

# Temporal frames of reference

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## 1. Introduction

Do people understand time in the same way across languages and cultures, or is our understanding of time culturally specific? On the one hand, anthropologists have often emphasised differences between the ways cultures interpret time (see Gell, 1992, and Munn, 1992, for reviews of the literature). On the other hand, some of the problems that conceptions of time address must be addressed by humans in all environments: human life is finite all around the globe, and humans live in groups which need to coordinate their activities. Maybe then there is some cognitive bedrock of thinking about time that is the same across languages and cultures?

One way of finding out is to look for universals in the way people across languages *talk* about time (Bloch, 1989). But although the anthropology of time is a vast research field with a long history, a systematic *linguistic* anthropology of time is less developed than one might expect (Levinson, 2004). This chapter discusses possibilities of making one aspect of such a linguistic anthropology of time more systematic. In particular, I will discuss possible heuristic contributions that typologies of *spatial* frames of reference might make to typologies of *temporal* frames of reference.

The observation that in English and many other languages the vocabulary used to talk about the location of objects in space is also used to talk about the location of events in time has attracted considerable interest (Clark, 1973; Fillmore, 1997 [1971]; Jackendoff, 1983; Lakoff, 1993). More recently, the *universality* of such vocabulary sharing has been hypothesised within the framework of Conceptual Metaphor Theory (Lakoff & Johnson, 1999). Within this framework, cross-linguistic studies assess the presence in the studied language(s) of metaphorical models such as TIME IS SPACE

(Radden, 2003), TIME AS SPACE (Yu, 1998), or TIME PASSING IS MOTION (Ahrens & Huang, 2002).

These studies have begun to provide semantic evidence for universals in the cognition of everyday time to supplement the abundant anthropological evidence for diversity in time cognition in ritual contexts (Bloch, 1989; Senft, 1996). However, these studies have also highlighted methodological problems. Global models such as TIME IS SPACE or TIME PASSING IS MOTION need to be qualified and specified before they can be appropriate frameworks for typological research, but such qualifications and specifications have not been systematically made. These models need to be qualified because, as they stand, they might suggest that abstract English concepts such as *time*, *space*, or *motion* are universally relevant, which they clearly are not. The contexts in which the word 'time' is used by speakers of English are diverse; although some of these contexts might be universally relevant, others are unlikely to be (Evans, 2004). Furthermore, these models need to be specified, because they are so general that constructions with diverse functions can be used as evidence for, for example, a TIME IS SPACE model. Taken together, the cross-linguistic irrelevance of terms such as 'time', 'space' and 'motion', and the generality of the proposed models, can lead to research that mirrors the unfortunate model of research into the universals of 'colour' terms: constructions with diverse functions are forced into a framework that has no validity for the languages studied (Saunders, 1995; Wierzbicka, 1996). As far as research on 'spatial time' is concerned, this global approach has indeed led to the formulation of universals on a rudimentary empirical basis. After all, nearly all of the languages in which the polysemy of spatiotemporal lexemes has been studied are spoken by urban speakers in industrialised societies (such as Chinese, English, Japanese, Turkish). Rare exceptions are Malotki's (1983) study of Hopi time, Moore's

(2000) study of spatial metaphors for time in Wolof, and Nuñez and Sweetser's (Nuñez & Sweetser, 2006) study of Aymara. The anthropological literature, in turn, contains many studies of time in non-industrialised cultures (Munn, 1992). However, the linguistic descriptions provided in these studies are usually not very detailed. Models such as TIME PASSING IS MOTION might be inappropriate as a framework for a linguistic anthropology of 'spatial time'. Some framework, of course, is necessary if we want to draw any (cross-linguistic) generalisations. The more detailed our framework, the better our chances that we describe genuine cases of conceptualisation rather than researcher-induced artefacts (Lucy, 1997). With this in mind, I want to suggest here that existing typologies of spatial frames of reference can help making useful conceptual distinctions for a semantic typology of 'spatial time'.

In the remainder of this introduction, I will briefly describe a distinction between two *kinds of time* commonly used in the philosophy of time. Further, a typology of *spatial frames of reference* will be briefly introduced. It will then be the aim of the main body of this chapter to bring the two together in developing a typology of temporal frames of reference that is detailed enough to serve as a framework for cross-linguistic investigation and generalisation.

### ***The A-series and the B-series of time***

What is time, anyway? In order to make sense of diversity across languages and cultures, we first need to have a good grasp of what we assume to be the universally experienced aspect of the world that English speakers refer to when they employ the word "time". Philosophical answers to this question can be categorised into two broad groups: The 'A-series' view of time and the 'B-series' view of time. This

classification can be traced back to the philosopher McTaggart (1908), and it has been taken up more recently by Gell (1992) in his anthropology of time. The brief discussion in this section is based on Gell's work.

Time can be thought of as a series of events. But what exactly is it about events that gives them a temporal quality? Some philosophers argue that events constantly change their status, from belonging to the future to belonging to the present to belonging to the past. Time is this constant change in the status of events. The series of events constituting time conceived of in this way is referred to as *A-series time*, and theorists arguing that time is the flux of events from futurity through presentness into the past are referred to as *A-series theorists*. Other philosophers argue that events never change their status; they do not 'become' and 'fade', but simply 'are', like beads strung together on a necklace. Time, on this view, is the set of relations of anteriority and posteriority holding between events. The series of events constituting time conceived of in this way is referred to as *B-series time*, and theorists arguing that time is a never-changing network of anteriority/posteriority-relations are referred to as *B-series theorists*.

We hence end up with two kinds of time: the time of our subjective experience, for which future events have a different meaning than past events (the A-series), and the network of events as they objectively occur, quite independently of our interest or lack of interest in them (the B-series). Philosophers debate which of these characterisations reveals the ontological reality of time. A-series theorists argue that the A-series captures the ontological reality of time: futurity is an intrinsic property of future events, and pastness is an intrinsic property of past events. B-series theorists argue that the B-series is ontologically real: events occur when they occur; futurity

and pastness are assessments which we bring to events due to our active orientation towards the world.

The distinction between an *A-series* and a *B-series* of time originates from a metaphysical debate, i.e. the question which ‘kind’ of time is ‘basic’ and ontologically real. Of course, the aim in this chapter is not to settle or even enter into metaphysical debates, but to provide a framework for comparing the semantics of everyday time reference across contexts. The distinction between A-series and B-series is only useful in the current context if it can be translated into different types of everyday time reference.

Intuitively, it does seem that we make a distinction between the two kinds of time – the A-series and the B-series – in our everyday life. The A-series is what we experience as we coordinate our everyday activities and grapple with the finiteness of our existence. The B-series is the real-world foundation for a culture’s inventory of event-types embodied in calendars. Furthermore, the future-present-past stream of the A-series and the before-after chain of the B-series are expressed using different vocabularies, both of which are also employed for talking about spatial relations. The A-series is the kind of time grammaticalised in many languages in the category of tense, which in many languages is marked by morphemes derived from motion verbs corresponding to English ‘come’ and ‘go’ (Bybee, 1994; Traugott, 1978). Also, consider the following expressions of A-series time:

- (1) a. I have a fun afternoon in front of me.  
You have a hard week behind you.
- b. I am looking forward to tomorrow.  
I look back at my childhood.

In (1a), events are marked as being in the experiencer's future or past by placing them in front of the experiencer or behind him, respectively.<sup>1</sup> In (1b), the experiencer's active orientation towards events in the future or in the past is expressed using perception verbs: In the perceptual field in front of the experiencer, future events can be anticipated, in the field behind the experiencer, past events can be scrutinised. Notions of *front* and *back* are also used to talk about anteriority/posteriority relations (the B-series of time), however, using different expressions in English:

(2)

- a. The 21<sup>st</sup> April is before the 22<sup>nd</sup> April.  
Thursday comes after Wednesday.
- b. We'll meet in the week following Easter.  
Tuesday is ahead of Wednesday.

It is an unchanging quality of the 21<sup>st</sup> of April that it occurs before the 22<sup>nd</sup> of April (within the year), and it is an unchanging quality of Thursday that it occurs after Wednesday (within the week). The time at which I make the statements in (2a) does not matter for the interpretation of the temporal reference – i.e. it is a reference to B-series time. In these examples, a form historically expressing the spatial relation *front* is used to express the temporal relation *anteriority*, and a form historically expressing

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<sup>1</sup> This chapter discusses only one aspect of the complex ways in which the temporal structures of events are communicated, and the example utterances are kept simple to avoid some of these complexities. In terms of Klein's (1994) approach to the communication of temporal relations, we deal here only with temporal relations between time intervals in TSIT, the 'time of the situation' talked about. The complex relations between TSIT, 'topic time' (TT) and 'temporal anchor' (TA) of the speech event are beyond the scope of this chapter. But these complexities at least need to be acknowledged. Thus, in an utterance like '*Once, I had a great future in front of me*', we might still say that 'front' expresses *futurity* within TSIT, but tense and the temporal adverbial 'once' establish TT as lying in the past relative to TA, the time of the speech event.

the spatial relation *back* is used to express the temporal relation *posteriority*. While *before* and *after* express static relations, the same conceptualisation of ‘spatial time’ can be conventionally expressed in English with terms expressing relations in motion events: In (2b), the posteriority relation of the meeting to Easter is expressed by locating it ‘behind’ Easter using the form *following*, and the anteriority relation of Tuesday to Wednesday is expressed by locating it ‘in front of’ Wednesday using the form *ahead of*.

Intuitively, and on the basis of some suggestive data as discussed above, it seems that the distinction between two kinds of time is cognitively real for speakers of English. For the purpose of this chapter, it will be assumed that both the experiencer-centred understanding of time as a series of future, present, and past events, and the experiencer-independent understanding of time as a series of before/after relations between events are universal temporal experiences. Furthermore, we have seen that in both contexts concepts of *front* and *back* are involved (at least historically) in temporal conceptualisation in English. The distinction between A-series and B-series might therefore be of value for a typology of temporal frames of reference. However, the characterisations provided in the philosophical and anthropological literature to explain how people make temporal sense of these event-series are not precise enough for our purposes. A-series time is characterised as a *stream* of events going past the experiencer. B-series time is characterised as a static *chain* of events (Gell, 1992). While these metaphors are suggestive, they are hardly a good basis for cross-linguistic comparison. We need a more precise language to address our question: Where does the association between the ideas of *front* and *future* in the case of A-series reference, and *front* and *anteriority* in the case of B-series reference come from? More



specifically: what exactly is the analogy between locating objects in space and locating events in time? To answer these questions, we first need to find out what the logic of the reference systems is which are used to locate objects in space.

### *Spatial frames of reference*

Three frames for locating objects and places in space are commonly used across languages: The *intrinsic* or *ground-based* frame of reference, the *absolute* or *field-based* frame of reference, and the *relative* or *projector-based* frame of reference (e.g., Levinson, 2003; Talmy, 2000).<sup>2</sup> The brief description in this section is based mainly on the work of Levinson (1996a; 2003).

Spatial frames of reference are constituted by three logical entities: the object to be located (the *figure*), an object with a known location which is used to locate the figure (the *ground*), and an object which determines the search space to be projected from the ground (the *origin of the coordinate system*).

In the *intrinsic frame of reference*, ground and origin are conflated: the ground object is also the origin of the coordinate system. For example, *The computer is in front of me* locates the computer using an intrinsic frame of reference. ‘I’ am the referential ground, and the asymmetry of my body also determines what is to be understood by the relator *front*, i.e. how the search space is to be projected from me. Asymmetric inanimate objects are also often thought of as having intrinsic *fronts* and *backs*. An utterance such as *The bike is in front of the house* can be understood in this way. The *front* of an inanimate object is often the side that people canonically interact with. In the case of *houses*, the *front* side would typically be the side facing the street, where

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<sup>2</sup> Levinson and his research group distinguish between intrinsic, absolute, and relative frames of reference, while Talmy has introduced the distinctions between ground-based, field-based, and projector-based reference. These terms overlap to a large extent and can, for present purposes, be treated as synonymous. To minimize confusion I will employ the terminology of intrinsic, absolute, and relative frames of reference.

the door to the house is located. Intrinsic frames of reference take diverse forms across languages, but the logic of an intrinsic frame of reference seems to be universally used to locate objects in space. The reason for this might be that intrinsic frames of reference are relatively simple: because ground and origin are conflated, reference within an intrinsic system requires the understanding of only a *binary* relation (Levinson, 1996a,b).

In the *absolute frame of reference*, the environment in which the ground object is located provides a field which is organised in such a way that it can be used to determine a search space; the environment here constitutes the origin of the coordinate system. Familiar examples are the cardinal points *north*, *west*, *south*, and *east*. The utterance *Hamburg is north of Bielefeld* is comprehensible because the cardinal directions provide a grid running across the globe (and through Bielefeld, the referential ground). But the environment used for absolute reference can also be more concrete and localised. For example, a bowling lane can provide an absolute origin. Suppose a team of weak bowlers have only managed to toss the bowls about half-way towards the pins. Bowls lying still do not have intrinsic fronts, so I cannot use an intrinsic frame of reference to locate a particular bowl in relation to another one. Still, I can refer to the blue bowl lying *behind* the red bowl, meaning that it is further away from the pins. Due to its directedness, the lane can serve as the field (or origin) of reference. Finally, absolute origins can also be temporary: in the utterance *John is behind Mary in the queue*, the directedness of the queue determines how the relator *behind* is to be understood (Talmy, 2000).

In the *relative frame of reference*, an observer constitutes the origin of the coordinate system. The speaker's coordinates *front*, *back*, *left* and *right* are projected onto the referential ground. The details of this projection differ across and within languages.

For example, the speaker's coordinates can be 'reflected' from the ground, as if the ground object was another observer 'facing' the actual observer. The utterance *The ball is in front of the tree* is understood in this way: the ball is *between* the tree and the observer, the tree's *front* is the side 'facing' the observer. However, in other contexts, the projection involves not *reflection* but *translation*, where the orientation of the observer is 'carried over' onto the ground object: A ball *to the left of* the tree is to the left from the observer's point of view, not from the point of view of an observer 'reflected' in the tree.

## **2. Temporal frames of reference**

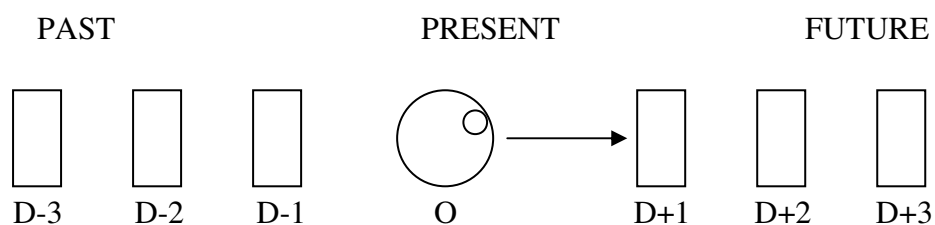
Do analogous *temporal frames of reference* exist? Can the technical terms as elaborated in work on spatial conceptualisation be of heuristic value in the description of space-time analogies used for temporal reference across languages? In this section, I aim to develop a typology of everyday (spatio-)temporal frames of reference on the background of the philosophical distinction between the A-series and the B-series of time.

### ***Locating events in A-series time***

'A-series' time is the subjective experience of a constant change in the status of events, from their futurity to presentness, to pastness. The futurity or pastness of an event can conventionally be expressed in English by placing the event *in front of* or *behind* the experiencer respectively, as in (1) above, repeated here:

- (1) I have a fun afternoon in front of me.  
You have a hard week behind you.

As we can now see, these utterances locate events within an intrinsic frame of reference. The defining feature of intrinsic frames of reference is their binary structure (Levinson, 2003): A figure entity is located in relation to a ground entity, and the ground is also the origin of the coordinate system. From *meetings*, through *afternoons* and *years*, to a whole *life*, events of varying regularity and temporal scope can conventionally be referred to as lying *in front of* us or *behind* us in English. It seems that for speakers of English, large-scale time intervals (such as *days*, *seasons*, *the duration of the world*) are abstracted from the actual environment as an additional, imaginary ‘landscape’ on which events can be (quasi-)visualised.<sup>3</sup> The conceptualisation of large-scale temporal intervals as a landscape affords the use of a viewer-centric, *relative frame of reference* for the localisation of events. The relative frame of *spatial* reference locates an object with respect to the ground from the point of view of an observer. With respect to the location of events in time, some authors have proposed that expressions such as *the day after tomorrow* are understood in a relative frame of reference (Radden, 2003, p. 12). Radden illustrates the spatial logic of this expression with the following figure:



D-3 – D+3: Days  
 O: Location of the observer at day 0

<sup>3</sup> It may be that in cultures where vision is not conceptualised as the most central modality in the acquisition of knowledge (see Evans & Wilkins, 2000) concepts of temporal intervals as a ‘landscape’ are less relevant.

Figure 1. A vision-based understanding of temporal relations (adapted from Radden, 2003)

The blocks in figure 1 symbolise days, and the *day after tomorrow* is the one ‘behind’ the one the observer is ‘looking’ at, *tomorrow*. In other words, *tomorrow* is the (primary) referential ground, the speaker’s *now* is the origin of the coordinate system. The deictic nature of *tomorrow* surely supports a relative reading in Radden’s example, but the present argument should apply also to *the day after Tuesday*. This relation can be understood in a relative, quasi-visual manner, if it is understood that I am talking about a particular *future* Tuesday.<sup>4</sup>

The function of using a relative frame of reference to locate events in A-series time might be that it allows more preciseness when talking about large-scale time intervals beyond the *now* than the intrinsic frame of reference and deictic expressions do. When talking about plans for the immediate future, we are more likely to use a deictic expression without a frame of reference: We would say *I’ll send this e-mail in a moment* rather than, e.g., *I’ll send this e-mail 20 seconds before a minute has passed*. However, in time-scales which go beyond the *now* (a border that is itself likely to vary across cultures, within and across language communities), simple deictics are not very useful: *I’ll get some crisps before the match* is a more relevant information than the deictic *I’ll get some crisps in 3 hours’ time*.

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<sup>4</sup> The quasi-visual conceptualisation of future time in English is further illustrated by the use of visual perception verbs in conventional expressions such as *I’m looking forward to the time after Easter*.

### *Locating events in B-series time*

The B-series of events is the time of anteriority/posteriority relations. While events arise in and fade from the field of our experience, their temporal relations to all other events never changes. In English, the words ‘before’ and ‘after’ express relations of anteriority and posteriority respectively. Let’s take a closer look at the example just used:

(3) I’ll get some crisps before the match.

Example (3) can be understood in a *relative*, quasi-visual manner, as discussed in the preceding section. When a future ground event (‘match’) and the observer ‘face’ each other as in a canonical encounter, a figure event (‘getting crisps’) between the ground event and the observer is ‘in front of’ the ground event. The temporal relation between crisps-getting and match in (3) might therefore be understood in a way that is analogous to the spatial reference in *The ball is in front of the tree*.

However, in a relative frame of reference the origin of the coordinate system is the observer. A spatial scenario anchored in an observer is incoherent with the observer-independent nature of relations in B-series time. If it was the case that we could understand expressions such as *I’ll get some crisps before the match* only in an observer-centred manner, it would mean that we could not express the observer-independent nature of B-series time. But this is implausible: we can easily be aware of the unchanging anteriority of the crisps-getting event relative to the match. The question is therefore whether the temporal relation between getting crisps and watching a match in (3) is *necessarily* understood in a relative manner.

In their work on the use of spatial frames of reference, Levinson and colleagues have employed rotation tasks to distinguish between different frames of reference (Levinson, 2003). Would it be possible to use an analogue of such rotation tasks to find out what kind of coordinate system is used in temporal reference? In order to do this, we would need to refer to the same figure-ground relation from the opposite temporal perspective.

Suppose, then, that I want to refer to the figure event in (3) in relation to the same ground event a day later. ‘Looking back’ onto the same events, I now say:

“Yesterday, I got crisps \_\_\_\_\_ the match”. If we understood the temporal relations between these events in an observer-anchored manner, the correct word to fill the gap would now have to be “after” or another expression of *behind*-ness, because the figure event (getting crisps) is now no longer between the match-watching event and me.

However, the correct word to fill the gap remains “before”.<sup>5</sup>

This suggests that temporal relations between *past* events are understood in English employing a coordinate system that is *independent* of the observer, and while temporal relations between *future* events can be understood in a relative manner, they, too, should be understandable in an experiencer-independent way. In other words, the spatial logic of the temporal reference in *I’ll get some crisps before the match* might be ambiguous. While deictic cues such as future tense and adverbials such as ‘tomorrow’ might prompt a relative understanding, non-finite expressions (*I always get crisps before a match*) might prompt an experiencer-independent understanding.

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<sup>5</sup> Of course, we might argue that the spatial meaning of “before” is not relevant in this case, and that the relevant meaning is, say, “earlier than  $X_{\text{ground}}$ ”. However, the next question then becomes: why has “before” acquired the general meaning “earlier than  $X_{\text{ground}}$ ” rather than “temporally between *now* and  $X_{\text{ground}}$ ”?

But how do speakers locate events ‘in front of’ (‘before’) other events in an observer-independent frame of reference? One possibility is that speakers make use of an intrinsic frame of reference in these contexts (Bender, Bennardo, & Beller, 2005; Yu, 1998). When locating objects in space in English, expressions of *front* (“in front of”) and *back* (“behind”) can be used in this way. For example, the spatial reference in *He is sitting in front of the TV* in most situations is intended in its intrinsic, rather than relative interpretation. Spatial reference in an intrinsic frame of reference is independent of the position of the observer: the referential ground object constitutes the origin of the coordinate system.

In order to locate events in time in an intrinsic frame of reference where the observer’s *now* is not part of the referential scene, we would need to be able to identify the search interval in which the figure event (*getting crisps* in (3)) takes place on the basis of intrinsic features of the ground event (*watching a match*). Can an event have an intrinsic front? The fact that this sounds like a funny idea should not deter us from entertaining the possibility. After all, the notion of *intrinsic front* is problematic also when applied to objects: The front side of a TV is not really intrinsic to the physical object, but determined by the way people canonically interact with TVs (Levinson, 2003).

It could be that the conceptualisation of events as ‘moving’ suffices to assign a *front* side to them. Consider symmetrical objects: Like events, balls do not have intrinsic fronts. Nevertheless, when a ball is rolling, we easily assign a *front* and *back* based on the direction of motion (Fillmore, 1997 [1971]; Svorou, 1994); thus, football players run *behind* a ball. Similarly, events in B-series time might be conceptualised as a train, with each cabin representing an event (Yu, 1998). Irrespective of the position of an observer, the first cabin, defined by the direction of motion, will always be in front



of the second one; similarly, anterior events always remain ‘in front of’ posterior ones. This account suggests that by invoking the idea of ‘moving events’ we can understand the space-time analogy in an expression like *I always get crisps before a match* within a binary figure-ground frame, i.e. in an intrinsic frame of reference. Ultimately, intrinsic temporal reference might be based in quite literally spatial front/back relations: The sun moves across the sky *ahead of* the moon. *Day comes before night, night comes after day*, and *one day comes after the other* might be the clearest cases of such motion-based intrinsic temporal reference.

But is it plausible to assume that speakers of English conceive of the events in *I always get crisps before a match* as moving? This seems counterintuitive, and, to be sure, it is not evident from linguistic data. While it is conventional to speak of calendaric event types (*Christmas, spring*) and other event types that are part of a natural cycle (*the evening, the morning*) as *coming* and *going by*, the same is much less felicitous when applied to singular events (*?The match is coming*). A more prudent account might be to suggest that *I always get crisps before a match* is understood in an absolute frame of reference, with the *day* as the origin of the coordinate system. The *before* relation means that the *crisps-getting event* is closer to the beginning of the *day*, the implicit secondary reference interval, than *the match*, the primary reference event. Conventionalised intervals, such as the *day*, provide a directed field for such absolute reference, in analogy to *people in a queue* (Talmy, 2000). Although the directedness of a queue ultimately derives from the canonical movement towards the goal of this queue, it maintains its directedness even when there is no motion. Similarly, events throughout a day can be thought of as ‘adding

up' one after the other at their specified dates<sup>6</sup> along the temporal field much like people forming a queue do, rather than as moving like bowls rolling one behind the other on a bowling lane. Such a 'motionless' account is advantageous also because some languages do not seem to use the idea of objects moving through space to think about temporal relations between events (Bohnmeyer, 1997). However, we would not want to deny speakers of such languages the ability to speak or even think about unchanging relations in B-series time.

Absolute reference to sequentiality relations does not require the speaker/hearer to specify a particular directedness of the field along which events are located. However, such directedness is necessary when communicating visually, rather than vocally, about (B-series) time, e.g., in co-speech gesture. In cultures with a writing system, the direction seems to be imported from the relevant conventions of using visual media, such as written language or comics. For example, speakers of Spanish assume by default that events displayed on the left side of a computer screen happened earlier than events displayed on the right side of a computer screen (Santiago, 2005). Arabic speakers asked to arrange objects representing a day's activities on a plane arrange these from right to left (Tversky, Kugelmass, & Winter, 1991). Speakers of Mandarin produce downwards gestures when talking about a time in the afternoon (irrespective of whether it is the afternoon of the same, a future, or a past day), and upwards gestures when talking about the morning.<sup>7</sup> With respect to the question of the metaphoricity of temporal understanding, it is important to bear in mind that such

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<sup>6</sup> The term 'date' as used here derives from the philosophy of time (see Gell, 1992). It refers to the real-world spatio-temporal coordinates of an event, and does not imply the existence of a calendar, as the everyday use of the word 'date' does.

<sup>7</sup> I am only aware of anecdotal evidence for this so far. However, the association between up-down relations and anteriority-posteriority relations in Mandarin is also evidenced in conventional expressions, such as "shang-ban-tian", literally upper-half-day, meaning "morning; forenoon" (Yu, 1998, p. 110).

figurative specifications of temporal ‘directions’ are not part of the conceptual structure employed in thinking for speaking, but of that employed in thinking for gesturing, i.e. in a visual medium of communication, which is by necessity one big ‘spatial metaphor’.<sup>8</sup>

### **3. Temporal frames of reference and other generalisations**

Probably the most widely used generalisations in the study of space-time analogies across languages are the Moving Time and Moving Ego metaphors, first introduced by Clark (1973) and Fillmore (1997 [1971]). These two models have been reformulated in various ways, as TIME PASSING IS MOTION OVER A LANDSCAPE, TIME PASSING IS MOTION OF AN OBJECT, and the further generalisation TIME PASSING IS MOTION (Lakoff, 1993). In the Moving Time model, time is viewed as a “highway consisting of a succession of discrete events” that are “moving past us from front to back”. In the Moving Ego model “we are moving along [time], with future time ahead of us and the past behind us” (Clark, 1973, p. 50). Both of these models thus describe the A-series of time. In terms of the frames of reference introduced here, both models involve an intrinsic (or possibly relative) frame of reference, and combine this with the idea of motion – either the motion of events, or the motion of the experiencer. However, while such models might indeed be operative for speakers of English, it is usually not possible to conclude this from linguistic data. Temporal reference often employs motion

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<sup>8</sup> The claim that temporal relations between events beyond immediate future can be understood in an absolute as well as a relative manner is currently based on intuition and linguistic data. It should be possible to obtain independent evidence by operationalising co-speech gesture. Speakers of English and related languages tend to make left-to-right gestures when talking about sequences in B-series time, but they produce forward gestures when talking about sequences in A-series time. If event sequences which are part of a speakers time plan are conceptualized in a ‘visualised’, relative way (such as the tasks on a given day), but event sequences not relevant to personal time planning (such as, maybe, daily routines) are located in a field-based frame of reference, speakers’ co-speech gestures should differ across these two contexts.

constructions, as for example in the utterance *the evening is coming*. This is a deictic reference which does not employ a frame of reference. Temporal reference also often does employ frames of reference, for example the intrinsic one in the utterance *I have a great evening in front of me*. But it is not common to talk of time as *moving* past the experiencer *from front to back* (?*A great evening is coming in front of me*). In cross-linguistic research, it would be more prudent to treat these two examples as different types of temporal reference rather than as evidence for one general TIME PASSING IS MOTION model. Such generalisations are better treated as complex models, i.e. as combinations of several more fundamental conceptualisations. Evidence for such complex models must be sought in non-verbal data.

Some authors have proposed to distinguish two frames of reference used for locating events in time: an ego-based or ego-reference-point (ego-RP) frame and a time-based or time-reference-point (time-RP) frame (Moore, 2000; Núñez & Sweetser, 2006).

This terminology might be somewhat unclear in so far as there are two reference points (or reference intervals) in temporal reference: a primary one, the ground, and a secondary one, the origin of the coordinate system (Talmy, 2000, Levinson, 2003).

The explication in Núñez & Sweetser (2006) suggests that the reference point they have in mind is the primary reference point, or ground of reference. If the RP in the suggested distinction between ego- and time-RP is to be understood as the primary reference point, the English examples discussed in this chapter should be classified as follows:

<i>ego-RP (ego=primary RP)</i>	<i>time-RP (event=primary RP)</i>
I have a fun afternoon in front of me	The 21 <sup>st</sup> April is before the 22 <sup>nd</sup> April

-	Wednesday is after Tuesday
	One day comes after the other
-	The day after tomorrow
-	I'll get some crisps before the match
-	I always get crisps before a match

Table 1. The primary reference point as the basis for classification

This classification seems wrong. It is the explicit aim of Núñez & Sweetser (2006) to separate reference to subjective past or future from reference to anteriority/posteriority relations. In this respect, *Wednesday is after Tuesday*, which describes sequentiality, should not be in the same category with *The day after tomorrow*, which refers to the speaker's future.

It seems to me that what Núñez & Sweetser (2006) actually have in mind is a distinction that is similar to the one between the A-series and the B-series in the philosophy and anthropology of time. If this is correct, the reference point in question would be the secondary reference point, or the origin of the coordinate system. The English examples discussed in this chapter would then fall into the two categories as follows:

<i>ego-RP (ego=secondary RP)</i>	<i>time-RP (event=secondary RP)</i>
I have a fun afternoon in front of me	The 21 <sup>st</sup> April is before the 22 <sup>nd</sup> April (RP=month)
The day after tomorrow	Wednesday is after Tuesday (RP=week) One day comes after the other (RP=day)
I'll get some crisps before the match	I always get crisps before a match

Table 2. The secondary reference point as the basis for classification

The distinction between the A-series and the B-series, or between types of secondary reference points as conceived in table 2, is an important one, the lack of which has led to a confusion of (A-series) *past* with (B-series) *anteriority*, and *future* with *posteriority* in earlier research (see the next section). However, as a typology of systems for locating events in time it is less powerful than the distinction between the intrinsic, relative, and absolute frame of reference. In this classification, *I have a fun afternoon in front of me* and *I'll get some crisps before the match* are grouped together as the same type of reference. However, they clearly differ in the way they locate events in A-series time. The relative frame of reference allows more specific reference to the temporal location of events in A-series time beyond the *now*. The price for this is an increase in cognitive complexity: while the intrinsic relator 'in front of' specifies a binary relation, the relative relator 'before' specifies a ternary relation. Similarly, the statement that *Wednesday is after Tuesday* is only true within the absolute frame of the week, whereas the reference *one day comes after the other* probably makes use of an intrinsic frame of reference.

Ultimately, it seems that frameworks that are based on the quality of a particular reference point run into problems. In this chapter, I have argued that it might be better to use a typology that is based on types of coordinate systems. In sum, the classification that I propose looks like this:

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<i>A-series</i>		<i>B-series</i>	
I have a fun afternoon in front of me	Coordinates: intrinsic Origin: speaker PRP: speaker	One day comes after the other	Coordinates: intrinsic Origin: day PRP: day

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You have a tough week behind you	Coordinates: intrinsic Origin: addressee PRP: addressee	Wednesday is after Tuesday	Coordinates: absolute Origin: week PRP: Tuesday
I'll get some crisps before the match	Coordinates: relative Origin: speaker PRP: match	I always get crisps before a match	Coordinates: absolute Origin: day PRP: match
The day after tomorrow	Coordinates: relative Origin: speaker PRP: tomorrow		

Table 3. Temporal frames or reference

The distinction between experiencer-centred (A-series, ego-RP) and experiencer-independent (B-series, time-RP) time *together* with a typology of frames of reference that are used to construct these ‘kinds’ of time provide a reasonably fine-grained framework for the systematic exploration of universals and diversity in space-time analogies.

#### 4. Universals and diversity in spatial time

We are now in a position to discuss how the distinctions made in this chapter can help us to integrate existing data, ask new questions, and formulate hypotheses about universals of spatial time.

Forms expressing spatial relations of *front* and *back* regularly express anteriority and posteriority across languages. Furthermore, it seems that, as in English, expressions of *front* always express *anteriority*, and expressions of *back* always express *posteriority* (Haspelmath, 1997).<sup>9</sup> A few examples are presented in (4-6).

(4)

Kwaio (Keesing, 1991)

(a) na'o-na mae i Gwee'abe

<sup>9</sup> Haspelmath (1997) provides examples of adverbials expressing both temporal and spatial anteriority and posteriority from a sample of 55 languages. He states that “almost all cases” (p. 56) follow this path, but he does not provide an example of a different case.

- 'before the battle at Gwee'abe', literally 'front-of battle'  
 (b) buri-na mae i Gwee'abe  
 'after the battle at Gwee'abe', literally 'back-of battle'

(5)

Hopi (Malotki, 1983)

pam	put	hihin	a-pyeve	tii-ti-wa
that	that	somewhat	he-before <sup>10</sup>	child-CAUS-PASS.PERF

'He was born a little bit before him'

(6)

Wolof (Moore, 2000)

Ci	gannaaw	la	ñów.
LOCPREP	back/behind	NONSUBJ.FOC.3	come.

"At back she came."  
 'She came afterwards'

Temporal relations of sequentiality (B-series time) using the relators *front* and *back* can be understood in an absolute frame of reference, and possibly in an intrinsic frame of reference, if speakers think of events as 'moving'. As in the domain of space, the linguistic data alone do not allow us to decide whether the expressions in (4-6) are understood absolutely or intrinsically. We need additional data sources to answer this question. Unfortunately, the use of rotation tasks, which make it possible to distinguish between spatial frames of reference, has its limits in the domain of time. Alternatively, co-speech gesture might be a valuable source of data, which can answer the question, e.g., whether speakers habitually think of events as moving. Similarly, it seems premature on the basis of our current knowledge to be too sure that all languages use the relators *front* and *back* to express sequential relations. Some languages might not at all explicitly mark anteriority and posteriority relations, relying instead on context and iconicity: the event mentioned earlier happened earlier (Bohnenmeyer, 1997). Furthermore, languages which prefer an absolute frame for

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<sup>10</sup> Malotki (1983) points out that the morpheme *-pyeve* 'before' itself is related to the locative suffix *-ve*, meaning 'before a (moving) object'. According to Malotki (p. 92-93), the antonymic suffixal element *-ngk* 'after a (moving) object' means temporally *after* in a sequence. However, Malotki does not provide an example for this use.



spatial reference based on the movement of the sun might use the same vocabulary to talk about sequentiality in time (*the morning is east of the evening*).

Absolute temporal reference requires that temporal intervals, which provide the secondary ground, i.e. the origin of the coordinate system, be understood as bounded entities, or 'fields'. The fundamental space-time analogy is that between the *beginning* of the unfolding of a temporal interval and a field's *front*. The reason for the possible universality of absolute temporal reference might be that relations within an absolute system remain the same when the 'viewpoint' of the observer changes. In a relative frame of reference, relations between figure and ground change when the observer's viewpoint changes. Of course, for human experiencers it is quite impossible to hold their temporal 'viewpoint' onto the world constant. An absolute frame of reference might therefore be the only viable system for talking about unchanging anteriority/posteriority relations.

Events in A-series time can be located in an intrinsic frame of reference. Could the particular association of an experiencer's *front* with his or her *future*, and an experiencer's *back* with his or her *past*, be universal? There is some ground for entertaining such an assumption. Anthropologists of time maintain that thinking about the *immediate future*, i.e. the work at hand, the time that is still part of the *now* rather than a *then*, is the fundamental context from which societal organisations of time arise (see Gell, 1992). The immediate future is constantly apprehended and enacted in (spatial) practice, e.g., manual work and gaze. It seems plausible enough to think that speakers universally might use their front space symbolically, e.g., for gesture-supported planning of imminent tasks, but we know too little about temporal

cognition across cultures to say. In this context, it is questionable whether we are dealing with a *metaphorical* association between front space and immediate future. After all, the idea that we do actually perceive the immediate future has been discussed at least since Husserl introduced the notion of *protentional consciousness*, which anticipates what lies just at the boundaries of the *now*, the current time interval. In so far as gaze and manipulation are relevant at all for protention, this form of consciousness will be directed to the body's front space.

However, not only the immediate future which is still part of the *now* is conceptualised as being in front of the experiencer in English. Large intervals of subjective time, such as the *future*, also 'lie' in front of us. The orientation towards large time-'scales', such as the relatively abstract English concept of *future* is very different perceptually, conceptually, and linguistically from thinking about *immediate future* – it involves an imaginary 'leap', the abstraction of conventional time intervals as an additional dimension. With relation to such 'larger-scale' temporal concepts, the association of *front* with *future* is not universal. Several authors have claimed that in particular languages and cultures, subjective future is conceptualised as lying *behind* the speaker, whereas past events are in the observer's visual field on a temporal landscape (Alverson, 1994; Clifford, 2004; Dahl, 1995; Klein, 1987; Miracle & Yapita Moya, 1981). The linguistic analyses supporting such arguments are often sketchy, and seem at times to have been misguided due to conceptual confusions between A-series and B-series time (for critical reviews, see Moore, 2000; Núñez & Sweetser, 2006; Shinohara, 1999). However, the analysis by Miracle and Yapita Moya in relation to Aymara has been supported by converging evidence from co-speech gesture research (Núñez & Sweetser, 2006). Núñez and Sweetser found that

Aymara speakers would produce hand gestures forward from their body when talking about past events in the community's history, but would produce gestures towards their back when explicating the meaning of the word *future*.

It seems plausible that the grade of figurativity of a temporal conceptualisation is related to its cultural specificity, such that the more figurative the analogy between spatial and temporal relations, the more restricted it is across cultures. Metaphoric 'leaps' seem to require a strong cultural scaffolding to be successful (see also Evans & Wilkins, 2000; Zinken, 2005). A cultural factor that might contribute to the gestural behaviour of Aymara speakers is the emphasis that is placed on being precise about the source of one's knowledge, which is grammaticalised in Aymara in the category of evidentiality (see Aikhenvald, 2004). When Aymara speakers make a predication, their grammar requires them to mark whether they have seen the reported event themselves or not (Miracle & Yapita Moya, 1981). Since predications about future events are necessarily predictions, they cannot have been eye-witnessed, which might contribute to their being conceptualised as lying behind one's back.

Finally, events in A-series time can be located in a relative frame of reference in English and related languages. Whether this also occurs more widely across languages is impossible to say, because, as in English, the linguistic form alone might not be sufficient to tell whether an utterance is understood in a relative or an absolute frame of reference.

Relative frames of *spatial* reference differ across cultures in the way in which the observer's coordinates are mapped onto the referential ground, as described earlier. In Hausa, this mapping of coordinates involves *translation* whereas it involves *reflection* in English. *The ball is on front of the tree* under a 'translational' understanding means

that it is on the other side of the tree from where the speaker is standing. Temporal reference in a relative coordinate system seems to show analogous diversity (Bender, Bennardo, & Beller, 2005; Hill, 1978). In Hausa, speakers “view a later day of the week as *gaba da* ‘in front of/before’ an earlier one, an earlier day as *baya da* ‘in back/ of after’ [sic] a later one” (Hill, 1978, p. 528). Hill does not specify whether Wednesdays are *always* ‘in front of’ Tuesdays (in which case it would be an expression of ‘B-series’ time, and as such independent from any experiencer, i.e. it could not be an instance of a relative frame of reference at all), or whether this applies only to days in Ego’s future, in which case it is a relative (translational) expression of relations in A-series time. His analysis, though, suggests that the latter is the case.

Why is the future beyond the *now* located in front of us in English and related languages? One factor might be the importance that is placed on the precise planning of one’s (future) time in our culture. The quasi-visual, if only imagined, access that the relative frame of reference imposes on temporal conceptualisation of future supports such planning by providing a ‘space’ that can be used for planning in imagination, and for temporal reference in language and in co-speech gesture. The use of a relative frame of reference converts relations in B-series time (relations of anteriority and posteriority between events) into an imagined space that is subject to personal planning and time-‘reckoning’.

Languages might differ not only in terms of the overall repertoire and the precise characteristics of temporal frames of reference, but also in terms of the preferred frame of reference for a given context. Such differences might exist even between closely related languages. For example, it seems that speakers of German prefer an

absolute frame of reference where speakers of English frequently use a relative frame of reference. When asked to disambiguate the sentence *The meeting planned for next Wednesday has been moved forward two days*, some speakers of English interpret *forward* to mean *later*, as would be expected when using a relative (translational) perspective, whereas others interpret *forward* to mean *earlier*, as would be expected when using an absolute perspective, with the (beginning of the) week as the origin of the coordinate system (McGlone & Harding, 1998). Speakers of German, however, consistently chose the absolute solution (Bender, Bennardo, & Beller, 2005).

These differences might be indicative of a more general preference for viewer-centred time reference in the case of English, and event-centred time reference in the case of German. Stutterheim, Carroll, and Klein (2003) found that speakers of English predominantly chose a viewer-centred strategy when re-telling the events in a short film, in which the film is retold as if it was playing again before the mind's eyes, with new events introduced with a 'and now I see' phrase. Speakers of German, on the other hand, predominantly chose a strategy which meant that they seemed to arrange the events "like a string of pearls" (Stutterheim, Carroll, & Klein, 2003, p. 108) and mark the posteriority of a new event with an 'and then' phrase. Stutterheim, Carroll, and Klein (2003) relate these differences to the grammaticalisation of an 'ongoing' aspect in the English progressive *-ing* form, which is absent in German.

## **5. Conclusion**

In this chapter, I have suggested some conceptual distinctions that might be useful for systematic data collection and analysis in cross-linguistic research on 'spatial time'. The suggested framework integrates previous data and opens a range of new questions: Are anteriority/posteriority relations always understood in an absolute

frame of reference, or can they be understood in an intrinsic frame of reference? Are the A-series and the B-series universal kinds of time, or do contexts of temporal reasoning exist which are constructed as 'A-series' by using a relative frame of reference in one language, but are constructed as 'B-series' by using an absolute frame of reference in another language? What are the relations between types of time intervals (cyclic vs. non-cyclic; 'punctual' moments vs. longer events; events in the immediate future vs. events in the further future vs. events in the past) and the use of different frames of reference? Systematic data from a more varied sample of languages and cultures are needed before we can attempt empirically grounded conclusions about possible universals in the domain of space-time analogies.

The implicit or explicit (Bloch, 1989) assumption in the anthropology of time has been that time reference in everyday contexts, as opposed to ritual contexts studied intensively in the anthropological literature, might display many universalities across languages and cultures. However, everyday life is a complex beast, and to make sure that we compare like with like across languages, we need to distinguish not only experiencer-centred (A-series, ego-RP) time from experiencer-independent (B-series, time-RP) time, but also frames of reference and the contexts in which they operate.

We might find that a relativised 'view' of a temporal landscape stretching out into the future in front of us is not so much a universal and natural feature of human mind, but rather an exotic development in cultures that have developed a strong interest in 'reckoning' and 'telling' time.

## **6. References**

- Ahrens, K., & Huang, C.-R. (2002). TIME PASSING IS MOTION. *Language and Linguistics*, 3(3), 491-519.
- Aikhenvald, A. Y. (2004). *Evidentiality*. Oxford: OUP.

- Alverson, H. (1994). *Semantics and experience: Universal metaphors of time in English, Mandarin, Hindi, and Sesotho*. Baltimore and London: John Hopkins University Press.
- Bender, A., Bennardo, G., & Beller, S. (2005). Spatial frames of reference for temporal relations: A conceptual analysis in English, German, and Togan. In B. G. Bara, L. Barsalou, & M. Bucciarelli (Eds.), *Proceedings of the Twenty-Seventh Annual Conference of the Cognitive Science Society* (pp. 220-225). Mahwah, NJ: Lawrence Erlbaum.
- Bloch, M. (1989). The past and the present in the present. In M. Bloch (Ed.), *Ritual, History and Power: Selected Papers in Anthropology* (pp. 1-18). London and Atlantic Highlands, NJ: The Athlone Press.
- Bohnemeyer, J. (1997). *Yucatec Mayan lexicalization patterns in time and space*. Paper presented at the CLS opening Academic Year '97 '98.
- Bybee, J., Perkins, Revere & Pagliuca, William. (1994). *The Evolution of Grammar: Tense, Aspect, and Modality in the Languages of the World*. Chicago: University of Chicago Press.
- Clark, H. H. (1973). Space, time, semantics, and the child. In T. E. Moore (Ed.), *Cognitive Development and the Acquisition of Language* (pp. 27-63). New York: Academic Press.
- Clifford, J. (2004). Traditional futures. In M. S. Phillips & G. Schochet (Eds.), *Questions of Tradition* (pp. 152-168). Toronto: University of Toronto Press.
- Dahl, O. (1995). When the future comes from behind: Malagasy and other time concepts and some consequences for communication. *International Journal of Intercultural Relations*, 19(2), 197-209.
- Evans, N., & Wilkins, D. (2000). In the mind's ear: The semantic extensions of perception verbs in Australian languages. *Language*, 76(3), 546-592.
- Evans, V. (2004). *The Structure of Time: Language, Meaning and Temporal Cognition*. Amsterdam, Phil.: John Benjamins.
- Fillmore, C. (1997 [1971]). *Lectures on Deixis*. Stanford, Cal.: CSLI Publications.
- Gell, A. (1992). *The Anthropology of Time. Cultural Constructions of Temporal Maps and Images*. Oxford: Berg.
- Haspelmath, M. (1997). *From Space to Time: Temporal Adverbials in the World's Languages*. München: LINCOM.
- Hill, C. A. (1978). *Linguistic representation of spatial and temporal orientation*. Paper presented at the Proceedings of the Fourth Annual Meeting of the Berkeley Linguistic Society.
- Jackendoff, R. (1983). *Semantics and Cognition*. Cambridge, Mass.: MIT Press.
- Keesing, R. M. (1991). *Time, cosmology, and experience*. Unpublished manuscript.
- Klein, H. E. M. (1987). The future precedes the past: time in Toba. *Word*, 38, 173-185.
- Klein, W. (1994). *Time in language*. London: Routledge.
- Lakoff, G. (1993). The contemporary theory of metaphor. In A. Ortony (Ed.), *Metaphor and thought* (Second edition ed.). Cambridge: Cambridge University Press.
- Lakoff, G., & Johnson, M. (1999). *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. New York: Basic Books.
- Levinson, S. C. (1996a). Frames of reference and Molyneux's question: Cross-linguistic evidence. In P. Bloom, M. Peterson, L. Nadel & M. Garrett (Eds.), *Language and Space* (pp. 109-169). Cambridge, MA: MIT Press.

- Levinson, S. C. (1996b). Language and space. *Annual Review of Anthropology*, 25, 353-382.
- Levinson, S. C. (2003). *Space in Language and Cognition. Explorations in Cognitive Diversity*. Cambridge: CUP.
- Levinson, S. C. (2004). Time for a linguistic anthropology of time. *Current Anthropology*, 43(Supplement), 122-123.
- Lucy, J. A. (1997). The linguistics of "color". In C. L. Hardin & L. Maffi (Eds.), *Color categories in thought and language* (pp. 320-346). Cambridge: Cambridge University Press.
- Malotki, E. (1983). *Hopi Time: A Linguistic Analysis of the Temporal Concepts in the Hopi Language*. Berlin: Mouton.
- McGlone, M. S. & Harding, J. L. (1998). Back (or forward?) to the future: The role of perspective in temporal language comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 24, 1211-1223.
- Miracle, A. M., Jr., & Yapita Moya, J. d. D. (1981). Time and space in Aymara. In M. J. Hardman (Ed.), *The Aymara Language in Its Social and Cultural Context* (pp. 33-56). Gainesville, FL: University Presses of Florida.
- Moore, K. E. (2000). *Spatial Experience and Temporal Metaphors in Wolof: Point of View, Conceptual Mapping, and Linguistic Practice*. University of California, Berkeley.
- Munn, N. D. (1992). The cultural anthropology of time: a critical essay. *Annual Review of Anthropology*, 21, 93-123.
- Núñez, R. E., & Sweetser, E. (2006). With the future behind them: Convergent evidence from Aymara language and gesture in the crosslinguistic comparison of spatial construals of time. *Cognitive Science*, 30, 1-49.
- Radden, G. (2003). The metaphor TIME AS SPACE across languages. In C. B. N. Baumgarten, M. Motz & J. Probst (Ed.), *Uebersetzen, Interkulturelle Kommunikation, Spracherwerb und Sprachvermittlung - das Leben mit mehreren Sprachen. Festschrift fuer Juliane House zum 60. Geburtstag*. (Vol. Zeitschrift fuer Interkulturellen Fremdsprachenunterricht 8 (2/3), pp. 226-239).
- Santiago, J. (2005). *Time also flies from left to right*. Paper presented at the First UK Cognitive Linguistics Conference, October 2005, University of Sussex.
- Saunders, B. (1995). Disinterring *Basic Color Terms*: a study in the mystique of cognitivism. *History of the Human Sciences*, 8(4), 19-38.
- Senft, G. (1996). Past is present - present is past: Time and the harvest rituals on the Trobriand Islands. *Anthropos*, 91, 381-389.
- Shinohara, K. (1999). *Typology of space-time mappings*. Unpublished manuscript.
- Stutterheim, C. von, Carroll, M., & Klein, W. (2003). Two ways of construing complex temporal structures. In F. Lenz (Ed.), *Deictic conceptualisation of space, time and person* (pp. 97-133). Amsterdam, PH: John Benjamins.
- Svorou, S. (1994). *The Grammar of Space*. Amsterdam: John Benjamins.
- Talmy, L. (2000). *Toward a cognitive semantics*. Cambridge, MA: MIT Press.
- Traugott, E. C. (1978). On the expression of spatio-temporal relations in language. In C. A. F. E. A. M. Joseph H. Greenberg (Ed.), *Universals of Human Language* (pp. 369-400). Stanford, Cal.: Stanford University Press.
- Tversky, B., Kugelmass, S., & Winter, A. (1991). Cross-cultural and developmental trends in graphic productions. *Cognitive Psychology*, 23, 515-557.



- Wierzbicka, A. (1996). The meaning of colour terms and the universals of seeing. In A. Wierzbicka (Ed.), *Semantics: Primes and Universals* (pp. 287-334). Oxford: Oxford University Press.
- Yu, N. (1998). *The Contemporary Theory of Metaphor: A Perspective from Chinese*. Amsterdam, Phil.: John Benjamins.
- Zinken, J. (2005). *The motion of time across languages and cultures: Explanations for universals and diversity*. Unpublished manuscript.