order to differentiate the abbreviations from those for the past *p*).

- (26) Lidia is at a concert now.  
(*regular present*)
- (27) Lidia will be at a concert now.  
(*epistemic necessity present*)
- (28) Lidia must be at a concert now.  
(*epistemic necessity present*)
- (29) Lidia may be at a concert now.  
(*epistemic possibility present*)
- (30) Lidia might be at a concert now.  
(*epistemic possibility present*)



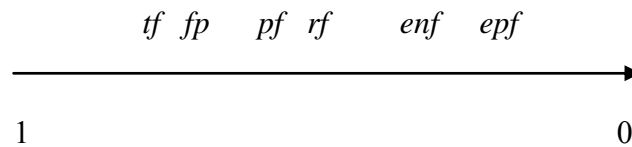


Fig. 3: Cline of epistemic commitment for selected types of expressions with future-time reference

It has to be noted that degrees of epistemic *commitment* can easily be represented on a reversed scale as degrees of epistemic *detachment*. Detachment, on its part, pertains to the epistemic modality. The role of modality in the concept of time, conceptualized as commitment/detachment, is the topic of the following section.

#### 4. Time as epistemic modality?

The gradation of epistemic commitment presented in Section 3 takes us part of the way towards an answer to the question of reductionism posed at the beginning of this investigation: Is the concept of time reducible to some more basic concept? Is the understanding of temporal expressions reducible to the understanding of some other components of an act of communication? One has to consider here three different domains: epistemology, semantics, and pragmatics, where, *pace* Frege, the latter allows for psychological explanations.<sup>9</sup> Assuming that evidence from linguistic semantics sheds light on the murky realm of conceptual properties, I shall start here with the linguistic semantic property of temporality and the connection with the epistemic, and also briefly ontological, domains. I shall leave the pragmatic question until Section 5 in which the contextualist stance (Recanati 2005; Jaszczolt 2005; Preyer and Peter 2005) and in particular its merger of semantics with pragmatics will allow us to address utterance processing.

In semantics, we have a clear association of temporal expressions with the gradation of epistemic modality. In epistemology, we have time as perception, memory of perception, and anticipation of perception. Without risking any missing steps in reasoning, we can plausibly juxtapose these two domains and hypothesize that gradation applies to both: just as there are degrees of detachment from the truth of the sentence, so there are degrees of certainty of perceptions: the certain here and now, and the scale of strong and weak memories, as well as strong and weak predictions/anticipations. It seems prudent to invoke at this juncture the tool of supervenience:

‘A set of properties A supervenes upon another set B just in case no two things can differ with respect to A-properties without also differing with respect to their B-properties. In slogan form, “there cannot be an A-difference without a B-difference”.’  
McLaughlin and Bennett (2005: 1).

<sup>9</sup> I argued for the importance of psychological explanations in pragmatics in Jaszczolt 2008.

Supervenience is not ontological dependence and hence it is not a relation of ontological priority. It is a weaker relation that may just do the job we need for our linguistic task of representing temporal expressions in a cognitively plausible theory.

Employing the tool of supervenience in the domain of temporality is not a new idea. Sattig (2006) presents the view of logical supervenience of *psychological time*, (or: ‘ordinary time’, past, present and future), on the *physical time* (an element of four-dimensional space-time). The idea is this: an object occupies various so-called regions of space-time which are not temporally extended (i.e. are punctual). Then the perceived *persistence* of objects supervenes on their spatiotemporal location. Likewise, the perceived *becoming* supervenes on an atemporal instantiation in such punctual regions of space-time. The consequences of this proposal are not to be underestimated since if supervenience of psychological time on real time is logically possible, then this view is in effect established as the hypothesis most worthy of pursuing – in view of Hawking’s (1988, 2001) exposition of the convergence of the arrows of time.

In the context of the findings from the preceding sections, we are mainly going to employ the idea of supervenience for a different purpose though. On the one hand, what is frequently pursued in psychology and philosophy is supervenience of the *concept of time* on *space-time* – that is, properties of the concept of time supervene on properties of space-time. On the other hand, what emerges from our earlier analysis is supervenience of the *concept of time* on the *concept of epistemic detachment* – that is, temporal properties supervene on modal properties. In other words, temporality is conceived of as graded departure from certainty, where certainty pertains to a subset of ‘here and now’ – a subset, because, as we could see from the examples of expressing the present, even within that domain there is room for gradation.

## 5. The contextualist semantic representation

For a theoretical linguist, the crowning of the thesis that time is reducible to modality has to be identifying or constructing a semantic theory that upholds this conclusion and, moreover, demonstrating that this semantic theory is methodologically sound and cognitively plausible. Natural languages provide plenty of evidence for the gradation of commitment to eventualities, be it past, present or future. The clines we sketched for some examples of English sentences in Section 3 have their equivalents in other languages. Here we have to qualify this statement by clarifying that the theoretical stance we are adopting is that of contextualism in semantics and pragmatics. Contextualism is an orientation in post-Gricean research according to which the analysis of sentence meaning takes us only part of the way towards the recovery of the truth-conditional content of utterances. It is assumed here that truth conditions are predicated of utterances, or thoughts, and that pragmatic inference or, on some views, also some form of default enrichment, completes the process. The effect of this pragmatic process has recently been referred to as *modulation*: the logical form becomes modulated as a result of pragmatic inference and the entire semantic/pragmatic product becomes subjected to the truth-conditional analysis (see e.g. Recanati 2004, 2005). Clines have their cross-linguistic equivalents but we have to allow for a variety of ways of conveying temporality in order to faithfully represent these equivalents. These ways cover lexical, grammatical, but also pragmatic means, the latter realised as contextual inferences or default assumptions. These pragmatic processes are free from syntactic constraints. According to some authors, this means that there are no syntactic ‘slots’ in the logical form of the sentence which guide the pragmatic process of inference or automatic enrichment

(e.g. Recanati 2004, 2005). According to others, the freedom from syntactic constraints goes further: the truth-conditional content of the utterance can be independent of the logical form of the sentence *tout court*; it need not pertain to its development or enrichment but may even override it (e.g. Jaszczolt 2005, 2009a, b; Sysoeva 2009).

Before we proceed further, the above question as to how radical this modulation can be has to be resolved. In other words, we have to take a stance on the question as to whether the truth-conditional content pertains to the developed logical form (where the development is not restricted to syntactic slots), or rather it pertains to *any* amendments of the logical form of the sentence, including the substitution of an entirely different form if the main meaning intended by the speaker and recovered by the addressee is indirect. In (38), the development of the logical form would amount to, say, (38a), while the main meaning which is entirely free from the syntactic constraint is exemplified in (38b) and (38c).

(38) Everybody is going to Egypt this spring.

(38a) All of the speaker's close friends and family are going to Egypt this spring.

(38b) Egypt seems to be a popular holiday destination among the people the speaker knows.

(38c) The interlocutors should consider going on holiday to Egypt this spring.

In relevant experimental studies, when asked about the 'main meaning', 'main message' or 'what is said' by the speaker, informants frequently select an unconstrained interpretation of the type of (38b) or (38c) across a wide range of categories of utterances.<sup>10</sup> This fact undeniably signals that the category of main meaning, or primary meaning as it is called in Default Semantics (Jaszczolt, e.g. 2009a, b), deserves a status of a suitably psychologically supported theoretical construct. In other words, instead of cutting the pie of utterance meaning into the logical form of the uttered sentence plus the developments of the logical form plus the implicatures, the cognitively real and experimentally supported division should be that into the main, primary meaning and secondary, subsidiary meanings. Needless to say, this distinction cuts across the explicit/implicit boundary (see Jaszczolt 2009c) but since the main meaning is often communicated indirectly, this is no surprise and certainly not a complication.

The primary meaning so understood is modelled in Default Semantics as the so-called merger representation ( $\Sigma$ ). Merger representations collect information from various linguistic and extra-linguistic sources, classified in the theory as (i) world knowledge, (ii) word meaning and sentence structure, (iii) situation of discourse, (iv) properties of the human inferential system, and (v) stereotypes and presumptions about society and culture.<sup>11</sup> They are formed through the interaction among various processes, identified as (a) composing meaning out of words and structure (WS), (b) conscious pragmatic inference from situation of discourse, social and cultural assumptions, and world knowledge ( $CPI_{pm}$ ), (c) cognitive defaults (CD), and social, cultural and world-knowledge defaults ( $SCWD_{pm}$ ). The subscript 'pm' stands for

<sup>10</sup> See e.g. Nicolle and Clark 1999; Pitts 2005; Sysoeva and Jaszczolt 2007; Sysoeva 2009.

<sup>11</sup> See e.g. Jaszczolt 2009a, b for examples and definitions.

‘pertaining to primary meaning’, to distinguish these processes from SCWD and CPI pertaining to secondary, less salient messages that are also conveyed by most utterances and that are produced as a result of such processes (SCWD<sub>sm</sub> and CPI<sub>sm</sub> respectively). I have given graphic representation of merger representations for a wide range of temporal expressions in English elsewhere (e.g. Jaszczolt 2009a) and will now confine the exposition to one case of a tense-time mismatch in Polish, in order to exemplify and further support the concept of primary, constraint-free meaning. Sentence (3), repeated below, shows the use of the present tense form ‘gra’ to convey future-time meaning.

(3)	Jutro	po	południu	Tomek	gra	w
	tomorrow	after	noon	Tom	play 3SgPres	in
	piłkę.					
	ball					

The output of the interaction of various processes identified in Default Semantics gives us precisely what we want: the meaning of futurity which overrides the grammatical form of the verb. On this analysis, instead of a mismatch between the temporal adverb and the form of the verb we talk about the result of the interaction. What was classified as a problematic meaning for the grammar (our WS), is not problematic on the level of the merger representation ( $\Sigma$ ); the interaction of WS with CPI produces the required result. In Fig. 4, the oval shape stands for the merger representation for sentence (3) and the subscripts stand for the types of processes operating on the material in square brackets.  $\Sigma'$  stands for the linguistic equivalent of the atemporal eventive content of ‘going to the concert’. The representation also shows how temporality is conceptualized as degrees of epistemic detachment or modality. ‘ACC’ stands for the operator on  $\Sigma'$ , which can be roughly compared to a sentential operator (in that merger representations are proposition-like mental constructs), and the subscript  $\Delta$  stands for the degree. The superscript *tf* stands for the use of the present as tenseless future, i.e. pertaining to strong possibility resulting from reliable planning or prediction. The condition

$$[ACC_{\Delta}^{tf} \vdash \Sigma']_{WS, CPI_{pm}}$$

then reads ‘it is acceptable to the degree pertaining to tenseless future (tf) that Tom’s playing football is the case’ – and this information is derived from the interaction of the process of the construction of sentence meaning from word meaning and sentence structure (WS) and conscious pragmatic inference (CPI<sub>pm</sub>). This is how our earlier clines of epistemic detachment/commitment are translated into the concept of a modal operator and its degrees of strength.

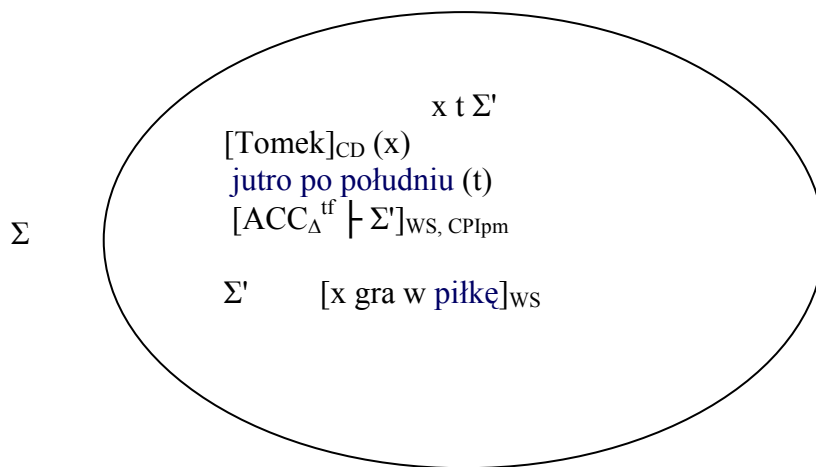


Fig. 4: Merger representation for sentence (3)

## 6. Concluding remarks

My objectives in this paper were to demonstrate that (i) temporality may not be a primitive concept but instead can be viewed as degrees of epistemic commitment to the state of affairs expressed in the proposition; (ii) temporality may be viewed as supervening on modality; (iii) tense-time mismatches are not an exception but can be easily accounted for when compositionality is sought at the level of the merger of information ( $\Sigma$ ) provided by various sources and via different processes as identified in Default Semantics. The cross-linguistic application of this idea is exemplified by an instance of the tense-time mismatch in Polish.

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