Complementarity of Space and Time in Motion-Framed Distance

Jacek Tadeusz Waliński¹, University of Lodz, Poland

Abstract

This study demonstrates a complementarity of spatial and temporal representations of distance in linguistic performance. Objectively verifiable frequencies of language patterns found in the British National Corpus show that in the semantic context of motion events English speakers have a tendency to denote distance in space both in spatial and temporal terms, with temporal representations being used more frequently. This inclination was found to occur for semantic attributes of motion manner and instrument., which suggests that the use of temporal expressions appears to be modulated by the presence of the semantic component of motion, rather than lexical patterns alone. The results indicate that in the semantic context of motion events space and time are correlated in a complementary fashion, which suggests that in this particular context neither time or space should be regarded as metaphorical extension of the other.

Keywords

Motion events, time, space, distance, empirical linguistics

Introduction

Do you know how many miles or kilometers away from home your office is? Or your favorite restaurant? Or the skiing resort you visit each winter? Even if you don’t, you can probably answer such questions by saying how long it takes to get there - by whichever means that you use to reach your usual destinations. It was already pointed out by Aristotle in Physics (350BC/1995: Book IV) that "all motion takes place in space and time; for space is the potentiality, time the measure of the motion". A link between space and time is reflected in the units of speed, e.g. the kilometer/mile per hour, including the largest unit of spatial magnitude, the light-year². Barbara Tversky (2011) notes that knowledge of space on the horizontal plane is derived from motion in time, hence spatial distance is often expressed as time. She adds that since each and every motion occurs in space and takes time,

1 Research carried out within COST Action TD0904 TIMELY, supported with National Science Centre (Narodowe Centrum Nauki) grant No 517/010057, Perception of Time as a Linguistic Category grant No. UMO-2011/01/M/HS2/03042.

2 Hawking (1988: 22–23) points out that nowadays time is used to measure distances precisely, because we can measure temporal duration more accurately than spatial length. “In effect, the meter is defined to be the distance traveled by light in 0.000000003335640952 second, as measured by a cesium clock. (The reason for that particular number is that it corresponds to the historical definition of the meter—in terms of two marks on a particular platinum bar kept in Paris.)”
space and time are interchangeable and intertwined in numerous senses. Observations of travel time as a popular metric of spatial distance have been made for years in studies on geographical cognition, especially in the context of urban environments (Lynch 1960; Montello 1997; Wagner 2006). MacEachren (1980) proposed a hypothesis that it is travel time that determines conceptualizations of cognitive distance in the space of navigation.

Lakoff and Johnson (1980, 1999) demonstrated that we systematically talk and think about time in spatial terms by metaphorical extension, but not vice-versa, which makes time asymmetrically dependent on space. However, in a recent study of space–time (dis)analogies in language, Langacker (2012) summarizes certain linguistic parallelisms closely tied to time and space, which make it plausible to view space and time in a complementary manner. On the one hand, space is more basic as the object of conception, which is indicated by the direction of metaphorical conceptions of time in spatial terms. But on the other hand, the dynamicity of spatial conception, where time functions as the medium of conception, makes time more basic as the fundamental prerequisite for cognitive processing of space. The relationship between time and space seems to be in a sense circular: time enables the apprehension of space in the subject of conception, which in turn allows for the apprehension of time as an object of conception.

It has also been observed that the scale of spatial conceptualization is, for the most part, not established by linguistic structures, but tends to be derived from the referent objects and settings (Langacker 1993, 2008; Miller and Johnson-Laird 1976; Talmy 2000a: Ch. 1 and 3). For example, talking about a place situated "near London" sets the scale of mental operations to kilometers, while an object "near the fridge" is likely to be conceptualized as distant in meters (Carlson and Covey 2005; Zacks and Tversky 2012). In a similar manner, events being talked about not only set spatial and temporal scales, but also structure the way we talk and think about space and time. This study demonstrates that spatial reasoning is sensitive to conceptualizations involving motion events (Talmy 2000a, 2000b), which allows for flexible denotation of spatial distance in terms of temporal duration.

(A)symmetry of space and time in cognition

As emphasized by Grondin (2010), comparisons between psychological space and time are difficult to conduct, because sensory modalities involved in the perception of space have more clearly defined aspects than those involved in the perception of time. Time does not have as clearly defined categories of experience as space, either. Cognitive frameworks of time perception are proposed in terms of either dedicated or intrinsic models, however, despite 125 years of research, psychology has not yet distinguished a definitive sensory system responsible for perception and

---

3 See Ivry and Schlerf 2008 for a review
processing of time (Hancock and Block 2012). Neither has research in neuroscience found the neural basis for the processing of temporal intervals and the experience of duration (Wittmann 2013).

On the other hand, the perception of space was historically both intuitively and in empirical philosophy, e.g. by Locke, Berkeley, and Hume, most closely associated with the visual modality (Millar 2008: Ch. 1). However, systematic studies in blind and sighted individuals have provided ample evidence that visual experience is not an essential feature in the mental development of spatial representations. It appears that spatial knowledge depends on a cognitive structure that organizes information obtained through any modality, but itself is not dependent on any particular modality (Spence and Driver 2004).

What makes investigations of the relationship between space and time in cognition additionally difficult to conduct is that they are attributed different dimensionalities. Time is generally regarded as a linear vector extending ahead into the future and back into the past. On the other hand, space is discussed in terms of one-dimensional distances, two-dimensional planes, and three-dimensional spaces. Another basic difference between space and time is that the dimension in which time extends, or "flows" as we often say, is not reversible, which has been termed by Galton (2011) as transience. What occurs in time, occurs once at that very moment, with no possibility of return.

However, there are also certain similarities observed between psychological space and time. Classic studies in psychophysics (Stevens 1986) demonstrated that people use structural similarity to associate various temporal and spatial stimuli. For example, we associate lines of different lengths with tones of different durations, and vice versa. Both adults and young children recognize them as meaningful representations and provide consistent and systematic responses to them in psychophysical tasks. Stevens (1986) argues that this spontaneous cognitive binding indicates that different dimensions of experience, including spatial length and temporal duration, are represented by analogue magnitudes and participate in cross-modal matching.

Moreover, studies investigating how people judge objects used in graphs and diagrams (I. Spence 2004) found that apparent space represented in two- or three-dimensional displays can produce linear psychophysical functions when only one dimension is recognized as relevant by an observer. For example, a set of depicted three-dimensional boxes with identical bases but varying in height, despite their visible dimensionality of three, can be perceived as having only one relevant dimensional aspect in observation.

A similarity between spatial and temporal dimensions of psychological distance has been also observed in their relation to the level of mental construal. An
extensive series of studies on construal of spatial and temporal distance (see Trope and Liberman 2010 for a review), found that events located further away in space and time are more likely to be represented in terms of abstract and general features at a higher level of mental construal, which is reflected in representations of events, and the breadth of object categorization. According to Trope and Liberman (2010), spatial and temporal (and other) instances of psychological distance are related to one another, and act in the human mind in a complementary and compensatory way.

Views on the relationship between space and time in cognition

There are two major views on the relationship between space and time in the human mind. One proposal views their relations symmetrically. It is epitomized by ATOM theory (A Theory of Magnitude) proposed by Walsh (2003), which assumes that time, space, and number are processed in cognition by a common processing mechanism. ATOM underpins its claims with an extensive number of neuropsychological findings, brain imaging studies, single-unit studies, and TMS (trans-cranial magnetic stimulation) studies, which report shared brain areas for processing space, time, and number as an analogue magnitude (see Bueti and Walsh, 2009 for a review). A more recent proposal (Cantlon, Platt and Brannon 2009) postulates a specialized Approximate Number System (ANS), which represents the number of discrete objects or events as a continuous mental magnitude. It bears a set of behavioral and brain signatures universally displayed across animal species, human cultures and development.

The symmetric theories are supported by numerous neuropsychological findings, developmental research on magnitude representation in human infants (e.g. Lourenco and Longo 2010), and studies on magnitude processing in primates (e.g. Merritt, Casasanto, and Brannon 2010), in which patterns consistent with symmetric processing have been observed. Moreover, for some people simultaneous perception of time, number, and space is triggered automatically in synesthesia, in which an association of time and space occurs as an explicit and vivid experience of time and/or number as occupying a predefined spatial location (Smilek, Callejas, Dixon, and Merikle 2007).

On the contrary, an asymmetric view holds that representations of time depend on space to a far greater extent than representations of space depend on time. This view stems from an observation that while the domain of space is directly accessible through senses, the domain of time escapes sensory perception. As put by Lakoff (1993: 218), "(...) we have detectors for motion and detectors for objects/locations. We do not have detectors for time". Consequently, it is plausible

---

6 See Dehaene and Brannon, 2011, for a comprehensive review of research on space, time, and number in the brain.
to assume that time is processed indirectly and structured metaphorically in terms of space (Clark 1973; Lakoff and Johnson 1980, 1999).

The view that cognition of time arises as a result of experiencing and processing motion through space has been supported by studies conducted in the domain of metaphorical language and cognition (Boroditsky 2000; Gentner, Imai, and Boroditsky 2002), which examined spatial conceptualizations of time in language from perspective-specific (moving-time or moving-ego) viewpoints. More recently, the asymmetric view on the relationship between space and time has been additionally supported by cognitive studies using non-linguistic stimuli and responses conducted with adults (Casasanto and Boroditsky 2008) and young children (Casasanto, Fotakopoulou, and Boroditsky 2010).

Linguistic representation of motion events

Motion of an object from one location to another can be characterized in terms of the Source–Path–Goal schema (Hampe 2005; Lakoff 1987). Talmy (2000b: 35) distinguishes two types of motion found in motion events: translational motion, when "an object's basic location shifts from one point to another in space"; and self-contained motion, when "an object keeps its same, or "average" location". Levinson and Wilkins (2006: 18) define the translational motion more precisely as "a durative event involving passage through an indefinite series of points in space over time", which they label as a translocation. Additionally, Slobin (1996: 201–202) distinguishes a journey, i.e. a complex process that often involves an extended, compound Paths that include numerous landmarks and subgoals, possibly occurring through various media. Levinson (2003: 96) notes that the description of motion involves an additional set of parameters that denote not only change of location, but also manner, instrument, medium of motion, and other attributes.

A motion event has been characterized by Talmy (2000b: 25) as a situation containing motion and the continuation of a stationary location alike. Essentially, the basic Motion event consists of four internal core components: (1) the presence or absence of the motion (Motion); (2) the moving entity (Figure); (3) the object with respect to which the Figure moves (Ground); (4) the course followed by the Figure with respect to the Ground (Path); and two components of an associated co-event: (5) the manner in which the motion takes place (Manner); and (6) the cause of its occurrence (Cause). Additionally, Jackendoff (1983) distinguished Source paths, i.e. motion in which the Figure moves away from the Ground, and Goal paths, i.e. motion in which the Figure moves toward the Ground.

On the basis of patterns used for mapping the semantic components of Manner and Path onto the surface forms, Talmy (2000b: Part 1) postulates distinguishing two main categories of languages: Satellite-framed languages (S-languages), and Verb-framed languages (V-languages). Talmy (2000b: 102) defines satellites as immediate verbal constituents other than noun-phrase or prepositional-phrase
complement that are in a sister relation to the verb root. Generally, S-languages, including English, elaborate more on Path than Manner. They tend to conflate Motion+Manner in verb roots with elaboration of Path in prepositional phrases or satellites. On the other hand, V-languages tend to conflate Motion+Path into verbs, whereas Manner is often left to inference or expressed with adverbial phrases. This dichotomous division has been contested as inadequate for some Asian languages (Beavers, Levin, and Wei Tham 2010; Slobin 2004). The lexicalization patterns, however, reflect general tendencies, not absolute differences across languages. As pointed out by Levinson and Wilkins (2006: 527–541), they seem to be more useful for analysis of European languages, rather than the entirety of worldwide sample.

Space and time in motion-framed distance representations

This research investigates what is termed in this paper as motion-framed distance. It refers to a distance that separates one point from another in space in the semantic context of motion events. The study aims to observe the proportion of temporal vs. spatial representations of the motion-framed distance in linguistic performance of English speakers. This research investigates how the motion-framed distance is denoted with spatial vis-à-vis temporal terms from a corpus-based cognitive linguistics perspective, which is an approach to language study that brings together a descriptive framework of cognitive linguistics with a methodological workbench of corpus linguistics.

Cognitive linguistics views language as intrinsically linked to human cognition and general cognitive processes. It is a dynamically developing perspective on the nature of language, the mind, and their relationship with social and physical experience, which aims to describe general principles that apply to human language (Croft and Cruse 2004; Evans 2012). Corpus linguistics can be essentially defined as "the study of language data on a large scale that involves computer-aided analysis of extensive collections of spoken and written texts" (McEnery and Hardie 2012: i). Essentially, it is an empirical branch of linguistics, which brings the principal advantage of verifiability to linguistic studies (McEnery and Wilson 2001; Sinclair 1991).

As put by Heylen, Tummers, and Geeraerts (2008: 92), corpus-based cognitive linguistics relies on explanatory notions adopted by the cognitive linguistics framework, but approaches them in such a way that their relevance to a given linguistic phenomenon can be empirically validated in large corpora, frequently with an aid of advanced statistical techniques (see Gries and Stefanowitsch 2006; Lewandowska-Tomaszczyk and Dziwirek 2009 for reviews and examples of studies). More specifically, this study employs a corpus-based approach, i.e. one

---

7 Cf. motion-framed location discussed by Tutton 2012
that relies upon quantitative analysis applied to a whole corpus, as opposed to a corpus-illustrated approach (Tummers, Heylen, and Geeraerts 2005).

**Methodology of research**

In order to verify empirically how natural it is to express motion-framed distance with spatial vis-à-vis temporal representations this research employs the *British National Corpus* (henceforth the BNC). It is a 100 million word collection of samples of written and spoken contemporary British English from a wide range of texts, not limited to any particular subject field, genre, or register (Aston and Burnard 1998). The BNC has the principal advantage of being a standard reference corpus (McEnery and Wilson 2001: 32), which presupposes wide availability of the corpus to other researchers, who can attest, verify, and expand studies based on its linguistic contents. Since its compilation the BNC has been used by researchers in a variety of contexts, including research on lexicalization patterns of motion events (e.g. Filipović 2007). In this study, the corpus is examined with queries based on simple regular expression syntax, which enables anyone interested in attesting or expanding this study to probe the data under the same research conditions.

The search for representations of the motion-framed distance in spatial and temporal terms was implemented by looking for frequencies of *spatial* and *temporal adverbials* (Haspelmath 1997; Tyler and Evans 2003). Adverbials examined in this study express *absolute distance*, i.e. denoted in spatial, e.g. "4,348 kilometers across Australia", or temporal units, e.g. "fifteen minutes from York". Although the use of adverbials represents a fundamental way of expressing spatial extension, it is far from being exhaustive of the entirety of ways used for representing spatial relations in language. Therefore, it must be emphasized that the aim of this paper is not to examine the full array of linguistic means available for denoting spatial extents, but to observe a general proportion between spatial and temporal expressions of distance in the context of motion events.

This study is additionally restricted to examining representations of the motion-framed distance in two semantic aspects of *manner* and *instrument* of motion. It has long been recognized that instrument and manner are not easily disentangled. Instrumentality plays a fundamental role in processing semantic primes of actions, events, movement, and contact (Goddard and Wierzbicka 2009; Wierzbicka 1996). Essentially, instrument and manner share common conceptual ground and participate in the action described by the verb simultaneously in a coordinate manner. Goddard and Wierzbicka (2009) demonstrate that semantics of physical

---

8 See www.natcorp.ox.ac.uk for more information
9 See Waliński 2013 for a full listing of queries employed for this research accompanied by corresponding concordances retrieved from the BNC
10 See also Mari 2006; Mari and Saint-Dizier 2006
activity verbs in English, Polish, and Japanese ties the kind of instruments used in the action with the manner in which the instrument is used.

A close relatedness of manner and instrument occurs for motion verbs, too. For instance, the verb *drive* expresses a certain manner of motion, which can be additionally specified by an instrumental adverbial, e.g. *drive by car*. However, in sentences such as "Everyday John drives to work through the suburbs of London", unless additionally specified, the meaning of *drive* entails instrumentality, since it is generally understood as *traveling by car*. And vice-versa, motion verbs derived from nouns denoting vehicle names, e.g. *bicycle*, essentially denote the instrument of motion, but also specify a certain manner in which the motion takes place. Therefore, at least for certain motion verbs, it is impossible to make an absolute distinction between instrument and manner, because they form a kind of semantic continuum.

**Representations of motion-framed distance for the manner of motion**

English as an S-language marks semantically the manner of motion in verb roots (Talmy, 2000b, Part 1). For that reason, the search for representations of motion-framed distance in the semantic context of motion manner was implemented by looking for distance expressions involving verbal roots. Eight verbs marking different manners of pedestrian motion, locomotion, aquamotion, and aeromotion were taken into consideration: *cruis(e), driv(e), fly, march, rid(e), sail, tour*, and *walk*. This selection is far from being exhaustive, since English has an enormous variety of motion verbs of manner (Levin 1993: Ch. 51; Slobin 2004; Filipović 2007). The search was implemented with the following lexical pattern:

```
QUANTIFIER + SPATIAL or TEMPORAL UNIT + MOTION VERB ROOT
+ SPATIAL PREPOSITION; SLOP FACTOR=3, PRESERVE ORDER=NO
```

Because one cannot expect lexical items from the above lexical pattern to always follow directly one after another in linguistic performance, searching was implemented with proximity queries to afford for occurrence of additional modifiers between the query terms. Essentially, proximity queries (Bernard and Griffin 2009) allow for searching with a slop factor, which specifies how far apart lexical items included in a query can be from one another to be still returned as a result to the query. It can be used in combination with a binary (yes/no) preserve order option, which indicates whether the original order of query terms should be preserved in results. For the purpose of this research, queries were implemented in a relaxed manner with the slop value of 3, and the preserve order option set to "no".

To boost precision of proximity queries, quantifiers (cardinal numbers and indefinite determiners used with countable nouns) were incorporated in the pattern.
Complementarity of Space and Time in Motion-Framed Distance

It was possible thanks to part-of-speech annotation of the BNC, which marks cardinal numbers, spelled both in words and digits, with the <CRD> tag (Garside, Leech, and McEnery 1997). Units of space measurement selected for analysis involve both metric and imperial units typically used in the UK, kilometers, metres, miles, and yards including their American variants of spelling (kilometers and meters). Units of time measurement selected for investigation involve ones typically used to express duration of traveling, i.e. minutes, hours, and days. The adverbial pattern was finally specified with a set of fifteen prepositions conveying spatial relations: across, ahead, along, apart, away, behind, between, beyond, from, off, over, through, to, towards, within.

Since the preserve order option is set to "no", this pattern identifies expressions with the preposition both in the initial, e.g. "He lives in a flat within two minutes walk of his office", and the final position, e.g. "The sandy beach is an easy 160 metre walk from the hotel". Unfortunately, it increases the recall of the result sets at the expense of their precision. Because of that, the resulting set had to be reviewed to eliminate examples sharing the defined sequence/proximity of lexical items by coincidence, e.g. "A boy who looked about sixteen walked from his front yard to the car". Out of 1297 concordance lines retrieved from the corpus, 967 were recognized as valid representations of the motion-framed distance in spatial and temporal terms. The results found for the selected verb roots are presented in Table 1.

Table 1. Representations of motion-framed distance in spatial and temporal terms found in the BNC for the semantic aspect of motion manner

<table>
<thead>
<tr>
<th>Manner of motion</th>
<th>Denoted in spatial terms</th>
<th>Denoted in temporal terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>cruis(e)</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>driv(e)</td>
<td>68</td>
<td>156</td>
</tr>
<tr>
<td>Fly</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>March</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>rid(e)</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Sail</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Tour</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Walk</td>
<td>209</td>
<td>354</td>
</tr>
<tr>
<td>Total</td>
<td>340</td>
<td>627</td>
</tr>
<tr>
<td>Proportion</td>
<td>35%</td>
<td>65%</td>
</tr>
</tbody>
</table>

11 See Pęzik 2011
Table 1 shows that for the semantic aspect of motion manner the number of temporal representations 627 (65%) of the motion-framed distance significantly exceeds the number of representations in spatial terms 340 (35%). This tendency is particularly conspicuous for verbs amply represented in the corpus, i.e. drive and walk, which indicates that the overall result does not arise from a coincidental occurrence in the BNC.

**Representations of motion-framed distance for the instrument of motion**

A similar procedure was implemented for the semantic aspect of motion instrument. The pattern was modified to include, instead of verb roots, prepositional phrases marking the instrument of motion (Talmy 2000b: Part 1). A selection of instruments was restricted to eight common means of private and public transportation, which are typically marked semantically in English with set prepositional phrases: by bike, by boat, by bus, by car, by coach, by plane / jet, by train, and on foot. This selection is far from being exhaustive and is dictated by availability of relevant examples in the corpus. For instance, the word plane yields only a single valid representation of distance from the BNC, therefore it was coupled with jet. The following lexical pattern was used in queries:

\[
\text{QUANTIFIER + SPATIAL or TEMPORAL UNIT + PREPOSITIONAL INSTRUMENTAL PHRASE; SLOP FACTOR=3, PRESERVE ORDER=NO}
\]

The search was implemented in a similarly relaxed manner using proximity queries with the slop value of 3, and the preserve order option set to "no". Again, quantifiers were employed to boost precision of proximity queries. Identical selections of space and time measurement units were used.

The resulting set of concordance lines was carefully reviewed to eliminate examples sharing the defined sequence/proximity of lexical items by coincidence. Out of 131 concordance lines retrieved from the corpus, 94 were recognized as valid representations of the motion-framed distance in spatial and temporal terms, e.g. "The Brighton Motel is situated 15 minutes from Brighton centre by car". The results found for the selected prepositional phrases are presented in Table 2.
Table 2. Representations of motion-framed distance in spatial and temporal terms found in the BNC for the semantic aspect of motion instrument

<table>
<thead>
<tr>
<th>Instrument of motion</th>
<th>Denoted in spatial terms</th>
<th>Denoted in temporal terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>by bike</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>by boat</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>by bus</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>by car</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>by coach</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>by plane/jet</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>by train</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>on foot</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td><strong>77</strong></td>
</tr>
<tr>
<td><strong>Proportion</strong></td>
<td><strong>18%</strong></td>
<td><strong>82%</strong></td>
</tr>
</tbody>
</table>

Table 2 shows that for the analyzed instruments of motion the number representations of motion-framed distance in temporal terms 77 (82%) significantly exceeds the number of representations in spatial terms 17 (18%). Although the overall number of examples identified for the instrument is not as extensive as for the manner of motion, it is substantial enough to presume that the difference is not coincidental.

**Summary of findings**

The results reported above demonstrate that in the semantic context of motion events English speakers have a tendency to express motion-framed distance both in spatial in temporal terms. The use of temporal representations appears to be modulated by the presence of the semantic element of motion, rather than by lexical patterns alone. The results suggest that in the context of motion events space and time can be regarded as complementary to one another. This complementarity can be observed more directly in certain instances of language use found through a concordance analysis, e.g. "[Apartments are] situated only 200 metres from the beach and within a three minute walk from the shops and nightlife" (found in the BNC) or "I visited Kadyny – located one kilometer away from the Vistula Lagoon, and half an hour away from Elbląg" [PL: odwiedziłam Kadyny – kilometr od Zalewu Wiślanego, pół godziny drogi od Elbląga] (found in the archive of the National Corpus of Polish). Such examples demonstrate that spatial and temporal representations can act on an equal footing in expressions of distance and location in space.12

12 See also Tutton 2012
Although it is impossible to discuss linguistic tendencies in absolute numbers, the proportions of spatial vs. temporal representations found in the BNC for two different (though closely related) semantic aspects of motion indicate that expressing spatial distance in temporal terms is the preferred way of denoting spatial extents in the semantic context of motion events. The inclination to conceptualize spatial distance in temporal terms can be conceptually motivated by the fundamental difference between static configurations of objects in space and energetic interactions conceptualized as events.

Each event is embedded in a spatial–temporal framework, which acts as the basic organizing factor for mental representations of events in mental models (Radvansky and Zaaacks, 2011). In the canonical event model proposed by Langacker (1991: Ch. 7; 2008: Ch. 11), for static objects the primary domain of instantiation is space, but for force-dynamic interactions, which are conceptualized as events, the primary domain of instantiation is time. According to Langacker, any force-dynamic event unfolds primarily in time, where it is temporally bounded and has its own temporal location. Accordingly, motion events are naturally more complex than static spatial relations, and inherently involve the temporal dimension as the primary domain of their conceptualization. For that reason, it is natural for temporal representations to frequently figure in linguistic expressions of motion-framed distance.

Conclusions

Since the linguistic representation of space is largely relativistic and approximate, rather than Euclidean and quantitative (Talmy 2000a: Ch. 1 and 3), it comes naturally to language users to express spatial distance in terms of the time required to execute a motion event. This way of expressing distance is highly versatile. It can be used to express a distance unknown precisely in spatial terms, e.g. "The village centre is about seven minutes walk away", and allows for expressing a distance from the speaker's subjective point of view as a particularly short/long way to a destination, e.g. "The station's only five minutes away" (which may equal to about 10 kilometers, if traveling by fast train), "[The] main camp must be nearly two days march away" (which may also equal to about 10 kilometers, if marching in a particularly difficult mountain/arctic terrain). Denoting spatial distance in terms of travel time is particularly convenient in urban environments, where reaching usual destinations depends not as much on the spatial separation as on the traffic volume at different times of the day (Wagner 2006: 16).

13 See Rappaport, Hovav, Doron, and Sichel 2010: 2–4 for an overview of various temporal dimensions involved in event structure
Because the perception of time cannot be attributed to any particular sensory modality, it seems that all of us are highly susceptible to a cognitive illusion. That makes us generally approach time as more abstract than space. However, as shown in this study, in semantic contexts involving motion it is absolutely natural for us to specify the distance to Mars in months of space traveling, or the distance to Mt. Everest peak in days of climbing, without even noticing the conceptual shift from spatial to temporal domain of representation. This indicates that in dynamic contexts space and time are closely tied and neither can be regarded as metaphorical extension of the other.

Moreover, it appears that the relationship between the cognitive domains of space and time depends, at least to some extent, on the underlying structures of objects and events, rather than space and time as such. This can be observed further in linguistic representations of spatial extension with fictive motion (Langacker 2008: Ch. 14.2; Talmy 2000a: Ch. 2), which has been disregarded in this paper and is discussed separately (Waliński, this volume).

References

14 Cf. A. Tversky and Kahneman 1974; Kahneman and Frederick 2005
15 See Langacker 2012; Engberg-Pedersen 1999


