



# ***Verbs in Fictive Motion***

Jacek Tadeusz Waliński



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This book is dedicated to my daughter Natasza





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## Introduction

Be lion-mettled, proud, and take no care  
Who chafes, who frets, or where conspirers are:  
Macbeth shall never vanquish'd be until  
Great Birnam Wood to high Dunsinane Hill  
Shall come against him.

W. Shakespeare (1623/1966), *Macbeth*, Act IV, Scene 1, lines 90–94

It was of vital importance to Macbeth whether Birnam Wood could march to Dunsinane. Yet, in everyday life, we rarely ponder about immobile material objects going to destinations. In language, mountains can surround a village or a fence can go from one building to another without sounding shocking or even odd for that matter. A number of linguistic studies discuss expressions like (1.1a–d), found in the British National Corpus:

- (1.1) a. The main *street sweeps* southward up the hill.
- b. The service *pipe runs* underground.
- c. Towering *mountains surround* the village.
- d. This wire *fence goes* all the way down to the wall at the other end.

What is noteworthy about these sentences is that the described object is stationary and there is not any entity traversing the depicted path, however, it is represented as moving along its spatial configuration. Although the first two sentences (1.1a–b) refer to entities that serve as media of motion, the other two (1.1c–d) describe objects that are difficult to associate with movement (Talmy, 2000a, p. 104; Matsumoto, 1996a, p. 187).

The phenomenon of employing motion verbs to describe spatial configurations that do not involve actual motion or change of state has been discussed in cognitive linguistic studies for over 35 years under a range of different labels. In 1983, Leonard Talmy published the seminal paper *How language structures space*, where he distinguished particular linguistic structures in which a stationary linear object “is conceptualized as having a leading edge that is in *virtual motion*, or as being scanned along its length by one’s focus of attention—as is generally indicated by verbs that . . . suggest movement” (Talmy, 1983, p. 236). He used this observation to propose that some apparent linear-locative cases in spatial descriptions can be interpreted more

efficiently in terms of reference to a moving point or line, rather than a stationary entity. At the same time, Ray Jackendoff (1983) pointed out that sentences such as (1.1a–d) pass tests for *state* rather than *event* expressions. He termed them *extent sentences*, and categorized verbs used in such sentences as *verbs of extent* (Jackendoff, 1983, p. 173). He emphasized that in his framework “these conceptual structures are organized spatially and nontemporally” (Jackendoff, 1983, p. 169), which denies motion as part of their semantics.

Three years later, another pioneer cognitive linguist Ronald Langacker (1986, p. 464–466) discussed *abstract motion* expressions used to refer to stable situations in which nothing is actually moving or otherwise changing. He termed this special kind of motion used to discuss spatial configurations *subjective motion* to emphasize that in this case the motion occurs on the part of the conceptualizer. He pointed out that the temporal component necessary for considering it to be a type of motion can be obtained by taking into account the time of the construal<sup>1</sup> itself. The term *subjective motion* was then adopted by Matsumoto (1996a), who demonstrated some intriguing characteristics of fictive motion expressions from the perspective of a cross-linguistic comparison between English and Japanese.

The term *fictive motion* was introduced<sup>2</sup> by Talmy (1996), who emphasizes that:

The term *fictive* has been adopted for its reference to the imaginal capacity of cognition, not to suggest (as perhaps the word *fictitious* would) that a representation is somehow objectively unreal<sup>3</sup> (Talmy, 1996, p. 212).

In the following years this term has been readily adopted by other linguists (e.g. Fauconnier & Turner, 2002; Langacker, 2005, 2008a), as well as researchers from other fields of cognitive science (e.g. Richardson & Matlock, 2007; Saygin, McCullough, Alac, & Emmorey, 2010). Nevertheless, alternative labels still crop up in this context, most recently *non-actual motion* (Blomberg & Zlatev, 2014).

However, the phenomenon of employing motion to describe the surrounding reality is much more widespread. Movement is used to describe a plethora of more or less abstract concepts, including trends, moods, prices, etc. For this reason, it must be emphasized at the very outset that the research discussed in this book is restricted to

---

<sup>1</sup> Langacker (2008a, p. 43) defines *construal* as “our manifest ability to conceive and portray the same situation in alternate ways” (see Langacker, 2015 for more information; see also Langacker, 2008, Ch. 9.1 for a distinction between *subjective* and *objective* construal).

<sup>2</sup> Talmy (1996, p. 214) notes that the term *fictive motion* was first set forth in his plenary address “Fictive motion and change in language and cognition” presented at *Conference of the International Pragmatics Association* in Barcelona, July, 1990.

<sup>3</sup> A similar discrepancy seems to occur in Polish. While some translators prefer to employ the term *ruch fikcyjny* (e.g. in Langacker, 2009b), perhaps a more appropriate way of rendering that term in Polish would be *ruch fiktywny* – to emphasize the difference between *fictive* and *fictitious* distinguished by Talmy.

those linguistic instances that use motion to depict static physical objects, which excludes expressions such as “The mood went from good to bad”, “The situation went from bad to worse”, or “The price climbed to a peak level”. Although they also employ motion as the metaphorical source domain, they describe non-physical states, which situates them outside the scope of the present volume (cf. Talmy, 2000a, p.103).

Talmy (1996) defines fictive motion broadly as “linguistic instances that depict motion with no physical occurrence” (Talmy, 1996, p. 211). He distinguishes a number of relatively distinct categories of fictive motion, which embrace representations of motion attributed to immobile material objects, states, or abstract concepts. Within this taxonomy (reviewed in Section 2.3), what had been discussed previously in the linguistic literature under the above-mentioned variety of labels was distinguished as the category of coverage paths. Subsequently, Talmy (2000a, Ch. 2, 2011) re-labeled the coverage paths to *coextension paths*, which he characterizes as follows:

The category of fictive motion previously most noticed, “coextension paths”, depicts the form, orientation, or location of a spatially extended object in terms of a path over the object’s extent. An example is the sentence *The fence zigzags from the plateau down into the valley*. Here, one cognitive subsystem in a listener has the world knowledge that the fence is stationary. But another subsystem responds to the literal wording — specifically, the motion words *zigzag, from, down, and into* — to evoke a sense of motion along the linear extent of the fence that serves to characterize the fence’s contour and positioning. A parallel sentence *The fence zigzags from the valley up onto the plateau*, evokes a sense of motion in the opposite direction. These two sentences together show how a concept—here, that of a sense of directed motion—can be imposed on or imputed to concepts of phenomena in the world through linguistic devices. By contrast, the factive stationariness of the fence might be represented, if poorly, by a sentence like *The fence stands in a zigzag pattern at an angle between the plateau and the valley* (Talmy, 2011, p. 632).

This study focuses specifically on fictive motion in this particular narrow sense of coextension paths. For this reason, throughout this volume, unless otherwise indicated, the terms *coextension paths* and *fictive motion* are used interchangeably.

This volume is structured as follows. The first, introductory chapter presents a review of inquiries into the role of motion in language and cognition, which were started in antiquity by pre-Socratic philosophers, who saw a proper understanding of motion as the key to understanding the nature of the world (Barnes, 1982; Sorabji, 1988). Subsequent sections of this chapter are devoted to the ties that bind space and time in motion, which were already pointed out by Aristotle (350BC/ 1995b) in *Physics*, and the entanglement of space and time in the human mind (Núñez & Cooperrider, 2013). The discussion then shifts to the phenomenological idea of *kinesthetic consciousness*, which sees the experience of movement and its organization into kinesthetic systems as the foundation of all

consciousness and cognition (Sheets-Johnstone, 2011). If we assume that movement provides us with the capacity to understand the world with respect to the objects that surround us, motion is the epistemological foundation for making sense of the dynamic nature of events and consequential relationships, which is reflected in numerous *image schemas* (Hampe, 2005a; Lakoff, 1987a; Oakley, 2007). These abstract schematic images provide us with the ability to structure our experience into coherent and meaningful *gestalts*. They include basic cognitive schemas of motion, such as the SOURCE–PATH–GOAL schema (Lakoff, 1987a), the *canonical event model* and *action chain* (Langacker, 1991, 2008a), and the sketch of a *basic motion event* (Talmy, 1985, 2007b).

Next, the discussion expands beyond the basic schemas of motion to review semantic roles involved in the *event structure* of motion events (Levin & Rappaport Hovav, 2005; Mani & Pustejovsky, 2012). This chapter also discusses *lexicalization patterns of motion events*. They allow for the distinction between *Verb-framed* languages, which tend to conflate the path semantics in verbs, and *Satellite-framed* languages, in which verbs tend to conflate manner semantics (Talmy, 1991, 2000b, Part 1). This distinction inspired a number of empirical studies investigating whether the lexicalization patterns affect one's thinking about motion events (Gleitman & Papafragou, 2013). The final section of this chapter is devoted to a review of motion typologies proposed in semantic studies (Pederson, 2017; Pourcel, 2010).

The second chapter focuses the discussion on fictive motion. It introduces the framework of *linguistic fictivity* proposed by Langacker (1999, 2005, 2008a; cf. Talmy, 1996, 2000a, Ch. 2)—with respect to *mental spaces* devised by Fauconnier (1985/1994, 2007)—as the conceptual explanation of how the linguistic code connects fictive entities to actuality (cf. Głaz, 2014). Subsequent sections of this chapter review cognitive linguistic models of fictive motion proposed in the literature. Langacker's (1986, 2005, 2008a, Ch. 14) account assumes that fictive motion involves *mental scanning*, by which the conceptualizer builds up a full conception of an object's spatial configuration. In Talmy's (1996, 2000a, Ch. 2) framework of *general fictivity*, which takes into account how non-veridical forms of motion are both expressed linguistically and perceived visually, coextension paths are approached in terms of the discrepancy between two cognitive representations of the same entity in which one is assessed as being more veridical than the other. Fictive representations occur naturally due to our kinesthetic inclination to perceive static objects as features of the environment that afford movement.

Although fictive motion is largely reconcilable with *conceptual metaphor theory* (Lakoff & Johnson, 1980, 1999; Lakoff & Turner, 1989), Kövecses (2015) argues against metaphoric interpretations of coextension path expressions because they

would call for a reversal of the typical direction of source-to-target mappings. However, fictive motion can be successfully interpreted in terms of *conceptual integration theory* (Fauconnier, 1997; Fauconnier & Turner, 2002), as a result of blending inputs from the domains of motion and immobility. An alternative explanation, proposed by Jackendoff (1983, 1990, 2002), posits that verbs used in fictive motion expressions are not verbs of motion but verbs expressing the state of *extension*. From the perspective of Jackendoff's conceptual semantic framework, fictive motion expressions do not involve any kind of motion. The next section presents a cross-linguistic comparison of structuring fictive motion based on intuition and linguistic examples (Matsumoto, 1996a), elicited descriptions (Blomberg, 2015; Bohnemeyer, 2010), and translation studies (Rojo & Valenzuela, 2003; Stosic & Sarda, 2009). The chapter concludes with a discussion devoted to the conceptual motivation of fictive motion expressions (Matlock, 2004b) and the broader phenomenological-linguistic framework of *consciousness-language interactionism* (Blomberg & Zlatev, 2014).

It must be emphasized that proponents of cognitive linguistic models of fictive motion voiced a need for more tangible data from experimental studies to support their claims (e.g. Talmy, 2000a, p. 104; Langacker, 2008c). Empirical research on the cognitive processing of coextension paths is reviewed in Chapter 3. It starts with positioning the phenomenon of fictive motion in the broad cognitive framework of *grounded cognition* (Barsalou, 2008, 2010), in which coextension path expressions can be viewed as instances of *embodied mental simulation* (Matlock, 2004a, 2017). Essentially, this view assumes that the cognitive processing of fictive motion involves activating schematic structures that relate motion to objects described in this way in order to mentally move through a described scene. Subsequent sections of this chapter review results obtained in psycholinguistic experiments (Matlock, 2004a; Rojo & Valenzuela, 2009; Tomczak & Evert, 2015), drawing studies (Matlock, 2006), the influence of fictive motion on temporal construal (Matlock, Ramscar, & Boroditsky, 2005; Ramscar, Matlock, & Dye, 2010), and eye-tracking experiments (Mishra & Singh, 2010; Richardson & Matlock, 2007). Taken together, these studies provide some support for the hypothesis that comprehending fictive motion sentences evokes mental simulation of motion (see Matlock & Bergmann, 2015 for review).

Nevertheless, the link between the linguistic structuring and the evocation of a conceptualization of motion is difficult to establish in a straightforward manner. This is because even the same person may deal with the same instance of fictive motion differently on different occasions (Talmy, 2000a, pp. 104–105). The next section reviews insights from brain studies comparing neuron activations elicited by actual motion, fictive motion, and metaphorical motion sentences (Cacciari, et al., 2011; Romero

Lauro, et al., 2013; Saygin, et al., 2010; Wallentin, et al., 2005). The results of these studies indicate that the salience of motion semantics in coextensions path expressions is likely to depend not only on individual comprehension strategies, but also on the conventionalization of constructional fictive motion patterns established through the socio-cultural transmission of language (Blomberg & Zlatev, 2014; Woelert, 2011).

The next chapter discusses a methodological workbench for the cognitive corpus-based linguistic research presented in this book. It starts with a review of *cognitive linguistics* as one of the fastest growing contemporary approaches to the study of language and conceptual structure (Croft & Cruse, 2004; Dancygier, 2017; Dąbrowska & Divjak, 2015; Geeraerts & Cuyckens, 2007). Next, the discussion shifts to *corpus linguistics* (Biber & Reppen, 2015; McEnery & Hardie, 2012) as an empirical approach to language research. The following section discusses cognitive semantics as a subfield of cognitive linguistics concerned with examining the relationship between experience, the conceptual system, and the meaning encoded by language (Evans & Green, 2006). Then, after reviewing the application of language corpora in cognitive semantics (Geeraerts, 2010; Glynn & Fischer, 2010; Glynn & Robinson, 2014), the chapter presents corpus linguistic resources employed for this study, which include the *British National Corpus* (Aston & Burnard, 1998; Burnard, 2000), Princeton's *WordNet* (Fellbaum, 1998, 2017) and *VerbNet* (Palmer, Bonial, & Hwang, 2017). This review concludes with a discussion devoted to the problem of retrieving fictive motion expressions from linguistic corpora.

The following two chapters present corpus-based empirical linguistic research on verbs used in fictive motion expressions. The verbs explored in this study are divided into two types according to a distinction that dates back to the discussion presented by Descartes (1644/1985b, Part II) in *Principles of Philosophy*, where he distinguishes motion understood as a change of place relative to a reference point from another commonly used sense of motion as movement caused by some action. This distinction, systematized by Tesnière (1959/2015), allows for a disassociation of *dislocation* from *movement*, which provides the conceptual ground for distinguishing two basic classes of motion verbs. One includes the verbs whose lexical semantics conflates a path of motion between one place and another, which implies *directionality*. The other class includes the verbs whose lexical semantics conflates the *manner of movement* understood as a dynamic activity which does not entail a change of location. This distinction has been regarded as a basic dividing line between verbs of motion in all major approaches to their lexical semantics (e.g. Jackendoff, 1983, 1990; Levin, 1993; Rappaport Hovav & Levin, 2010; Mani & Pustejovsky, 2012; Talmy, 1985, 2000b, 2007b).

Chapter 5 examines the use of directional verbs in fictive motion. It starts with a review of encoding directionality in *spatial cognition* (Tversky, 2009) in relation to *frames of reference* (Levinson, 2003). The next section presents formal semantic models of directionality proposed in different terms, such as axes, vectors, or topological distinctions (van der Zee & Slack, 2003; Zwarts, 2017), as well as nuances of the linguistic encoding of directionality in motion vis-à-vis location (Vulchanova & van der Zee, 2013). Then, the discussion focuses on directional verbs used in fictive motion. The corpus-based research presented in subsequent sections of this chapter examines the use of directional motion verbs in coextension path expressions in a number of distinguished categories, including *deictic* verbs, *source/goal* verbs, *unbounded path* verbs, *route* verbs, as well as *chase* and *accompany* verbs (Geuder and Weisgerber, 2008; Jackendoff, 1983; Levin, 1993; Rappaport Hovav & Levin, 2010; Zwarts, 2008). This chapter concludes with a summary of spatial relations expressed with the directional verbs in fictive motion.

Chapter 6 explores the use of manner and instrument semantics in fictive motion. It starts with a discussion on the notion of manner in motion semantics, which still has not been fully particularized (Slobin, 2006; Slobin, et al., 2014). Subsequent sections present proposals of formal semantic models of motion manner (Jackendoff, 1990, 1996b, 2012; Levin & Rappaport Hovav, 2005; Mani & Pustejovsky, 2012) and different lexical-semantic approaches to motion manner verbs (Goddard, 2011; Goddard, Wierzbicka, & Wong, 2017; Rappaport Hovav & Levin, 1998, 2010; Taylor, 1996). This is followed by a review of recent cross-linguistic cognitive studies examining manners of human locomotion on the basis of free naming tasks (Malt, et al., 2008, 2010, 2014; Slobin, et al., 2014; Vulchanova, et al., 2013). The results of these studies indicate that verbs approached collectively as verbs of motion manner are likely to represent *radial sets* with conceptual continua formed around prototypes (Lewandowska-Tomaszczyk, 2007), rather than clear-cut categories. Subsequently, the chapter focuses on manner verbs used in fictive motion. The corpus-based research presented in subsequent sections examines the use of manner verbs in coextension paths expressions in a number of distinguished categories, including *verbs of rolling*, *verbs of walking*, *verbs of running*, and *verbs of unsteady movement* (Dodge & Lakoff, 2005; Levin, 1993; Slobin, et al., 2014). The final part of this chapter discusses the entanglement of manner and instrument in motion verbs and examines of the use of instrumentality in coextension paths.

The results of the corpus-based research presented in Chapters 5 and 6 are summarized in the final chapter of the book, which presents observations about the characteristics of verbs used to express coextension paths. It starts with a summary of the frequency of verbs used in fictive motion expressions found in the corpus data.

Subsequent sections of this chapter discuss certain categories of verbs that emerge from the frequency of occurrence and lexical-semantic properties in fictive motion. One of these categories includes *generic verbs of fictive motion*, whose semantics is stripped of the original meaning in coextension paths through *semantic bleaching* (Seuren, 2013; Sweetser, 1988; Traugott, 2006). Another category includes the directional verbs of motion used to refer to *paths and directions*. A third category includes the verbs of motion manner used in fictive motion to specify *shapes* of the path. What additionally emerges from the corpus data is a specific category of context restricted fictive motion expressions, in which the semantics of manner conflated in a verb expands beyond providing information about the spatial configuration of a path to express an association with actual motion that is known to occur along the path. An explanation for this type of fictive motion expressions is proposed in terms of *conceptual integration theory* (Fauconnier, 1997; Fauconnier & Turner, 2002) and its modern extension – the *approximation and re-conceptualization theory* (Lewandowska-Tomaszczyk, 2010, 2012, 2017).

The final section in this volume presents overall conclusions that can be drawn from the results of the study. A complex picture that emerges from the data suggests that, depending on the particular use and the wider linguistic context, a fictive motion expression can be interpreted either as a simple representation of the state of spatial extension, or more figuratively through *summary scanning* based on a simulation of actual motion. The latter is likely to depend not only on individual comprehension strategies, but also on the degree of cultural-linguistic conventionalization of certain fictive motion patterns (cf. *graded salience hypothesis* in Giora, 1997, 2003, see also Desai, et al., 2013). From this perspective, cognitive linguistic models of fictive motion proposed in the literature can be approached as complementary, rather than contradictory to one another.

The author's interest in the cognitive-linguistic exploration of fictive motion on the basis of empirical linguistic data arose during the preparation of the cognitive corpus-based study on *Complementarity of Space and Time in Distance Representations* (Waliński, 2014b). One chapter in that volume is devoted to *atemporality of coextension path expressions*, which can be observed in both English and Polish linguistic corpora. A surprising fact found at that time was that, in spite of numerous studies on fictive motion published as journal articles and chapters in edited volumes, there was no book that would offer a systematic analysis of this phenomenon from a comprehensive cognitive linguistic perspective. Because, as far as we are aware of, no such volume has been published to date, this book is intended to fill this obvious gap. At the same, we hope that this monograph will evoke interest in the exploration of other aspects of fictive motion expanding beyond the examination of verbs used to express coextension paths.

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It must be emphasized that the previous cognitive linguistic work on fictive motion paved the way for subsequent studies on structuring abstract concepts. For instance, Langacker's (1986) proposal of *sequential* and *summary scanning* as two modes of structuring events constitutes the foundation for more general models of dynamic apprehension of space, time, and language presented in his more recent writings (e.g. Langacker, 2005, 2008a, 2009a, 2012). Moreover, fictive motion sometimes serves as an example for arguments that our conceptions of the surrounding reality are grounded in metaphorical knowledge anchored in embodied experience (Gibbs & Matlock, 2008; Lakoff, 1987a; Lakoff & Turner, 1989). The rich taxonomy of fictive motion types proposed by Talmy (1996, 2000a) and pioneering comparative studies between English and Japanese (Matsumoto, 1996a, 1996b) have inspired research investigating other types of fictive paths across a wide variety of languages (e.g. Blomberg, 2015; Huumo, 2005, 2017; Matlock, 2010; Slobin, 2009; Takahashi, 2001).



## Chapter 1

# Motion in language and cognition

For a being completely immovable there would be neither space nor geometry; in vain would exterior objects be displaced about him, the variations which these displacements would make in his impressions would not be attributed by this being by change of position, but to simple changes of state; this being would have no means of distinguishing these two sorts of changes, and this distinction, fundamental to us, would have no meaning for him.

H. Poincaré (1905/1958), *The Value of Science*, p. 48

### 1.1 Motion in natural philosophy

An inquiry into the nature of motion was started in antiquity by pre-Socratic philosophers of nature. They saw a proper understanding of motion as the key to resolving questions about the natures of space and time, as well as their mutual interconnections (Barnes, 1982; Sorabji, 1988). Heraclitus of Ephesus (c.535–c.475 BC) proposed a view on the universe as constantly undergoing motion and change. He is reported by Plato (388 BC/1997) in *Cratylus* (401d, 402a) to claim that all entities move and nothing remains still. Hence, “you cannot step into the same river twice”. On the other hand, Parmenides (c.515–c.450 BC) viewed the world as unchanging, indestructible whole, and motion as illusory (Palmer, 2016). His disciple, Zeno of Elea (c.490–c.430 BC), contributed a series of ingenious paradoxes (e.g. *Achilles and the Tortoise*, *Arrow*) to argue for the non-existence of motion on the ground that a body in motion must arrive at the half-way stage before it arrives at the goal<sup>4</sup> (Huggett, 2018; Palmer, 2017).

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<sup>4</sup> Aristotle critically reviews Zeno’s paradoxes in *Physics*. His treatment was the generally accepted solution until the late 19th century. The standard solution used nowadays is based on the calculus (see Dowden, 2009 for a review).

For Aristotle, motion (*kinesis*) was a broad term, encompassing changes in several categories. His account of motion can be found in *Physics* (350 BC/1995b), which discusses the science of material nature in terms of motion and change. Aristotle defines motion as “the actualization of what potentially is, as such” (the actualization of what is in potentiality, insofar as it is in potentiality), which sounds rather perplexing. These concepts are, as emphasized by Aristotle himself, “difficult to grasp” (*Physics* III, 1, 202a1). A linguistic analysis (Kosman, 1969, 1987; Ugaglia, 2016) reveals a subtle complexity included in this definition. By actuality Aristotle means both *energeia*, which means being-at-work, and *entelechia*, which means being-at-an-end, which relates respectively to a process and the result of a process. In Aristotle’s treatment of motion, these two concepts function as synonyms, in spite of their different meanings (see Sachs 2005 for an overview).

For ages commentators disagreed on the interpretation of Aristotle’s definition of motion. St. Thomas Aquinas in his *Commentary on Aristotle’s Physics* (1269/1999, pp. 145–147) expounds the definition by referring to an example of water being heated. It starts cold and subsequently heats to room temperature. The heat it has at this point, has replaced the potentiality it previously had to be warmed to this temperature. So after some heating, the temperature of the water belongs to it in actuality. But the water still has the capacity to become even hotter, which belongs to it in potentiality. It has moved to the extent that it is actually hot, but it has not moved yet to the extent that it is going to be eventually hot through further heating. Thus, the motion is just the joint presence of potentiality and actuality with respect to the same thing. The account of St. Thomas reveals a sense in which Aristotle’s definition is free of contradictions, and genuinely is a definition of motion: to say that something is in motion means that it is both what it already is and something else that it is not yet, but toward which it moves.

However, as summarized by Sachs (1995, p. 22), inattentive translations of Aristotle writings made the meaning of Aristotle’s definition of motion inaccessible. By the 17th century, “the actuality of the potentiality as a potentiality” had become a joke used by academics to demonstrate the corruption of common sense by pretentious scholarly jargon. René Descartes, sometimes credited as the ‘Father of Modern Philosophy’ due to his disagreement with the Scholastic-Aristotelian tradition, suggested in his *Discourse on the Method* (1637/1985a) that while everyone knows what motion is, no one understands Aristotle’s definition of it. In order to promote the development of a new mechanistic approach to physics, Descartes proposed to define motion as “simply the action by which a body travels from one place to another” (Descartes, 1644/1985b, Part II, 24). Sachs (2005) argues that although the word “travels” makes this definition circular, Descartes

deliberately meant to manifest that he preferred a straightforward statement reflecting ordinary common sense to the cryptic definition of Aristotle, which seemed to be laden with contradictions. Because Descartes views motion as an ultimate concept, his physics does not aim to provide an account of motion itself, but focuses on describing the configurations through which moving things pass (Huggett & Hofer, 2015; Slowik, 2017).

In his *Principles of Philosophy*, Descartes (1644/1985b, Part II) argues that while space can be assumed to be a relative concept, it does not entail that motion is relative in the same way. In one sense, motion can be interpreted as “change of place”, which is relative to an arbitrary reference body (*Principles*, Part II, 13). Another sense of motion is “the ordinary sense” (*Principles*, Part II, 24), which stems from the rules of ordinary speech, in which motion is attributed to bodies whose movement is caused by some action, without reference to a change of location. For instance, a person sitting motionless on board of a ship which is leaving port is said to be at rest in the ordinary sense, because he/she performs no action. However, from the relative perspective, the person is in motion because at each point during the departure the person gets farther away from the shore. Since both motion and the lack of motion can be distinguished in this scenario, movement can be distinguished from dislocation (cf. Tesnière, 1959/2015, pp. 311–313).

Descartes’ treatment of motion spurred a debate on *absolute* vs. *relational* conceptions of space, time, and motion in the natural science (Earman, 1992; Huggett & Hofer, 2015). In his *Mathematical Principles of Natural Philosophy*, Isaac Newton (1687/1995) argues that true motion cannot be identified with the kinds of motion considered by Descartes because both of them are relative motions. In the *Scholium* to the definitions included in the book (see Rynasiewicz, 2014a), Newton postulates to distinguish *absolute time* as the only true time, which “by itself and from its own nature flows equably without relation to anything external”. In contrast, relative time is a measure of duration by the means of motion, as exemplified by the clock and calendar. Secondly, Newton proposes that absolute space “in its own nature, without relation to anything external, remains always similar and immovable”. In contrast, relative space is “some movable dimension or measure of the absolute spaces; which our senses determine by its position to bodies”. Thirdly, place “is a part of space which a body takes up, and is according to the space, either absolute or relative”. With reference to these notions, absolute motion is defined as “the translation of a body from one absolute place into another”. In contrast, relative motion is “the translation from one relative place into another”. This view is called *absolute theory of space and time* (DiSalle, 2006, pp. 17–39; Rynasiewicz, 2014b).

Newton's proposal of absolute space, time, and motion was criticized by his contemporary Gottfried Wilhelm Leibniz. Although Leibniz shared the view that true motion cannot be identified with the kinds of motion considered by Descartes, for him it was not the matter of motion relative to the dimensions of space and time, but the possession of *force*. Leibniz maintained that bodies have an intrinsic force resistant to motion, which he called *natural inertia*.<sup>5</sup> According to Leibniz, this natural force is opposed to motion itself, not only to changes in velocity, as Newton held. Leibniz assumed that true motions should be defined with respect to the active forces that are inherent in truly moving bodies, which he viewed as ontologically prior to the spatiotemporal quantities (Huggett & Hofer, 2015; McDonough, 2014).

However, Leibniz' work in the philosophy of physics is predominantly remembered for his correspondence with Newton's ardent supporter Samuel Clarke (Alexander, 1956). In a series of letters exchanged in 1715–1716, Leibniz presents a theory of space and time, which assumes that space and time should be regarded as systems of relations holding between entities. In short, space is a system of relations, or more precisely spatial relations, between coexistent objects, and time is a system of temporal relations between successive events. Because space and time are relations, they are not real, but ideal phenomena. This view is called *relational theory of space and time* (Ballard, 1960; Earman, 1992, Ch. 6; Grant, 1981, pp. 247–254; Huggett & Hofer, 2015; McDonough, 2014). With reference to motion this view implies that the properties of motion are relative properties, e.g. relative velocity, acceleration, etc. All relative motions are equal and there is no absolute motion postulated by Newton.

Kant in his early writings sided with Leibniz's relational account. Later, in his dissertation on incongruent counterparts, Kant (1768/1968) embraced the Newtonian view (DiSalle, 2006, pp. 60–64). Eventually, he dissociated himself from both views and formulated his own theory of space and time, in which they are not objective realities, but subjective requirements of the human sensory-cognitive faculties to which all conceptualized entities must conform. According to this unprecedented view, space and time are not empirical concepts derived from outer experiences, but originate from an innate subjective condition, which makes cognition possible at all. Kant regards space and time as indispensable tools that arrange and systemize the images of the reality imported by our sensory perception. Without *a priori* conceptions of space and time, our minds would not be able make sense of the raw stimuli supplied by our eyes and other sensory organs (DiSalle, 2006, pp. 66–72; Janiak, 2012).

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<sup>5</sup> Leibniz believed that in the absence of any countervailing active force a body in motion will naturally come to rest, whereas Newton maintained that under idealized conditions no active force is required to keep a body moving at a constant speed.

Newton's theory dominated physics from the 17th century until the advent of the theory of relativity in the 20th century. During that time no other natural philosopher offered a serious rival theory that could end its reign. The most notable criticism of Newton's theory was made by Ernst Mach (1883/2013, Ch. 2), who accused Newton of going beyond what the observational facts tell us about motion and acceleration to establish the existence of absolute space. He viewed the notion of absolute space as an unwarranted abstraction from the practice of measuring motions relative to a reference ground, for instance, fixed stars. To find a usable replacement for the unobservable absolute space, the concept of *inertial frames* (DiSalle, 2016) was developed, although it was already implicit in Newton's *Principia*. The inertial frames provided more concrete definitions of the reference frames in which motions are time-scaled and have the dynamical properties of Newton's laws (DiSalle, 2016; Huggett & Hoefer, 2015).

By the beginning of the 20th century, the notion of inertial frames had been widely accepted. When announcing the Special Theory of Relativity, Einstein (1905/1952a) assumed it to be obvious to his readers that the equations of mechanics do not require a single privileged frame of reference. The lack of a privileged spatial frame anchored in the absolute space, combined with the existence of privileged states of motion, which are aligned rectilinearly in space and uniform with respect to time, laid the foundations for the *four-dimensional space-time*, which was geometrically modeled by Minkowski (1908/1952).

By adding the role of gravitation and its relation to other forces of nature, Einstein (1916/1952b) subsequently proposed the General Theory of Relativity summarized by the American physicist John Wheeler as follows: "Space-time tells matter how to move; matter tells space-time how to curve" (Wheeler & Ford, 2010, p. 235). The theory posits that we function in a four-dimensional universe determined by three-dimensional space combined integrally with the fourth dimension of time (DiSalle, 2006, 2016; Hawking, 1988; Huggett & Hoefer, 2015; Smart, 1964). The theory forces us to accept that time is not completely separate from and independent of space, but is combined with it to form an entity called *space-time*. As explained in accessible terms by Hawking:

An event is something that happens at a particular point in space and at a particular time. So one can specify it by four numbers or coordinates. The choice of coordinates is arbitrary; one can use any three well-defined spatial coordinates and any measure of time. In relativity, there is no real distinction between the space and time coordinates, just as there is no real difference between any two space coordinates (Hawking, 1988, pp. 23–24).

Hawking adds that although it is sometimes helpful to think of the four spatial-temporal coordinates of an event in terms of space-time pictured mentally as a four-dimensional space, imagining a four-dimensional space is in fact impossible.

Although the concept of space-time has been considered in some linguistic studies (e.g. Bączkowska, 2011; Jaszczolt, 2009; Sattig, 2006) it normally escapes human intuition. As noted by Hawking (1988, p. 10), most people, including scientists, still use Newton's model to think and talk about time and space in everyday situations because the difference between its predictions and those of general relativity is very small in the situations that we normally deal with.

As emphasized by Langacker (2012, pp. 200–203), the assumption that space and time form a four-dimensional representational space in conception of objects and events is a foregone conclusion. Despite certain parallelisms suggesting that space and time are comparable, there exist important asymmetries indicating that time is not just another space-like cognitive dimension. For example, although from the perspective of Einstein's model it would be equally accurate to assume that motion through space occurs in time or that motion through time occurs in space, in everyday language we are inclined to say that a falling apple gets "closer and closer", rather than "later and later" to the ground. Similarly, it makes sense to ask "How much time does it take to get from Oxford to Cambridge?", but it would sound rather preposterous to ask "How much distance does it take to get from 1 p.m. to 2 p.m.".<sup>6</sup>

Nevertheless, the preference for the conceptualization of motions with respect to the spatial dimension appears to be established, at least for some part, by the cultural *embedding* and *entrenchment* in the patterns of commonly used phraseology (see Langacker, 2014), rather than by conceptual restrictions as such. A somewhat flexible nature of the conceptualizations of motion can be observed in distance expressions, in which language users are at certain liberty to choose either a spatial or temporal aspect of distance in a motion event, according to what suits better their subjective profiling needs in a particular situation (Waliński, 2014b). Especially in urban environments, where our separation from remote locations depends on the traffic intensity, we often spontaneously choose to express spatial distance as *travel time* (Burnett, 1978; McEarchen, 1980; Wagner, 2006, p. 16). 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 duration. Elastic conceptualizations of this kind are possible due to the very nature of motion, which glues space and time together.

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<sup>6</sup> However, describing passage of time in terms of space traversed is natural when we explain workings of the analogue clock. In this context it is natural to say "When the big hand moves from 3 to 6, a quarter will pass". See Williams, 2004 for a discussion on a constitutive role of the clock in the conceptualization of time.

## 1.2 Ties among time, space, and motion

It was already pointed out by Aristotle in *Physics* (350 BC/1995b) that all motion takes place in space and time: space is the potentiality, and time is the measure of motion. The ties that bind space and time in motion are reflected in cultural artifacts, such as clocks (especially those analog with movable hands) and calendars. They facilitate the conceptualization of events as happening in time measured in units analogous to those of spatial measurement. Instruments of this kind serve as *material anchors* for conceptual structuring of time in spatial terms (De Smedt & De Cruz, 2011; Hutchins, 2005; see also Evans, 2003, Ch. 13). The bond between space and time is also reflected in units of speed, e.g. the *kilometer/mile per hour*, or the largest unit of spatial magnitude, the *light-year*. Hawking (1988, pp. 22–23) notes that nowadays time of motion is used to measure precisely distances in space because we can measure temporal duration more accurately than spatial length. For instance, the standard meter is defined as the distance traveled by light in vacuum during the time interval of 0.000000003335640952 second,<sup>7</sup> as measured by a cesium clock. 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, space and time are interchangeable and intertwined in numerous senses.

The first psychologist to demonstrate a link between space and time in human perception was probably Vittorio Benussi, who in 1913 published results of an experiment demonstrating that judgments of spatial distance are related to temporal intervals in which that distance is presented. In the experiment three successive flashes of light at different locations marked two spatial distances and two temporal intervals. Benussi found that when two equidistant points in space were combined with two unequal temporal intervals, participants judged the spatial distance not by the actual separation in space, but by the temporal interval produced by the lights (Cermisoni, Actis-Grosso, Stucchi, & Antonelli, 2010). This illusion, labeled by Helson (1930) as *tau effect*, demonstrates the dependence of judgments of spatial distance on temporal duration: shorter temporal intervals are associated with shorter spatial distance judgments, and vice versa. The reverse phenomenon, called *kappa effect* (Cohen, Hansel, & Sylvester, 1953), demonstrates the dependence of judgments of temporal duration on spatial distance.

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<sup>7</sup> The reason for this particular value is that it corresponds to the historical standard of the meter used from 1889 to 1960, which was defined in terms of a particular platinum-iridium bar kept in Sèvres near Paris.

Those initial experimental studies reported that participants intuitively attributed movement to visual stimuli, as if the signals were “traveling” at a certain speed from one point to another. Subjects made errors in their judgments when that imputed motion changed between successive intervals, which violated their intuition that it would continue to “travel” between points at the inferred speed. For this reason, these spatiotemporal illusionary effects were hypothesized (e.g. Cohen, Hansel, & Sylvester, 1955; Price-Williams, 1954) to result from the cognitive primacy of movement discrimination, which was assumed to effectuate in the imputed motion intuitively inferred from the overall pattern of stimulation. This hypothesis is still investigated in modern studies (Sarrazin, Giraudo, & Vercher, 2008; Sarrazin, Tonnelier, & Alexandre, 2005).

Another optical illusion in which stationary objects appear to move is the phenomenon of *apparent movement* (Steinman, Pizlo & Pizlo, 2000) discovered by Max Wertheimer (1912), one of the founders of *Gestalt* psychology. The *apparent movement* is perceived when no stimulus actually moves (changes position over time) in the visual field. In one experimental setting, which illustrates the *phi phenomenon*, participants are exposed to two spots of light shown at two different locations in rapid succession transcending the threshold at which they can be perceived separately. The participants report that they notice the light moving, rather than two independently lit points. In another experimental setting, which illustrates the *beta phenomenon*, apparent movement is caused by a set of lights going on and off at regular intervals perceived as flow of light over an area. The phenomenon of apparent movement<sup>8</sup> is involved in watching motion pictures, in which series of still photographs are projected in rapid succession onto a screen (Ramachandran & Anstis, 1986).

The mutual entanglement of space and time in cognition has been viewed in different manners. One view holds that our conceptions of space and time are *asymmetrically* dependent: we construct abstract mental representations of time by referring to concrete mental representations of space, but not vice-versa. It is based on observations of conventional time–space mappings used in everyday language: typically people talk about time in terms of space more frequently than they talk about space in terms of time. This view is epitomized in the *Conceptual Metaphor Theory* (Lakoff & Johnson, 1980, 1999; Lakoff, 1993; see Gibbs, 2017;

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<sup>8</sup> Fauconnier and Turner (2000) and Coulson and Oakley (2000) propose an explanation for the phenomenon of apparent movement in terms of conceptual blending. They argue that our perception of the beam of light sweeping in real time between flashes of light is a result of the visual system’s integration of effects and causes in cognition. The effects seem to us to be in the cause, thus we compress mentally two separate events into a unified percept of motion.

Ruiz de Mendoza Ibáñez & Pérez Hernández, 2011; Sullivan, 2017 for reviews), which holds that time constitutes an abstract cognitive construct that is often conceptualized in the human mind through perceptual and motor experience in the concrete domain of space.<sup>9</sup> It stems from the assumption that while the domain of space appears to be accessible through the senses, the domain of time escapes sensory perception. As put by Lakoff (1993, p. 218), “...we have detectors for motion and detectors for objects/locations. We do not have detectors for time” (see Matthews & Meck, 2014 for the state of the art in research on time perception). The theory is supported by evidence from psycholinguistic experiments (e.g. Boroditsky, 2000; Casasanto & Boroditsky, 2008; Srinivasan & Carey, 2010; see Gijssels & Casasanto, 2017 for a review), which indicate that the time–space mappings are not only reflected in linguistic expressions, but also psychologically observable.

An alternative proposal holds that the relationship between space and time is *symmetric*. Empiricist philosophers assumed that all knowledge originates from the sensory access to reality. Because space and time serve as our two basic locational frameworks by means of which we situate objects and motions, it is impossible to think about either without thinking about the other. As put by Locke (1689/1995, p. 140), “expansion and duration do mutually embrace and comprehend each other; every part of space being in every part of duration, and every part of duration in every part of expansion”. Engberg-Pedersen (1999) argues that space and time are so strongly interwoven in cognition, that they should not be analyzed as two separate domains (see Conway, Repke, & Houck, 2016 for a proposal of a psychological spacetime processor). She notes that although it is possible to distinguish between conceptualizations of space and time at some cognitive levels, the distinction between space and time should be attributed to the basic perceptual difference between static configurations and dynamic events, rather than space and time as such. She adds that these two concepts are so tightly interwoven in cognition that it is possible to talk about time-to-space metaphors but also about space-to-time metaphors at different cognitive levels.

The symmetric view 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. The ATOM underpins its claims with a substantial body of research from several different areas, including

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<sup>9</sup> Although the origins of this view is sometimes attributed to Lakoff & Johnson, it was articulated earlier by Herbert Clark (1973), who concluded his study of child’s acquisition of linguistic expressions of time and space with a hypothesis that linguistic references to time are metaphoric extensions of the dimensional semantics of space.

an extensive number of neuropsychological findings, brain imaging studies, single-unit studies, and TMS (Transcranial Magnetic Stimulation) studies (see Buetti & Walsh, 2009 for a review). Moreover, simultaneous perception of time, number, and space is triggered automatically in *synesthesia*<sup>10</sup> (Deroy, 2017), in which for some people in the population the association of time and space occurs as an explicit and vivid experience of time and/or number as occupying a predefined spatial location (Kadosh & Gertner, 2011; Smilek, Callejas, Dixon, & Merikle, 2007). The symmetric proposal is additionally supported by developmental research on magnitude representation in human infants (Lourenco & Longo, 2010, 2011) and primates (Cantlon & Brannon, 2006; Merritt, Casasanto & Brannon, 2010), in which patterns consistent with the symmetric processing have been observed.

As a third option, it is plausible to assume that the conceptions of space and time are *independent* of each other, although they are very much alike due to a structural similarity between these two domains. Jackendoff (1983, 2002; see also Jackendoff & Aaron, 1991) suggests that, although our conceptions of time and space may be thematically parallel, which is reflected in spatial metaphors used for expressing temporal concepts, the presumed primacy of space is illusory. Jackendoff points out that it is epistemologically equally plausible to assume that space and time are essentially unrelated domains organized by a common set of parameters, which are simply more transparent in the spatial than in the temporal language. From this perspective, it is possible to argue that the metaphorical structuring of time in terms of space arises out of the similarity of pre-existing conceptual structures between space and time. Although spatial metaphors of time have become conventional ways of talking about time in terms of space, they are actually unrevealing about their mutual relations (Murphy, 1996, 1997).

Another important thread in the discussion on the intertwined relations between space, time, and motion in language and cognition, has been contributed by Langacker (1986, 2005, 2008a, 2012), who points out that expressions of movement in the primarily spatial sense, e.g. “They went from Cambridge to Oxford”, and expressions of movement in the primarily temporal sense, e.g. “The concert went from midnight to 4 a.m.”, are both based on the conception of a mover proceeding

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<sup>10</sup> *Synesthesia*, from the Greek *syn* (together) and *aisthesia* (perception), is a harmless neurological condition (with a genetic basis) in which a perceptual or conceptual stimulus in one sense triggers an additional concurrent experience in another sense. For example, some people see digits in colors. In other reported cases, hearing music might cause a synesthete to experience colors or textures, or a sound might trigger a taste, or a weekday might trigger a color (Deroy, 2017). Synesthetic expressions are common in language, e.g. *loud colors*, *sweet music*, *sharp tones*, *warm person*, etc. (see Williams, 1976).

through an ordered series of component states. The difference between the two is that in the temporal sense time serves as the cognitive domain of the relation between each component state of the mover and a point in time, whereas in the spatial sense each component state of the mover in time is related to a location in space. Still, both the above-quoted expressions are based on the conceptualization of *movement* involving *mental scanning* (Langacker, 2005, 2008a, pp. 82–83). In both cases the conceptualizer tracks mentally a series of locations in space or time, respectively, in order to situate the process in relation to a reference point.

Langacker (2008a, p. 111; 2012, p. 205) argues that the sequential processing of events demonstrates our cognitive capacity for *summation*, by means of which structures experienced sequentially are superimposed, as in a multiple-exposure photograph. The continued activation and superimposition of successive “time slices” produces a stable and coherent conception of event, which encompasses more than the relation of component states in space and time at a single moment. Once built up in this fashion, conceptions of events are accessible as conceptual structures functioning as unitary *gestalts*. For Langacker (2012), summation is a way of overcoming the transience of temporal experience (cf. Bergson, 1922/2002, pp. 205–222; Galton, 2011). However, he doubts whether the transfer from space to time observed in the metaphorical extension of spatial expressions to temporal representations is sufficient to claim that space is conceptually more basic than time.

In certain cognitive contexts, space, time, and motion can be viewed as elements of a unified conceptual frame. Kövecses (2005, p. 53) discusses the TIME-MOTION schema, within which elements can stand for each other in the form of metonymies. He notes that in English one can say, for example, “I slept for *fifty miles* while she drove” (DISTANCE FOR TIME-DURATION), as well as “San Francisco is *half an hour* from Berkeley” (TIME-DURATION FOR DISTANCE). The metonymical relationship between space and time in motion is also discussed by Engberg-Pedersen (1999), who points out that we can use names of places, which are primarily spatial words, to denote punctual moments in time in terms of spatial locations, e.g. “I haven’t had a drink since London” (PLACE FOR A POINT IN TIME). Overall, these observations indicate that in the context of motion events the cognition of space and time is tightly bound to the SPACE-TIME-MOTION schema, within which any two elements can stand for the third one: time elapsed in motion can be used to express spatial distance; space traversed in motion can be used to identify duration, which is commonly used for telling the time by the Sun’s position in the sky; a punctual moment in time can be used to specify a location passed while traveling; and a specific location passed while traveling can be used to refer to a specific moment in time (Waliński, 2014b, p. 248).

### 1.3 Primacy of movement in cognition

An idea of the primacy of movement in apprehension of the surrounding world can be traced back to Aristotle's insight that motion is the fundamental principle of nature. According to Aristotle, the very nature of nature is reflected in motion and change. "Nature is a principle of motion and change ... We must therefore see that we understand what motion is; for if it were unknown, nature too would be unknown." (Aristotle, 350 BC/1995b, *Physics*, 200b11–14) Thus, to understand the nature of the world is to understand the dynamic nature of surrounding events, by which we apprehend the sensible form of imperceptible, immaterial concepts, such as *inside–outside*, *new–old*, *close–distant*, etc., arising from consequential relationships.

Given Aristotle's recognition of this principle, it is not surprising that he thought it had an important role in understanding of *anima*, or the soul, in the animate world in which humans, animals, and plants live. In his book *On the Soul* (350 BC/1995a), Aristotle discusses how animate forms, from the most basic invertebrates through plants and animals, are structured in ways that are sensitive to movement (cf. *The Great Chain of Being* in Lovejoy, 1936; see also Lakoff & Turner, 1989, pp. 167–168; Krzeszowski, 1997, pp. 67–69; Szwedek, 2018). Aristotle states that "sensation depends ... on a process of movement or affection from without, for it is held to be some sort of change of quality." (Aristotle, 350 BC/1995a, *On the Soul*, 416b33–34). For Aristotle, a sensation is essentially a change of quality, and the change of quality is a matter of movement. The principle of motion permeates all forms of organic life and defines the fundamental way in which organic life functions (see Sheets-Johnstone, 2011, Ch. 3 for a review of the Aristotelian account of the primacy of movement).

Husserl's *phenomenology of embodiment* (see Behnke, 2011 for a review) regards *kinesthetic consciousness*, i.e. the experience of movement and its organization into kinesthetic systems, as the foundation of all consciousness and cognition. According to Husserl (discussed by Sheets-Johnstone, 2011, Ch. 4), we come into the world moving: we are literally *not stillborn* (see also Johnson, 2007, p. 19). In this respect, primal movement defines our aliveness and marks the starting point of our departure for living in the world. Husserl argues that as we grow kinetically into our bodies,<sup>11</sup> we literally discover ourselves in movement as animate organisms. In that sense, movement is like primal sensibility: it is the epistemological foundation for making sense of what we are and who we are.

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<sup>11</sup> Psychological studies on motor development of infants and young children (see Thelen, 1995, 2000 for reviews) demonstrate a contextual and self-organizing nature of developmental change, with the unity of perception, action, and cognition. See Sheets-Johnstone, 2011, Ch. 5 for a discussion of how psychological findings on infancy might complement and support phenomenological theories of kinesthetic consciousness.

Moreover, learning to move is the epistemological foundation by which we come to understand the world with respect to objects that surround us. By discovering ourselves in movement, we embark on a lifelong journey of meaning-making. We gradually expand our kinetic-based repertoire of “I cans” (*I can stretch, I can reach, I can twist, I can turn over*, etc.), which is the foundation of our sense of ourselves as agents within the surrounding world (Sheets-Johnstone, 2011, pp. 116–119). Therefore, the capacity to grow kinetically into our bodies is the foundation of our conceptual understandings of the world:

Spontaneous movement is the constitutive source of agency, of subjecthood, of selfhood, the dynamic core of our sense of ourselves as agents, subjects, selves. Kinesthetic consciousness in turn defines an emergent, progressively expanding consciousness whose structures can be thematized, i.e. analyzed phenomenologically. In particular, kinesthetic consciousness unfolds on the ground of spontaneous movement and in its initial unfolding reveals not only corporeal concepts on the order of those described above, but spatio-temporal concepts that are basically qualitative in nature and that emanate from what we discover to be the creative, i.e. freely variable, character of our movement (Sheets-Johnstone, 2011, p. 119).

Since our fundamental kinesthetic consciousness arises on the ground of movement that comes to us spontaneously, it can be regarded as the epistemological foundation of all consciousness, or as put by Sheets-Johnstone (2011, p. 118), “the mother of all cognition”.

Mark Johnson (2007, Ch. 1) views movement as the foundation of our knowledge of the world, which, at the same time, provides us with important insight on our own nature, capacities and limitations. He emphasizes that movement is characterized by specific dynamic qualities, such as *graceful* or *explosive*, *smooth* or *jerky*, etc. Through movement we experience various qualities of things, spaces, and forceful exertions. For example, by putting things in and out of containers, we learn about *containment*; by observing paths of motion we develop understanding of *trajectories* and learn concepts such as *straight*, *curved*, *vertical*; by moving objects from one place to another we learn about different *weights*; by moving ourselves between places we learn about varying *distances* in space. Johnson (2007, pp. 21–24) argues that these qualitative dimensions of motion form not only the meanings of movements, but more importantly the meaning of the world we move within.

Investigation of the relationship between motion, space, and time has a long tradition of studies in developmental psychology. Jean Piaget, who examined time (Piaget, 1946/1969), space (Piaget & Inhelder, 1948/1956), motion and speed (Piaget, 1946/1970), and geometry (Piaget, Inhelder & Szeminska, 1948/1960) in the child’s mind, arrived at the conclusion that at early stages of cognitive development children first learn physical bodies and motions and only later, as they grow up, develop conceptions of space, time, and velocity in relation to them.

According to Mandler (1992, 2004, 2005), our conceptual development arises from an innately given process of *perceptual meaning analysis*, which forms image schematic structures from the spatial structure of objects and their movements. Taking into account components needed to describe the understanding of events that infants observe and take part in during the first six to seven months of life, Mandler and Cánovas (2014) propose to distinguish three tiers of cognitive structure. They distinguish *spatial primitives* as the most basic conceptual building blocks formed in infancy, mostly with reference to motion along paths: PATH, START PATH, END PATH, PATH TO, LINK,  $\pm$ MOVE, ANIMATE MOVE, BLOCKED MOVE, THING, INTO, OUT OF,  $\pm$ CONTACT, CONTAINER, OPEN, LOCATION, APPEAR, DISAPPEAR, BEHIND, and EYES.<sup>12</sup> Some of them are known to be innate and others either innate or learned very early.

Mandler and Cánovas (2014) argue that these spatial primitives are subsequently used for building *image schemas*, which form the basic spatial stories with special emphasis on containment and occlusion, e.g. PATH TO THING, THING INTO CONTAINER, etc. According to this proposal, image schemas are not just *gestalts* that serve the purpose of mapping spatial information from one conceptual structure to another, but form the initial conceptual structures that enable infants to understand and conceptualize events without the burden of the immense variety of perceptions and sensations that discrete events present to the human mind. A third tier of cognitive structure that can be distinguished from the perspective of developmental diachrony includes *schematic integrations*, which use the first two types to build non-spatial concepts involving elements that cannot be imaged, e.g. FORCE. Each of these tiers can be distinguished with respect to developmental origin, imageability, and the role in meaning construction in language and thought (see also Mandler, 2010, 2012).

#### 1.4 Image schemas

The notion of *image schema* was introduced<sup>13</sup> by Johnson and Lakoff in their separate books published in 1987 (Johnson, 1987; Lakoff, 1987a) and developed further in subsequent publications (e.g. Johnson, 2007; Lakoff & Johnson, 1999; Lakoff & Núñez, 2000). Both of them proposed that perceptual interactions, manipulation of objects, and bodily movement involve certain recurring patterns, which function in our minds as abstract schematic images that enable us to make

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<sup>12</sup> EYES are distinguished as a special primitive since they are the only object known to be of intense interest to infants from birth. It is hypothesized (Batki, Baron-Cohen, Wheelwright, Connellan, & Ahluwalia, 2000) that we have an innate neural mechanism dedicated to perceiving another's eyes and detecting their gaze direction.

<sup>13</sup> Johnson (1987, Ch. 6) credits Kant (1787/2003) with devising the notion of *schema* as the answer to a problem in his philosophy about how categories (as pure concepts) can apply to sensible intuitions (percepts).

sense of the world we reason about and act within. Johnson defines *image schema* as “a recurring, dynamic pattern of our perceptual interactions and motor programs that gives coherence and structure to our experience” (Johnson, 1987, p. xiv). He adds that in this context experience is understood broadly “as including basic perceptual, motor-program, emotional, historical, social and linguistic dimensions” (Johnson, 1987, p. xvi). Image schemas are neither *images* nor *schemas* in the sense used for these terms in philosophy, psychology, or anthropology. Lakoff (1987a, p. 453) explains that “Like conventional images, they are neither context-bound, nor specific, nor conscious, nor effortful. They are unlike conventional images in two important respects: they are not rich (that is, fully detailed), and they do not have specific knowledge associated with them”.

Essentially, image schemas integrate information from multiple modalities into *gestalt* structures that constitute embodied anchors of the entire conceptual system. Johnson (1987, p. 126) proposes the following basic image schemas: CONTAINER, BALANCE, COMPULSION, BLOCKAGE, COUNTERFORCE, RESTRAINT REMOVAL, ENABLEMENT, ATTRACTION, MASS-COUNT, PATH, LINK, CENTER-PERIPHERY, CYCLE, NEAR-FAR, SCALE, PART-WHOLE, MERGING, SPLITTING, FULL-EMPTY, MATCHING, SUPERIMPOSITION, ITERATION, CONTACT, PROCESS, SURFACE, OBJECT, COLLECTION. He explains that they were identified through a cross-linguistic analysis of concepts of motion and spatial relations coupled with a reflective survey of the contours of our lived experience. Lakoff (1987a, p. 267) additionally includes UP-DOWN and FRONT-BACK schemas. These initial proposals were not intended to be exhaustive. They have been supplemented with contributions proposed subsequently by other scholars (e.g. Cienki, 1998; Krzeszowski, 1993; Mandler, 1992). However, a full list of all image schemas has not been compiled to date (see Hampe, 2005b; Oakley, 2007 for reviews).

Oakley (2007) points out that performing a routine activity, such as “walking to a library, selecting a book from the collection, bringing it to the circulation desk, checking it out, and taking it home” (which involves coordination of multiple acts of perceiving, conceptualizing, and moving) fits the following image-schematic profile: SOURCE-PATH-GOAL—CONTAINER—COLLECTION—PART-WHOLE—TRANSFER—ITERATION and possibly other image schemas, if we wish to account for miscellaneous facets of such an undertaking. Because getting a book from the library can be conceptually grouped with a number of other instances exhibiting a parallel image-schematic structure, image schemas act as a kind of “distillers” of spatial and temporal experiences, which “cognitive linguistics regards as the basis for organizing knowledge and reasoning about the world” (Oakley, 2007, p. 215).

Since the initial proposals of Johnson and Lakoff were rather eclectic and not entirely consistent with each other, practically all key aspects of the image schemas have been debated (see Hampe, 2005b for a review). For instance, Cienki (1997) argues that image schemas “usually do not occur in an isolated fashion in our

experience, but rather are experienced grouped as *gestalts* or wholes” (Cienki, 1997, p. 9). He adds that they form more complex *compounds*, which can be reduced into simpler elements. For instance, CYCLE, PATH, PROCESS, ITERATION, and FORCE may be approached as the following compound: “A CYCLE can be understood as a PATH that returns to its point of origin, representing a PROCESS which can be repeated (ITERATION) and continued by virtue of the FORCE of momentum” (Cienki, 1997, p. 8).

From the perspective of axiology in lexical semantics, Krzeszowski (1993, 1997) proposes to include an additional *axiological parameter* (PLUS–MINUS) that reflects *evaluative*, i.e. positive or negative, polarity arising from the basic embodied experience of keeping an upright position, moving forward, maintaining balance, etc. as a default property of image schemas. Krzeszowski (1993, 1997, pp. 112–131) argues that the axiological parameter is relevant to such image schemas as UP–DOWN, FRONT–BACK, RIGHT–LEFT, and NEAR–FAR, as well as PART–WHOLE, CENTER–PERIPHERY, LINK, BALANCE, and SOURCE–PATH–GOAL. In the SOURCE–PATH–GOAL schema the goal component is assumed to be positively charged when it gets closer to the goal (Krzeszowski, 1997, p. 125). However, on the basis of data drawn from English language corpora, Hampe (2005c) disagrees with the proposal of considering the PLUS–MINUS parameter as default in image schemas. She argues that rather than isolated elements, default evaluations should be attributed to entire stereotypical contexts (ICMs),<sup>14</sup> in which image schemas act as complex superimpositions, i.e. image schema groupings or compounds as proposed by Cienki (1997).

However, subsequent studies have failed to work out a consistent set of definitional criteria for distinguishing image schemas from other schematic concepts. Clausner and Croft (1999) argue that the failure to define necessary and sufficient conditions for image-schematicity indicates that image schemas should be approached as *image-schematic domains*. Domains that are image-schematic can be defined as “those found in the largest number of domain matrices (for the concepts used in human experience)” (Clausner & Croft, 1999, p. 22). This definition has two implications: there is no sharp distinction between image-schematic domains and concrete domains, and image-schematic domains are not characterized by necessary and sufficient criteria. Instead, their definitional criterion is occurrence in a large number of domains of human experience. For instance, CONTAINER is image-schematic since it is an abstract property found in a large number of experiential domains (see Dewell, 2005 for an in-depth analysis of the image schema of

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<sup>14</sup> The notion of *idealized cognitive model* (ICM) was proposed by Lakoff (1987a) to explain how the background knowledge for certain concepts involves a stereotypical model of experience, which results in some categorization problems. For instance, the category defined by the English word *bachelor* can be defined as “an unmarried adult man”, but this noun would probably not be used to refer to the Pope. The clash arises from the mismatch between the ICM and a more complex socio-cultural reality (see Fillmore, 1982, p. 34).

CONTAINMENT). Still, it refers to the material substance of spatial profiles and the material of surfaces defining an interior, which are concrete aspects. On the other hand, the *temperature* domain, despite being grounded in our physiological bodily experience, is not image-schematic because it is not necessary for describing our understanding of a wide range of concepts in experience (see also Clausner, 2005).

Grady (2005) proposes to resolve the problem of definitional criteria by recognizing the distinction between the sensory and non-sensory dimensions of experience. He points out that while some schemas, such as *CYCLE* or *SCALE*, may be associated with perceptual concepts, such as *circle* and *path*, they are also recognizable as concepts in their own right, referring to conceptual dimensions of phenomenological experience, independent of any sensory associations. He argues that the recognition of the perceptual vs. non-perceptual dimensions of experience opens a possibility for refining the definition of image schemas in terms of “the degree of specificity they allow, and by the extent to which the schemas must be tied to perception” (Grady, 2005, p. 44). According to his proposal, image schemas can be viewed as “mental representations of *fundamental units of sensory experience*” (Grady, 2005, p. 44). He adds that the sensory experiences associated with image schemas can be seen as minimal *gestalts* based on recurring patterns of our bodily sensations, which includes visual, aural, tactile, and kinesthetic perception, and possibly other sensations such as hunger, pain, etc.

Although the image schemas have never been defined precisely, researchers find them useful for developing accounts of the relationship between bodily experience and thought from different viewpoints and levels of analysis (see Hampe, 2005a for an edited collection of studies). Image schemas have contributed crucial input to an enormous body of research, including studies on developmental acquisition of concepts (e.g. Mandler, 1992, 2004), senses of prepositions (e.g. Dewell, 1994; Vandeloise, 1994), and, more recently, designing intuitive multifunctional interfaces for mobile touchscreen phones (Britton, Setchi, & Marsh, 2013). A recurrent topic in the research on image-schemas concerns the linguistic encoding of motion.

## 1.5 Basic image schemas of motion

Probably the simplest conceptualization of an object following a trajectory through space, without regard to the characteristics of the object or the details of the trajectory, is *PATH*, which was put by Lakoff (1987a, p. 267) among basic *kinesthetic* image schemas (cf. Jackendoff, 1983, Ch. 9). However, Lakoff (1987a) proposes that a basic bodily experience of motion can be described more thoroughly with a *SOURCE-PATH-GOAL* schema, which reflects the fact that “Every time we move anywhere there is a place we start from, a place we wind up at, a sequence of contiguous locations connecting the starting and ending points, and a direction” (Lakoff, 1987a, p. 275). He distinguishes four structural elements of

this image schema: (1) a SOURCE, i.e. the starting point; (2) a GOAL, i.e. the ending point, (3) a PATH defined as “a sequence of contiguous locations connecting the source and the destination” (Lakoff, 1987a, p. 275); and (4) a DIRECTION going toward the destination. Lakoff (1987a) lists two elements of the basic logic behind this image schema. First, if something moves from the source to the destination along a path, then it must pass through each intermediate point on the path, which reflects the spatial dimension of movement. Second, the further along the path something travels, the more time has passed since the start, which reflects the temporal dimension of movement. Taken together, this basic image-schematic logic essentially reflects the inextricable bond between space and time that characterizes movement, which was articulated by Aristotle in *Physics* (350 BC/1995b), and recalled in numerous later studies discussed in Section 1.2.

Talmy (1985, 2000b, p. 25) sketches a basic motion event as the situation that “consists of one object (the *Figure*) moving or located with respect to another object (the reference object or *Ground*)” (see Talmy, 1975a, 2000a, Ch. 5 for a discussion on *figure and ground* in language). The basic schema of *Motion event*<sup>15</sup> has four internal core components, which apart from the above-mentioned Figure and Ground, include also Motion and Path. The *Path* is a path followed or site occupied by the Figure object with respect to the Ground. The component of *Motion* “refers to the presence per se of motion or locatedness in the event” (Talmy, 2000b, p. 25), despite the fact that in the latter motion as such does not occur. Talmy (2000b, pp. 35–36) distinguishes two types of motion found in motion events: *translational motion*, in which “an object’s basic location shifts from one point to another in space”; and *self-contained motion*, in which “an object keeps its same, or ‘average’ location”, e.g. oscillation, rotation, expansion, contraction, etc., or rest. Levinson and Wilkins (2006c, p. 18) propose to define the translational motion more precisely as “a durative event involving passage through an indefinite series of points in space over time”, and to label it *translocation*. Slobin (1996b) proposes to distinguish a *journey* as “an extended path that includes *milestones* or *subgoals*” (Slobin, 1996b, p. 202), possibly occurring through various media, which can be encoded in a sequence of clauses.

Moreover, Talmy (1985, 2000b, p. 26) distinguishes an associated *Co-event*: “a motion event can be associated with an external Co-event that most often bears the relation of Manner or of Cause to it”. Thus, besides the above-mentioned four internal components of the core schema of motion, the *Manner* component reflects the manner in which the motion takes place, and the *Cause* is the cause of its occurrence. Talmy illustrates the components of Manner and Cause with sentences presented in Table 1.1.

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<sup>15</sup> Talmy marks semantic components of motion events with capital letters.

Table 1.1 *Manner and Cause in motion events expressing motion and location*

	<b>Manner</b>	<b>Cause</b>
<b>Motion</b>	The pencil rolled off the table.	The pencil blew off the table.
<b>Location</b>	The pencil lay on the table.	The pencil stuck on the table (after I glued it)

In all four sentences included in Table 1.1, *the pencil* functions as the Figure and *the table* as the Ground. The prepositions *off* and *on* express Paths, i.e. a path and a site, respectively. The verbs in the upper row, *rolled* and *blew*, express translational motion, while the verbs *lay* and *stuck* express location. The verbs in the left column, *rolled* and *lay*, express the Manner of motion, while the verbs *blew* and *stuck* express the Cause. Talmy (1985, pp. 139–140) explains that the assessment of whether Manner or Cause is conflated in a verb depends on the verb's basic reference to what the Figure does or to what the Agent/Instrument does. For instance, "He pushed the keg" expresses Cause because the verb refers to what the Agent did. On the other hand "He rolled the keg" expresses Manner since the verb basically refers to what the Figure (keg) did.

Mandler (1992, 2004) proposes to distinguish five image schemas of motion that appear to enable infants to make an initial conceptual division of the world into animals and artifacts. Those used by infants to distinguish animals include SELF-MOTION, which is a representation of an object that starts to move without any forces acting on it (see Gill & Lennox, 1994). As depicted in Figure 1.1a, it can be represented schematically as a vector extending from a point [A] representing a source of self-motion at the beginning of its path, which basically corresponds the notion of a *trajector* (Johnson, 1987, p. 33; cf. Langacker, 1987, Ch. 6.3, 2008, Ch. 3.3.2). She adds that this schematization can be achieved by analyzing watched movement or abstracted from felt movement of the self in the environment and therefore may have a kinesthetic base. Another schema of ANIMATE MOTION consists of a simple description of the way animals move, which may be represented schematically by an irregular rhythmic path that follows up and down pattern<sup>16</sup> instead of a straight line, as shown in Figure 1.1b.

<sup>16</sup> Mandler (1992, p. 593) notes that children playing with toy animals were observed to make them hop along the table, which is an example of their representation of animate motion (see Baker, Pettigrew, & Poulin-Dubois, 2014).

Additionally, LINK schemas represent contingencies between events. The simplest type is a one-way link, in which one event is regularly followed by another. Mandler (1992) emphasizes that the LINK image schema is not the same as a path. It means “that two entities . . . are constrained by, or dependent on, one another even though they are not in direct contact. Links can occur across both spatial and temporal gaps and can be one way or mutual” (Mandler, 1992, p. 594), as shown in Figure 1.1c.

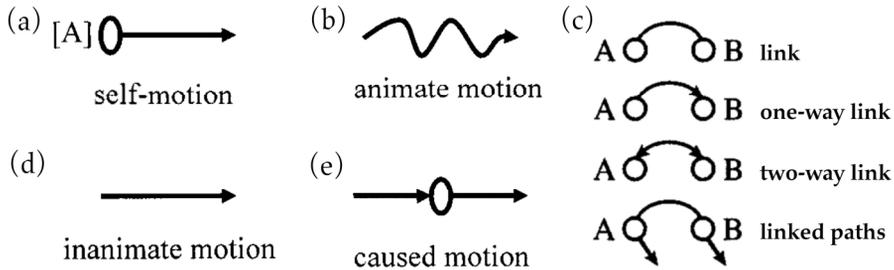


Figure 1.1 Diagrams for image schemas of motion proposed by Mandler

Besides the image schemas that enable infants to distinguish animals, Mandler (1992, 2004) discusses schemas relevant to distinguishing artifacts. The schema of INANIMATE MOTION typically follows a direct path, and can be represented schematically merely as a straight line, as shown in Figure 1.1d. However, inanimate objects typically do not move at all. When they do, they are caused to move. The cause of motion can be either animate, e.g. a hand picks up an object, whose trajectory then begins, or inanimate, e.g. a ball rolls into another, starting it on its course. Thus, a CAUSED MOTION involves another trajector acting at the beginning of path. This schema may be represented schematically as a vector toward a point occupied by an object, and another vector leaving that point, which is depicted in Figure 1.1e. These two trajectories are not independent: the first one ends or changes its course at the place and time at which the other begins its motion.

The schema of CAUSED MOTION basically corresponds to an essential conceptual archetype that Langacker (1991, Ch. 7; 2008a, pp. 357–358) terms *canonical event model*. It is based on the prototypical finite clause describing an action performed by an agent on some affected object, which reflects our way of apprehending events. As shown in Figure 1.2, in the canonical event model an *agent* acts as an energy source and the initial participant in a bounded, forceful event. A *patient* usually undergoes a change of state as a result of being affected by outside forces. An event unfolds primarily in time, where it is temporally bounded and has its own temporal location. The model incorporates also a *setting*, and a *viewer* observing the event from an external vantage point.

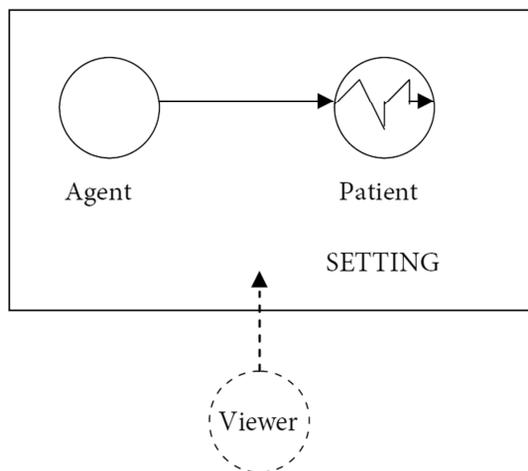


Figure 1.2 Canonical event model

According to Langacker (2008a), this model (cf. EVENT-STRUCTURE metaphor in Lakoff, 1993, pp. 219–229; Lakoff & Johnson, 1999, pp. 194–201) is the basic foundation of our apprehension of the world. In the default coding of an event, clausal elements assume their prototypical values. The prototypical *noun* encodes agents as clausal subjects, and patients as clausal objects. They are *physical objects* (animate or inanimate) composed of a material substance residing primarily in space. The prototypical *verb* encodes an energetic agent-patient interaction, which is transient and immaterial. This model underlies another basic conceptual archetype of energy transfer sketched in Figure 1.3, which Langacker (1991, p. 283, 2008a, p. 355) terms *action chain*.

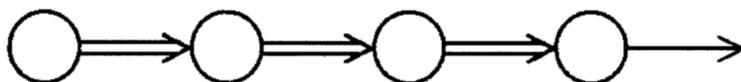


Figure 1.3 Action chain

As shown in Figure 1.3, the action chain is “a series of forceful interactions, each involving the transmission of energy (double arrow) from one participant to the next” (Langacker, 2008a, pp. 355–356). In principle, an action chain can go on indefinitely, until the energy is exhausted or no further contact is made. However, a minimal action chain consists of just one link: a single, two-participant interaction (Langacker, 1991, p. 283, 2008a, pp. 355–356). Langacker (2008a, p. 356) adds that we can further distinguish a number of various *archetypal roles*, which are associated with more

specific roles of event participants. For instance, a *mover* can be defined straightforwardly as anything, either animate or inanimate, that changes position in relation to its external surroundings. An *instrument* is typically an inanimate object physically used by an agent to affect another entity. It is not an independent force but acts as an intermediary in the transfer of energy from agent to patient. The logic of these archetypes is likely to exert an influence on more complex inferences about motion events, which are discussed in the following section.

## 1.6 Beyond basic schemas of motion

Lakoff & Núñez (2000, pp. 37–38) emphasize that the basic structure of the SOURCE-PATH-GOAL image schema manifests an inherent logic used in mathematics and geometry to discuss, for example, lines “meeting at a point” or to describe the graph of a function as “reaching a minimum at zero”. However, they distinguish a broader set of elements expanding beyond this basic schema: (1) a *trajector* that moves; (2) a *source* location; (3) a *goal*, i.e. an intended destination of the trajector; (4) a *route* from the source to the goal; (5) the *actual trajectory* of motion; (6) the *position of the trajector* at a given time; (7) the *direction* of the trajector at that time; (8) the *actual final location* of the trajector (which may or may not be the intended destination), as depicted in Figure 1.4.

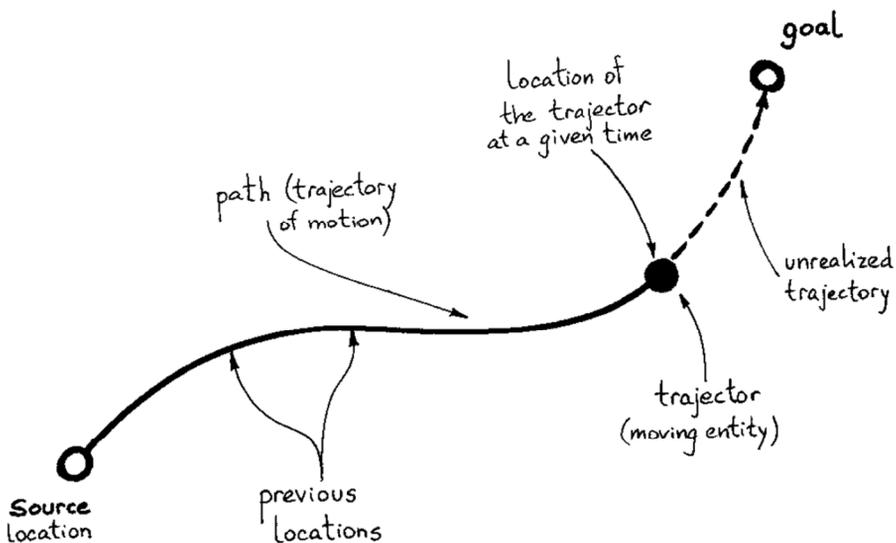


Figure 1.4 Elements of the SOURCE-PATH-GOAL image schema

They add that in natural language this schema can be extended further to include such properties as the speed of motion, the trail left by the thing moving, obstacles to motion, forces that move the trajector, additional trajectors, and so on.

Moreover, Lakoff and Núñez (2000, pp. 39–40) demonstrate how the meanings of sentences such as “The car drove *into* the garage” and “The car drove *out of* the garage” involve a conceptual composition of image schemas. In such scenarios, the motion of an object from the starting location inside/outside the container to the endpoint is captured by superimposition of the SOURCE–PATH–GOAL image schema onto a CONTAINER schema used to locate the initial/final position of the object relative to the container. The meanings of “into” profiles the *interior* of the CONTAINER schema as the *goal* of the SOURCE–PATH–GOAL schema, while the *exterior* is profiled as the source of motion. And vice-versa, the meaning of “out of” profiles the *interior* of the CONTAINER schema as the starting point, while the *exterior* is profiled as the destination. Dodge and Lakoff (2005) point out that *in* and *out* in such sentences combine the elements of CONTAINER and SOURCE–PATH–GOAL schemas in reversed order with a minimal shift in linguistic form. It means that *in* and *out* are not utterly different, but rather *inverses* of one another, which may escape notice because forming composites of image schemas is done automatically and unconsciously (see also Cienki, 1997).

Mani and Pustejovsky (2012), following largely Talmy’s (1985, 2000b, Part 1) work on motion semantics, assume that spatial expressions of motion can be decomposed into distinct semantic elements, which include: (a) the event of MOTION; (b) the FIGURE that is undergoing movement; (c) the PATH or the region traversed; (d) the GROUND against which the movement occurs; (e) the MANNER of movement; (f) the MEDIUM involved. Apart from these semantic components, Mani and Pustejovsky (2012) see *argument structure*, *semantic role selection*, and *event structure* as essential aspects of meaning required for the representation of lexical information about motion.

*Argument structure* determines the number of a predicate’s arguments in the syntax, e.g. *throw*(arg<sub>1</sub>, arg<sub>2</sub>, arg<sub>3</sub>), as in “The boy(arg<sub>1</sub>) threw a bone(arg<sub>2</sub>) to the dog(arg<sub>3</sub>)”. However, to properly determine whether a linguistic expression of motion is well formed, the argument structure must be coupled with *role selection*, which involves specifying, for each argument, selectional constraints that must be satisfied for the verb to be interpreted properly. The role selection involves both imposing the required *syntactic category*, e.g. noun phrase (NP), verb phrase (VP), adjective phrase (AP), or sentence (S), and a *semantic role* (or *thematic role* in another nomenclature). The *semantic role* can be defined as the manner in which the argument participates in the event. As a partial semantic function of the event, it must behave according to a pre-defined calculus of role relations (see Carlson, 1984; Fillmore, 1985; Gruber, 1976;

Jackendoff, 1972). Thematic roles were proposed<sup>17</sup> in the 1960s (Fillmore, 1968; Gruber, 1965; Jackendoff, 1972) with the intention of creating a closed set of participant types that could describe each participant's relation to the event expressed by the verb. However, a full set of thematic roles has never been established and still remains an open subject in the linguistic community. The distinguished thematic roles were criticized for lacking criteria for defining each role and the inability to exhaustively characterize the argument types of all verbs.

Mani and Pustejovsky (2012, p. 37) view the following roles as relevant to the formal semantic description of motion events: (a) AGENT – the event participant that performs or causes the event; (b) EXPERIENCER – the event participant who experiences or perceives the event; (c) SOURCE – the location or place where the motion begins; (d) GOAL/RECIPIENT – the location or place where the motion terminates or is directed to; (e) PATIENT – the event participant who is affected by the event; (f) THEME/FIGURE – the event participant undergoing a change in position or state; (g) INSTRUMENT – the event participant used by the Agent to perform or cause the event; (h) LOCATION/GROUND – the location or place where the event occurs.

Apart from specifying the number and roles for the arguments in the predicate, the formal interpretation of motion proposed by Mani and Pustejovsky (2012), involves indicating a specific shape of the event denoted by the predicate, which is referred to as *event structure*<sup>18</sup> (Davidson 1967/2001b; Parsons, 1990; see Lewandowska-Tomaszczyk, 2011 for a review). One of the most widely accepted classifications of events proposed by Vendler (1957) identifies their four basic types: (a) *activity* is a homogenous event with no natural finishing; (b) *accomplishment* is a non-homogenous event that culminates in a new state; (c) *achievement* is an event with a instantaneous culmination; (d) *state* is a homogenous event where nothing is changing, which may extend over time.

With reference to the above classification, Kenny (1963/2003) proposes to subsume *accomplishments* and *achievements* into a single class of *performances*. Pustejovsky (1991) proposes an internal structure of events which differentiates these classes structurally. He argues that the internal structure of event types can be explicitly represented as three basic event structures: STATE, PROCESS, and TRANSITION, where events, marked with  $e_i$  below, can be considered atomic sequences following temporal precedence.

<sup>17</sup> The idea of distinguishing thematic roles goes back to Blake (1930), who proposed distinguishing *case relationships* from *case forms* through a semantic analysis.

<sup>18</sup> The body of research that has led to formulation of event-based semantic theories embraces a tremendous range of topics, including tense and aspect, nominalization, anaphora, plurals, adverbial modification, naked infinitives, and numerous other features of language discussed in relation to event structuring (see Higginbotham, Pianesi & Varzi, 2000; Lewandowska-Tomaszczyk, 2008a; Mani, Pustejovsky & Gaizauskas, 2005; Rappaport Hovav, Doron & Sichel, 2010, for multidisciplinary collections of studies).

EVENT → STATE | PROCESS | TRANSITION

a. STATE: → e

b. PROCESS: → e<sub>1</sub> . . . e<sub>n</sub>

c. TRANSITION<sub>achievement</sub>: → STATE STATE

d. TRANSITION<sub>accomplishment</sub>: → PROCESS STATE

Taken together, the primitive semantic components of argument structure, semantic role selection, and event structure can be used for the semantic analysis of two basic predicative classes denoting movement, which essentially corresponds to the distinction between *path* and *manner* verbs proposed by Talmy (1985, 2000b, Part 1).

The first basic class includes *path predicates*, which can be characterized as involving “those verbs that presuppose a specific path for the moving object (the figure), along with a possible distinguished point or region on this path (the ground), which the figure is moving toward or away from” (Mani & Pustejovsky, 2012, p. 39). This class can be decomposed as follows:

- a. There is a transition event of an action (e<sub>1</sub>) bringing about a change of location from one state (e<sub>2</sub>) to another state (e<sub>3</sub>).
- b. The FIGURE undergoes this change of location.
- c. The FIGURE traverses a presupposed path through the motion.
- d. There is a distinguished region of the path identified as the GROUND (Mani & Pustejovsky, 2012, p. 39).

By distinguishing the additional semantic parameter of *orientation*, the path predicates can be divided into four specific subclasses: (a) *topological path expressions*, e.g. arrive, exit, leave, take off; (b) *orientation path expressions*, e.g. ascend, descend; (c) *topometric path expressions*, e.g. approach, near, distance oneself; (d) *topometric orientation expressions*, e.g. hover. Moreover, the predicates that identify the origin of the path being traversed can be designated as *left-headed path predicates*, e.g. leave, depart. In contrast, the predicates that identify the end of the path can be designated as *right-headed path predicates*, e.g. arrive, enter (Mani & Pustejovsky, 2012, pp. 39–40). Additionally, the meaning denoted by the main verb in path predicates can be expressed more specifically by incorporating *manner adjuncts*, e.g. John arrived by bike.

The other basic class of predicates encompasses *manner verbs* that “indicate motion, but with no particular source, goal, or path associated with this motion” (Mani & Pustejovsky, 2012, p. 40). According to Mani and Pustejovsky (2012, pp. 40–41), manner verbs can be considered subtypes of an atomic predicate for motion, which they call *move* (cf. Jackendoff, 1990, Ch. 5.2). The atomic predicate *move* “takes as its arguments the figure and the tracing of the movement by the object in motion, which is a path”. For this reason, such verbs can be referred to as path-creating predicates and characterized as follows:

- a. There is an action (e) bringing about an iterated non-distinguished change of location.
- b. The figure undergoes this non-distinguished change of location.
- c. The figure creates (leaves) a path by virtue of the motion.
- d. The action (e) is performed in a certain manner (Mani & Pustejovsky, 2012, p. 41).

The path-related meaning of manner predicates can be specified more precisely by incorporating *path adjuncts*, e.g. John biked to the store. The motion expressed by manner predicates can be differentiated according to a parameter identifying manner types. Mani and Pustejovsky (2012, Ch. 2.4) demonstrate how, for the sake of computation, the parameter of manner be defined through modification of other aspects of the motion frame, which is discussed further in Section 6.2.

In the context of *spatial frames of reference*, Levinson (2003, p. 97) notes that motion is naturally more complex than location. For that reason, the description of translational motion is organized, to some extent, differently to the description of static locations by involving additional parameters that denote not only the change of location, but also *manner*, *instrument*, *medium of motion*, and possibly other attributes. For example, if we consider a simple motion scene of a cat traversing a room, it is possible not only to trace the cat's trajectory (along or across the room), but also to articulate the manner of movement (walked or jumped), to indicate whether the motion was externally caused or spontaneous, and to express some emotional aspect of the event (e.g. lazily, nervously, frantically) (see Radvansky & Zacks, 2011, 2014; Zacks & Tversky, 2001; Zwaan & Radvansky, 1998). These complex aspects of movement are encoded in various ways across languages.

## 1.7 Lexicalization patterns of motion events

By examining the systematic relations between different aspects of meaning and surface forms of linguistic expression across languages, Talmy (1975b, 1985, 1991, 2000b, 2007b) demonstrates how the semantic structure of linguistic representations reflects the conceptual structure in the domain of motion. Linguistic elements taken into consideration include *open class* categories, such as verbs of motion, and *closed class* categories, such as prepositions acting as satellites. The *satellite* is defined by Talmy (2000b, p. 102) as “the grammatical category of any constituent other than noun-phrase or prepositional-phrase complement that are in a sister relation to the verb root”, e.g. move *away*, move *behind*, move *between*, move *up*, etc.<sup>19</sup>

<sup>19</sup> Croft, Barðdal, Hollmann, Sotirova, and Taoka (2010, pp. 205–206) argue that it makes more sense to define *satellite* as “anything that is not a verb root but encodes an event component”, which includes English prepositions that encode the Path without an accompanying Ground expression.

Talmy (1985, 2000b, Part 1) observes that different languages conflate the semantic components of the Motion event in different ways. He identifies three main typological patterns of the mappings between the meaning and form for the expression of motion events. The *Motion+Co-event* pattern (Talmy, 2000b, pp. 27–29) can be illustrated with the sentences such as “The rock rolled down the hill” (Motion+Manner), or “The napkin blew off the table” (Motion+Cause). It is characteristic of the Indo-European family except Romance languages, as well as Finno-Ugric, Chinese, and others. The *Motion+Path* pattern (Talmy, 2000b, pp. 49–53) can be illustrated with the following sentences from Spanish: “La botella entró a la cueva (flotando)” [Lit. The bottle MOVED-in to the cave (floating), i.e. “The bottle floated into the cave”], and “La botella salió a la cueva (flotando)” [Lit. The bottle MOVED-out to the cave (floating), i.e. “The bottle floated out of the cave”]. This pattern is characteristic of Romance and Semitic families of languages, as well as Japanese, Korean, Polynesian, Turkish, and others. The *Motion+Figure* pattern (Talmy, 2000b, pp. 57–59) expresses the fact of Motion together with the Figure. It is characteristic of American Indian languages, but can also be observed in some English sentences, e.g. “It rained in through the bedroom window” (non-agentive) or “I spat into the cuspidor” (agentive).

On the basis of the patterns used for mapping the semantic components of the core schema (particularly Path) and co-events (Manner and Cause) onto the surface forms, Talmy (1991, 2000b, Part 1) proposes to distinguish two main categories of languages. The languages that characteristically map the core schema into the verb are referred to as *Verb-framed languages* (V-languages). They tend to conflate Motion+Path in verbs, while a co-event of Manner or Cause is typically encoded with adverbials and gerunds, or just left to inference. The languages that characteristically map the core schema onto the satellite are referred to as *Satellite-framed languages* (S-languages). Generally, S-languages, including English, tend to conflate Motion+Manner in verb roots whereas the Path is encoded with satellites and prepositional phrases.

The Manner/Path asymmetry becomes even more salient when the following compositionality restriction is taken into consideration: while in the S-languages manner verbs can be combined freely with different kinds of Path modifiers, in the V-languages, at least some of them, e.g. Spanish, manner verbs cannot be used with *telic* path phrases, i.e. ones marking an end-of-path location of the moving object (Aske, 1989). Slobin and Hoiting (1994) expand this restriction to propose the *boundary-crossing constraint*, which assumes that V-languages license a manner verb as the main verb in a path expression only if no boundary-crossing is predicated (see also Özçalışkan, 2013). The lexicalization patterns, however,

are not absolute. The V-languages, such as Greek and Spanish have motion verbs that express Manner, and the S-languages have motion verbs that express Path, e.g. *arrive*, *ascend*, *enter*, or *exit*.<sup>20</sup>

Talmy's dichotomous division has been contested as inadequate for certain Asian languages, e.g. Chinese (Slobin, 2004) and Thai (Zlatev & Yangklang, 2004), which do not seem to fall into either category. Slobin (2004, 2006) proposes extending Talmy's typology to include a third class of *Equipollently-framed languages* (E-languages), in which "path and manner are expressed by equivalent grammatical forms" (Slobin, 2004, p. 249). However, Talmy (2009), despite agreeing with the idea of equipollent-framing, describes such languages as having a *parallel* system, i.e. having both satellite- and verb-framing properties. He concludes that "the concept of *equipollent framing* should only be applied to cases where a constituent expressing Path and a constituent expressing the Co-event together serve most or all of a main verb-like function in a sentence, not where they are both outside a third constituent that does function as a main verb" (Talmy, 2009, p. 401).

Filipović (2007) demonstrates how studying lexicalization patterns provides insights into how speakers of different languages from the same group organize experiential data in their accounts of events. By comparing two S-languages, English and Serbo-Croatian, she demonstrates that speakers of these two languages use two different algorithms for the processing of sentences expressing motion events. Levinson & Wilkins (2006b, pp. 527–541) show through a wide array of cross-linguistic comparisons that Talmy's typology is helpful for scrutiny of European languages (see Goschler & Stefanowitsch, 2013 for a collection of studies), but does not entirely apply to a worldwide sample. More recent studies (Beavers, Levin, & Wei Tham, 2010; Croft, Barðdal, Hollmann, Sotirova, & Taoka, 2010; Sampaio, Sinha, & Sinha, 2009) suggest elaboration of Talmy's classification to include additional language types. Talmy (2005a) himself emphasizes that the lexicalization patterns reflect general tendencies, not absolute differences across languages, and that the typology is open to further improvements. Despite these criticisms, Talmy's typological framework still stands as a valid contribution to our understanding of the processes of form–meaning connections for the expression of motion events in cross-linguistic contexts. Studying lexicalization patterns contributes not only to typological studies, but has consequences for the practice of foreign language teaching and translation (see Cadierno, 2008; Cadierno & Robinson, 2009; Hasko, 2010 for applications in a Second Language Acquisition).

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<sup>20</sup> Talmy (1985, p. 72) notes that the majority of verbs in English that conflate Path are mostly borrowings from Romance, rather than original English forms.

## 1.8 Influence of lexicalization patterns on cognitive processes

Because the encoding of motion is a semantic dimension fundamental to all humans, yet the patterns of encoding differ between the typological groups, there has been a number of studies investigating whether the language related to representations of motion events affects<sup>21</sup> speakers' higher-level cognitive processes. This domain offers a particularly convenient test bed because motion scenes are concrete and readily observable, which means that they can be easily controlled in testing.<sup>22</sup> A particular area of interest concerns differences in reasoning about motion events between speakers of Path languages, like Greek or Spanish, and Manner languages, like English. The Path/Manner distinction parallels, though not exactly, Talmy's (1991, 2000b) distinction between V-languages and S-languages. Slobin (1996a, 1996b, 1997) suggested that for speakers of English, the habitual target of attention is Manner, since it is encoded directly in the verb. For that reason, it is more frequently expressed, and thus more cognitively salient. In contrast, for Spanish speakers the habitual target of attention is Path because Manner is less frequently expressed as not being as readily encodable in verbs.

Gennari, Sloman, Malt, and Fitch (2002) compared performance of English and Spanish speakers on a linguistic task with their performance on two non-linguistic tasks involving recognition memory and similarity judgments. Experiments were conducted with videotaped motion events in which the Manner or Path of the target event had been altered. Participants encoded the events while describing them verbally or not. Four options were taken into consideration. "*Strong*" *linguistic relativity* hypothesis (Lucy, 1992a, 1992b, 1997) holds that habitual thought<sup>23</sup>

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<sup>21</sup> A hypothesis that natural languages shape the way we think is attributed to the American anthropologist-linguist Edward Sapir (1929) and his student Benjamin Lee Whorf (1939/1956a, 1940/1956b), though it never was articulated very precisely by either of them. Although it was generally rejected by mainstream linguistic and psychological research by the end of 1970s, it returned in the 1990s in a more moderate form embracing several "stronger" and "weaker" variants, which may be generally subsumed under the umbrella term of *linguistic relativity* (Lucy, 1992a; 1992b; 1997; see Gentner & Goldin-Meadow, 2003; Gumperz & Levinson, 1996; Wolff & Holmes, 2011 for multidisciplinary collections of studies). Despite criticisms (e.g. Bloom & Keil, 2001; Deutscher, 2010; McWhorter, 2014; Pinker, 2007, Ch. 3), it is still actively pursued in modern cognitive research, and even appears to enjoy a sort of Renaissance in the contemporary psychological and linguistic discussion (see Boroditsky, 2011; Reines & Prinz, 2009; Wolff & Holmes, 2011 for concise reviews).

<sup>22</sup> Other related domains where such studies have been conducted include linguistic encoding of *time* (e.g. Boroditsky, 2001; Casasanto, 2008) and linguistic encoding of *spatial relations* (e.g. Levinson & Wilkins, 2006a; Majid, Bowerman, Kita, Haun, & Levinson, 2004).

<sup>23</sup> Since Whorf (1939/1956a) did not state precisely what he meant by "habitual thought", it has been interpreted quite flexibly in different studies.

patterns are shaped by language used to represent the environment, which is acquired during language learning. *Thinking for speaking* hypothesis, developed by Slobin (1987, 1996a, 2003), is a more cautious reformulation of the linguistic relativity hypothesis. It holds that “there is a special kind of thinking that is intimately tied to language—namely, the thinking that is carried out on-line, in the process of speaking.”<sup>24</sup> (Slobin, 1996a, p. 75). Slobin argues that on-line processes of language production and interpretation are influenced by those aspects of events that are made salient by their encoding in linguistic descriptions. *Language as strategy* hypothesis is another “weaker” variant of the linguistic relativity, which was suggested by Kay and Kempton (1984) in the context of recognition of boundaries between colors (cf. Berlin & Kay, 1969; Deutscher, 2010, Ch. 1–4). It proposes that people are influenced by language only when performing certain tasks, for example, classification or judgments of similarity, but the influence of linguistic characteristics on mental representations disappears when people are not using language. As a fourth option, the experimenters took into consideration a possibility that the conceptual organization is independent of linguistic patterns.

The study did not find any evidence that language was mediating or influencing recognition performance. No effect of language in the recognition memory task was observed after either linguistic or non-linguistic encoding. However, a linguistic effect was observed in the similarity task: it prompted responses consistent with the linguistic patterns, but only after verbal description. There was no effect of language in the similarity task after non-linguistic encoding. The results indicate that certain non-verbal tasks such as similarity judgments may be influenced by language, which lends some support to the *language as strategy* hypothesis. The results are also partly consistent with the *thinking for speaking* hypothesis, although remotely because linguistic encoding did not have a detectable effect in the recognition task. Despite lending some support to the “weaker” variants of the linguistic relativity hypothesis, the results did not bring a definite answer. Conflicting pieces of evidence that were collected in the study allow as well for the interpretation that the conceptual representations of motion events are universal and relatively independent of linguistic representations.<sup>25</sup>

Papafragou, Massey and Gleitman (2002) designed two experiments to compare the performance of English and Greek children and adults. In one experiment participants solved nonlinguistic tasks involving motion events. In the other experiment, linguistic descriptions of the same motion events were compared.

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<sup>24</sup> Although Slobin uses the label “thinking for speaking” his hypothesis ultimately includes all forms of linguistic production (speaking, writing) and reception (listening, reading), as well as a range of mental processes, such as understanding, imaging, and remembering (Slobin, 2003).

<sup>25</sup> Loucks and Pederson (2011) argue that there is not sufficient meaningful linguistic variation for manner and path between English and Spanish to conduct linguistic relativity research.

The study found that even though the two linguistic groups differed significantly in terms of their linguistic preferences, their performance in the nonlinguistic tasks was identical. A subsequent study (Papafragou, Massey & Gleitman, 2006) also compared motion descriptions produced by English and Greek children and adults. It found that Greek speakers mentioned the manner of motion in their descriptions of motion events significantly more frequently when it was not inferable. By contrast, inferability of manner had no measurable effect on motion descriptions in English, where Manner is already encoded in verbs. The results demonstrated that Greek speakers actively monitor and presuppose the manner of motion, even though their language favors the use of Path conflating verbs.

An eye-tracking study (Papafragou, Hulbert & Trueswell, 2008) compared eye movements of Greek and English adults as they viewed motion events. One experiment examined how speakers of different languages visually inspect a motion scene while they prepare verbal descriptions (a linguistic task). Another monitored shifts in eye movements while participants were memorizing a motion scene (a nonlinguistic task). During the linguistic task, speakers' eyes followed the event components typically encoded in their native language. While watching motion scenes in the nonlinguistic task, participants allocated attention in a similar manner, regardless of their native language. However, when the motion scenes stopped in the nonlinguistic task, differences between language groups arose: as participants were committing facts to memory they spontaneously studied those aspects of the scene that their language does not routinely encode in verbs. The results indicate that effects of language on mental representations of motion events arise when linguistic forms are recruited to achieve the task at hand, which lends some support to Slobin's (1996a, 2003) *thinking for speaking* hypothesis.

Papafragou and Selimis (2010) compared categorization preferences for motion events by English and Greek adults and 5-year-olds. The study explored linguistic effects observed earlier in similarity judgments by (Gennari, et al., 2002). Language-congruent categorization preferences emerged in tasks that implicitly encouraged the use of linguistic stimuli during event apprehension. The results suggest that there exist on-line linguistic intrusions that correspond to language-specific event encoding preferences, but these effects are temporary and task-dependent. They do not reflect a permanent reorganization of the underlying cognitive representation of motion.

As summarized by Gleitman and Papafragou (2012, 2013) cognitive studies of motion representation between speakers of Satellite- and Verb-framed languages suggest that the conceptual organization of space and motion is independent of language specific patterns. It is just as obvious, however, that language influences on-line thought in many ways. Although cross-linguistic differences do not overrun

event apprehension, language can be recruited to aid event encoding, particularly in tasks that involve heavy cognitive load. These patterns are temporary in the sense that they do not change the nature of motion apprehension itself. In some cases, they emerge in the course of handling linguistic instructions for a cognitive task. In other scenarios, linguistic information is used on-line to recode non-linguistic stimuli for a task that requires no language use. However, “in neither case of linguistic intrusion does language reshape or replace other cognitive formats of representation, but it does offer a mode of information processing that is often preferentially invoked during cognitive activity” (Gleitman & Papafragou, 2012, p. 559).

### 1.9 Types of motion beyond lexicalization patterns

The above-reviewed cognitive studies investigating the influence of the lexicalization patterns on higher-level cognitive tasks, such as memorizing, similarity judgments, or classifying, have been criticized by Pourcel (2005, 2010). She argues that the research conducted in the domain of motion relies on assumptions, hypotheses, and experimental designs based on the language-embedded categories without considering, to an appropriate extent, the conceptual reality of motion independently of language.

Few of these studies have reached successful conclusions or even consensus across their respective findings. The outcome of these studies might have proved altogether different had they considered, from the outset, the conceptual reality of motion – independently of language – and had they examined their data relative to conceptually real categories, rather than to solely linguistically-defined parameters such as path and manner (Pourcel, 2010, p. 420).

Pourcel (2010, pp. 419–420) argues that the conceptual categories of motion are richer and more complex than the generalizations that emerge from the language data.<sup>26</sup>

She proposes a typology of motion based on cognitive data obtained from categorization tasks. Her aim is to represent the complexity of the domain of motion according to directional, aspectual, causal, agentive, and other properties. As a starting point for the typology, Pourcel (2005, 2010) proposes to distinguish between what she terms *motion events* and *motion activities*. A motion event refers to a situation in which the conceptual emphasis is put on directionality and reaching a goal through the path of motion, e.g. “Tom walked to the store”. On the other hand, a motion activity specifies a motion in progress, e.g. “Tom is jogging”. In this case, the conceptual emphasis of an event is put on the ongoing nature of motion and the manner in which it takes place. This distinction corresponds largely

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<sup>26</sup> Some arguments put forward by Pourcel (2010, pp. 419–421) against “linguacentric” tendencies in motion research appear to be questionable to the author. Especially her attempt to detach “linguistic typologies” from “conceptual typologies” does not sound entirely convincing.

to what Descartes (1644/1985, Part II) distinguishes as the *change of place* sense and the *ordinary sense* of motion, and what Tesnière (1959/2015, pp. 311–313) discusses under the labels of *displacement* and *movement*, respectively.

According to Pourcel (2010, pp. 423–424) the main difference between motion activities and events relates to the presence of directionality or a destination. Motion events refer to directional or goal-oriented motion by entailing a change of location. A manner, if specified, serves merely to follow the course of the path. On the other hand, motion activities do not inherently require overt directionality. They refer to the type of motion performed, which typically describes a specific manner. Unfortunately, Pourcel (2005, 2010) does not provide any additional conceptual criteria for distinguishing activities from events that would significantly expand beyond the focus on either Path or Co-event, as categorized by Talmy (1985, 2000b, 2007b). Please note that a detailed discussion on the directionality of motion is presented in Chapter 5. The manner of motion is expounded in Chapter 6.

Zlatev, Blomberg, and David (2010), analyze the distinction between motion events vis-à-vis motion actions using the traditional labels of *translocative* vs. *non-translocative motion* (cf. *translational motion* in Talmy, 2000a, 2000b). They point out that in the non-translocative motion there is neither Path nor Direction, because there is no explicit change of the figure's position in relation to one or more reference points. On the other hand, the expressions of translocation, specify the change of position in relation to a source, middle part, or goal of motion, which involves either the Path or the related but different category of Direction. The crucial difference between the two is that the Path implies *bounded motion*, whereas the Direction implies *unbounded motion*. The boundedness of motion implies that it will lead to a state-transition (see Pustejovsky, 1991; Vendler, 1967), i.e. that the figure departs from the Source, or passes through a Midpoint, or reaches the Goal. In contrast, the unboundedness of motion implies that motion can go on indefinitely without reaching a definite point, as in “They marched forward/uphill” (Cappelle & Declerck, 2005). The Direction can be specified either as a vector or as a trajectory, which can take a particular shape, such as *around* or *along* (see Gehrke, 2008; Zwarts, 2003, 2008).

Another conceptual dimension closely related to the distinction between bounded vs. unbounded motion is *telicity*, i.e. the event completion understood as reaching the goal of motion (from Greek *telos* meaning “end”).<sup>27</sup> With reference to this property, *telic* and *atelic* motion can be distinguished (Comrie, 1976, pp. 44–48; Declerck, 2007; Depraetere, 1995). Motion activities are typically atelic because they

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<sup>27</sup> The word *entelecheia* used by Aristotle in his discussion on motion in the sense of “being-at-an-end” comes from the adjective *enteles*, meaning “complete, perfect”, whose root is *telos*.

refer to ongoing, uncompleted instances of motion. On the other hand, motion events tend to be telic because they involve an endpoint: a change of location or state. Telic events may also involve a change of location via the crossing of boundaries, e.g. entering, exiting, or crossing (see Aske, 1989; Özçalışkan, 2013; Slobin & Hoiting, 1994). However, if directionality is involved in a motion event, the goal does not need to be salient, e.g. “They sailed along the shore for weeks”. Although directional motion events of this kind are atelic due to the lack of an endpoint, they still differ from activities by having the property of directionality. Declerck (2007) and Depraetere (1995) emphasize the need of distinguishing among the aspectual categories of (un)boundedness, (a)telicity, and (im)perfectivity (see also Demonte & McNally, 2012 for a comprehensive overview of telicity, change, and state as key components of event structure).

Another distinction among motion types can be made with reference to *causality* (see Shibatani, 2002; Solstad & Bott, 2017 for introductory reviews). A figure with physical motor abilities can initiate its own motion, e.g. “Lucy crossed the room”, which is an instance of *self-motion* (see Gill & Lennox, 1994). On the other hand, a primary figure of motion can cause an alteration in a secondary figure, which results in the secondary figure undergoing a change of location, as in “Molly pushed the wheelbarrow through narrow streets”, or it may undergo a change of state, as in “Amadeus rocked the baby to sleep”. In cognitive linguistic studies, the caused motion has been approached from different angles (e.g. Goldberg 1995, Ch. 7; Levin & Rappaport Hovav, 1994, 1998; Rappaport Hovav, 2014; Miller & Johnson-Laird, 1976, pp. 544–547; Talmy, 1988, 2000b, Ch. 1), to expound the semantic complexity of relations holding between entities involved in this kind of dynamic interactions.

As a further distinction related to self-motion and caused motion, Pourcel (2010, p. 427) proposes to distinguish *animate motion* from *inanimate motion*, with reference to the animacy of the figure (see Mandler, 1992, 2004). However, since natural forces, like wind or flowing water, are also capable of self-motion, another relevant distinction relates to the intentional basis of instantiating movement. It allows for distinguishing *agentive* and *non-agentive* motion with reference to the intention of the animate figure (Davidson, 1963/2001a, 1971/2001c; Dowty, 1991b; Jackendoff, 1983, pp. 179–183; 1990, pp. 127–129; Miller & Johnson-Laird, 1976, pp. 547–554; Talmy, 1988, 2000a, Ch. 8).

Finally, with reference to the physical properties of motion including such aspects as muscular effort, a degree of control, speed, and the overall dynamics of movement, Pourcel (2010) proposes to distinguish instances of typical, or *default motion*, such as walking for adult humans, from less typical *manners of motion*, such as limping, staggering, waltzing, etc. (see Dodge & Lakoff, 2005; Levin, 1993, pp. 264–267; Rappaport Hovav & Levin, 2010; Slobin, 2004, 2006; Slobin, et al., 2014).

She adds that while manners of motion are highly diversified, at the same time, they are constrained by the inherent properties of the moving figure, for instance, pigs cannot fly and snakes cannot walk (cf. Slobin, 2004, 2006). Additionally, motion types requiring a form of instrument or vehicle, may be referred to as instances of *instrumental motion* (see Frawley, 1992, pp. 178–179; Ikegami, 1969, pp. 61–63 & 75–79; Levin, 1993, pp. 267–268; Waliński, 2015b).

For further elaboration of the typology, Pourcel (2010) proposes to juxtapose the above-mentioned types of motion with different figures performing or undergoing motion. She sees the figure as a central conceptual element that influences and constrains most types of motion and motion properties: “any conceptual model of the domain of motion should be based on, or centered around, the figure schema” (Pourcel, 2010, p. 430). She proposes to divide motion figures into real and fictional. *Real figures*, which have physical existence, are perceptually real and can be physically interacted with. On the other hand, *fictional figures* are created and exist only in the world of fiction. They may be found in myths, literature, cartoons, films, and other forms of culture, as well as figments of individual imagination. What ensues from the distinction of figures is another division between *real motion* and *fictional motion*.

Pourcel (2010) argues that these properties influence the conceptualization of motion in significant ways. She adds that additional classes of motion may include, for instance, real-life animal non-default motion (stunts performed by animals in circuses) or specific types of motion performed by humans in sports (Pourcel, 2010, p. 449). She admits, however, that more data is needed to substantiate the distinction between motion event and motion activity, as well as other distinctions proposed in her study. Zlatev, Blomberg, and David (2010) also express the need for a more language independent representation of motion because unless the classes of motion experiences are defined independently of language, the issues of linguistic relativity cannot be addressed. On the basis of evidence from Yucatec Maya, Bohmeyer (2010) argues against universalism in representation of motion events (see Pederson, 2017 for a review of approaches to motion event typology). Apart from these types, there is another class of motion reflected in linguistic representations in which real objects incapable of movement are described in terms of motion over their configuration in space. This phenomenon of *fictive motion*, announced in the Introduction as the core topic of this book, is discussed in the following chapter.



## Chapter 2

# Cognitive linguistic models of fictive motion

Two important characteristics of maps should be noticed. A map *is not* the territory it represents, but, if correct, it has a *similar structure* to the territory, which accounts for its usefulness. . . . If we reflect upon our languages, we find at best they must be considered *only as maps*.

A. Korzybski (1933/1995), *Science and Sanity*, p. 58

## 2.1 Linguistic fictivity

Language abounds in references to fictive entities invoked for describing real-life situations. Langacker (2005, 2008a, Ch. 14.2) starts the discussion on linguistic *fictivity*, also referred to as *virtuality* (e.g. Langacker, 1999), from the reflection that a lexical noun by itself (e.g. *book*, *air*) merely specifies a type of thing, not any specific instance of that type. Similarly, a lexical verb by itself (e.g. *go*, *love*) merely specifies a type of event or situation, which Langacker (2005, p. 170) terms a *process* (cf. Dowty, 1979/1991a; Kenny, 1963/2003; Pustejovsky, 1991; Vendler, 1957; Verkuyl, 1993), not any particular instance of the process. Langacker notes that the thing or process designated by a *type* specification is fictive in nature as it does not refer to an actual thing or an actual process as such (cf. *sense* and *reference* in Frege, 1892/1960). For example, in the statement “I don’t have a brother”, the type specification *a brother* is conjured up in order to specify what is not the case, i.e. non-existence of any representative instance of this type. Thus, a *type* can be essentially described as a fictive entity that “represents an abstraction from actuality which captures the commonality inherent across a set of actual instances” (Langacker, 2005, p. 170).

Typically, a noun phrase or finite clause incorporates a *grounding element* (Langacker, 1991, Ch. 6, 2008a, Ch. 9), which singles out a particular instance of a type and locates it with respect to the ground, i.e. the speech event and its participants. Figure 2.1 demonstrates how the relation between a type (t) and instances of a type ( $t_{i,j,k}$ ) can be illustrated using the metaphor of planes, or *mental spaces*<sup>28</sup> (Fauconnier, 1985/1994, 2007) to indicate abstraction.

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<sup>28</sup> Fauconnier (2007, p. 351) defines *mental spaces* as “very partial assemblies constructed as we think and talk for purposes of local understanding and action”. Grady (2007, p. 199) provides

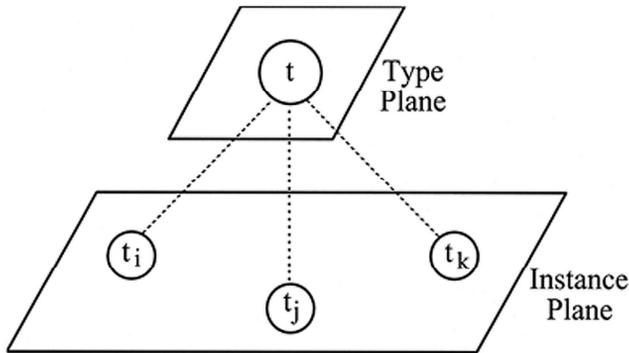


Figure 2.1 Type vs. instance

As shown in Figure 2.1, a *type* of thing or process can correspond to any number of instances of that type, which is marked by their position in the *instance plane*, or in Langacker’s (1991, 2008a, pp. 132–136) terms the *domain of instantiation*. While the type projects to all its specific instances, it does not occupy any particular position in the domain of instantiation. Langacker emphasizes that it is important to keep in mind not only how *types* are connected to *actuality*, but also how they arise from it “as a kind of generalization over actual occurrences, such that sets of occurrences are perceived as being alike in significant respects” (Langacker, 2005, p. 170; see also Barsalou, 2008, 2010 for a discussion from a broader perspective). He adds that the lower plane in Figure 2.1 is labeled the *instance plane* rather than the *actual plane* because the *type/instance* distinction does not equal the *fictive/actual* distinction. Types are always fictive entities, but instances do not necessarily have to be actual – they can either be actual or fictive. For example, let’s assume that the sentence “This road runs to London” refers to an actual road built to provide an easy access to the city of London. The linguistic reference to motion – namely *runs* – appears to be at the instance level. However, while the sentence is a statement about actuality (both the road and the city are actual instances), the process of motion conjured up to describe the road is fictive in nature because no actual movement occurs. This demonstrates that in order to grasp the expression’s overall meaning, we must apprehend not only what is directly coded linguistically, but also how the fictive entities are connected to actuality (see also Głaz, 2014).

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an alternative definition of *mental space* as “a coherent bundle of information activated in the mind at a particular time, representing an understanding of a scenario, real or imagined”.

Fictive patterns are learned, as one option, by *abstraction*, which is a fundamental means of transcending direct experience characterized by Langacker (2008a) as follows:

Abstraction comes about through the reinforcement of what is common to multiple experiences. Since features that fail to recur are not reinforced, an abstracted structure is always impoverished relative to the experiences it derives from. And since commonalities are often apparent only in a coarse-grained view, involving lesser precision, abstracted structures are usually schematic relative to these experiences. Though immanent in all of them, an abstracted structure is independent of any particular instantiation. It represents a generalization with the potential to be invoked in subsequent processing. Without the capacity for abstraction, every experience would be unique and unrelated to every other (Langacker, 2008a, p. 525).

By its very nature, an abstraction conforms to the structures it is based on but is less detailed. Put differently, it is essentially a representation of what the structures share, but not in an exhaustive fashion.

Another basic means of transcending direct experience, but one that exhibits the opposite nature, is *conceptual integration* (Fauconnier & Turner, 1998, 2002), which includes *metaphorization*<sup>29</sup> (Lakoff & Johnson, 1980, 1999). Conceptions are blended through correspondences between mental spaces. The resulting blend is a new conception, which is often substantially different from the inputs. Conceptual integration enables us to form conceptions that are surprisingly novel (e.g. scorching rain on the Sun), purely imaginary (e.g. tooth fairy), and even conceptually incoherent (e.g. colorless green ideas). On one hand, blending is used in producing works of fiction based purely on imagination, on the other hand, it provides a convenient means of dealing with actuality in the ever-changing circumstances of real life.<sup>30</sup>

As a further means of transcending direct experience, Langacker (1990, 1991, 2006, 2008a) distinguishes *subjectification*, which he defines as “a semantic shift or extension in which an entity originally construed objectively comes to receive a more subjective construal” (Langacker, 1991, p. 215). Langacker (2006, p. 24) emphasizes that subjectification is not metaphorical *per se*. To demonstrate the difference he discusses sentences (2.1a–c) with the verb *rise*, whose meaning is illustrated with respective diagrams (a–c) in Figure 2.2.

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<sup>29</sup> In the typology of conceptual blends proposed by Fauconnier and Turner (1998, 2002) metaphor is viewed as a special case of conceptual mappings defined by an asymmetry in the degree to which two input domains provide the conceptual frames structuring a conceptual blend (see Dancygier & Sweetser, 2014; Fauconnier & Lakoff, 2009; Kövecses, 2010) for reviews of the relationship between metaphors and blends.

<sup>30</sup> The comedy *The Invention of Lying* (Gervais & Robinson, 2009) portrays an alternative reality in which there is no concept of an untruth. The absence of fiction results in people making unintentionally cruel statements, movies limited to lecture-style historical readings, absence of religions, and advertisements bluntly truthful about the shortcomings of promoted goods.

- (2.1) a. The balloon *rose* quite slowly. [objective, *actual motion*]  
 b. Last year the price of coffee *rose* steadily. [objective, *metaphorical motion*]  
 c. The trail *rises* steeply near the summit. [subjective, *fictive motion*]

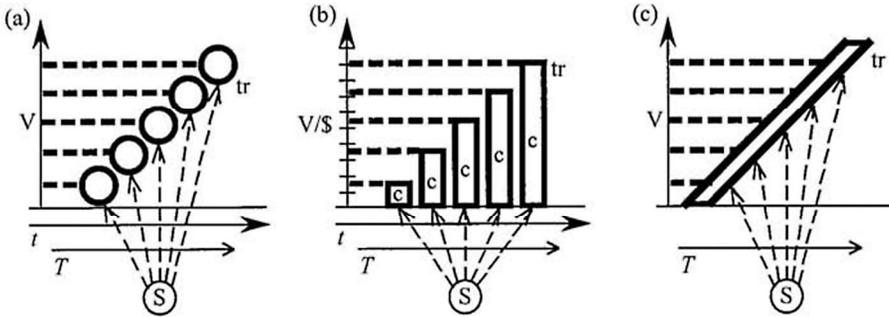


Figure 2.2 Objective vs. subjective construal in actual, metaphorical, and fictive motion

The sentence (2.1a) profiles actual motion, which is construed objectively by the subject. Through time ( $t$ ), the trajector (balloon) occupies a series of successively higher positions. As shown in Figure 2.2a, the subject of conception follows the trajector's spatial progress in apprehending the profiled event. In the second sentence (2.1b), the verb *rise* is used metaphorically in reference to an increase in price. In this case, the source domain of spatial motion is superimposed on the target domain of coffee pricing to form a *blend* (Fauconnier and Turner, 1998, 2002; Turner, 2007). As shown in Figure 2.2b, the trajector (the price of coffee) is still construed objectively in its movement, and the conceptualizer still scans this event sequentially. The difference is that in this case the movement occurs metaphorically in a blended space. Finally, the sentence (2.1c) exemplifies subjective, fictive motion. In this case, there is no objective change through time – nothing in the scene actually moves or otherwise changes. For that reason, the verb *rise* is imperfective, and occurs in the simple present tense, which indicates constancy through time. The trajector does occupy a series of successively higher points along the vertical axis, but does so simultaneously as a spatially extended object. As put by Langacker:

This motion by the subject of conception is subjectively construed: the conceptualizer does not think of herself as moving through space, but merely apprehends the scene; the movement is inherent in the very conceptualizing activity, hence offstage and construed subjectively . . . The conceptual element of spatial movement therefore undergoes subjectification when *rise* is extended from factive to (imperfective) fictive motion (Langacker, 2006, p. 25).

Langacker (2008a, p. 528–529) sees fictive motion specifically as a product of subjectification, which occurs when cognitive operations inherent in the conception of motion events are transferred to the conception of static scenes. He notes that it is called *subjectification* to indicate “that the operations come to be independent of the objective circumstances where they initially occur and whose apprehension they partially constitute” (Langacker, 2008a, p. 528; see Langacker, 1990, 2006 for a broader discussion; cf. Traugott, 1989; 2010 for a different perspective;<sup>31</sup> see De Smedt & Verstraete, 2006 for a fine-grained analysis of the notion of *subjectivity*; see Athanasiadou, Canakis, & Cornillie, 2006; Davidse, Vandelanotte, & Cuyckens, 2010 for edited collections of studies on subjectification and subjectivity).

Langacker (2005; 2008b) points out that if we consider the pair of sentences (2.2a–b):

(2.2) a. The path runs from the car park to the lighthouse.

b. The path runs from the lighthouse to the car park.

It seems intuitively evident that they include elements used to express spatial movement, i.e. the motion verb *run* and the path prepositions *from* and *to*, and incorporate a sense of movement in opposite directions. Yet, they both describe the same static scene in which nothing is moving or otherwise changing. Their semantic contrast resides exclusively in the conceptualizer’s direction of mental scanning. Thus, the general sense of movement inherent in these sentences, as well as the sense of directionality they inspire, does not arise from a difference in the conceptual content, but rather from the order in which the spatial configuration of the object is build up on the part of the conceptualizer, who through subjectification construes the path by scanning the trajector’s extent in either direction (see also Langacker, 2012, p. 212).

Another argument for believing that coextension paths involve some sort of subjectively induced motion can be derived from *temporality* (cf. Waliński, 2014a, 2014b, Ch. 8) of coextension path expressions, which is exemplified in (2.3).

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<sup>31</sup> In current linguistic thought, two most prominent proponents of *subjectification* are probably Langacker and Traugott, who have elaborated this notion according to the premises of their respective theoretical frameworks. Traugott (1989, p. 31) defines *subjectification* as a pragmatic–semantic process in which “meanings tend to become increasingly situated in the speaker’s subjective belief state or attitude toward the proposition”. Langacker (2006, pp. 17–18) emphasizes that while for her it refers to the hypothesized tendency for meanings to become more subjective, for him *subjectification* pertains to vantage point, which is a matter of *construal*. In other words, Langacker does not focus on the extent to which an expression or its meaning is subjective, but rather on the status of a particular element within the overall situation. Although Langacker and Traugott use the term *subjectification* differently, these uses are not totally unrelated. See *Introduction* in Athanasiadou, Canakis, & Cornillie, 2006 for a review of differences between these two frameworks.

- (2.3) a. The highway runs along the coast *for a while* (but for the most part it runs far away from the coast).
- b. *For a long time* the highway ran along the coast (but it was rebuilt and nowadays runs through the mountains).

In the sentence (2.3a), the temporal phrasing indicates the duration of the motion along the coast that correlates to the length of the relevant section of the described highway. Matsumoto (1996a, p. 187) emphasizes that the expression *for a while* in (2.3a)<sup>32</sup> does not refer to the duration of the state of location with reference to the described object, which occurs in (2.3b). Comparing these two sentences demonstrates that fictive motion expressions manifest a complex two-level structure of employing temporality: at one level time can be used to represent the duration of motion, but at another level it can be used to represent the duration of the state of location. Both the *directionality* and the *temporality* of fictive motion suggest that coextension path expressions cannot be fully accounted for without assuming motion of some kind.

Some other fictive structures that have been found to be linguistically relevant fall under the rubric of *fictive change* (Matsumoto, 1996b; Sweetser, 1997). Langacker (2008a, p. 530, 2008b, p. 70) argues that one category of fictive change includes expressions involving past participles derived from change-of-state verbs used as adjectives, e.g. *a detached garage* (which actually has never been attached), *a broken line* (which has never undergone the process of breaking), or *scattered villages* (which have never been clustered together). In such expressions the change designated by the participle is only virtual, i.e. subjectively construed “as a mental progression in which the profiled state is viewed as departing from the canonical one” (Langacker, 2008a, p. 530). The change is not conceived as unfolding through time, but serves to specify how the actual situation deviates from one considered typical or neutral (see Matsumoto, 1996b for a detailed analysis).

Langacker (2005, 2008a, pp. 530–531) points out that another kind of fictive change is exemplified by sentences (2.4a–d):

- (2.4) a. The general’s limousine keeps getting longer.
- b. The cars get three feet longer when you enter Beverly Hills.

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<sup>32</sup> A more elaborate example is analyzed by Matlock (2004b, p. 229) in her study of conceptual motivation of fictive motion. The sentence “The road runs through the city for over an hour, through the suburbs for 30 minutes, and then along the coast for only two seconds!” illustrates the speaker’s intention to contrast the length of different sections of the road in terms of duration.

c. His apartment keeps getting bigger every time I visit.

d. Our Christmas tree gets smaller every year.

Obviously, in all these statements the discussed change is fictive rather than actual. They can be explained using the distinction between *roles* and *values of the roles* made by Fauconnier (1985/1994, Ch. 2.2, 1997).<sup>33</sup> For example, in the case of (2.4a), the general's limousine describes a *role* fulfilled by different cars at different times, each being assigned a value of that role.

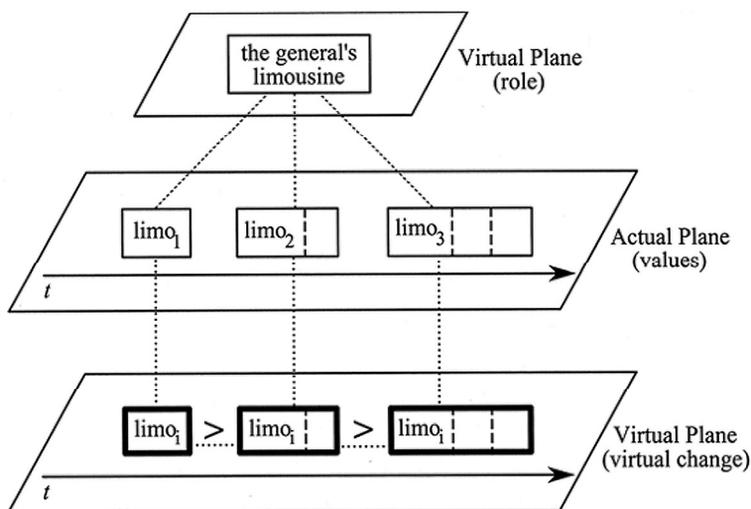


Figure 2.3 Fictive change

Langacker (2005, pp. 174–175) argues that the reference to a role, depicted at the top in Figure 2.3, is only one of three virtual planes that occur for this example. The role instantiates the general type – a virtual limousine that occurs in this scenario. Beyond this, we see a series of different actual limousines (each constant in size but longer than the previous one), which are distinct values instantiating the role. They are conceived as if they were one single entity, which leads to the conception of a virtual object whose length can be compared at subsequent times constituting the third plane. The change resulting from that comparison with respect to a single entity is required for a coherent conception of fictive change.

<sup>33</sup> Langacker (2005, p. 174), notes that similarly to a *type*, a *role* per se is a fictive entity: you may be able to drive a car, but you cannot drive a role, since it is not an actual, individual object. Roles and types are different in that a *role* is itself a virtual instance of some *type*.

In other words, imagining these fictive instantiations to be a single entity leads to the notion of the limousine getting longer (see Sweetser, 1997 for a more elaborate analysis of other examples of this kind).

From this perspective, fictive motion may be viewed as a special case of fictive change, with the following crucial differences pointed out by Matsumoto (1996b, pp. 138–140). First, in fictive change the referent of the Subject NP is supposed to undergo a change. However, in fictive motion the described object does not undergo any sort of change, only its spatial configuration is described. The second difference concerns the basis of induction of the two processes. Fictive change is induced due to an unusual character of the object in question, which marks a deviation from a certain reference state. Fictive motion, on the other hand, is induced by the spatial configuration of the described object, which triggers the focus of attention in the mind of the conceptualizer. Thirdly, the relevant stages of the process for the description of the state are different. What is described in fictive change is the final stage of a change. The initial state is relevant only in comparison with the final state, and all the intermediate stages of the change are irrelevant to the object description. In contrast, in fictive motion all successive stages of motion along the spatially extended entity are relevant to its description, which forms the basis for mental scanning.

## 2.2 Fictive motion as sequential/summary scanning

Langacker (1986, 2005, 2008a, Ch. 14) assumes that both expressions of actual and fictive motion involve *mental scanning* along a path. We conceptualize *actual motion* events by tracking a mover's progress along a spatial path. As shown in Figure 2.4a, in *processing time* (T) the conceptualizer performs *sequential scanning* along the path which the mover traverses physically. The moving object is successively conceptualized as occupying a series of locations that collectively constitute the path of motion.<sup>34</sup> The actual motion event is apprehended by the conceptualizer by mentally accessing the mover's successive locations in the same order as it reaches them. The movement occurs in *conceived time* (t), which is inherently involved in any actual event (see Radvansky & Zacks, 2011, 2014); see also *canonical event model* in Langacker, 1991, Ch. 7, 2008a, pp. 357–358).

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<sup>34</sup> Miller and Johnson-Laird (1976, Ch. 6.1.4) demonstrate that in the formal semantics *paths* can be described in terms of a temporal succession of points traced by an object moving in space. The spatial path can be perceived more or less independently of the object whose motion it describes. Verkuyl (1993, Ch. 10.5) also views a path as a spatiotemporal complex involving a sequence of locations linked with a sequence of times. However, Jackendoff (1983, 1990, 1996c, 2002) views paths as atemporal.

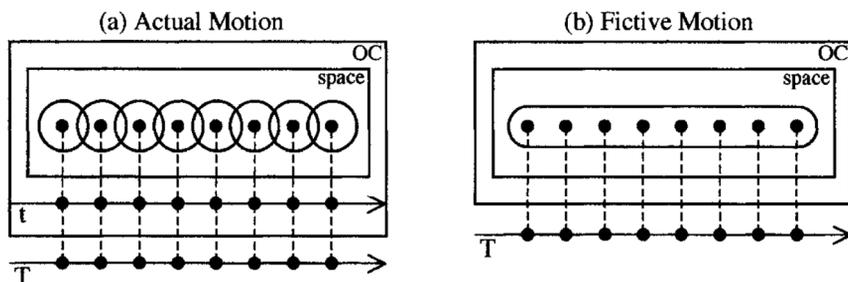


Figure 2.4 Actual vs. fictive motion event conceptualization

According to Langacker (1986, 2005, 2008a, p. 529), in *fictive motion* essentially the same mental operations are applied to a static scene. As shown in Figure 2.4b, an analog of the mover is a spatially extended object, e.g. a road, fence, etc. Instead of tracking the object's movement, the conceptualizer scans mentally along the path of the object's spatial configuration, by which they invoke the constitutive locations to build up to its full conception. Hence, the conceptualization of fictive motion occurs in a manner largely parallel to the conceptualization of the actual motion event. The *conceived time* ( $t$ ) has no significant role in the expression's objective content (OC), because the object occupies all spatial locations on the path simultaneously. Still, the temporal component necessary for considering it to be a type of motion (cf. Aristotle, 350 BC/1995, *Physics*) can be obtained by taking into account the *processing time* ( $T$ ), i.e. the time in which the conceptualization takes place.

Langacker (2005, p. 175) distinguishes *perfective fictive motion*, exemplified by (2.5a–b), from *imperfective fictive motion*, exemplified by (2.6a–b).

(2.5) a. The path *is rising* quickly as we climb.

b. This road *is winding* through the mountains.

(2.6) a. The path *rises* quickly near the top.

b. This road *winds* through the mountains.

He suggests that the progressive occurrence in (2.5a–b) typically involves motion on the part of the subject. Although the *perfective fictive motion* is still fictive rather than actual, it has an experiential basis, reflecting what a person experiences while travelling along the described path, which in (2.5a) is mentioned explicitly in the adverbial clause *as we climb*. As shown in Figure 2.5, the conceptualizer moving through the conceived time ( $t$ ) occupies different positions along the spatial path. What counts as the path is a segment of the entity being

traversed, which actually differs referentially from one moment to another.<sup>35</sup> Langacker adds that the segment can probably be identified with the immediate field of view of the conceptualizer (see Millar, 2008 for a discussion on interrelations between the senses and spatial processing).

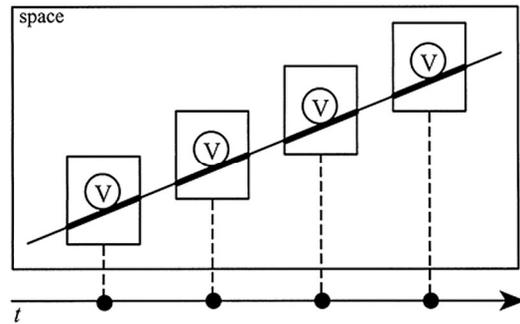


Figure 2.5 Perfective fictive motion

Rectangles in Figure 2.5 mark segments of the path experienced by the conceptualizer at subsequent moments. The conceptualization of this type of fictive motion appears to involve *sequential scanning* along the path, which Langacker characterizes as follows:

Suppose we actually watch a ball roll down an incline. In our real-time viewing of this occurrence, we see the ball in just one position at any moment, and we necessarily access these component states in the precise sequence of their temporal manifestation. Sequential scanning is thus inherent in this viewing arrangement (without being restricted to it). If a relationship develops through time, the most natural way of apprehending it is to track it through time in this manner. Hence sequential scanning is equally applicable whether an event is observed, remembered, or imagined (Langacker, 2008a, p. 111).

He adds that while the sequential scanning may seem mysterious, we actually engage in this mode of scanning whenever we directly observe any event.

On the other hand, statements like (2.6a–b) are *imperfective*, i.e. the spatial entity they profile is construed as stable and temporally unbounded, which is indicated in English by the use of the simple present tense. In this case, neither the conceptualizer nor any other viewer actually moves. The imperfective fictive motion

<sup>35</sup> Langacker (2005, p. 175) notes that *perfective fictive motion* is infelicitous when the object in question is too small, e.g. a scar, wrinkle, etc. to imagine someone traveling along it. Nevertheless, if we zoom in conceptually from the external *global* perspective, we can easily imagine, for instance, a spider walking along a crack in the wall, or an ant travelling along a cigarette lying on the floor.

describes the global configuration of the path observable at any time by the conceptualizer. The sense of change resides in the conceptualizer's mental scanning through the scene to build up to a full conceptualization of the spatial configuration of the described object.

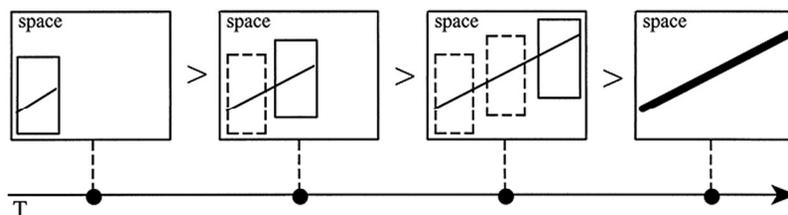


Figure 2.6 Imperfective fictive motion

As shown in Figure 2.6, in the imperfective fictive motion the time involved in the construal is the processing time (T). It can be taken into account because no matter how short the time required for a conceptualization to occur may be, some span of time is required for neural processing to take place. For instance, in (2.6a–b) the conceptualizer experiences the path as *rising* or *winding*, respectively, by mentally scanning along its expanse. What motivates the use of motion verbs in the imperfective fictive motion is a subjective counterpart of actual motion that emerges conceptually from mental scanning along a particular spatial path. The profiled relationship, i.e. the spatial configuration of the path, is portrayed as being stable through time – the resulting sentences are imperfective (Langacker, 2005, p. 177). Langacker (1986, 2005, 2008a, pp. 83 & 111–112) terms this more holistic mode of building up *gestalts* manipulable in memory as simultaneously available wholes as *summary scanning*.

The difference in construal between perfective and imperfective fictive motion can be attributed to the contrast between a *local* and *global perspective* (see Langacker, 2008a, Ch. 3.4). The key to the perfective fictive motion is a *local view* generated by traveling along an extended object, when only a portion of that object can be seen at a given moment. On the other hand, the imperfective fictive motion expressions reflect taking a *global view* of the object in question, which happens when one apprehends the entire configuration of the object as a single *gestalt* (Langacker, 2005, p. 176, 2008b, p. 69; cf. *perspectival modes*<sup>36</sup> in Talmy, 2000a, pp. 70–72). Langacker (2005, p. 176) adds that the perfective cases of fictive

<sup>36</sup> Talmy (2000a, p. 70) distinguishes between the adoption of a stationary distal perspective point with a global scope of attention, which he terms *synoptic mode*, and the adoption of a moving proximal perspective point with a local scope of attention, which he terms *sequential mode*.

motion can potentially be described further in terms of whole-for-part metonymy.<sup>37</sup> He assumes that the sense of motion diminishes as one goes from actual motion, through perfective fictive motion, to imperfective fictive motion, which has been confirmed, to some extent, in brain studies (Cacciari, et al., 2011; Romero Lauro, et al., 2013; Saygin, et al., 2010; see Section 3.6).

Moreover, mental scanning can be viewed from a broader perspective: “Once we have made the transition from actual motion to mental scanning through processing time, we are no longer limited to the spatial domain” (Langacker, 2005, p. 177). From this viewpoint, fictive scanning appears to be a common feature of everyday language use, which we resort to in a variety of contexts, as exemplified by (2.7a–d):

- (2.7) a. *From one restaurant to the next*, prices vary greatly.
- b. *Through the centuries*, we have had many great leaders.
- c. When you think of our options, *each one seems worse than the last*.
- d. *Reliability improves* with the more expensive models.

All these sentences describe generally static situations in dynamic terms. While they do not include motion verbs, they are likely to induce mental scanning through a range of alternatives in a certain order. It demonstrates that mental scanning can be prompted linguistically in different ways, e.g. by prepositional phrases specifying *source* and *goal* (2.7a), by prepositional phrases specifying *path* (2.7b), by *comparatives* (2.7c), by expressions of *fictive change* (2.7d), and so forth. Langacker believes that a proper explanation of the semantics of such expressions must take into account mental scanning as a basic organizing feature. However, Broccias and Hollmann (2007) attacked *sequential* and *summary scanning* as a convincing cognitive explanation for structuring complex scenes by pointing out that complementation patterns of causatives, e.g. *get*, *make*, do not seem to reconcile with the two scanning modes. In his reply, Langacker (2008c) admitted that more experimental evidence for the two scanning modes would be desired, but found their argumentation to be invalid.

Langacker (2005, 2008a) sees the use of motion verbs and adverbials in fictive expressions as a linguistic manifestation of *embodiment* (see Gibbs, 2005; Glenberg, 2010; Kardela, 2006a; Meteyard, Cuadrado, Bahrami, & Vigliocco, 2012; Wilson & Foglia, 2015 for reviews from different perspectives). He believes that

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<sup>37</sup> Matsumoto (1996b) points out that the sensory-motor basis of fictive motion suggests that at least some expressions of this kind involve metonymy. He adds, however, that a systematic explanation of fictive motion in terms of metonymy would be inadequate because some non-travelable entities, e.g. *mountains* or *fences*, cannot be directly associated with motion.

cognitive processing of linguistic fictivity involves *mental models* (Johnson-Laird, 1983; Therriault & Rinck, 2007; Zwaan & Radvansky, 1998) and *mental simulations* (Bergen, 2012; see Section 3.1) used to schematically represent and simulate the scanning experience.<sup>38</sup>

### 2.3 Talmy's account of coextension paths

Talmy (1996, 2000a, Ch. 2) proposes a unified model of the cognitive representation of fictive motion as an introduction to a more comprehensive framework of general fictivity. He takes into account how non-veridical forms of motion are both expressed linguistically and perceived visually<sup>39</sup> to embrace “partial similarities and differences across distinct cognitive systems in the way that they structure perceptual, conceptual, or other cognitive representations” (Talmy, 2000a, p. 100). Assuming that it extends continuously beyond what is generally associated with visual perception or conception alone, Talmy (1996, 2000a, Ch. 2) proposes a systematic account of fictivity that covers the combination of perception and conception in a single continuous cognitive domain. To this end, he coins<sup>40</sup> the term *ception*, which is meant “to cover all the cognitive phenomena, conscious and unconscious, understood by the conjunction of perception and conception” (Talmy, 2000a, p. 139).

In the proposed framework, the fictivity is approached as the discrepancy between two cognitive representations of the same entity in which one is assessed as being more veridical than the other. The representation of a particular object assessed to be more veridical is termed *factive*, and the representation of the same object assessed to be less veridical is termed *fictive*. Talmy (2000a, p. 100) makes a reservation that a factive cognitive assessment does not mean that a particular representation is in some sense objectively real. At the same time, a fictive cognitive assessment does not mean that a particular representation is somehow objectively unreal. He adds that he specifically employs the less common term *veridical* instead

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<sup>38</sup> Zwaan (2008, p. 15) views *situation-model theories* and *simulation theories* as complementary in explaining processing of the flow of events in language, and provides the following distinction: “Whereas situation-model theories tend to treat events as empty nodes, simulation theories go ‘inside the node’ ... The former [perspective] provides insights into the flow between event representations and their interconnectedness in memory, whereas the latter provides insights into the internal structure of the event representations”.

<sup>39</sup> Talmy's (1996, 2000a, Ch. 2) account of fictive motion is based in language, but extends out from there to considerations of visual perception, which, however, falls outside the scope of this book.

<sup>40</sup> Talmy (1996, 2000a, Ch. 2) explains in endnotes that the term and the essential concept of *ception* derive from a short unpublished paper by Stephen Palmer and Eleanor Rosch titled “Ception: Per- and Con-”.

of *true*, to emphasize that *veridicality* is some degree of epistemic commitment<sup>41</sup> ascribed to the mental representation of a given entity by the human cognitive system, without a plea to some absolute or external reality.

Talmy (2000a, pp. 100–101) points out that in the framework of general fictivity, the discrepant representations frequently (though not exclusively) differ with respect to a single aspect representing opposite poles of one dimension. One such dimension is *change*, which in the physical domain of spacetime results in the more specific dimension of *motion* (see Galton, 2011; Stocker, 2014). Depending on the particular case, the more veridical representation is *stationariness* while the less veridical representation is *motion*, or vice versa, which results in *fictive motion* and *fictive stationariness*, respectively (see also Wychorska, 2014).

From this perspective, fictive motion in language includes “the linguistic pattern in which the literal meaning of a sentence ascribes motion to a referent that one otherwise normally believes to be stationary” (Talmy, 2000a, p.101). This general stipulation, however, encompasses a number of relatively distinct categories of fictive motion, including:

- *emanation*, which is essentially the fictive motion of an intangible entity emerging from a source. This category comprises a number of relatively distinct types, including *orientation paths*, i.e. “a continuous linear intangible entity emerging from the front of some object and moving steadily away from it” (Talmy, 2000a, p. 106); *radiation paths*, i.e. “radiation emanating continuously from an energy source and moving steadily away from it” (Talmy, 2000a, p. 111); *shadow paths*, i.e. “the linguistic conceptualization . . . that the shadow of some object visible on some surface has actively moved from that object to that surface” (Talmy, 2000a, p. 114); and *sensory paths*, i.e. “the conceptualization of two entities, the Experiencer and the Experienced, and of something intangible moving in a straight path between the two entities in one direction or the other” (Talmy, 2000a, p. 115);
- *pattern paths*, which involve the fictive conceptualization of some configuration as moving through space. “The literal sense of a sentence depicts the motion of some arrangement of physical substance along a particular path, while we factively believe that this substance is either stationary or moves in some other way than along the depicted path.” (Talmy, 2000a, p. 129);
- *frame-relative motion*, in which the factively stationary surroundings are fictively depicted as moving;

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<sup>41</sup> In crude terms, *epistemic commitment* can be expressed as *likelihood*. See Jaszczolt (2009) for a study that argues that on the underlying level of basic concepts the internal conceptualization of time can be attributed to epistemic commitment, i.e. the sense (un)certainly of the speaker.

- *advent paths*, which include depictions of a stationary object's location in terms of its arrival or manifestation at the site it occupies. The two main subtypes include *site arrival*, i.e. the fictive motion of the object to its site; and *site manifestation*, i.e. the fictive change (see Section 2.1) in the sense of the object's manifestation at its site (Talmy, 2000a, p. 135);
- *access paths*, which are depictions of a stationary object's location in terms of a path that some other entity might follow to the point of encounter with the object. The representation of the object as stationary, without any entity traversing the depicted path, is factive. What is fictive is the representation of some entity traversing the depicted path (Talmy, 2000a, p. 136);
- *coextension paths*, which are depictions of the form, orientation, or location of a spatially extended object in terms of a path over the object's extent (Talmy, 2000a, p. 138).

As already mentioned, this study focuses specifically on the last category, which, as noted by Talmy (2000a, p. 103), "can serve as an orientation to fictive motion in general".

Talmy (2000a, p. 104) points out that coextension paths are typically illustrated by sentences like (2.8a–c):

- (2.8) a. This road goes from Modesto to Fresno.  
 b. The cord runs from the TV to the wall.  
 c. That mountain range goes from Canada to Mexico.  
 d. That mountain range lies (longitudinally) between Canada and Mexico.

However, a pure demonstration of this type of fictive motion would exclude references to entities that act as paths enabling the actual motion of other objects, such as a *road* (2.8a), as well as items that are movable, such as an *electric cord* (2.8b) (cf. Matsumoto 1996a for a distinction between *travelable* and *non-travelable* paths). Hence, the example (2.8c) seems to serve as a relatively most accurate illustration of coextension paths. Comparing it to (2.8d) demonstrates the general fictivity pattern, which involves two discrepant representations of the same object. The *fictive representation* in (2.8c), i.e. the one that is assessed and experienced as *less veridical*, includes wording that literally depicts the mountain range as moving. The *factive representation* in (2.8d), i.e. the one that is assessed and experienced as *more veridical*, includes wording that reflects our belief that the mountain range is stationary.

What is factive in coextension paths is the representation of the object as stationary with the absence of any entity traversing the depicted path. What is fictive is the representation of the object as moving along or over the configuration in space. However, Brandt (2009) questions the dichotomy between *factive* and *fictive* representations of the same object. She argues that it neglects to differentiate between referential and non-referential aspects of construal, i.e. mind-dependent and mind-independent reality.

It confuses the matter of *representational means*, i.e. the semiotic genesis of the representation, and *veridictive representation*, i.e. the propositional content generated. The dynamicity in question is a property of the representation as a mental gestalt but is not believed to be a property of the reference, or put differently: it is a property of the *simulation* and is not in itself truth-conditional (Brandt, 2009, pp. 590–591).

Consequently, she proposes to separate the simulation, i.e. the non-referential aspect of construal involving the subjective mental enactment unfolding in time, from the propositional content, i.e. the referential aspect of construal pertaining to verifiable states of affairs.

However, Blomberg and Zlatev (2014; see also Blomberg, 2014, pp. 157–160) argue that Talmy's distinction should not be seen as ontological but rather as one between two modes of perception, which are not mutually exclusive. The fictive mode corresponds to an *enactive and engaged* mode, whereas the factive mode corresponds to a more *reflective and distanced* one, which is compatible with Husserl's (1948/1973, pp. 81–85 & 104–106) analysis of *kinaestheses*, according to which perception derives from the correlation to possible bodily movements. The incompleteness of every singular perception is complemented by the possibility for another appearance, from another point of view, which may also be that of another subject in the environment. Essentially, it means that perception is dynamic, not only in the sense of a process unfolding together with movement, but also in the sense that perceptual objects give themselves in the dynamic flow of space, which provides us with the *kinesthetic capacity* of perceiving static objects as features of the environment that afford movement (see also Overgaard, 2012).

Talmy (2000a, p. 138 & 170) points out that fictive motion can also express *fictive change* in some property of the path, which is exemplified in (2.9). In the sentence (2.9a), the factive spatial arrangement of two road sections with an in-between gap is construed fictively as a single continuous entity. As our attention moves along that entity, it fictively changes from being present, to being absent, and to being present again. In the sentence (2.9b), which involves both fictive change and fictive motion, the fence is construed fictively as extending based on the change of successive states of its different sections along a path. In both these examples, as a part of the object in the focus of attention changes, the object as a whole is conceptualized as alternating (see Matsumoto, 1996b for an analysis of other examples of this kind).

(2.9) a. The road disappears for a while by the lake and then reappears toward the border.

b. The fence gets higher as you go down the road.

Moreover, Talmy (2000a, p. 104) distinguishes between *constructional fictive motion*, which refers to linguistic forms and constructions whose basic reference is to motion, from *experienced fictive motion*, which refers to the degree to which such expressions evoke an actual sense or conceptualization of motion. He emphasizes that the latter differs substantially from one person to another. For a particular instance of constructional fictive motion, some speakers report a strong semantic evocation of motion, while others report that there is none at all. Still, every speaker experiences a sense of motion for certain fictive-motion constructions. Talmy adds:

Where an experience of motion does occur, there appears an additional range of differences as to what is conceptualized as moving. This conceptualization can vary across individuals and types of fictive motion. Even the same individual may deal with the same example of fictive motion differently on different occasions (Talmy, 2000a, pp. 104–105).

Consequently, it is plausible to assume that the range of different conceptualizations of fictive motion is quite extensive. It may include movement of the described object in the mental imagery of the speaker or hearer.<sup>42</sup> Or, as an alternative, it may be the conceptual equivalent of their focus of attention moving relative to the described object. It may also involve some other object imagined as moving with respect to the described object, e.g. a car along the highway, though it is not specified in the coextension path expression (Talmy, 2000a, p. 105 & 138; see also Bloomberg & Zlatev, 2014). The strength and character of the experienced fictive motion, as well as its clarity and homogeneity, are still under investigation in different fields of cognitive science, which is discussed in Chapter 3.

Talmy (2000a, pp. 171–172) proposes an explanation of fictive motion in terms of a cognitive bias toward dynamism in linguistic, perceptual, and conceptual semantics.

It can be observed that, in language, fictive motion occurs preponderantly more than fictive stationariness. That is, linguistic expressions that manifest fictive motion far outnumber ones that manifest fictive stationariness. In other words, linguistic expression exhibits as strong bias toward conceptual dynamism as against staticism (Talmy, 2000a, p. 171).

The cognitive bias toward dynamism stems from the distinction between fictive and factive modes of cognition: although the latter is more veridical, it is less conceptually salient.<sup>43</sup> The *ception* of the fictive mode requires the veridicality to be overridden,

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<sup>42</sup> Brandt (2009) notes that fictive motion sentences can be viewed in terms of being *executive* from the speaker's point of view – imagining the described object, and *instructive* from the hearer's point of view – being instructed to visualize what the speaker describes.

<sup>43</sup> The cognitive bias toward dynamism can be observed in visual perception, too. For instance, a person viewing a picture hanging on a wall at an angle is more likely to *ceive* it as

which takes place naturally: we tend to focus on the dynamic aspects of reality, while the static and unchangeable is less conspicuous (see Sheets-Johnstone, 2011). Moreover, Talmy (1996, 2000a) assumes that the general bias for cognitive dynamism is strong enough to override the direction of the mapping between metaphorical domains, making it possible to argue for a metaphoric interpretation of fictive motion.

## 2.4 The relation of fictive motion to metaphor

Talmy (1996, 2000a, Ch. 2) sees the conceptual metaphor theory (Lakoff & Johnson, 1980, 1999) as largely reconcilable with his framework of fictivity. “The representation of an entity within the target domain is understood as factive and more veridical. The representation from the source domain that is mapped onto the entity in the target domain, on the other hand, is understood as fictive and less veridical.” (Talmy, 2000a, p. 168). He assumes that, at least potentially, fictive motion can be interpreted in this fashion:

In terms of metaphor theory, fictive motion in language can be interpreted as the mapping of motion as a source domain onto stationariness as a target domain. A mapping of this sort can be seen as a form of cognitive *dynamism*. Fictive stationariness, then, is the reverse: the mapping of stationariness as a source domain onto motion as a target domain (Talmy, 2000a, p. 171).

He adds, however, that he prefers to adopt the fictivity theory over the metaphor theory as the umbrella framework for explanation of fictive motion because “it is constructed to encompass cognitive systems in general rather than just to apply to language” (Talmy, 2000a, p. 168).

Lakoff (1987a, pp. 442–443), analyzes fictive motion sentences in terms of image-schema transformations. He assumes that there is a natural relationship between a *one-dimensional trajector* (1DTR) in fictive motion and a *zero-dimensional moving trajector* (0DMTR) that traces a path in actual motion. They are linked by the following image-schema transformation: “0DMTR <-> 1DTR: When we perceive a continuously moving object, we can mentally trace the path it is following.” (Lakoff, 1987a, p. 442; see also Martínez-Losa, 2006 for an attempt at analysis in terms of metaphor in combination with metonymy and image-schemas). Lakoff adds that such image-schema transformations are direct reflections of our experiences, which may be visual or kinesthetic.

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a square that has been tilted (and calls for righting) than to *ceive* statically as a diamond (Talmy, 2000a, p. 172). The perceptual bias toward dynamism is reflected in numerous adjectival forms, e.g. a *falling* cliff, a *sloping* hill, etc. (see Matsumoto, 1996b; Brand, 2009).

Lakoff and Turner (1989, p. 142) analyze briefly sentences listed in (2.10) from the perspective of the conceptual metaphor:

- (2.10) a. The road runs on for miles and then splits.
- b. The path stretches along the shore of the lake.
- c. The fence dips and rises in parallel with the terrain.

They argue that such expressions are based on a metaphorical way of understanding static shapes:

Such language is based on a common way of understanding static shapes metaphorically in terms of motion tracing that shape. For example, in “the roof slopes down,” the roof isn’t doing anything, but we understand its shape—that of a slope—in terms of a downward “sloping” motion. The metaphor here is that FORM IS MOTION, in which a form is understood in terms of the motion tracing the form (Lakoff & Turner, 1989, p. 142).

The metaphor FORM IS MOTION transforms a static schema of form into a dynamic schema of motion tracing the form, which is grounded in experience. However, the analysis does not delve deeper into the nature of the phenomenon. It appears to go along the lines of the conceptual metaphor theory only to the extent that “the essence of metaphor is understanding and experiencing one kind of thing in terms of another” (Lakoff & Johnson, 1980, p. 5).

Kövecses (2015) points out that from the perspective of the subjective mental scanning proposed by Langacker (1986, 2005, 2008a, Ch. 14.2; see Section 2.2) it might be tempting to see fictive motion as a case of metaphoric conceptualization. From that standpoint, an objective static scene could be viewed in terms of the dynamic cognitive process that occurs during conceptualizing it. If we assume a metaphoric interpretation, it is the dynamic cognitive process of mental scanning along a path of a stationary object that renders the static scene in a dynamic way.

However, Kövecses argues against metaphoric interpretations for sentences of this kind since they would call for a reversal of the typical direction of source-to-target mappings: “The emerging metaphor would have to be a static concrete (objective) situation (target) being conceptualized as a dynamic abstract (subjective) situation (an internal cognitive operation), which is unlikely to be the case.” (Kövecses, 2015, p. 18). Kövecses (2015, pp. 25–26) takes the sentence *The road is winding through the valley* to demonstrate that a metaphor account of fictive motion is not entirely convincing. Within the conceptual metaphor theory (Lakoff & Johnson, 1980, 1999; Lakoff, 1993), the target domain would be a static scene including the *road*, the *valley*, and the direction *through*. The source domain would be the dynamic scene consisting of some moving entity, e.g. a car, traversing the *road* in relation to (*through*) the *valley*. The following mappings between Dynamic Source (DS) and Static Target (ST) would be expected:

DS: road	→	ST: road
DS: valley	→	ST: valley
DS: through	→	ST: through
DS: motion	→	???
DS: moving entity	→	???

Kövecses (2015) points out incomplete mappings, marked in the above list with question marks, which indicate two major problems with this analysis. First, under the conceptual metaphor theory analysis, *motion* in the Dynamic Source would have to be mapped on *lack of motion* in the Static Target, which is unlikely. Second, a moving entity from the Dynamic Source is not mapped onto the Static Target at all. He adds, however, that the above example can be successfully reinterpreted in terms of the conceptual integration theory.

## 2.5 Fictive motion as conceptual integration

Fauconnier (1997) argues that the complexity and richness of fictive motion expressions cannot be accounted for by conceptual metaphors. He points out that sentences like (2.11a–b) are not metaphorical since they “cannot be interpreted as a literal motion of a blackboard in a source domain that would project onto a ‘stationary’ target domain. What moves fictively is not the blackboard but the imaginary trajector” (Fauconnier, 1997, p. 177).

(2.11) a. The blackboard goes all the way to the wall.

b. The blackboard extends all the way to the righthand corner.

Instead, he sees fictive motion as a mode of expression based on *conceptual integration* (Fauconnier & Turner, 1998, 2002; see also Turner, 2007 for a concise review; see Glebkin, 2015 for a criticism), which conveys motion and immobility at the same time.

Fauconnier (1997, pp. 177–181) believes that fictive motion works in descriptions of stationary scenes by having an *imaginary* trajector move along the relevant dimension of the described object, or along some *imaginary* path linking two objects. Sentences (2.11a–b) involve blending of a static construal of the object’s spatial extent with an image schematic understanding of the trajector moving relative to a landmark. The apparent contradiction of mixing motion with immobility is a consequence of the conceptual integration, which allows several different mental spaces to be blended simultaneously to form a single mental construction.

As shown in Figure 2.7, the two input spaces to the conceptual integration network employed in scenarios (2.11) include: a space with a moving trajector on a path, with a reference point (Input 1), and a space with the object for the

stationary scene, with the relevant dimension (Input 2). In the blend the path in the Input 1 space is mapped onto the relevant dimension of the object in Input 2. The blended space is determined by the context in connection to typical functional and geometric properties of the described object. Depending on the particular situation, the choice of the relevant dimension can vary as exemplified by different descriptions of the blackboard in (2.11a–b).

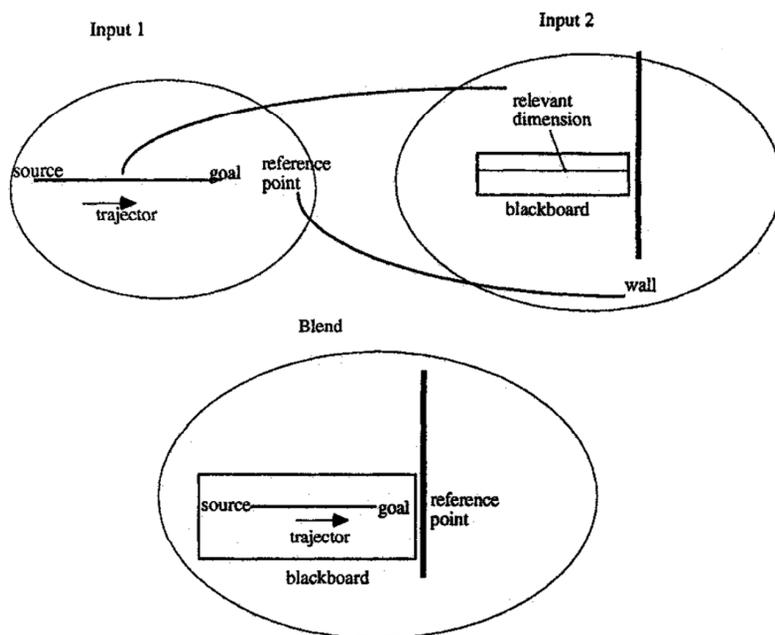


Figure 2.7 Fictive motion as conceptual integration

The blend depicted in Figure 2.7 reflects specifically the sentence “The blackboard goes all the way to the wall”. The blackboard identifies the trajector of motion, which is projected from Input 1. The blend still remains anchored to the original inputs, which allows for the inferences made from the motion scene to be mapped back appropriately to the stationary scene from Input 2. The inference in the conceptual integration that the trajectory goal coincides with the reference point is projected back to Input 2, which yields the inference that one end of the blackboard is located against the wall (Fauconnier, 1997, p. 178).

Fauconnier and Turner (2002) argue that “fictive motion blends a dynamic scenario of motion with a static situation so that the static situation can be conceived and described as having motion. . . . The dynamic input contributes a moving trajector on a path, which is mapped onto a relevant dimension of the static object in the other input.” (Fauconnier & Turner, 2002, p. 349).

As an outcome, the blend establishes a set of correspondences between the features of the static situation and the characteristics of the movement. A fictive entity in the blended space may have a number of distinct counterparts related to one another via *compression of vital relations*<sup>44</sup> from multiple input spaces.

In more general terms, Fauconnier and Turner (2002) assume that we establish fictive motion blends because it gives us global understanding of abstract configurations at human scale:

We have the overarching goal of achieving human scale, and the operation of conceptual integration accomplishes that by projecting motion to the blended space. We also have grammatical constructions that prompt for just such integration networks, and we can use those constructions to describe the static scene, provided that we use the motion input (Fauconnier & Turner, 2002, pp. 377–378).

The blended space has a human-scale scene of a trajector moving in human-scale time along a human-scale path. Space and time have been scaled down, and a simple, ideal path has been created along which there is motion. . . . In most respects, the blended space is more complicated than the static scene. It has all the aspects of dynamic motion, including time-space coordinates and contiguous positions in time. . . . In spite of or, rather, because of this added complexity, the blended space gives global insight at human scale into the static configurations (Fauconnier & Turner, 2002, p. 378).

Moreover, they argue that fictive-motion blends are strongly *double-scope*, i.e. they integrate inputs with different (often clashing) organizing frames to produce creative emergent structures. In coextension path expressions, an essentially static scene is blended with an essentially dynamic scene to create a conceptual integration network with emergent properties that draw on the organizing frames of both inputs.

The double-scope blending operates not only at the conceptual level, but sometimes also at the formal level. For instance, in the sentence “The mountain range goes across the United States from Mexico to Canada” the endpoints of the trajectory of motion from the input space are put in the grammatical position of the surface traversed, which demonstrates that the fictive motion has the potential to draw grammatical elements from the inputs to create double-scope syntactic blends that express the conceptual structure in the blended space (Fauconnier & Turner, 2002, p. 380).

Coulson and Oakley (2005) share the view that fictive motion constructions differ from metaphors. They argue that the meaning of fictive motion does not reside exclusively within the blended space. “Rather, it inheres in the entire network

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<sup>44</sup> According to Fauconnier and Turner (2002, Ch. 6) *compression* operates in blending on a restricted set of *vital relations* rooted in fundamental human neurobiology and shared social experience, such as: *Change, Identity, Time, Space, Cause-Effect, Part-Whole, Role, Analogy, Property, Similarity, Category, Uniqueness, Intentionality*, etc. They define essential topology within mental spaces.

of mental spaces, capturing both the static spatial relationship represented in the reference as well as the imposition of a motion construal on the scenario in question.” (Coulson & Oakley, 2005, p. 1531). They argue that the *fictive change* (Matsumoto, 1996b; Sweetser, 1997; see Section 2.1), can also be interpreted via compression of vital relations (Fauconnier & Turner, 2002, Ch. 6), which allows a single element in the blended space to simultaneously represent a variety of distinct counterparts from multiple input spaces (see Fauconnier & Turner, 2008 for an example). Thus, to fully understand a fictive motion expression, one is obliged to unpack the blend into its constituent input spaces. They add, however, that drawing mappings between elements in different mental spaces ultimately “relies on the speaker’s ability to unpack the blend and apprehend the mappings to elements in the input reference spaces” (Coulson & Oakley, 2005, p. 1533), which varies across conceptualizers (see Talmy, 2000a, pp. 104–105).

Kövecses (2015, p. 26) demonstrates that the sentence *The road is winding through the valley* (discussed in the previous section to show that the conceptual metaphor account of fictive motion is not entirely convincing) can be successfully reinterpreted in terms of the conceptual integration. Since we can assume only a partial selective projection from the inputs into the conceptual integration network, the *motion* can be mapped from the Dynamic Source into the blend without the *moving entity*. In a parallel fashion, the described entity can be mapped selectively from the Static Target into the blend without projecting the stationary character of the path it occupies. As an outcome, in the blend the *road* as a path in the Static Target is combined with motion from the Dynamic Source, which can be viewed as a kind of *personification* or *mobile-objectification* (cf. Szwedek, 2009, 2011, 2014) of the path. Thus, the fictivity of coextension paths may be seen as arising from the actual motion in the source being mapped onto the stationary character of the target path. Kövecses (2015, p. 38) adds that the cognitive arising of fictive motion can be motivated by *embodiment* irrespective of whether we think of it in terms of *blending* or *subjectification* (Langacker, 1990, 2006, 2008a; see Section 2.2). It appears to provide the grounds for structuring fictive motion expressions, which reflects human conceptualizations of the world.

## 2.6 Coextension paths as expressions of state

The cognitive linguistic models of fictive motion discussed so far assume that expressions of this kind are motivated, in one way or another, by some kind of subjectively induced motion. There is, however, an alternative explanation, which posits that verbs used in fictive motion expressions are, as a matter of fact not verbs of motion, but instead verbs of *extent*. This view has been proposed by Jackendoff (1983), who systematically argues (Jackendoff, 1990, 2002, 2012) that verbs like *go* and *run*, when used in coextension paths, signify merely “occupy a position in space”, rather than “move”. Accordingly, such expressions do not involve any kind of motion.

Jackendoff (1983, 1990, 2002) views *Conceptual Structure*<sup>45</sup> as composed of conceptual constituents, e.g. [THING], [EVENT], [GO], [STAY], [EXT], [ORIENT], [PATH], [PLACE], etc., which are combined in accordance with conceptual well-formedness rules. Together, the constituents and the combinatory rules constitute “the machinery available to the human mind to channel the ways in which all experience can be mentally encoded” (Jackendoff, 1990, p. 32). Jackendoff (1983, p. x) declares openly that “when we are studying semantics of natural language, we are by necessity studying the structure of thought”, and consistently rejects the claim that the organization of language is autonomous of general cognition (Jackendoff, 2002; 2011). However, he himself admits (Jackendoff, 1996a) that his approach to semantics displays much more formal disposition (see Aloni & Dekker, 2016; Cann, 1993) than other cognitive linguistic proposals.

Discussing the semantics of spatial expressions (Jackendoff, 1983, Ch. 9) argues that spatial prepositional phrases (PP) can function referentially to express both [PLACES] and [PATHS], which he regards as the most important distinction within their senses. While a [PLACE] projects into a point or region, a [PATH] has more varied structure and plays a wider variety of roles both in *events* and *states*. Jackendoff (1983, p. 163) argues that the internal structure of the [PATH] typically consists of a *path-function* coupled with a *reference object*, e.g. “toward the mountain”, “around the tree”, and “to the floor”, or a *reference place*, e.g. “from under the table”, where *from* expresses the path-function and *under the table* expresses the reference [PLACE].

He assumes that paths can be divided into three generic categories, stemming from the path’s relationship to the reference object or place. (1) *Bounded paths* include *source-paths*, for which the usual preposition is *from*, and *goal-paths*, for which the preposition is *to*. (2) In *directions*, the reference object or place is not included in the

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<sup>45</sup> *Conceptual Structure*, as developed by Jackendoff (1983, 1990, 2002), encodes linguistic meaning as a system of conceptual structures built up out of discrete primitive features and functions. It fits into a much broader framework of *Representational Modularity* (Jackendoff, 1987, Ch. 12, 1992, Ch. 1, 1997, Ch. 2, 2007b, Ch.1), which assumes that the mind encodes information in a number of distinct representational “languages of the mind”, each with its own mind module and proprietary format. For instance, there is a separate representation module of *Spatial Representation*, which is responsible for the encoding of objects and their configurations in space (Jackendoff, 1996b, 2012; Landau & Jackendoff, 1993). Additionally, there is a special *linguistic-spatial interface* responsible for the connection of language and spatial cognition, (Jackendoff, 1996b, 2012), which translates between mental representations proprietary to the linguistic faculty and mental representations proprietary to the spatial faculty. It establishes only a partial correspondence between them because, despite sharing certain aspects, conceptual structure and spatial structure each encode types of information inaccessible to the other.

path, but would, if it were extended further. Most common transitive prepositions expressing directions are *toward*, and *away from*; most common intransitive prepositions are *up(ward)*, *down(ward)*, *forward*, *backward*, *homeward*, etc. (3) In *routes*, the reference object or place is related to some point on the path, e.g. “by the house”, “along the river”, “through the tunnel”, etc. (Jackendoff, 1983, pp. 165–166).

Looking at the *roles* that paths may play in an event or state, Jackendoff (1983, p. 168) observes that a [PATH] may be *traversed* by a [THING], as in (2.12a–c):

- (2.12) a. John ran into the house. (bounded path)
- b. The mouse skittered toward the clock. (direction)
- c. The train rambled along the river. (route)

Alternatively, a [THING] may *extend* over a [PATH], as in (2.13a–c). In this case, the subject of the sentence is not understood as being in motion.

- (2.13) a. The highway extends from Denver to Indianapolis. (bounded path)
- b. The flagpole reaches (up) toward the sky. (direction)
- c. The sidewalk goes around the tree. (route)

Or, as a third option, a [THING] may be *oriented* along a [PATH], as in (2.14a–c). Here the subject is understood to be adopting an orientation, not traversing the path.

- (2.14) a. The sign points to Philadelphia. (bounded path)
- b. The house faces away from the mountains. (direction)
- c. The cannons aim through the tunnel. (route)

Having a closer look at this taxonomy reveals that while the first type embraces *actual motion*, the latter two reflect what Talmy (1996, 2000a, Ch.2) views as *fictive motion*. More specifically, the second category embraces *coextension paths*, and the third reflects what Talmy (2000a, pp. 106–111) discusses under the label of *orientation paths* (with *demonstrative paths*, *prospect paths*, and *targeting paths* as respective types for the roles distinguished by Jackendoff within that category).

Furthermore, analyzing the basic sentence that describes motion in space, we can assume that the subject NP refers to a thing, PP refers to a path, and the verb specifies precisely what the thing is doing with respect to the path. The sentence as a whole refers to a situation or event in which the thing is located or moving in some way with respect to the place or path. According to Jackendoff (1983, pp. 170–173), such sentences can be divided into two major classes: those that express [EVENTS] and those that express [STATES]. To tell them apart, one can apply a simple

linguistic test, which checks the possibility of the sentence in question occurring after “What happened/occurred/took place was (that)...”. Since events happen, only sentences expressing events pass this test. Sentences expressing states do not.<sup>46</sup>

If we return to sentences in (2.12), it turns out that they all pass this test. It is because they express events of actual motion along a spatial path. By contrast, none of sentences in (2.13) can be preceded in the past tense by *What happened was...*, as in “?What happened was that the highway extended from Denver to Indianapolis”. This indicates that they pass the test for state, rather than event expressions. Comparing these two categories demonstrates that in actual motion sentences, such as *Amy went from Denver to Indianapolis*, “the subject is asserted to have traversed the path, covering each point of the path in order over time”. On the other hand, in sentences such as *Highway 36 goes from Denver to Indianapolis*, “the subject is asserted to occupy the entire spatial path at a single point in time” (Jackendoff, 1983, p. 173).

Jackendoff (1983) assumes that these types reflect different functions associated with [PATHS]. Sentences expressing *events* of motion along a path in space, like those in (2.11), are assigned to GO function, whose functional composition can be represented as follows:

[Event GO ([Thing *x*], [Path *y*])]

Coextension path sentences, like those in (2.13), which Jackendoff (1983, p. 173) terms *extent sentences*, are used to express the *state of spatial extension* of an object along a path in space. They are assigned to GO<sub>Ext</sub> function, which can be represented as follows:

[State GO<sub>Ext</sub> ([Thing *x*], [Path *y*])]

Finally, *orientation sentences*, like those in (2.14) describe not the location of an object but the direction it points in space. They are assigned to ORIENT function, which is represented as follows:

[State ORIENT ([Thing *x*], [Path *y*])]

In the above functional decompositions, the variables *x* and *y* represent the information to be filled in by the subject [THING] and the prepositional phrase [PATH] of the sentence, respectively.

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<sup>46</sup> Jackendoff (1983, p. 171) adds that another relevant grammatical distinction between sentences expressing events and states concerns the use of the simple present tense. “With states, simple present can be used to express present time . . . With events, however, present time must be expressed by present progressive aspect . . . simple present may only be used to express generic events, future time, and various less common sorts of speech acts such as stage directions and newspaper headlines”. This is, however, idiosyncratic to English.

Jackendoff (1983) emphasizes that most verbs of extent can also be used as verbs of motion, which sometimes results in the necessity of disambiguation:

With such verbs, the possibility of a motion or extent interpretation is determined by the motility of the subject (people travel, roads don't) and sometimes by the tense (simple present for extent, a state, and progressive for traversal, an event). With the proper choice of subject and tense, one can produce an ambiguous sentence such as "The giant reached to the ceiling," which may describe either a movement by the giant or the giant's extreme height (Jackendoff, 1983, p. 173).

He argues that the distinction between verbs of motion and verbs of extent provides a uniform set of conceptual structures for prepositional phrases that express paths.

To explicate the difference between *events of motion* and *states of extent*,<sup>47</sup> Jackendoff (1996c) starts from an assumption that in the course of a motion event, the event, path, and time, can be represented by separate axes, which are connected to one another by a *structure-preserving binding relation*, or *sp-bound* for short, following Jackendoff's (1996c, p. 322) nomenclature. *Canonical Event*, as proposed by Jackendoff (1996c, p. 328), has an axis that is sp-bound to time, which is the essential property of all events (see also *canonical event model* discussed by Langacker, 1991, Ch. 7; 2008a, pp. 357–358; see Section 1.5). By contrast, *Canonical State*, as proposed by Jackendoff (1996c, p. 327), manifests no dependence between the temporal constituent and the structure of the situation: it remains unchanged irrespective of time. Thus, what distinguishes an Event from a State is that an Event has a time-course, while a State has only a location in time. If we create an event in which a [THING] remains in the same place over a period of time, we will arrive at the primitive function of *staying* [STAY], which is involved in verbs such as *stay*, *remain*, and their causative *keep*. Despite the fact that it is minimally different from a state, it still it has event structure. In this case, the Space position is not projected onto the axis sp-bound to the event (Jackendoff, 1996c, p. 328).

However, for elongated objects, which can be decomposed into *axis plus cross-section*,<sup>48</sup> it is possible to sp-bind two linear spatial axes to one another without projecting time, which results in a state. "The State has a cross-section in which

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<sup>47</sup> Initially, Jackendoff (1983, p. 173) suggested two possibilities concerning the relationship between GO and GO<sub>Ext</sub> functions. Either they are not distinct functions and the difference between a traversal and an extent interpretation depends on whether the GO function is a feature of an [EVENT] or a [STATE], or they are distinct functions, but share a common internal structure. But in subsequent publications Jackendoff (1990, 2002, 2012) distinguished them as two separate primitives, which is reflected in the notation changed from GO<sub>Ext</sub> to EXT.

<sup>48</sup> Jackendoff (1996c) argues, following Marr (1982/2010), that the notion of projecting a cross-section onto an axis is cognitively necessary in order to capture the way we understand objects. For instance, an H-beam can be represented by its representative cross-section, which is an H-shape, being projected onto a linear (one-dimensional) axis to form the shape of the object as a whole (see also Jackendoff, 1996b, 2012; Landau & Jackendoff, 1993; Marr & Vaina, 1982).

a cross-section of the theme is located at a cross-section of the path; these cross-sections are projected over the linear axes of the theme and the path to form the entire State” (Jackendoff, 1996c, p. 329). As an outcome, we arrive at another primitive function [EXT], originally denoted as GO<sub>Ext</sub> in which the *theme*, i.e. the entity in question, extends over the path. The path can be assumed to measure out the extended entity, or vice-versa, but spatially rather than temporally.

Iwata’s (1996) analysis of the semantic functions GO and GO<sub>Ext</sub> confirms that they are distinct functions, despite sharing a great deal of internal structure. Iwata demonstrates that the most crucial difference between these functions is associated with the presence/absence of the passage of time and the dimensional characteristic of the mover through transition. The GO function involves the time component. Since the traversal occurs over time, the component states are mutually exclusive, which corresponds to a more *compact* characteristic of the described object. On the other hand, the GO<sub>Ext</sub> function does not involve the time component. It includes a chain of transitions whose component states coexist independent of time, which corresponds to a more *elongated* characteristic of the described object.

Jackendoff (2002, 2012) consistently sustains that paths are atemporal and have a cognitive role independent of the motion of objects traversing them. He argues that the uses of paths in describing static configurations embrace two functions, namely *non-temporal extension* [EXT(x,Path)] and *orientation* [ORIENT(x,Path)], both of which express *states*. He emphasizes that the inferences from these functions differ substantially from the GO function. In *a motion event* the described object undergoes motion over time, whereas in *a state of extension* different parts of the described object occupy all parts of the path concurrently. In contrast, in *a state of orientation*, the described object is oriented along the path, but neither occupies it nor travels along it.

Jackendoff’s proposal stands somewhat in opposition to the previously discussed models of fictive motion, which seem to be complementary to one another. Jackendoff (2002, p. 362) questions whether any sort of mental scanning is involved in processing fictive motion sentences. He argues that even if the sense of an observer scanning an extended object has some intuitive appeal, it cannot account for the difference in inference patterns in the formal decomposition of state-functions.

Comparing Jackendoff’s (1983, 1990, 1996c, 2002, 2012) and Langacker’s (1986, 1999, 2005, 2008a, 2012; see Section 2.2) proposals reveals two fundamental differences. One concerns the conceptualization of motion in general. While Langacker views both actual and fictive motion in terms of a series of points, each constituting a *snapshot* of the object in a subsequent location, Jackendoff rejects the snapshot conceptualization, on the grounds that it misrepresents the essential continuity of motion:

The choice of a finite set of subevents is altogether arbitrary. How many subevents are there, and how is one to choose them? Notice that to stipulate the subevents as equally spaced, for instance one second or 3.5 milliseconds apart, is as arbitrary and unmotivated as any other choice (Jackendoff, 1996c, p. 316).

He adds that another problem with the snapshot conceptualization concerns the representation of *activities*, i.e. non-bounded events (Vendler, 1957; see also Dowty, 1979/1991a; Kenny, 1963/2003; Pustejovsky, 1991; Verkuyl, 1993), e.g. *John ran along the river for hours*. Since a finite sequence of subevents necessarily entails a specified beginning and ending, it cannot account for the absence of bounding endpoints. A final difficulty with the snapshot conceptualization is that it specifies a sequence of momentary states, which suggests that the object is suddenly appearing at a new location, rather than continuously moving. Thus, instead of treating motion as a countable sequence of states, Jackendoff (1996c) proposes to encode it as continuous change over time.

The other difference concerns the role of temporality in the conception of fictive motion. While Langacker incorporates the temporal component in fictive motion by taking into account the time in which the conceptualization takes place, Jackendoff discards the temporal component, which reduces the extension path to a purely spatial entity. Although Verkuyl (1993, p. 235) proposed, as an expansion of Jackendoff's system, to introduce a temporal parameter as part of the Path, Jackendoff (1996c, p. 317) rejected it, stating as the basic reason that *states* do not require time at all. According to Jackendoff (1996c, p. 317, 2002, p. 362, 2012, pp. 1147–1148), neither the *extension* or the *orientation* of an object along a path involves the temporal parameter. Since time plays a role in motion, but not in paths, the correlation between time and space should be attributed to the motion predicate itself, rather than to the path as such.

From a broader perspective, the difference appears to hinge on the approach to conception: while Langacker takes into account the active role of the conceptualizer as a key component for the dynamic unfolding of fictive motion construal, Jackendoff restricts his proposal to the formal semantic organization of the Path within the Conceptual Structure, which situates the active role of the conceptualizer in the background, and puts outside the scope of investigation the mechanisms that people use to acquire, produce, and understand such expressions (see Taylor, 1996).

## 2.7 Structuring fictive motion across languages

From the perspective of a cross-linguistic comparison, Matsumoto (1996a) demonstrates some intriguing characteristics of coextension path expressions in English and Japanese. He points out that, despite sharing certain common

properties, fictive motion expressions in English and Japanese demonstrate important differences. He starts from a distinction between *travelable paths*, i.e. paths that can be traveled by people, e.g. roads, paths, etc., and *non-travelable paths*, i.e. extended linear entities which normally are not intended for human travel, e.g. walls, wires, fences, etc. He reports that in Japanese some non-travelable entities, such as *walls* and *fences*, cannot be described with verbs that appear in fictive motion descriptions of travelable paths. Some other non-travelable entities, such as *borders* and *wires*, take a restricted set of motion verbs, which can be motivated by the fact that in Japanese certain motion verbs cannot be used to describe movement of a path that does not involve a sensory-motor basis (Matsumoto, 1996a, pp. 213–217; see also Amagawa, 1997). In English, descriptions of non-travelable linear entities in terms of fictive motion are not so restricted.<sup>49</sup>

Moreover, Matsumoto (1996a, p. 204) proposes a division of fictive motion expressions into two semantic types in terms of the specificity of the motion involved, which is exemplified by sentences in (2.15).

(2.15) a. The highway passes through a tunnel.

b. The highway I was driving on passed through a tunnel then.

The meaning of (2.15a) can be paraphrased as “the highway is in such a state that someone moving along it would pass through a tunnel”. The fictive motion does not occur at any specific time. It is arbitrary in the sense that the moving entity is an arbitrary person, or merely the focus of attention. On the other hand, the sentence (2.15b) describes a highway as experienced by a specific person moving at a specific time. The meaning can be paraphrased as “the highway was in such a state that the conceptualizer who was driving along it passed through a tunnel then”. The motion is specific in the sense that it is based on the experience of a specific person at a specific time. Matsumoto (1996a, p. 204) terms these two types of fictive motion expressions *Type I* and *Type II*, respectively.

He notes that the difference between Type I and Type II fictive motion expressions is related to Langacker’s (1987, 2008a, Ch. 3.4) distinction between a *local* and *global view* (see Section 2.2) or *scope of attention*, and Talmy’s (1988/2007c, 2000a, p. 70) distinction between a *stationary* and *moving perspective*. Type I fictive motion expressions involve a stationary perspective with a global scope of attention, whereas Type II fictive motion expressions involve a moving perspective with a local scope of attention. Matsumoto adds, however, that there is

<sup>49</sup> Rojo and Valenzuela (2009, Exp. 1) do not observe this distinction to occur as vividly in Spanish, but detect that it takes longer for Spanish speakers to process fictive motion sentences with non-travelable entities than those with travelable ones (see Section 3.2).

no absolute correlation between the above distinctions and the division of fictive motion into Type I and Type II expressions: “perspective mode and scope of attention are not necessarily correlated with the distinction between the motion of a particular entity at a particular time and the motion of an arbitrary entity that can be evoked at any time” (Matsumoto, 1996a, p. 205).

Furthermore, Matsumoto (1996a, pp. 205–206) demonstrates that in English fictive motion expressions belonging to the Type I category verbs of motion appear to have *stative*, rather than *dynamic* meaning (Biber, et al., 1999, p. 458; Quirk, et al., 1985, p. 178). One criterion for distinguishing between stative and non-stative verbs is that the non-past tense form of a stative predicate is interpreted as a relatively permanent state, while that of a non-stative predicate is interpreted as a habitual aspect (Kenny, 1963/2003, Ch. 8; Dowty, 1979/1991a). For instance, comparing pairs of sentences in (2.16) demonstrates that the verb *run* cannot be interpreted in the habitual sense, because adverbs like *often* or *always* are not compatible with the habitual interpretation<sup>50</sup> (cf. Onozuka, 2012).

- (2.16) a. The road runs through the center of the city.  
 b. ?The road *often/always* runs through the center of the city.  
 c. The road ran through the center of the city when I was a child.  
 d. ?The road *often/always* ran through the center of the city when I was a child.

Further evidence for the stativity of verbs in Type I fictive motion expressions concerns the progressive aspect form. When stative verbs occur in the progressive aspect, some sort of temporariness is typically expressed to mark that the described situation came about as a result of some change (Dowty, 1979/1991a, pp. 173–180). For Type I fictive motion expressions, this can be demonstrated by contrasting pairs of sentences in (2.17).

- (2.17) a. ?Two highways were running between the cities.  
 b. After the bombing, only two highways were running intact between the two cities.  
 c. ?The road was running along the shore.  
 d. During the reconstruction of the tunnel, the road was running along the shore.

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<sup>50</sup> Onozuka (2012) points out that, contrary to Matsumoto’s (1996b) prediction, Type I subjective motion expressions do accept the addition of frequency adverbs. He quotes the following sentences found online: *Despite its high elevation, the trail often dips below the alpine timberline to provide a measure of safety in the exposed, storm-prone regions above tree line; I normally use way to go to Simonstown first since the road always goes along the sea side.* To account for these uses, he proposes a licensing condition employing the sense of iteration.

Sentences like (2.17a & 2.17c) are questionable because they are most plausibly descriptions of a relatively permanent state. But the progressive form of *run* can be used when some sort of temporariness is expressed as in sentences (2.17b & 2.17d), which describe situations that came about as the result of a change. This also suggests that motion verbs in Type I fictive motion expressions have the properties of statives.

On the other hand, fictive motion expressions belonging to the Type II category in English have the properties of non-stative predicates, which is demonstrated by sentences (2.18a–d).

- (2.18) a. The highway was entering California when I woke up.  
 b. The highway had already entered California when I woke up.  
 c. The road entered California then.  
 d. The road was running on the side of the mountain and then began to run on the ridge.

All these Type II fictive motion sentences involve the experience of a person actually travelling on a road or highway. Unlike Type I fictive motion expressions, the temporal phrasing does not indicate the time at which the described object has a particular configuration, but rather the time at which the conceptualizer undergoes the process described by the predicate.

Another piece of evidence to support the claim that in English motion verbs in the Type II category manifest the properties of non-stative predicates comes from the interpretation of the progressive form. As pointed out by Leech (2004, pp. 23–25), the progressive aspect of a non-stative verb can signal different meanings depending on the nature of the verb: (a) the progressive aspect of a verb denoting an activity, e.g. *run*, marks a temporary duration of the process; (b) the progressive aspect of a verb denoting a gradual transition, e.g. *approach*, represents the transition in progress; (c) the progressive aspect of a verb that denotes a non-gradual transition into a new state, e.g. *enter*, represents a gradual approach to the transition, rather than the transition itself. For Type II fictive motion expressions, this is demonstrated by sentences (2.19a–c).

- (2.19) a. The highway was *running* along the shore when I woke up.  
 b. I woke up and realized that the highway was *approaching* Dallas.  
 c. The highway was *entering* California when I woke up.

The sentence (2.19a) represents a *temporary process* (from the perspective of the speaker), (2.19b) represents a *gradual transition in progress*, and (2.19c) represents a *gradual approach to the transition*. This indicates that in English motion verbs

used in coextension paths manifest different aspectual properties depending on the type of fictive motion expressions in which they occur. In Type I verbs have the properties of statives, but in Type II verbs have the properties of non-statives (Matsumoto, 1996a, p. 207; see also Binnick, 1991, pp. 173–175 for a review of criteria used for distinguishing statives from non-statives).

Matsumoto (1996a, pp. 208–213) conducts a parallel analysis for Type I and Type II fictive motion expressions in Japanese. He demonstrates that in Japanese, unlike English, motion verbs in Type I fictive motion expressions, unless in the specific stative *-te iru* construction (see Harasawa, 1994; Tsujimura, 2001), have the properties of non-stative predicates. Verbs of motion in Type II fictive motion expressions, similarly to English, are non-stative in Japanese. Matsumoto (1996a) concludes that the aspectual difference between English and Japanese in the stativity of Type I fictive motion expressions is a reflection of a more general difference in the grammatical structure of verbs in the two languages:

[T]he linguistic expression of subjective motion is constrained by the grammatical structure—notably the aspectual system—of the particular language in which subjective motion gets expressed. The aspectual system of a particular language is not related to the way subjective motion is conceptualized as a cognitive phenomenon. In this sense, the linguistic expression of subjective motion is not a direct reflection of conceptualization, but is mediated and constrained by grammar (Matsumoto, 1996a, p. 213).

On the basis of evidence from elicited descriptions, Bohnemeyer (2010) argues that fictive motion is not grammaticalized in Yucatec Maya. In Yucatec, motion verbs do not encode semantics based on *translational motion*<sup>51</sup> along a Path. Instead, they express *change of state* that occurs punctually and can only specify one landmark bounding the spatial transition to either: the source state, the target state, or the transitional phase in between. Essentially, verbs corresponding to *enter* and *exit* actually mean “become inside/outside”, which occurs also for verbs corresponding to *ascend*, *descend*, and *pass*. In this framework of *state-change* semantics, the spatial characteristics of motion event is captured by a Place function, which is used in event descriptions instead of Paths.

Because motion verbs in Yucatec are restricted to specifying a single landmark, change of location involving several landmarks must be broken down into separate clauses, each specifying a change of state rather than continuous movement from one location to another. For instance, a journey between A and B is described as “She left A, and then she arrived at B”. This chunking of motion events into

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<sup>51</sup> Levinson and Wilkins (2006, p. 18) define *translational motion* as “a durative event involving passage through an indefinite series of points in space over time”.

sequences of separate states replaces the composition of Path functions. Likewise, fictive motion is subject to the constraints of the state-change semantics. Spatial relations were found to be described in Yucatec non-figuratively or with a limited amount of change of location expressions that encode the transition from one state to another. For example, the sentence “This road here goes from Señor via Tixcacal to Yaxley” would be rendered in Yucatec as “This road here, it exits Señor; then [lit. that having ended] it passes [through] Tixcacal; then [lit. that having ended] it arrives [in] Yaxley” (Bohnmeyer, 2010, p. 128). Since in such expressions the semantics of Path is not mapped onto syntactic representations, they are more appropriately characterized as *fictive change of location* rather than fictive motion.

Blomberg (2014, 2015) elicited descriptions based on pictures from native speakers of French, Swedish, and Thai to compare how fictive motion differs across these languages. Several patterns of fictive motion sentences were detected, some common to all and some unique to one of the three languages. The Swedish speakers used verbs of motion conflating Manner and Cause, but not Path. Path conflating verbs were used by the French speakers, which can be attributed to conflation patterns typical for *S- and V-languages*, respectively (Talmy, 1991, 2000b, Part 1; see Section 1.7). Both Swedish and French participants frequently expressed fictive motion with generic motion verbs (go, run) coupled with adverbs and prepositions to express path and direction. The Thai participants were not found to use verbs of this kind, but rather employed Path conflating verbs, similarly to the French speakers.

Most notably, the Thai speakers used *serial verb constructions* with Manner- Path- and Direction verbs, as exemplified in (2.20), to differentiate between entities associated with fast and slow movement. While trails and paths were described with the verb *walk* (doen), larger roads and highways were described with *run* (wîng) or *dash* (phung).

(2.20) Thanõn sen nueng sueng wîng khâw pai bon phukhaõ.

road CLF NUM COMP *run enter go away* inside mountain

“A long road that enters into a mountain.”

This indicates that in Thai the verb of Manner is used to convey information about how fast one tends to move along the described object, which was not observed for French and Swedish. In these languages, Manner verbs occurring in fictive motion sentences were bleached and interchangeable with generic motion verbs. Overall, fictive motion sentences in French, Swedish, and Thai were found to follow patterns parallel to those of actual motion (see Blomberg, 2014, 2015), and were highly conventionalized in each respective language, which suggests an interaction between conceptual motivations and language specific semantic constraints (see also Stosic, Fagard, Sarda, & Colin, 2015).

Further insight into the nature of structuring fictive motion expressions across different languages comes from translation studies. Following Talmy's (1991, 2000b, Part 1) typological framework of *lexicalization patterns*, which implies that speakers of Verb-framed languages are less concerned with the manner of motion than speakers of Satellite-framed languages, Slobin (1996b, 2005) reports significant differences occurring when motion expressions are translated between English and Spanish.<sup>52</sup> For instance, due to lexical and syntactic constraints, the manner of motion was often omitted in Spanish translations of English, but added in English translations of Spanish.

Rojo and Valenzuela (2003) investigated whether the differences in the translation of actual motion found between English and Spanish apply to fictive motion. By analyzing the gain or loss of the path/manner information in translations of English novels into Spanish, they found a relatively less significant divergence in comparison to the results reported by Slobin (1996a).<sup>53</sup> Rojo and Valenzuela (2003) argue that the tendency to keep details about the path and manner in translations of fictive motion expressions can be attributed to the translators' efforts to preserve information regarded as basic. Although, the manner information is overall less central to fictive motion, whenever it occurs in a fictive motion expression it conveys information related directly to the path (Matsumoto, 1996a). For that reason, translators are reluctant to leave out this type of information.

Stosic and Sarda (2009) examined the role of locative posture verbs (e.g. *sit, stand, lie*, see Newman, 2002; Newman & Rice, 2004) vis-à-vis fictive motion expressions as different types of locative predicates in French–Serbian translations.

<sup>52</sup> This is particularly evident when Spanish translators must deal with *clause-compacting*, i.e. several segments of a path encoded with a single clause with prepositional phrases or satellites appended to the verb (Slobin 1996b, p. 202). In such cases, Spanish translations tend to break the path using separate verbs that provide an appropriate imagery for the described setting, for instance:

English SL: "Their way wound along the floor of the hollow, and round the green feet of a steep hill into another deeper and broader valley, and then over the shoulder of further hills, and down their long limbs, and up their smooth sides again, up on to new hill tops and down into new valleys." (J. R. R. Tolkien (1954/2012), *The Fellowship of the Ring*, p. 155). Spanish TL: "El camino serpenteaba a lo largo de la hondonada, bordeando el pie verde de una colina escarpada hasta entrar en un valle más profundo y más ancho, y luego pasaba sobre otras cimas, descendiendo por las largas estribaciones y subiendo otra vez por las faldas lisas hasta otras cumbres, para bajar luego a otros valles." (J. R. R. Tolkien (1954/2012), *La Comunidad del Anillo*, p. 145).

<sup>53</sup> Slobin (1996b, p. 210) reported that in English to Spanish translations of *actual motion expression* the path information was reduced in almost 24% of the cases and the manner information was left out in 49% of the cases. Rojo and Valenzuela (2003, p. 135) reported for *fictive motion expression* that the path information was suppressed in 6.11% of cases and manner was omitted in 10.5% of cases.

In particular, they tried to pinpoint the importance of using fictive motion expressions in lieu of posture verbs in locative constructions. To that end, they performed a bi-directional analysis of translations included in a parallel corpus of French and Serbian novels. Although both fictive motion and posture verbs can serve to translate locations across this language pair, their study indicates that in some contexts Serbian posture verbs tend to be translated into French with fictive motion. It is because Serbian uses posture verbs to express the location of both animate and inanimate objects, whereas French, with some exceptions, uses posture verbs to express the location of animate entities. Accordingly, when the described object is inanimate and when the situation does not involve any change of location, fictive motion appears to be the preferred way of rendering locative predicates in French. Quantitative, corpus-based results of the study indicate “that French speakers will preferably use fictive motion in describing certain static spatial scenes that are canonically described by posture verbs in Serbian. Moreover, in many cases, translating French fictive motion descriptions by posture verbs seems to be more natural than translating them by fictive motion” (Stosic & Sarda, 2009, p. 56).

Taken together, the above-reviewed studies indicate that the shared features of coextension paths observed across different languages stem from the nature of fictive motion as a cognitively universal phenomenon, which can be motivated by the primacy of movement in the human conception of the world (Talmy, 2000a, pp. 171–172; Johnson 2007, Ch. 1; Sheets-Johnstone, 2011; see Section 1.3). At the same time, the differences found cross-linguistically in the elicited descriptions (Blomberg, 2015; Bohnemeyer, 2010), and the translation studies (Rojo & Valenzuela, 2003; Stosic & Sarda, 2009) indicate that the structuring of fictive motion is mediated by the grammatical and lexical structure of the particular language, and the language specific conventions (see Stosic, Fagard, Sarda, & Colin, 2015).

## 2.8 Conceptual motivation of fictive motion

Matlock (2004b) attempts to pin down the conceptual motivation that underlies fictive motion. She sees the trajector as the central element in constructions of this type “because its construal shapes the overall meaning and structure of the construction, including what is generally considered semantically and grammatically acceptable” (Matlock, 2004b, p. 226). She adds, however, that typically fictive motion expresses the spatial configuration of the trajector relative to a landmark, as exemplified in (2.21).

(2.21) a. The road runs along the coast.

b. The railroad tracks follow the river.

(2.22) a. ?The road runs along.

b. ?The railroad tracks follow.

Sentences (2.21a–b) make sense because the described trajector has a conceptually plausible relationship with the landmark. In contrast, sentences (2.22a–b) sound odd because of the absence of a landmark that would enable us to mentally position the trajector in the described scene. This demonstrates that without reference to a landmark it is impossible to infer the spatial configuration of the trajector, unless there is substantial background shared by the interlocutors, e.g. both the speaker and listener are looking at a picture.

Moreover, Matlock (2004b, pp. 227–228) emphasizes that the trajector in fictive motion must be an oblong or spatially extended object. When it is not inherently an elongated entity, it must have at least an option of spatial extension. Reading the sentence (2.23a) results in a conceptualization of a *table* that is long and rectangular/oval, rather than small and round. Similar inferences occur for the *fish pond* (2.23b), which in this case is more likely to be conceptualized as elongated than round.

(2.23) a. The table goes from the kitchen wall to the sliding door.

b. The fish pond runs along the back fence.

Matlock assumes that such restrictions emerge from the inherent conceptual properties contributed by the motion verb: the trajector must be extensive enough to trigger *mental scanning* (see Section 2.2), which enables the conceptualizer to obtain a coherent understanding of the described configuration in space. Without mental scanning, the conceptualizer could only activate discrete locations in the configuration without building up a coherent whole.

Another observation about the trajector in fictive motion, apart from an elongated shape, is that it must be large enough for the mental scanning to occur. Matlock (2004b, p. 228) argues that there is no reason to scan small objects because a coherent whole can be obtained with just a glance. For that reason, even though a cell phone is typically rectilinear, most English speakers would probably agree the sentence “The cell phone goes from the cup to the book” sounds odd. However, when the same sentence is construed in the context of huge cell phone depicted on a billboard, the scale of space is sufficiently large to enable the conceptualizer to perform mental scanning of the trajector, and the sentence is more likely to make sense.

Furthermore, Matlock (2004b) observes that *travelable paths*, i.e. paths normally associated with motion (Matsumoto, 1996a), tolerate manner verbs to a greater extent than paths not normally associated with motion. For instance, in (2.24a) the manner verb conveys information about how motion is known to occur along a given path. The manner of motion does not describe an actual motion event but instead yields the construal of a path (highway) that tends to be congested/does not have much traffic during rush hours (2.24a).

(2.24) a. The highway *crawls/races* through the city.

b. ?The flower bed *crawls/races* along the back fence.

In (2.24b) the manner of motion is difficult to be construed in a consistent way because no motion is expected to occur along the non-travelable trajector. In this case, the properties associated with the speed of motion cannot be metonymically mapped onto the shape or configuration of the path, which demonstrates that the trajector restricts what sorts of inferences the conceptualizer makes about paths and various types of motion in fictive motion expressions.

Matlock (2004b) argues that the semantics of verb in fictive motion enables us to metonymically derive information about the properties of the path from the world knowledge about how a particular kind of motion occurs within a particular spatial region, which may go far beyond conveying information associated with speed. For instance, in the sentence “The footpath staggers from the bar to the outhouse”, the verb can be associated with a crooked shape of the path. Matlock (2004b, p. 232) believes that in this case the verb *stagger* sounds fine because bars are associated with drinking, and a drunk person is known to walk erratically, zigzagging back and forth. She adds that although such uses of fictive motion “have a somewhat poetic flavor and are less conventional” (Matlock, 2004b, p. 232), they sound perfectly right in specific contexts.

Taking a phenomenological perspective, Brandt (2009) argues that the soundest approach to expressions of fictive motion is a cognitive *pragmatic-semiotic* approach, in which the phenomenon is viewed not as independent of expressive function of language, but as intrinsic to it. Blomberg and Zlatev (2014; see also Blomberg, 2014, Ch. 6) postulate that a proper account of fictive motion needs to embrace a broader phenomenological-linguistic framework of *consciousness-language interactionism*, which takes into account an interactive loop between subjective experiences and conventional linguistic meaning shaped by cultural beliefs and discourse practices (see Zlatev, Blomberg & Magnusson, 2012 for a broader discussion). It must be emphasized that the proponents of cognitive linguistic models of coextension paths have voiced a need for more tangible data from experimental studies to support their claims (e.g. Talmy, 2000a, p. 104; Langacker, 2008c). Therefore, before continuing the discussion on the compatibility of various cognitive linguistic models with the linguistic reality, the next chapter reviews empirical research conducted on fictive motion in other fields of cognitive science.

## Chapter 3

# Cognitive processing of fictive motion

As a target of analysis, conceptualization is elusive and challenging, but it is not mysterious or beyond the scope of scientific inquiry.

R. W. Langacker (2008a), *Cognitive Grammar*, p. 5

### 3.1 Fictive motion as mental simulation

Over the past 20 years theories of *embodied mental simulation* have been rising to prominence in cognitive studies (see Bergen, 2016; Meteyard, Cuadrado, Bahrami, & Vigliocco, 2012 for reviews). They fit into the broader framework of *grounded cognition* (Barsalou, 2008, 2010; see Pecher & Zwaan, 2005; Semin & Smith, 2008 for edited collections of studies), which proposes that bodily states, situated action, and mental simulations underlie cognitive processing. Generally, mental simulation theories (e.g. Barsalou, 1999; Glenberg, 1997; Zwaan, 2004) assume that cognition involves partial reenactments of sensory-motor states from embodied experiences gained earlier. Barsalou (2008, p. 618) defines mental simulation as “the re-enactment of perceptual, motor and introspective states acquired during experience with the world, body, and mind”. He adds that we do not have *direct access*, i.e. we are not consciously aware of the simulation processes that are going on automatically in our brains (see Barsalou, 2009a for a sketch of how the brain implements situated simulations).

Recent cognitive linguistic studies point to a role of embodied simulation in the process of language comprehension (see Bergen, 2012 for a review). Roughly, when processing language we seem to activate perceptual, motor, and other brain systems to create internal perceptual representations of things and events, even without the things and events being present. These internal experiences are similar to those we would have when experiencing such items in reality. They encode details not explicitly mentioned in the language, for instance, what the mentioned items would look like (Stanfield & Zwaan, 2001) or sound like (Winter & Bergen, 2012). Bergen and Chang (2013) note that while the body of research

on embodied simulation in language comprehension has been growing rapidly, there has been relatively little work on the embodied simulation in language production. There is, however, some evidence from gesture (Hostetter & Alibali, 2008) and reaction time (Sato, 2010) studies that provides support for the hypothesis that mental simulation plays a role in producing utterances, too.

Mental simulation can involve *mental imagery*, i.e. the ability to activate and manipulate visual representations in the absence of the corresponding visual stimuli (Ganis & Schendan, 2011). In this case, parts of the brain's visual system become activated in ways similar to how they would react if the corresponding visual stimuli were actually present,<sup>54</sup> which gives rise to the experience of "seeing with the mind's eye".<sup>55</sup> Mental simulation can also be *motor*. In this case, when people process language about actions, parts of the brain dedicated to motor control become activated as an internal representation of physical action, normally without actually engaging muscles (see Anderson & Spivey, 2009; Taylor & Zwaan, 2009 for reviews from psychology; see Aziz-Zadeh & Damasio, 2008; Pulvermüller, 2005; Pulvermüller & Fadiga, 2010 for reviews from neuroscience). These motor representations can be specific down to the body part used to perform the action (Bergen, Chan Lau, Narayan, Stojanovic, & Wheeler, 2010).

A mental simulation for the particular instance of a concept is assumed to be *embodied* (Wilson, 2002; cf. Chatterjee, 2010; Mahon & Caramazza, 2008 for criticisms) and *situated* (Barsalou, 2003, 2009b; Yeh & Barsalou, 2006) in a particular environmental setting. For example, in the context of having an afternoon rest, people might represent *a chair* by simulating the multimodal experience of its shape, orientation, size, comfort, etc., while in the context of house furnishing, people might mentally simulate its color, material, upholstery, aesthetics, etc.

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<sup>54</sup> The nature of visual mental imagery has been debated in philosophy and cognitive science since the late 1970s. The debate moved into a new phase when neuroimaging started to be used to study mental imagery. One position (Kosslyn, Ganis, & Thompson, 2001, 2003; Kosslyn, 2005) draws on neural evidence to hold that visual mental imagery involves mechanisms used in perception and motor control to simulate the perceptual experience. The opposing position (Pylyshyn, 2002, 2003) rejects the idea that neural evidence could bear on the imagery debate and holds that representations underlying the experience of mental imagery are similar to those used in language.

<sup>55</sup> The concept of "the mind's eye" is rooted in Plato's *dualism* of eternal Forms and physical bodies (Robinson, 2012). In literature, it dates back to at least the 14th century, when it was used in Chaucer's (1387/1997) *The Man of Law's Tale*, lines 552–553 "But it were with thilke eyen of his mynde, With whiche men seen, after that they been blynde". It is mentioned in Shakespeare's *Hamlet* (1603/1966), Act 1, Scene 2, lines 184–186 when Hamlet is recalling his father: "HAMLET: My father, methinks I see my father. HORATIO: O! where, my lord? HAMLET: In my mind's eye, Horatio".

Depending on the context, we may also simulate actions taken toward chairs in the surrounding space, as well as any agents, objects, and events relevant to a particular situation. Moreover, simulations may adopt a particular perspective from which a person simulates the perception of an event. Adoption of that viewpoint, which can be an actor's perspective or an external viewer perspective, is affected, for instance, by pronoun variation, e.g. *you* vs. *he*, and the discourse context (Brunyé, Ditman, Mahoney, Augustyn, & Taylor, 2009; Ditman, Brunyé, Mahoney, & Taylor, 2010; Sato & Bergen, 2013).

The theories of mental simulation are supported by a large number of experimental studies, which indicate that when processing linguistic expressions people unconsciously simulate a variety of implied perceptual and motor details, such as shape (Zwaan, Stanfield, & Yaxley, 2002), orientation along the horizontal/vertical axis (Richardson, Spivey, Barsalou, & McRae, 2003; Stanfield & Zwaan, 2001), toward/away direction (Glenberg & Kaschak, 2002; Kaschak, et al., 2005; Zwaan, Madden, Yaxley, & Aveyard, 2004), rotation (Zwaan & Taylor, 2006), visibility (Yaxley & Zwaan, 2007), and color (Connell, 2007; Connell & Lynott, 2009) of the described object (see Zwaan & Pecher, 2012 for a review). Although behavioral and brain imaging evidence leaves little doubt that people comprehend utterances by performing embodied simulations, it remains less clear to what degree precisely simulation is involved in different aspects of language understanding<sup>56</sup> (Bergen, 2012).

Matlock (2001, 2004a) argues that studies on mental simulation, despite the fact that they usually target animate agents and real motion scenarios, may be extended to provide support for the idea that processing fictive motion takes place via mental simulation. For instance, Barsalou (1999, 2003; see also Yeh & Barsalou, 2006) points out that we use language more frequently to discuss non-present situations, i.e. activities and accomplishments from the past or ones that will happen in the future or purely hypothetical entities and events, than to communicate what we are doing at present time in a step-by-step fashion.

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<sup>56</sup> Dove (2009) points out that arguments put forward in support of perceptual representations are more relevant to concrete or highly imageable concepts, rather than abstract ones. He proposes *representational pluralism* that allows both perceptual and non-perceptual (i.e. *amodal*, see Fodor, 1975, 1983, 2008) representations in cognition. Barsalou, Santos, Simmons, and Wilson (2008) propose LASS (*Language and Situated Simulation*) theory of conceptual processing, which assumes the existence of two modal-specific systems of knowledge representation: one employing linguistic representations, the other situated simulations. Bedny and Caramazza (2011) argue that understanding action-verbs does not rely on modality-specific visual or motor circuits, but instead relies on a network of amodal brain regions that represent conceptual and grammatical properties of words.

When language is used to describe remote locations and actions, the listener simulates the experience of being in the location and certain aspects of performing the action. These mental simulations share their representational format with the perception of the actions. Over time, some of them become established in memory to function as *perceptual symbols*.

The assumption that mental simulations are involved in the cognitive processing of fictive motion expressions can be derived from Glenberg's (1997; see also Glenberg & Roberston, 1999, 2000; Kaschak & Glenberg, 2000) model. It assumes that a meaningful and coherent comprehension emerges through a *mesh* of affordances that people recognize with reference to the object in question. According to the *indexical hypothesis* (Glenberg & Roberston, 1999, 2000), the meaning of a sentence emerges in three steps: (1) indexing, i.e. referring words and phrases to real objects or perceptual, analog symbols; (2) deriving affordances from the objects and symbols to guide the interpretation of the language; (3) meshing the affordances under the guidance of syntax. Extending this framework to fictive motion, it is plausible to assume that the processing of fictive motion involves constructing a situation model through a mesh of knowledge about what the described object is capable of, which under the guidance of syntax provides constraints for the meaningful interpretation of fictive motion sentences.

Matlock (2001, 2004a, 2004b) assumes that the cognitive processing of fictive motion sentences involves constructing a spatial scene that resembles physical space and activating schematic structures that relate motion to objects described in this particular manner in order to mentally "move" through that scene. She adds that, depending on the particular situation, a mental simulation of fictive motion may entail information pertaining to direction, shape, and scale, as well different characteristics associated with travel, such as velocity, medium, manner, and instrument of motion. Matlock (2001, 2004a, 2004b, see also Matlock, 2017 for a broader review) emphasizes that processing linguistic expressions of fictive motion in this way does not necessarily involve conscious images of motion because it takes place unconsciously as part of natural language comprehension. It is plausible to presume that the constructional fictive motion triggers brain states similar to ones resulting from experiencing actual motion, which parallels, to some extent, what we experience while watching motion events or actually moving in space. Such re-enactments of motion enable us to enrich the conceptual representations of fictive motion by drawing relevant inferences grounded in the embodied experience and sensitive to local contextual conditions. They can be assumed to occur universally, except that they are mediated by an individual's sensorimotor experiences, which results in a subjective perspective on the object in question.

### 3.2 Psycholinguistic experiments

In her doctoral dissertation, Matlock (2001) discusses a series of experiments designed to test whether a mental simulation of motion occurs in the on-line processing of coextension path sentences. In each experiment, participants were first presented with a story about a protagonist traveling through a physical environment, and then made a timed decision about a fictive motion sentence related to the story by pressing either Yes or No button. Matlock explains the idea behind the experiments as follows: “The rationale underlying the methods used in this set of experiments relates to constructing a spatial model by reading about travel through a landscape and simulating motion through that landscape” (Matlock, 2001, p. 15).

The first three experiments involved target fictive motion sentences with four motion verbs, two of which, *cross* and *follow*, typically take a direct object as the verb complement, e.g. *A trail crosses the mountain range*, *The path follows the creek*, whereas the other two, *run* and *go*, typically take an indirect verb object, e.g. *A highway runs from the city to the park*, *Highway 15 goes from the mountains to the city*. These motion verbs were selected because they do not explicitly convey information about the manner of motion or about the shape of the trajectory. Experiment 1 investigated whether the distance traveled in a story influences the comprehension of fictive motion sentences. Participants answered the same FM-question immediately following a story about either a relatively *long-distance journey* or one about a relatively *short-distance journey*. Both versions of each story included very similar information, but differed with respect to the distance traveled by the protagonist, e.g. *walking 10 miles* vs. *walking a half mile* or *driving 100 miles* vs. *driving 20 miles*. Experiment 2 examined whether the rate of travel in a story influences the comprehension of fictive motion sentences. Participants were presented with stories about a protagonist traveling at either a relatively *fast rate*, e.g. *driving 100 MPH*, or relatively *slow rate*, e.g. *driving 40 MPH*. To accentuate the difference in speed, the respective stories included different types of vehicles, e.g. *Ferrari* vs. *old VW bus*. Experiment 3 investigated how the processing of FM-sentences is influenced by varying the terrain through which a protagonist travels. Participants read stories varying with respect to a relatively *easy terrain*, involving information typically associated with unimpeded travel, e.g. *flat and even fields*, or a relatively *difficult terrain*, involving information associated with impeded travel, e.g. *a rocky mountain riddled with gullies*.

The results showed that manipulating information in the stories influenced the comprehension of FM-sentences. Experiment 1 showed that people took longer to process fictive motion sentences in the context of a long distance than in the context of a short distance traveled. In Experiment 2 longer decision times were observed

for FM-sentences following slow-motion descriptions than for FM-sentences following fast-motion descriptions. Similarly, Experiment 3 showed that after reading a story about travel through a terrain that is rugged or otherwise problematic, people were slower to make the decision about FM-sentences than after reading a story about travel through a terrain that is smooth and unproblematic to traverse.

Another experiment<sup>57</sup> examined how people process fictive motion sentences with *non-travelable paths*,<sup>58</sup> as distinguished by Matsumoto (1996a), e.g. *A fence crosses the field, An earthquake fault runs across the valley*. The FM-sentences featured subject-noun phrases with non-travelable paths followed by manner-neutral motion verbs: *go, run, cross, and follow*, similarly to the first three experiments. Again, stories were varied with respect to a relatively *difficult terrain* or a relatively *easy terrain*. The results obtained in that experiment were similar: it took participants longer to process an FM-sentence following a story about a difficult terrain than it did following a story about an easy terrain. Matlock (2001, p. 44) notes that because of the non-travelable subject noun phrases, in this case faster decision times for easy terrain descriptions are likely to arise due to the mental simulation of visual scanning, rather than motion.

Matlock (2001) emphasizes that the difference in the decision times for the target FM-sentences was not simply the result of more information in stories describing different conditions because in each case both stories contained the same amount and type of information (same length, same protagonist, same setting, etc.). Moreover, in a follow-up publication, Matlock (2004a) reports three control studies conducted for Experiments 1–3. In these follow-up experiments, participants read the same stories and performed the same task, but the target sentences instead of fictive motion included similar non-fictive motion sentences, e.g. *The road is in the valley* instead of *The road runs through the valley*. Crucially, the consistent latency differences did not arise, which confirms that different decision times observed in the original experiments were not the result of linguistic priming alone.

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<sup>57</sup> This is Experiment 6 in Matlock's (2001) PhD dissertation. Experiments 4 and 5 extended the scope of Experiment 3 by targeting the comprehension of FM-sentences with motion verbs that conflate either fast or slow manner of motion, i.e. *speed, race, zip, and jet* vs. *crawl, creep, jog, and meander*. The results were similar, but these experiments were not accompanied by follow-up control studies. A different experiment with motion verbs expressing varying rates of speed was reported in a later study based on free-style drawings (Matlock, 2006, Study 3), which is discussed in the following section.

<sup>58</sup> In her early publications Matlock (2001, 2004) seems to equate non-travelable paths with Type II fictive motion sentences distinguished by Matsumoto (1996b). Although Type II fictive motion sentences are likely to involve travelable paths more frequently than non-travelable paths, Type II refers to fictive motion based on the experience of a specific person at a specific time, rather than the type of medium traversed.

Taken together, the experiments have demonstrated that reading about actual physical journeys with different characteristics (distance, speed, terrain) affects the time that subjects take to process fictive motion expressions. Matlock (2001, 2004a) believes that the easier it was for the participants to mentally simulate the motion described in a target FM sentence under the circumstances sketched in the priming story, the shorter their reaction times were. Overall, the results indicate that when people are attempting to comprehend the meaning of FM sentences, they engage, at least to some degree, in simulating motion or visual scanning.

Rojo and Valenzuela (2009, Exp. 1) examined processing expressions of fictive motion depicting travelable and non-travelable entities (Matsumoto, 1996a) by Spanish speakers. Participants performed a self-paced reading task on a computer screen. They read blocks composed of four sentences, each including a target fictive motion sentence as one of available options. Half of the blocks included fictive motion sentences describing travelable entities, the other half non-travelable entities. Each sentence in a block was divided into four chunks. To proceed to the next part of the sentence the participants had to press the spacebar key. After each block, the participants were presented with a picture, and had to decide whether it corresponded to any of the sentences they had read before. What the experimenters actually measured was the time participants took to read the target fictive motion sentences in the self-paced reading task. The results showed that people took longer to read sentences with non-travelable paths, e.g. *the pipe climbed to the top of the hill*, than sentences with travelable paths, e.g. *the path climbed to the top of the hill*. The results indicate that the distinction between travelable and non-travelable paths is cognitively relevant to Spanish speakers, despite the fact that describing non-travelable entities with fictive motion expressions is perfectly acceptable in Spanish.

Another experiment, Rojo and Valenzuela (2009, Exp. 2) investigated the difference in the processing of path-related vs. non-path related verbs of motion manner in fictive motion sentences. Essentially, it employed the same procedure as the previous experiment. This time, however, half of the blocks included a motion sentence with a verb of motion manner related in one way or another to the shape of a path, e.g. *zigzag*, while the other half included a manner verb not related to the shape of a path. The results demonstrated that Spanish speakers took longer to read fictive motion sentences with non-path-related manner verbs than ones with path-related manner verbs. Additionally, the experiment showed that people took longer to read sentences including *verbs of motor pattern*, e.g. *crawl*, than sentences with *verbs of speed*, e.g. *hurry* or *ease of progress verbs*, e.g. *slide*. Although the manner condition does not seem to function very rigidly in Spanish at the surface level, the results suggest that it affects Spanish speakers. Taken together, these experiments indicate that Spanish speakers are sensitive both to the travelable/non-travelable path distinction and the manner condition proposed by Matsumoto (1996a).

Tomczak and Evert (2015) examined cross-linguistic influences between L1 and L2 in the processing of fictive motion sentences in bilingual speakers. They prepared a psycholinguistic experiment aimed to test cognitive representations and online processing of fictive motion sentences in English monolinguals, Polish monolinguals, and advanced Polish users of English as a second language (L2). The experiment was prepared in two language versions. While the monolingual groups performed the task only once in their respective native languages, the bilingual Polish users of English as L2 completed both the English version and the Polish version of the experiment on two different occasions.

The experiment was a reading task that involved four different types of sentences: 1) fictive motion with travelable paths, e.g. *The footpath crawls between the trees*; 2) fictive motion with non-travelable paths, e.g. *The ditch crawls between the trees*; 3) real motion, e.g. *John crawls between the trees*; 4) static depictions, e.g. *The footpath is between the trees*. The study employed the unmasked priming paradigm: every target sentence for all four sentence types was preceded by a priming word, either noun or verb, displayed shortly on the screen. For the Polish version of the task translation equivalents of the English sentences and primes were used. All three groups of participants went through the same task procedures in their respective languages. Participants were asked to read sentences presented one by one on a computer screen and decide whether they did or did not make sense to them by pressing keys indicated as Yes/No on the keyboard. The experiment was self-paced, i.e. each sentence remained on the screen until the participant indicated their decision. For each group of participants, sentence meaningfulness judgment and response time data were collected to examine the presence of priming effects in the processing of the four sentence types.

In all three groups people processed both types of fictive motion significantly longer than real motion and static sentences, which seems to provide support for the hypothesis that the conceptual processing of fictive motion depictions involves mental simulation of motion. However, having examined the meaningfulness judgments the experimenters found that the two groups of monolingual speakers differed in how they assessed the meaning of sentences used in the experiment. The Polish monolinguals rated both types of fictive motion sentences lower on meaningfulness, in particular those with non-travelable paths, than English monolinguals. Moreover, the response time data showed that the monolingual speakers of English demonstrated the priming effect in the processing of all motion sentences, which, somewhat surprisingly, was not the case with the monolingual speakers of Polish. Tomczak and Evert (2015) take as a possibility that the Polish monolinguals did not display the priming behavior

because of the lower meaningfulness of the target sentences.<sup>59</sup> As an alternative, they assume that speakers of Polish, which is a free word order language, might have different sentence processing strategies from speakers of English (see Mishra & Singh, 2010, Exp. 1, discussed in Section 3.5).

Interestingly, while the monolingual groups differed in their judgments of sentence meaningfulness, the Polish L2 users of English rated the sentences similarly meaningful in both languages. Their ratings of English sentences were similar to those of English monolinguals, and they rated parallel Polish sentences as more meaningful than Polish monolingual speakers. Tomczak and Evert (2015) interpret it as an instance of transfer from L2 to L1. On the other hand, the Polish L2 users of English demonstrated no priming effect in processing English sentences, which can be interpreted as an instance of transfer from the L1 to the L2. Taken together, the results obtained with advanced Polish L2 users of English suggest an occurrence of *bidirectional transfer* (Brown & Gullberg, 2008; Hohenstein, Eisenberg, & Naigles, 2006) with fictive motion expressions. Overall, the results suggest that conceptual representations of fictive motion expressions may be affected by influences from foreign languages.

Overall, the results of psycholinguistic experiments reviewed in this section demonstrate that manipulating the information related to the coextension path influences the time it takes participants to comprehend a sentence of this type. Additionally, the results of the experiment carried out by Tomczak and Evert (2015) indicate that the comprehension of fictive motion is mediated by linguistic constraints. From a broader perspective, the results of psycholinguistic experiments suggest that the on-line processing of fictive motion sentences engages people in unconscious simulation of motion or visual scanning. Further insight into the cognitive processing of fictive motion comes from off-line experiments based on drawing tasks.

### 3.3 Drawing studies

People do not describe events and things in space exclusively with language – they also use gestures and draw sketches to share their experiences with others. Drawing studies provide insights into how people conceptualize objects, states, and actions. In some cases, drawings reveal aspects of conceptualization that might be difficult to

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<sup>59</sup> The experimenters allow that the lower ratings of Polish monolingual speakers might have been induced by the choice of the experimental sentences. Obviously, the fact that “the English and Polish sentences had equivalent wording” (Tomczak & Evert, 2015, p. 60), does not mean that they sound equally natural in both languages. One might hypothesize that the lower ratings on meaningfulness were caused by a *translationese* (Duff, 1981) character of the sentences, but this path is not explored in the study.

express in words alone. Graphic creations of both children and professionals often spontaneously adopt metaphoric and analogic uses of space and the things in it (Tversky, 2001). Pictorial representations of motion in space are seen in the way illustrators of comics draw lines trailing behind a figure (McCloud, 1994). Inferring motion from lines is so natural that even blind artists render extended or irregular lines to connote motion in their drawings (Kennedy, 1997). Especially sketches are a kind of cognitive tool used to represent ideas about spatial elements or abstract relations. Since they incorporate relevant information and omit irrelevant details, sketches do not portray reality but rather convey conceptions of reality. Unlike language, sketches convey figural and relational properties in space more directly. As put by Tversky (2002, p. 140), “Of course, written language can do the same, but sketches have the advantage of conveying visuospatial ideas directly, using elements and spatial relations on paper to convey elements and spatial relations in the world”.

Matlock (2006) designed a series of drawing studies to investigate the underlying conceptual structure of fictive motion sentences. She assumed that if simulation of movement takes part in the conceptualization of fictive motion, it should be reflected in the way people sketch spatial objects described with coextension path sentences. In Study 1, participants were asked to draw non-artistic, free-style sketches representing their conceptions of scenes described using either statically or with fictive motion. Both types of descriptions were semantically and syntactically parallel: each coextension path sentence featured the motion verb *run*, and the static sentence featured the copula verb *be*, e.g. “The pond *runs* between the barn and the corral” vs. “The pond *is* between the barn and the corral”. Each sentence in the experiment included the subject noun phrase that referred to an object outdoors, indoors, or on the human body, e.g. *a tattoo, birthmark, scar*, etc. Respective sentence pairs were put into two lists so no participant would see both sentences in a pair. Each participant was given a booklet with a list of randomized sentences and instructed to sketch an image below each sentence. The results showed that on average objects described with fictive motion sentences were significantly longer in drawings.

Study 2 employed the drawing task from Study 1 to examine the conceptual structure of coextension paths from a slightly different angle. This time, participants were presented only with sentences that described inherently long outdoor objects. Using the same procedure the study investigated whether objects of this type would be longer in drawings based on fictive motion sentences. Similarly to the results of Study 1, people drew longer objects when drawing fictive motion sentences than static sentences, as exemplified in Figure 3.1. Taken together, the results obtained in Studies 1 and 2 indicate that the objects described with fictive motion sentences are conceptualized differently. A plausible explanation is that when forming the mental image of a coextension path people simulate motion described in the sentence, which makes them conceptually elongate the depicted object.

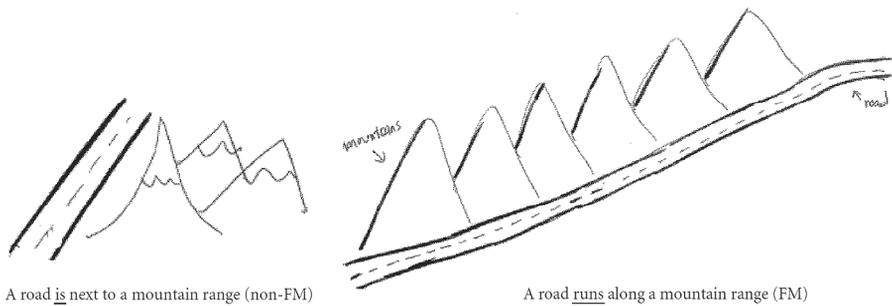


Figure 3.1 Example actual vs. fictive motion drawings

In Study 3, the conceptual structure of fictive motion was investigated further with a different task. Participants were given fictive motion sentences featuring an underlined word that represented a traversable route, e.g. *road*, *footpath*, *sidewalk*, etc. Target sentences included motion verbs expressing different rates of speed. The slow verbs were *crawl*, *creep*, *jog*, *meander*, *plod*, and *ramble*; and the fast verbs were *fly*, *jet*, *race*, and *speed*. Participants were asked to quickly draw an arrow to represent the underlined word in each sentence. It turned out that participants drew longer, thinner, and straighter arrows for fictive motion sentences with the fast verbs than with slow verbs. A possible interpretation of the results obtained in Study 3 is that the semantic velocity expressed by the motion verb maps onto the velocity of the hand during drawing. When forming an image described by the sentence, people mentally simulated motion, which made them draw movement quickly and for the fast verbs and slowly for the slow verbs, irrespective of the described object.

The results of these studies indicate that, “it is not unreasonable to assume that longer trajectors in depictions of FM sentences are the end result of (a greater degree of) simulated motion or scanning” (Matlock, 2006, p. 77), especially if we take into account that sketches reflect people’s direct conceptions of reality. In more general terms, the findings suggest that the motion simulated during the comprehension of coextension paths is variable and adaptive. The hypothesis that the meaning evoked with coextension path expressions is not unlike that of actual motion was investigated further in studies examining how processing fictive motion sentences affects the conceptual projection of time.

### 3.4 Influence on temporal construal

Entanglement of space and time in the human mind is among most intensely pursued problems in contemporary cognitive linguistics (e.g. Evans, 2013; Moore, 2014; Waliński, 2014b), and cognitive science (see Núñez & Cooperrider, 2013 for a review).

A number of psycholinguistic studies have demonstrated that people's understanding of time depends on their conceptions of motion in space,<sup>60</sup> to the extent that manipulating their spatial representations affects the construal of time (e.g. Boroditsky & Ramscar, 2002; Torralbo, Santiago, & Lupiáñez, 2006; see Casasanto, 2010 for a review; Pinker, 2007, Ch. 5 for a criticism). Such studies frequently employ asking participants ambiguous temporal questions, like that proposed by McGlone and Harding (1998):

Next Wednesday's meeting has been moved forward two days. What day is the meeting now that it has been rescheduled?

The answer to this question depends on how one conceptualizes time at the particular moment. If someone takes the perspective of themselves as moving forward through time, then moving a meeting "forward" means moving it further along the direction of motion, and the answer is *Friday*. But if someone takes the perspective of time as coming toward them, then moving a meeting "forward" means moving it closer, and the answer is *Monday*.

Taking into consideration that thinking about actual motion in space affects how people conceptualize time, Matlock, Ramscar, and Boroditsky (2003, 2004, 2005, Exp. 1), designed an experiment to examine whether engaging in thought about fictive motion influences the metaphoric construal of time. Participants were asked to sketch an image of a fictive-motion sentence, e.g. *The road runs along the coast*, or a parallel non-fictive motion sentence, e.g. *The road is next to the coast*, and then they answered the ambiguous question about "next Wednesday's meeting". The experimenters assumed that if people interpreted a fictive motion sentence in terms of actual motion, they would be more likely to think of themselves as moving forward in time, and consequently take the ego-moving perspective.

The results showed that significantly more participants primed with a fictive motion sentence thought that the meeting was moved to *Friday*. Among those who were primed with a non-fictive motion sentence the was no

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<sup>60</sup> Lakoff and Johnson (1999, p. 52) argue that time is conceptualized by unconscious cognitive mechanisms through perceptual and motor experience in the concrete domain of space as the TIME IS MOTION metaphor in two major variants: *motion of objects* and *motion along a path*. The metaphorical conceptualization of time along the *front/back axis* results in MOVING TIME and MOVING OBSERVER metaphors. With the MOVING OBSERVER metaphor (Lakoff & Johnson, 1999, pp. 145–148), time is conceived of as a stationary landscape, along which we are moving, encountering events as we proceed, e.g. *we are approaching the deadline, leave your childhood behind*, etc. With the MOVING TIME metaphor (Lakoff & Johnson, 1999, pp. 141–144), we conceive of ourselves as stationary, with events approaching us from the future, e.g. *the coming weeks, the deadline is approaching*, etc.

significant difference between *Monday* and *Friday* answers. The results indicate that when people engage in reading a fictive motion sentence and then draw a picture to represent its meaning, they appear to activate a motion schema, which in turn encourages them to conceptually move forward in time. The conceptualization of temporal movement is affected in a way similar to thinking about actual motion (see Boroditsky & Ramscar, 2002), which suggests that it is activated by simulating actual motion.

Another experiment (Matlock, Ramscar, & Boroditsky, 2005, Exp. 2), investigated whether the conceptualization of time movement is sensitive to the number of points depicted along the path of fictive motion. It used the same procedure as Experiment 1, but this time participants read fictive motion sentences that varied as to the number of scan points along a path: *Four pine trees run along the edge of the driveway.* vs. *Eight pine trees...* vs. *Twenty pine trees...* vs. *Over eighty pine trees...*, and then answered the ambiguous “next Wednesday’s meeting” question. The experimenters assumed that a stronger simulation of motion or visual scanning along a path would be evoked with more scan points. The results showed that as number of scan points increased from 4 to 8 to 20, the participants were more likely to answer *Friday*.<sup>61</sup>

To probe the influence of fictive motion on temporal understanding further, a third experiment (Matlock, Ramscar, & Boroditsky, 2005, Exp. 3) examined whether fictive motion involves some sense of *directionality*, which is the basic conceptual property of an image schema of motion (Lakoff, 1987a). Using the same experimental setup as Experiments 1 and 2, this time participants were presented with a fictive motion sentence describing a road going either *toward* or *away from* their deictic centre. The experimenters expected that engaging people in thought about a road going away, i.e. *The road goes all the way to New York*, would encourage a *Friday* response, consistent with the ego-moving perspective. In contrast, engaging people in thought about a road going toward their location, i.e. *The road comes all the way from New York*, should encourage a *Monday* response, consistent with the time-moving perspective. The results showed that people thinking of *a road going away* from them more often provided a *Friday* response, while those who had thought about *a road coming toward* them more

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<sup>61</sup> Interestingly, with 80 trees the effect diminished, which can be explained by too excessive number of scan points being no longer conducive to evoking mental scanning. As put by Matlock (2010, p. 250), “an inordinately large number of trees meant too many trees to conceptualize as a path”.

often responded *Monday*. The results suggest that fictive motion, somewhat like actual motion, includes a defined sense of direction, which is strong enough to influence people's conceptions of time.

However, in all the above-reviewed experiments participants were required to sketch a drawing of the fictive motion sentence before answering the target question. Because the activity of drawing involves some degree of actual motion, it could have been the decisive factor that produced the temporal bias. To eliminate that possibility, Ramscar, Matlock and Dye (2010) conducted further experiments to examine whether fictive motion priming alone, in the absence of drawing, could shape participants' temporal understanding. Experiment 2 essentially replicated Experiment 2 from the above-discussed study (Matlock, Ramscar, & Boroditsky, 2005, Exp. 2) omitting the drawing part. Additionally, this time target sentences included five new integers (10, 11, 12, 19, and 100) to eliminate the effect of co-occurrence patterns for numerals associated with temporal understanding.<sup>62</sup> Experiments 3 and 4 essentially replicated Experiment 1 and Experiment 3 from the earlier study (Matlock, Ramscar, & Boroditsky, 2005). However, this time instead of drawing sketches participants were just asked to indicate whether the sentence made sense to them before answering the "next Wednesday's meeting" question.

Overall, the results of these experiments confirmed earlier findings. Even in the absence of drawing, participants were more likely to respond *Friday* after reading a fictive motion sentence than after reading a non-fictive motion sentence. Interestingly, Experiment 2 showed that as the number of trees mentioned in the stimuli increased, the number of *Friday* responses decreased. As a possible explanation, the experimenters propose that participants' responses might have been partly influenced by their linguistic expectations from the co-occurrence patterns for numerals associated with time English. Nonetheless, the newly introduced numbers of trees still influenced participants toward providing a Friday response.

The above-reviewed studies examining how fictive motion affects metaphorical construal of time (see Gibbs & Matlock, 2008; Ramscar, Matlock, & Boroditsky, 2010 for recapitulations from a broader perspective) have demonstrated that fictive motion appears to recruit structures from the conceptual domain of motion, which are vivid enough to affect the conceptual projection of time movement. This indicates that the abstract conceptual domains of time and fictive motion share

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<sup>62</sup> In the *Corpus of Contemporary American English* (Davies, 2009) 5 of the 10 most likely words to be encountered after *four* are time words: *years, months, days, hours, and weeks*.

a common conceptual base, which is actual motion in physical space.<sup>63</sup> Taken together, the evidence from decision time latencies, drawing studies, and the influence on time construal provides some support for the hypothesis that comprehending fictive motion sentences evokes mental simulation of motion. Nevertheless, it provides this support indirectly. More explicit support for the cognitive processing of fictive motion expressions with mental simulations comes from eye-tracking studies, which allow to observe perceptual mechanisms in a manner that is unconstrained by task conditions other than looking and listening.

### 3.5 Eye-tracking experiments

Eye movements are driven not only by perceptual properties of the surroundings but also by cognitive processes, which makes eye-movement records a relevant source of information for studies on language, perception, and cognition (see Duchowski, 2007 for a comprehensive overview of the eye-tracking methodology). Eye-tracking methods can measure when the eye movement is launched, where it lands, and how long the eye stays in a particular location. Importantly, eye-tracking data provide a record of visual field regions that are briefly considered relevant *during the course* of cognitive processing, not after, as is often the case with other methods. In eye-tracking experiments, the responses usually occur regardless of instructions and the participant's intent, which provides a certain degree of ecological validity for studies on language processing (Richardson, Dale, & Spivey, 2007). Since eye movements are uniquely poised between perception and cognition, eye-tracking experiments are particularly relevant to studies investigating the incremental and interactive nature of language comprehension (e.g. Altmann & Kamide, 2007, 2009; Coventry, et al., 2010; Tanenhaus, Spivey-Knowlton, Eberhard, & Sedivy, 1995).

Matlock and Richardson (2004) investigated whether eye movements are influenced by fictive motion. Participants viewed depictions of spatial scenes while listening to either fictive motion sentences or non-fictive motion sentences. Pictures serving as primary visual stimuli depicted schematically simple spatial scenes. Each picture featured both a horizontally extended figure and a vertically extended figure, e.g. books running along the wall from left to right, and a cord running along the wall from top to bottom, as shown in Figure 3.2.

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<sup>63</sup> Subsequent studies (Matlock, Ramscar, & Srinivasan, 2005; Matlock, Holmes, Srinivasan, & Ramscar, 2011), have demonstrated that even *abstract motion*, understood as mentally moving from one symbol to another in an ordinal sequence, e.g. counting, countdown, reciting the alphabet, etc. influences the temporal construal in a similar way.

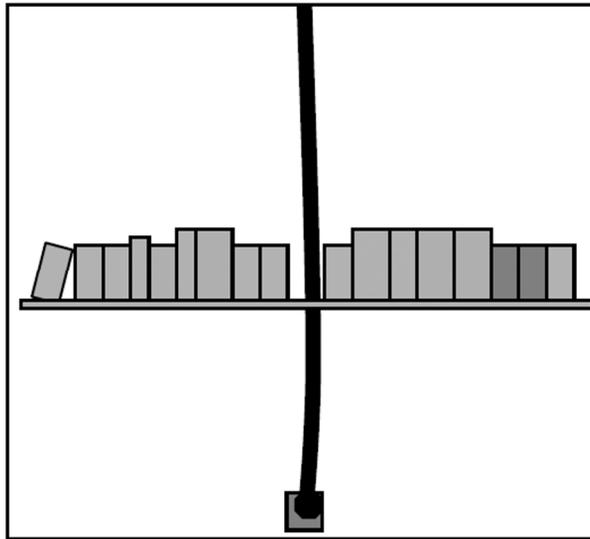


Figure 3.2 Example image used in eye-tracking studies

Each picture was accompanied by two sentence pairs: one pair referred to the vertical object in a picture, as exemplified in (3.1), and the other referred to the horizontal object in that same picture, as exemplified in (3.2). Each pair included a fictive motion sentence and a comparable non-fictive motion sentence. For instance, for the picture in Figure 3.2 the accompanying sentence pairs were:

(3.1) *For the horizontal landmark:*

- a. The books run along the wall. (fictive motion)
- b. The books are on the wall. (non-fictive motion)

(3.2) *For the vertical landmark:*

- a. The cord runs along the wall. (fictive motion)
- b. The cord is on the wall. (non-fictive motion)

The participants were presented with randomized pictures, each accompanied by one of four sentence variants. Their eye movements were recorded by a remote eye tracker. Overall, the results demonstrated that people spent more time gazing at the region of a picture associated with the figure while processing the fictive motion sentences than non-fictive motion sentences. In particular, gaze duration was longer for the horizontal/vertical region overlapping with the figure described in the sentence. As a plausible explanation for the results, Matlock and Richardson (2004, p. 913) propose that when the participants heard the fictive motion input, they

mentally simulated motion or visual scanning along the figure, which guided their eye movements. They add that if the literal meaning of the verb alone had led to longer inspection times, they would not have observed selective differences in gaze duration for the axis of orientation (horizontal vs. vertical), because motion verbs used in the study provided no information about direction.

A follow-up study (Richardson & Matlock, 2007) provides additional evidence that fictive motion descriptions affect eye movements. This time, participants did the same task based on the same stimuli, but each picture and experimental sentence was preceded by a short terrain description. The terrain descriptions characterized the region of the potential movement conceptualization as either easy or difficult, e.g. *The valley is covered with dust* vs. *The valley is covered with ruts*. The eye movement data were parsed into two dependent variables: the total looking time in the region of the path, and the frequency of path scanning fixations, in which participants fixated one path region followed immediately by another. The results showed that the total time of eye movements scanning along the path increased for fictive motion sentences when the terrain was first described as difficult as compared to easy. Moreover, participants made more path scanning fixations after hearing a fictive motion sentence preceded by a difficult terrain description than an easy terrain description. Critically, their eye movements were not influenced when the terrain descriptions were coupled with non-fictive motion sentences.

Taken together, these two complementary eye-tracking studies demonstrate that fictive motion sentences consistently influence eye movements, which suggests that comprehending fictive motion sentences engages people in mental simulation of motion or visual scanning. As summarized by Matlock (2010, p. 252), “the reason such evidence was so readily forthcoming is because the cognitive processes associated with that linguistically induced mental simulation are so tightly connected to motor processes (especially eye movements) that we could see that simulated motion borne out in the eye-movement patterns themselves.”

Mishra and Singh (2010) conducted eye-tracking experiments on fictive motion with speakers of Hindi. They explored the hypothesis that the higher allocation of visual attention reported for English speakers in the above-discussed studies (Matlock & Richardson, 2004; Richardson & Matlock, 2007) may result from the syntactic structure of English, which inherently promotes the fictive trajector to the discourse-prominent position of sentence subject. Unlike English, Hindi is a free word order language, which allows for manipulating word order of fictive motion sentences, as exemplified in (3.3a–b).

(3.3) a. Yeh dewaar ghar ke saamne se ho kar guzarti hai. (Hindi canonical)

[EN: *The wall goes from the front side of the house.*]

b. Ghar ke saamne se yeh dewaar guzarti hai. (Hindi topicalized)

[EN lit.: *From the front of the house goes the wall.*]

In the topicalized variant (3.3b), the subject does not occupy the prominent frontal position. Reportedly, in Hindi both the canonical and topicalized forms of fictive motion are semantically parallel and equally acceptable in everyday discourse.

Experiment 1 aimed to examine whether word order affects attentional mechanisms during the comprehension of fictive motion sentences. It replicated, to some extent, the above-reviewed experiments by Matlock and Richardson. Visual stimuli included pictures of travelable and non-travelable objects, either horizontal or vertical. For each visual display, one of three sentence variants was used: a canonical version, a topicalized version, or a non-fictive motion sentence in the canonical form. Participants were instructed to look at the pictures while listening to the sentences, and indicate by pressing either Yes or No button whether the displayed object is compatible with the sentence. The results of Experiment 1 confirmed findings from studies with English speakers (Matlock & Richardson, 2004; Richardson & Matlock, 2007). Eye movement records revealed that higher visual attention was allocated during comprehension of fictive motion sentences, possibly evoking mental simulation of motion (see also Singh & Mishra, 2010). Additionally, significantly longer gaze durations and more fixations were found for the canonical variant of fictive motion sentences, which suggests that word order affects simulation patterns of fictive motion.

Experiment 2 aimed to explore mental simulation of fictive motion during mental imagery, i.e. in the absence of visual stimuli. It was conducted with a different group of people using a *blank-screen paradigm* (Altmann, 2004), in which participants hear each target sentence only after the corresponding visual scene has been displayed and then removed. In this scenario, anticipatory eye movements are not dependent on the concurrent visual scene, but on a mental record of the scene.<sup>64</sup> This experiment employed a task similar to that used in the previous experiment, including the same pictures and target sentences. However, this time participants were presented with a picture and then, after a short break (1000 ms), listened to a sentence about it while the screen was blank. The same dependent eye movement variables were used. They were measured on the part of the blank screen that had been previously occupied by the displayed object.

<sup>64</sup> Eye-tracking studies on narrative comprehension (e.g. Laeng & Teodorescu, 2002; Spivey & Geng, 2001) show that eye movements during visual imagery reenact those of perception of the parallel visual scene.

Surprisingly, the results obtained in Experiment 2 were the opposite of those from Experiment 1. For the same set of sentences, people allocated higher visual attention during comprehension of non-fictive motion sentences than both syntactic variants of fictive motion: “the number of fixations, average duration of fixation, and total gaze duration for NFM [non-fictive motion] sentences were significantly higher than for either of the fictive motion sentences” (Mishra & Singh, 2010, p. 154). Moreover, the results did not show any significant difference in eye movements between the canonical and the topicalized variant of fictive motion sentences. Based on these findings, Mishra and Singh (2010, p. 155) argue that “presence of a scene is a necessary condition for embodied simulation to take place and for relevant perceptual motor systems to become activated during figurative language processing in imagery”.

Even if in the light of studies reviewed so far this condition appears to be formulated too rigidly,<sup>65</sup> it is not overly astounding that not each and every instance of processing fictive motion evokes mental simulation. Chatterjee (2010, p. 99) points out that the first line in the narratives used by Matlock (2001, 2004a) explicitly instructed the participant to imagine a spatial scene, e.g. “Imagine a desert”, which probably contributed to constructing a spatial scene mentally. Moreover, in those experiments participants processed a fictive motion sentence only after hearing the preceding narrative, and processing narratives inherently involves building spatial situation models (Bower & Morrow, 1990; Rinck, 2005). Processing a fictive motion sentence against a spatial scene pre-established in a purely linguistic manner may be as likely to trigger mental simulation as processing it against a picture showing a spatial scene.

The link between linguistic structuring and evocation of a conceptualization of motion is difficult to establish in a straightforward manner, since even the same person may deal with the same instance of fictive motion differently on different occasions (Talmy, 2000a, pp. 104–105; see Section 2.3). Therefore, it seems more reasonable to presume, especially given that coextension paths are readily available means of denoting spatial relations in the conceptual repertoire of language users, that they yield mental simulation of motion in some contexts, but not necessarily in others. However, before continuing the discussion, contributions from brain imaging studies must be taken into consideration.

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<sup>65</sup> It is plausible to presume that fictive motion sentences yield visual imagery in the absence of a background scene, either depicted or imagined, but at a subsequent time course. This can be inferred from longer latencies observed in participants performing self-paced reading tasks (Rojo & Valenzuela, 2009; Tomczak & Evert, 2015; see Section 3.2). Longer response times found in those behavioral studies suggest that after reading a fictive motion sentence participants subjectively created some kind of a spatial scene to comprehend the meaning.

### 3.6 Insights from brain studies

The organization of conceptual knowledge in the human brain is among the most challenging questions in cognitive neuroscience (see Binder, Desai, Graves, & Conant, 2009; Martin & Caramazza, 2003 for reviews). Recently, the hypothesis that the neural circuitries associated with action representation are recruited when processing action-related language (e.g. Glenberg & Gallese, 2012; Martin, 2007; Pulvermüller, 2005; see Section 3.1) has challenged traditional amodal theories of conceptual knowledge (e.g. Fodor, 1975, 2008; Johnson-Laird, 1989). Yet, although various neuroimaging studies have demonstrated involvement of the motor system in the processing of the action-related content of linguistic utterances (see Aziz-Zadeh & Damasio, 2008; Pulvermüller & Fadiga, 2010 for reviews), the nature of the relationship between concepts and perception/action has not been determined. It is still debated whether sensory-motor processes form a constitutive or only context-dependent, i.e. affected by factors such as task demands or expectations due to the nature of the stimuli, component of conceptual representations (Kiefer & Pulvermüller, 2012; Meteyard, et al., 2012). A definite account of the boundaries of semantic processing is still far from being completed because the exact location of the neural circuitries for action-related language may vary according to the type of stimuli, e.g. single words vs. sentences, linguistic characteristics, e.g. transitive vs. intransitive verbs, modality involved in processing, and the specific task at hand.

Wallentin, Østergaard, Lund, Østergaard, & Roepstorff (2005) used fMRI (Functional Magnetic Resonance Imaging, see Logothetis, 2008 for an overview) to examine the neural systems underlying linguistic representations of space, including fictive motion. The study was designed to compare sentences with spatial meaning that had the grammatical subject representing either an *animate* (An) or *inanimate* (In) entity and the prepositional complement representing either a *concrete* (Co) or *abstract* (Ab) landmark. This combination generates 2×2 matrix of structurally parallel, yet semantically different types of sentences exemplified in (3.4a–d):

- (3.4) a. The man goes through the house. (An–Co) [actual motion]  
 b. The man goes through the sorrow. (An–Ab) [metaphorical motion]  
 c. The trail goes through the house. (In–Co) [egocentric fictive motion]  
 d. The trail goes through the sorrow. (In–Ab) [meaningless]

The study was designed to examine brain activations elicited by these four sentence types presented during scanning. It was conducted in Danish, which, similarly to English, demonstrates the general pattern *noun-verb-preposition-noun* in such sentences e.g. *Manden går gennem huset* (EN: The man goes through the house). All nouns were in the singular determinate form, and all verbs were in the present tense.

The sentences were either read or heard by subjects to examine modality independent semantic activations. They were presented in a pseudo-randomized order to make sure that sentences with the same elements were kept as far apart as possible.

One of the key variables in the study was the animacy of the subject noun. The default interpretation for an animate entity preceding a motion verb in An-Co sentences is the subject performing self-propelled *actual motion*, and for an inanimate entity preceding a motion verb in In-Co sentences is *fictive motion*. With reference to fictive motion, two hypotheses were tested in the study: (1) “that fictive motion sentences (In-Co) relative to ordinary motion sentences (An-Co) would elicit more activity in areas related to egocentric space construction”; and (2) “that An-Co sentences might elicit neural activity, which to a higher degree reflects allocentric spatial processing compared to fictive motion” (Wallentin, et al., 2005, p. 223).

The fMRI scanning did not show any brain regions that were significantly activated or deactivated as a main effect of the animacy of the grammatical subject, or any brain regions that were significantly activated or deactivated by an interaction between animacy of the grammatical subject and concreteness of the prepositional complement. The results did not bring any solid support for the hypotheses that *fictive motion* (In-Co) would induce significant activations in brain regions responsible for *egocentric* motion construction in comparison to *actual motion* (An-Co), which was assumed to involve primarily *allocentric* motion construction. When comparing fictive motion sentences with actual motion sentences, a small right lateralized activation in the parietal lobe was detected, however, it was below the threshold for activation cluster size assumed in the study.

Saygin, McCullough, Alac, and Emmorey (2010) used fMRI to examine whether sentences expressing motion events modulate neural regions that are selective to visual properties. They focused on BOLD (blood-oxygen-level dependent) responses in primary motion-sensitive brain areas in human posterior lateral temporal cortex (PLTC) labeled MT+. In the study, MT+ areas were localized individually in each participant. Although the above-discussed study by Wallentin and colleagues (2005) found that processing fictive motion activated PLTC, those regions were localized anterior to the coordinates of the MT+ region and were not functionally mapped in the individual participants. Saygin, et al. (2010) designed the study to check specifically whether motion-related semantics modulates neural activity in individually localized MT+ regions in both hemispheres as participants were presented with sentences with or without motion event semantics, including fictive motion.

Three types of sentences were used for fMRI scanning: (1) actual motion sentences e.g. “I drove from Modesto to Fresno”, (2) fictive motion sentences, e.g. “The highway runs from Modesto to Fresno”, and (3) static sentences, e.g. “Modesto and Fresno are in California”. All three types contained similar number of words, similar syntactic structure, and the same or comparable content words.

Additionally, meaningless sentences resembling the experimental sentences in structure and content were used. Subjects were simply asked to press a button whenever they encountered a semantically anomalous sentence. The task was designed to keep subjects' attention to the meaning of the sentences without focusing specifically on the motion information. The sentences were presented using video clips of a native speaker of English uttering them in a randomized order.

The fMRI scanning showed that BOLD responses in the MT+ region were greatest for actual motion sentences. Fictive motion sentences activated MT+ to a lesser degree than actual motion sentences but more than static sentences. Moreover, while static sentences led to a decreased activity in MT+ in both hemispheres, fictive motion sentences led to a small decrease in activity only in the left hemisphere. Such responses were localized precisely to visual motion-sensitive areas as identified in individual subjects. Statistical testing showed that the increased activation in the right hemisphere for fictive motion sentences was significant.<sup>66</sup>

The finding that fictive motion sentences activate the MT+ region significantly more than static sentences, but evoke a smaller response than actual motion sentences, indicates that it is the degree of motion semantics expressed within the sentence as a whole that makes a significant contribution to the MT+ response, rather than the mere presence of motion verbs (see also Bergen, Lindsay, Matlock, & Narayanan, 2007). Saygin, et al. (2010) assume that the modulation of the MT+ area by fictive motion sentences may possibly reflect neural correlates of mental simulation in cognitive processing.<sup>67</sup> As an alternative explanation, they propose that the presence of motion verbs in the processing of fictive motion semantics

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<sup>66</sup> The finding that the response in the MT+ area by fictive motion was relatively (though not selectively) right lateralized in comparison to static sentences is consistent with the hypothesis that the right hemisphere is involved in figurative language processing (Coulson & Van Petten, 2007). A meta-analysis of fMRI studies on the role of the right hemisphere in metaphor comprehension conducted by Yang (2014) indicates that the right hemisphere only shows significant effects in metaphor processing when the meaning is novel, when it is presented in sentential context, and when the task involves some kind of semantic relatedness judgment. Saygin, et al., (2010) emphasize that the stimuli they used in the experiment were novel and unlikely to have been overlearned, which suggests that conventionalized uses of figurative language might be less likely to rely on embodied literal representations compared with novel uses (see also Aziz-Zadeh & Damasio, 2008).

<sup>67</sup> Saygin, et al. (2010) add that it is impossible to unambiguously answer the question whether these results simply reflect *visual imagery* (Ganis & Schendan, 2011; see Section 3.1). The subjects were presented with audiovisual stimuli, were not asked to visualize the sentences, were blind to the experimental hypotheses, and were focused on processing the sentences for anomalies in meaning, which suggests that any contribution imagery made to the neural responses was likely to be a component of language understanding. Yet, it is difficult to pinpoint precisely the contributions of imagery to language processing, especially when it is engaged automatically and unconsciously.

increases MT+ response, while the sentential semantics of a static scene inhibits it at the same time. Overall, the findings suggest that the neural substrates of linguistic semantics that are engaged in the processing of fictive motion include visual areas related to the represented semantics of actual motion, but to a lesser extent.

Cacciari, Bolognini, Senna, Pellicciari, Miniussi, & Papagno (2011) used TMS (Transcranial Magnetic Stimulation; see Rossini & Rossi, 2007 for an overview) to examine whether reading actual, metaphorical, idiomatic, and fictive motion sentences modulates the activity of the motor system. Both of the above-discussed fMRI studies (Saygin, et al., 2010; Wallentin, et al., 2005) indicated an involvement of motion-sensitive visual temporal cortex in the comprehension of fictive motion sentences, but did not demonstrate activation of primary motor and premotor areas in the brain. Cacciari, et al. (2011) assessed the impact of actual and non-actual motion sentences on motor excitability by measuring MEP (motor evoked potential) changes during TMS stimulation. The aim of the study was to clarify the role of motor area activation by comparing various ways in which a motion verb can be used in literal and non-literal ways.

The study was conducted with Italian speakers. Twenty seven verbs expressing movement were selected. For each of them four different types of sentences were created: (1) actual motion sentences, e.g. *The girl crosses the street full of traffic* [IT: *La ragazza attraversa la strada trafficata*]; (2) metaphorical sentences, e.g. *Luciano crosses many difficulties with bravery* [IT: *Luciano attraversa molte difficoltà con coraggio*]; (3) idiomatic sentences, in which the relationship between the constituent words and the meaning is arbitrary and learned as a single interpretive unit, e.g. *Paola crosses a bad quarter of hour* [IT: *Paola attraversa un brutto quarto d'ora*], which means in Italian that Paola is in troubles; and (4) fictive motion, e.g. *The path crosses the valley in blossom* [IT: *Il sentiero attraversa la valle fiorita*].

During the experiment, participants were presented with both experimental sentences (two for each sentence type) and control sentences with verbs of mental activity, e.g. *think*, *consider*, etc., which contained similar number of words and syntactic structure to the experimental ones. Participants were instructed to read for comprehension. Each sentence was divided into three segments: the subject noun phrase, the motion verb, and the complement. The participants were presented with each segment on a monitor, one at a time, and were asked to press a keyboard button as soon as they finished reading it. The sentences were presented in a randomized order. At the end of each sentence, the leg motor area in the left hemisphere was stimulated with single-pulse TMS. For each stimulation, motor evoked potentials were measured from the right leg muscles. The hypothesis behind the experiment was that if a particular sentence could modulate the excitability of the motor area, it should also modulate the size of MEP responses, which was used as an indicator of the involvement of the motor system.

The results showed that the strongest MEP response was obtained for actual motion sentences, followed by fictive motion, and metaphorical motion sentences. For idiomatic sentences, in which the original motion semantics is frequently lost, a significantly weaker response was recorded. The high motor excitability induced by fictive motion sentences, as demonstrated by the activation of the motor cortex, suggests that the motor component in fictive motion retains much of the characteristics of actual motion semantics.

A more recent fMRI study (Romero Lauro, Mattavelli, Papagno, & Tettamanti, 2013) has investigated whether the activation of the motor system is sensitive to the literal vs. figurative context of the motion verb, and whether the type of figurative sentence modulates the activity of the motor system. Besides actual motion sentences, the study compared three different types of figurative motion sentences: fictive, metaphorical, and idiomatic in a single experiment. The aim of the study was to clearly distinguish between these types of figurative motion expressions, similarly to what Cacciari, et al. (2011) did.

The study was conducted with Italian native speakers. Twenty one motion verbs were used to generate experimental sentences. Additionally, similar sentences with verbs of mental activity were included as a control condition. All sentences were balanced with respect to their length and frequency of content words. Each target sentence was associated with another either semantically congruent or semantically incongruent sentence used to monitor participants' processing of the semantic content in the experimental sentences. During the experiment the participants silently read the sentence pairs in a pseudo-randomized order and performed a semantic congruency task. Their reaction times were measured.

The fMRI scanning showed that, in addition to the previously found activation of motion sensitive visual areas (Saygin, et al., 2010; Wallentin, et al., 2005), fictive motion sentences were associated with activation of the premotor cortex. This activation was comparable to that for literal sentences, with both conditions eliciting higher effects on the same regions than metaphorical and idiomatic sentences. For metaphorical sentences the effect was less pronounced, and for idiomatic sentences it only approached the level of significance, as in the above-discussed TMS study (Cacciari, et al., 2011), which suggests that there is a substantial difference between idiomatic, metaphorical, and fictive motion sentences, with some motion involvement only in the latter two. The results suggest that the motion component of the verb is preserved in fictive motion sentences, and possibly metaphorical sentences, but to a significantly lesser extent in idiomatic sentences. Following this finding, Romero Lauro, et al. (2013, p. 369) hypothesize that "the more the motion verb loses its concrete meaning and acquires an "abstract" connotation, as is presented in a figurative context, the lesser the effect is found".

Moreover, a comparison of all three types of figurative sentences demonstrated that fictive motion activated also the left middle frontal gyrus, which Romero Lauro, et al. (2013) found more challenging to explain. They speculate that this activation may reflect the need for additional cognitive resources because of the presence of an inanimate agent that “conflicts” with the motion verb. This is additionally indicated by reaction times measured for fictive motion sentences, which were slower than for actual motion sentences (see also Tomczak & Ewert, 2015; see Section 3.2). Alternatively, it is plausible to presume that this area plays a monitoring role over the visual areas, which takes part in mental scanning.

The above-reviewed studies indicate that, at the sentence level, the comprehension of both actual and fictive motion activates identical motion-sensitive visual areas in the brain, though they are involved to a lesser extent for fictive motion. It appears to provide support for those linguistic models discussed in Chapter 2 that propose that this kind of spatial descriptions is motivated by some kind of subjectively induced motion, i.e. people mentally scan the path described with fictive motion. Additionally, more recent studies (Cacciari, et al., 2011; Romero Lauro, et al., 2013) demonstrate a specific recruitment of motor and premotor areas for fictive motion comprehension, though not as pronounced as for actual motion sentences. Taken together, the findings indicate that the neural activity underlying the processing of both actual and fictive motion sentences is, to some extent, overlapping. It suggests that fictive motion may be processed by creating a kind of mental simulation of the described action, as proposed by Matlock (2001, 2004a, 2004b, 2017).

However, Blomberg and Zlatev (2014) argue that the view of fictive motion as *mental simulation* (see Section 3.1) leads to over-simplification since it does not make clear what is actually simulated when processing sentences of this type. They point out that for the sentence “The highway crawls through the city” it could be any of the following cases:

- a. The subject’s imagined motion through the desert along a highway.
- b. The subject’s imagined motion of some external object, such as a car, along a highway.
- c. The motion of something animate such as a snake, which resembles a highway.
- d. The viewpoint of someone who is (merely) visually “scanning” a highway.

While each of these options corresponds to an experience related to actual motion, they include at least three different features of human consciousness: *imagination*, *enactive perception*, and *visual scanning*, which are quite distinct from one another. Therefore, instead of conflating them under the umbrella term of “mental simulation”, they should be considered as different possible motivations for fictive motion sentences (Blomberg & Zlatev, 2014, p. 399).

Another problem with the mental simulation approach is the risk of blurring boundaries between fictive and actual motion. The framework of embodied simulation assumes that comprehending fictive motion sentences involves some kind of implicit motion to be unconsciously simulated. However, comprehending actual motion sentences also requires the moving object to be imagined, unless it is perceived directly both by the speaker and the hearer during the speech act.

A third problem with the mental simulation view of fictive motion is that it does not delimit clearly enough between the unconscious mental processes, which are assumed to underlie the simulation processes in our brains in mental simulation theories, and the conscious imagination. In the studies that led to formulation of the simulationist explanation (Matlock, 2001, 2004a) participants were encouraged explicitly to imagine a spatial scene based on a narrative before their reaction times were measured. However, the role of that conscious imagery has not been made clear. Since there are considerable individual differences between speakers processing fictive motion sentences, imagination may contribute a significant factor in the cognitive processing of fictive motion sentences.

The factor of imagination appears to be particularly relevant to those fictive motion expressions, in which the motion verb conveys a particular manner of movement that can be figuratively mapped onto some specific property of the path, which is exemplified by the sentence provided by Matlock (2004b) “The footpath staggers from the bar to the outhouse”. It presents the figure as if it were moving in a specific way associated with the gait of an intoxicated person. This expression of fictive motion encodes the particular manner of movement in order to express the erratic, zigzagging characteristics of the path through the specific motion semantics (see also Brandt, 2009, pp. 584–585). In such cases, imagination can be viewed as a layer on top of the fictive motion experience.

In general, imagination can be regarded (metaphorically) as an “apex” of human consciousness, allowing unparalleled heights of intentionality and creativity. However, it is not the “ground” of meaning in general and, correspondingly, should not be regarded as the primary motivation for the use of non-actual motion sentences (Blomberg & Zlatev, 2014, p. 409).

This problem is examined further in Chapters 5 and 6, which explore, respectively, the use of directional and manner verbs in fictive motion expressions from the cognitive linguistic perspective based on data drawn from the British National Corpus. However, before proceeding with the analysis, a general introduction to the cognitive corpus-based linguistics is required, which is presented in the following chapter.

## Chapter 4

# Cognitive corpus-based linguistic approach to fictive motion

For a *large* class of cases of the employment of the word “meaning”—though not for *all*—this word can be explained in this way: the meaning of a word is its use in the language.

L. Wittgenstein (1953/2009), *Philosophical Investigations*, §43

## 4.1 Cognitive linguistics

This book approaches the phenomenon of fictive motion from the perspective of *cognitive corpus-based linguistics*, which relies on explanatory notions adopted by the *cognitive linguistic* framework, but approaches them in such a way that their relevance to a given linguistic phenomenon can be empirically validated in linguistic corpora (Heylen, Tummers, & Geeraerts, 2008, p. 92). As an approach to language study, this paradigm combines the descriptive framework of cognitive linguistics with the methodological workbench of corpus linguistics.

*Cognitive linguistics* is a relatively new but rapidly-developing discipline of language study. It emerged in the 1980s out of dissatisfaction with formal approaches to language study based on the principles of *Generative Grammar* (Chomsky, 1965) and *Formal Semantics* (Montague, 1974), which reigned in linguistics and language philosophy in the 1960s and 1970s (see Kalisz, 2001 for an analysis). As an approach to linguistic research, cognitive linguistics views language as inextricably linked to general cognitive strategies, thus, it seeks explanation of linguistic phenomena in terms of what is known about the mind from other cognitive disciplines. Moreover, cognitive linguistics assumes that meaning is an inseparable part of language. Consequently, it attempts to unravel correlations between form and meaning, rather than focus on either of these aspects independently of each other. At present, cognitive linguistics is among the most influential perspectives on the nature of language, the mind, and their mutual interaction taking into account both the bodily-kinesthetic and socio-cultural experience (Evans, 2012, 2017; Janda, 2015).

Since cognitive linguistics assumes that “language is governed by general cognitive principles, rather than by a special-purpose language module” (Croft & Cruse, 2004, p. i), studying language from this perspective provides insights into the structure and organization of thoughts and ideas, rather than organization of the linguistic structure alone (Pinker, 1994, 2007). As put by Evans (2017, p. 284), “If language is informed by cognition, then language can be deployed as a window on the mind”. It must be emphasized that cognitive linguistics is not a single, narrowly spelled out theory, but rather a broad conceptual framework of linguistic enquiry into the relationship between language and cognition. Cognitive linguistics proliferates through cooperation with other disciplines of cognitive science, including philosophy of mind, cognitive psychology, and brain studies (see Dancygier, 2017; Dąbrowska & Divjak, 2015; Geeraerts & Cuyckens, 2007 for collections of introductory reviews). It has spurred new interests in the study of language, cognition, and communication including such areas as *cognitive semiotics* (Zlatev, 2015), *cognitive stylistics* (Semino & Culpeper, 2002; Stockwell, 2016), and inspired, at least to a visible extent, *Cultural Linguistics* (Sharifian, 2017). For that reason, it is sometimes described in general terms as an “intellectual movement” (Langacker, 2002, p. i) or an “enterprise” (Evans & Green, 2006).

Cognitive linguists have developed a number of influential frameworks describing cognitive mechanisms reflected in language. These frameworks measure themselves against what is now known about workings of the mind from psychology, neuroscience, and other fields practiced in the interdisciplinary domain of *cognitive science* (Chipman, 2017; Frankish & Ramsey, 2012). Some of these frameworks focus more explicitly on the study of language structure and organization, which includes, for example, Goldberg’s (1995, 2006) Construction Grammar, Langacker’s (1987, 1991, 2008a) Cognitive Grammar, Talmy’s (2000a, 2000b) cognitive semantics, and the cognitive grammar of English (Dirven & Verspoor, 2004; Radden & Dirven, 2007). Other frameworks focus on language as a means for studying aspects of knowledge representation and meaning construction, which includes, for example, the Conceptual Metaphor Theory (Lakoff & Johnson, 1980, 1999; Lakoff, 1993), the mental spaces theory (Fauconnier, 1985/1994, 1997), and the conceptual integration theory (Fauconnier & Turner, 1998, 2002). Conceptual models of fictive motion proposed within these frameworks were discussed in Chapter 2 to provide the explanatory framework for the research presented in the following parts of this book.

What holds these cognitive linguistic frameworks together is a set of basic principles that serve as guiding assumptions for the study of language and cognition. Croft and Cruse (2004, pp. 1–4) enumerate three major hypotheses that are fundamental to cognitive linguistics. The first hypothesis assumes that *language is not an autonomous cognitive faculty*. It opposes the view that language is an

autonomous cognitive faculty or module of the brain separated from non-linguistic cognitive abilities (Hauser, Chomsky & Fitch, 2002).<sup>68</sup> Cognitive linguistics views the representation of linguistic knowledge as essentially the same as the representation of other conceptual structures. It assumes that “the organization and retrieval of linguistic knowledge is not significantly different from the organization and retrieval of other knowledge in the mind, and the cognitive abilities that we apply to speaking and understanding language are not significantly different from those applied to other cognitive tasks, such as visual perception, reasoning or motor activity” (Croft & Cruse, 2004, p. 2).

The second hypothesis assumes that *grammar reflects conceptualization*. It is opposed to *truth-conditional semantics* (Montague, 1974; see Cann, 1993 for a more recent introduction), which evaluates semantic metalanguage in terms of truth/false propositions relative to a pre-established model of the world that we agree to share. This thesis is generally grounded in Langacker’s (1987, 1991, 2008a) position that the conceptual structure cannot be reduced to a simple truth/false conditional correspondence with the world because language is used primarily to describe states of affairs in the world, which are thus central to the account of linguistic meaning. Cognitive linguistics assumes that an essential aspect of human cognitive capacity encapsulated in linguistic structures is the imaginative projection of embodied experience to be communicated (Clark, 2006; Evans & Green, 2006, pp. 455–458).

The third basic hypothesis of cognitive linguistics assumes that *knowledge of language emerges from language use*. It opposes reductionist tendencies of both generative grammar and truth-conditional semantics, which aim at maximally abstract and succinct representations of grammatical form and meaning (Croft & Cruse, 2004; Kardela, 2006b). While the traditional approach relegates idiosyncratic or anomalous patterns to the “periphery” of language use, cognitive linguistics assumes that they are as central in discourse processing, because “categories and structures in semantics, syntax, morphology and phonology are built up from our cognition of specific utterances on specific occasions of use” (Croft & Cruse, 2004, p. 4).

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<sup>68</sup> The view that language constitutes an autonomous module of mind that arises from a biologically based structure with a domain-specific learning mechanism was proposed by Chomsky (1965, 1975). His hypothesis of *fixed innate core* found supporters (e.g. Fodor, 1983), but at the same time generated a lot of controversy, especially among psychologists (e.g. Piaget, 1979). Under increasing criticisms, the original proposal has been subsequently updated and adjusted in its scope (Chomsky, 1986, 1995). The most recent, substantially modified version proposed with reference to insight from evolutionary biology, anthropology, psychology, and neuroscience (Hauser, Chomsky & Fitch, 2002) has also come under sharp criticism (Pinker & Jackendoff, 2005; see Fitch, Hauser & Chomsky, 2005 for a reply; see Jackendoff & Pinker, 2005, for counter-argumentation). This debate is still far from being settled (see Lewandowska-Tomaszczyk, 2008b for a review; Evans, 2014 for a recent contribution).

Analyzing subtle variations in the syntactic behavior and semantic interpretation allows for accommodating both general as well as highly idiosyncratic patterns of the linguistic behavior for a proper interpretation of the relationship between language and cognition.

Evans (2012, 2017) provides a broader set of central theses guiding cognitive linguistic studies. Besides the above-discussed hypotheses, he puts a strong emphasis on an *embodied* perspective on human cognition, which holds that human conceptions are based on multimodal representations that emerge from our embodied experience in the world (Foglia & Wilson, 2013; Gibbs, 2005; Lakoff & Johnson, 1999; Stocker, 2015; Wilson, 2002). Another basic premise distinguished by Evans (2012, 2017) is the thesis of *encyclopedic semantics*, which assumes that semantic representations in the linguistic system are closely tied to representations in the conceptual system constituting a vast network of structured knowledge that is encyclopedic in its nature and scope (Haiman, 1980; see also Evans, 2009; Kardela, 2006b). Moreover, the *symbolic thesis* holds that our mental grammar comprises of units consisting of pairings of form and meaning (see *symbolic assemblies* in Langacker, 2008a; *constructions* in Goldberg, 1995, 2003, 2006), which range from morphemes to sentence-level structures (Goldberg & Suttle, 2010; Hoffmann & Trousdale, 2013, Part III). Cognitive linguistics posits a *lexicon-grammar continuum*, which holds that the study of grammar includes the full spectrum of units that make up a language, from the lexical to the grammatical.

Since cognitive linguistics assumes that examination of the linguistic structure draws on and, at the same time, contributes evidence about human cognition, it is a framework which strongly interacts with other disciplines of cognitive science, such as anthropology, philosophy, psychology, cognitive neuroscience, and artificial intelligence. Evans (2012) argues that what makes cognitive linguistics additionally distinctive in the contemporary study of language is the specific *cognitive linguistic worldview*, which embraces the following basic dimensions: 1) language reflects conceptual organization; 2) language is a lens on the mind; 3) language provides a mechanism for construal; 4) language influences non-linguistic cognition; 5) humans have a common conceptualizing capacity.

Evans (2012) notes that in the course of its development cognitive linguistics had to cope with various fundamental issues, some of which have still remained unresolved. One, for example, relates to the nature of concepts, more specifically to the difference between linguistic versus conceptual meaning, which has been debated over many years without reaching a satisfactory conclusion (see Fodor, 2008 for a compelling, albeit not entirely impartial review of the debate). Another concern that has been voiced in the cognitive linguistics community relates to an increased awareness of some essential methodological issues (e.g. Geeraerts, 2006; Grondelaers, Geeraerts, & Speelman, 2007; Heylen, Tummers, & Geeraerts, 2008).

As summarized by Heylen, Tummers and Geeraerts (2008, pp. 91–92), “More and more researchers feel that traditional methods of linguistic enquiry, relying mainly on introspective analysis, are not sufficient for the study of cognitive grammar or conceptualization processes”.

It seems that such concerns are not totally unjustified. In general reasoning, intuitive judgments often lead to heuristics and biases (Kahneman, 2011; Kahneman, Slovic, & Tversky, 1982; Tversky & Kahneman, 1974). Similarly in linguistics, some aspects of language are generally perceived, while others have to be computed to be evaluated properly. As emphasized by Sinclair (1991, p. 4), “human intuition about language is highly specific, and not at all a good guide to what actually happens when the same people actually use the language”. A number of scholars have been postulating that cognitive linguistics should put a stronger emphasis on applications of empirical data derived from corpora (e.g. Grondelaers, Geeraerts & Speelman, 2007; Gries, 2012; Gries & Divjak, 2010). They emphasize that since the usage-based approach to language study is among the central theses of cognitive linguistics, the use of natural language samples brings important advantages to the cognitive linguistic research.

The benefits of corpus-based evidence in the cognitive linguistic investigations have been already demonstrated in a number of studies (e.g. Deignan, 2005; Fabiszak, 2008; Glynn & Fischer, 2010; Glynn & Robinson, 2014; Gries & Stefanowitsch, 2006; Lewandowska-Tomaszczyk & Dziwirek, 2009; Trojszczak, 2016; see Gries, 2017 for a review). The application of corpora in cognitive linguistic research makes observations more inter-subjective and allows one to accept results with a greater confidence (Fabiszak & Konat, 2013). Gries (2012, 2017) views corpus linguistics as a crucial element of the modern cognitively-inspired language investigations. He does not, however, favor using corpora as the sole source of evidence in linguistics, but advocates reciprocal exchanges among corpus linguistics, cognitive linguistics, and psycholinguistics (see also McEnery & Hardie, 2012, Ch. 8).

## 4.2 Corpus linguistics

Corpus linguistics emerged as a separate field of study in 1980s, when it achieved an important position as a methodology unveiling new horizons in linguistics (McEnery & Hardie, 2013; McEnery & Wilson, 2001, Ch. 1). It 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 & Hardie, 2012, p. i). Some researchers (e.g. Stubbs, 1993; Tognini-Bonelli, 2001; Teubert, 2005) view corpus linguistics as a theoretical approach or at least an important concept in linguistic theory, while others (e.g. McEnery & Wilson, 2001) see it as a methodological

approach to language studies. As emphasized by Biber and Reppen (2015, p. 2) a lot of linguists agree that corpus linguistics is more than just a methodology, “because the analytical innovations of this approach have enabled researchers to ask fundamentally different kinds of research questions, sometimes resulting in radically different perspectives on language variation and use from those taken in previous research”. What has been generally agreed (Biber & Reppen, 2015; Gries, 2009; McEnery & Hardie, 2012; Teubert, 2005) is that the object of study in corpus linguistics is real language data, which makes it an empirical science.

The empirical approach to language study is among the greatest benefits of corpus applications in linguistic inquiry. “Empirical data enable the linguist to make statements which are objective and based on language as it really is rather than statements which are subjective and based upon the individual’s own internalized cognitive perception of the language” (McEnery & Wilson, 2001, p. 103). Thus, the principal advantage brought by the use of corpora to linguistic studies is objectivity and verifiability of results (McEnery & Hardie, 2012; see also Geeraerts, 2006, 2010). Moreover, the methodology of corpus linguistics is not restricted to any specific area of language study or any particular aspect of language use (see Biber & Reppen, 2015 for a collection of reviews on corpus investigations of language variation and use).

Another important asset that the corpus linguistics brings to language research is providing access to statistics on the *frequency of language patterns*. Sinclair (1991, 2004) points out that systematic examination of linguistic corpora is the only reliable source of evidence about this language feature, because it is unavailable through introspection. He emphasizes that verifiable data on the frequency of different language items provide linguistic evidence with unprecedented quality. Apart from analyzing frequencies, probably the most common way of using corpora in language studies is through a *concordance* analysis (Sinclair, 2003b; Waliński, 2005; Wynne, 2008). A concordance is an index to the places in a corpus where a particular *search item* (word or phrase) occurs. In modern computer software it is typically presented in the KWIC (Key Word In Context) format, in which the search item is shown in the center with a certain amount of context visible on left and right.

Reading concordances requires certain skill (Sinclair, 2003b), but is profoundly revealing for identification of *semantic prosody*, in which a word occurs primarily in a positive or negative context (Lewandowska-Tomaszczyk, 1996; Louw, 1993; Louw & Milojkovic, 2014; Stewart, 2010; Stubbs, 1995), as well as other aspects of language use that notoriously escape intuition. Such relatively unsophisticated corpus linguistic techniques yield facts about language use that might otherwise remain hidden. As summarized by Fillmore (1992):

I have two main observations to make. The first is that I don't think there can be any corpora, however large, that contain information about all of the areas of English lexicon and grammar that I want to explore; all that I have seen are inadequate. The second observation is that every corpus that I've had a chance to examine, however small, has taught me facts that I couldn't imagine finding out about in any other way (Fillmore, 1992, p. 35).

A conclusion that emerges from these studies is that the rational-introspective linguistics and the empirical-corpus linguistics need each other.

Deignan (2005, 2008) offers excellent examples of non-quantitative corpus-based cognitive semantic analyses of metaphorically used words that have contributed developments to understanding of metaphor. Another, more recent example of this approach to the cognitive semantic analysis of conceptual metaphors comes from Trojszczak (2016). Moreover, corpus data can be analyzed statistically to estimate statistical significance of results, detect patterns in data, or identify multiple senses of words, etc. (Gries, 2015; see Brezina, 2018; Desagulier, 2017; Gries, 2013 for comprehensive guides to statistics in corpus linguistic studies).

There is a certain lack of clarity in the application of the terms “corpus-based” and “corpus-driven” linguistics with reference to the conceptual split of the field introduced by Tognini-Bonelli (2001):

[T]he term corpus-based is used to refer to a methodology that avails itself of the corpus mainly to expound, test or exemplify theories and descriptions that were formulated before large corpora become available to inform language study... (Tognini-Bonelli, 2001, pp. 65–66) ... [I]n a corpus-driven approach the commitment of the linguist is to the integrity of the data as a whole, and descriptions aim to be comprehensive with respect to corpus evidence. The corpus, therefore, is seen as more than a repository of examples to back pre-existing theories or a probabilistic extension to an already well-defined system. The theoretical statements are fully consistent with, and reflect directly, the evidence provided by the corpus... (Tognini-Bonelli, 2001, pp. 84–85).

As pointed out by McEney and Hardie (2012, pp. 150–151), this distinction is rather fluid in practice.

A corpus-based researcher may apply a scheme based upon a pre-existing theory but then, when the scheme is applied to data and is found to be deficient, goes on to refine the scheme in what could be termed a corpus-driven fashion. Such a process may be cyclical, as has been well understood by linguists in general and computational linguists in particular for some time. (McEney & Hardie, 2012, p. 150).

Some authors, who object to the *corpus-based/corpus-driven* distinction, use the term “corpus-based” in the broad sense that encompasses both approaches distinguished by Tognini-Bonelli (McEney, Xiao & Tono, 2006, pp. 8–11).

In this book, the term *corpus-based* is used consistently to refer to semantic studies based on corpora, which would probably be labeled by other authors as “corpus-driven” (cf. Glynn, 2010). Here, the term *corpus-based* is distinguished in opposition to *corpus-illustrated* approach, following the distinction made by Tummers, Heylen and Geeraerts (2005).

### 4.3 Corpus-based cognitive semantics

Cognitive semantics is a subfield of cognitive linguistics concerned with “investigating the relationship between experience, the conceptual system and the semantic structure encoded by language” (Evans & Green, 2006, p. 48). Glynn (2010) discusses the complexity of this holistic approach to meaning, which entails that everything the speaker knows about the world is relevant to description of meaning. The broad definition of cognitive semantics implies that it is essentially a usage-based model rather than a hypothetical “ideal” model of linguistic meanings. Glynn (2010) emphasizes that the usage-based approach to semantics means that the idea of *grammaticality* is being replaced with that of *entrenchment* proposed by Langacker (1987, 2008a, 2014).

Every use of a structure has a positive impact on its degree of entrenchment, where [...] disuse has a negative impact. [...] Moreover, units are variably entrenched depending on the frequency of their occurrence [...] The absence of a sharp division between units and non-units has the consequence that the scope of a grammar is not precisely delimited. (Langacker, 1987, pp. 59–60).

More recently, Langacker elaborates on the usage-based approach to meaning in the following manner:

Meanings (like other linguistic structures) are recognized as part of a language only to the extent that they are (i) entrenched in the minds of individual speakers and (ii) conventional for members of a speech community. Only a limited array of senses satisfy these criteria and qualify as established *linguistic units*. But since entrenchment and conventionalization are inherently matters of degree, there is no discrete boundary between senses which have and which lack the status of established units. We find instead a gradation leading from novel interpretations, through incipient senses, to established linguistic meanings (Langacker, 2008a, p. 38).

Glynn (2010) argues that although Langacker’s idea of entrenchment is primarily concerned with the status of a linguistic unit, it can be extended to substitute for the notion of *grammatical correctness*, where the principle of frequency of use for the individual is replaced with that of frequency of occurrence in the community. Since entrenchment varies from individual to individual, grammatical rules are rather generalizations about language usage, and the basis of linguistic research is real language use in all its complexity.

From this perspective, making hypotheses about meaning should be based on a sample of language usage, rather than individual subjective competence of a particular linguist (see Bybee, 2006, 2010). In the early days of cognitive linguistics that “sample” was usually very small, and typically based on observations of the linguist discussed with some of his/her colleagues. This contributed to criticisms of cognitive semantic studies as being largely based on subjective introspective judgments of individual researchers, rather than empirically sound methodology (see Sandra & Rice, 1995).

Nevertheless, there are cognitive linguists who argue that introspection<sup>69</sup> should be the central method in this domain of research. For instance, Talmy (2000a, pp. 4–6, 2007a) argues that cognitive semantics is a branch of phenomenology, where the content and structure of consciousness is best studied by introspection. He states explicitly that corpus research “cannot directly yield many abstract linguistic patterns” (Talmy, 2007a, p. xix). Glynn (2010) addresses this reservation by pointing out that, despite limitations, the patterns of natural language usage observed through language corpora produce a clear picture of language structure, which provides a rich source for working out how people use language.

Semanticians working with corpora try to reconcile phenomenological and empirical approaches to the cognitive linguistic research by emphasizing that the empirical approach is not meant to replace introspection. It is rather that introspection serves to propose hypotheses, which then can be analyzed in empirical studies designed to adequately attest such proposals (Geeraerts, 2010; Gries & Divjak, 2010; Grondelaers, Geeraerts, & Speelman, 2007). From this outlook, the application of corpus data drawn from actual usage is not only permissible, but outright necessary in cognitive semantic studies. Geeraerts (2010) explicitly states that introspection plays a crucial role as the first step in the research cycle, but is not sufficient for a true advancement of the domain. Gries and Divjak (2010) see an important advantage of corpus-based approaches to semantics in restraining slapdash models that do not find support in corpus data and statistical significance. They warn, however, against a tendency to believe that corpus-based semantic studies are automatically more objective than traditional methods, since in the study of semantics the choices involved in the interpretation of empirical language data still remain largely subjective.

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<sup>69</sup> Engelbert and Carruthers (2010) address two main questions about the role of introspection in cognitive science: whether it exists, and whether it is a reliable source of self-knowledge. They point out that most philosophers have assumed that the answers to both questions are positive, whereas an increasing number of cognitive scientists take the view that introspection is either non-existent or at least unreliable. Their review of different models of self-knowledge indicates both the existence and reliability of introspection.

Perhaps the greatest concern about application of corpora in cognitive semantics stems from the question: “How can meaning, the most qualitative of all linguistic features, be expressed in numbers, and more broadly, how could meaning, the most ephemeral and subjective of all linguistic phenomena, be tackled with methods that aim at objectivity?” (Geeraerts, 2010, p. 64). Fischer (2010) addresses this question by pointing out that cognitive semantics involves four different aspects of meaning: *conceptualization*, *usage*, *world knowledge*, and *reference*. They interact with one another in immensely complex and inseparable ways. These aspects of meaning lend themselves to examination with quantitative methodologies to different degrees. While *conceptualization* is impervious to direct scientific probing, what can be investigated with collections of natural language samples included in corpora, at least to some degree, is *usage* (see papers in Glynn & Fischer, 2010; Glynn & Robinson, 2014). This study demonstrates an application of this approach by examining the use of verbs in structuring fictive motion in the linguistic practice of English speakers from the perspective of corpus data.

#### 4.4 Corpora in linguistic studies

In modern linguistics, the term *linguistic corpus* generally designates a large collection of texts, usually stored in a machine readable form, collected according to specific criteria in order to represent a particular variety or use of language (Davies, 2015; McEnery & Hardie, 2012; Sinclair, 2005). A linguistic corpus is assumed to have certain characteristics that distinguish it from a mere collection of texts. Although different authors define the minimum conditions for the linguistic corpus somewhat differently (e.g. Sinclair, 1996 vs. McEnery & Wilson, 2001), they depend to a great extent on a particular corpus design and intended applications.

Davies (2015, pp. 11–12) lists the following types of corpora and corpus resources that are approximately representative of currently available general classes of corpora.

1. Small 1–5 million word, first-generation corpora like the Brown Corpus (Kučera & Francis, 1967).
2. Moderately sized, second-generation, genre-balanced corpora, such as the 100 million word British National Corpus (Burnard, 2000).
3. Larger, more up-to-date (but still genre-balanced) corpora, such as the 450 million word Corpus of Contemporary American English (Davies, 2009).
4. Large text archives, such as *Lexis-Nexis*.
5. Extremely large text archives, such as *Google Books*.
6. The Web as corpus, seen through the lens of Google searches.
7. The web-based corpora available through *Sketch Engine*.
8. An advanced interface to *Google Books* (available at: [googlebooks.byu.edu](http://googlebooks.byu.edu)).

He discusses how well these types of corpora provide data for researching various lexical, morphological, syntactic, and semantic linguistic phenomena, considering the quantity and quality of the data in relation to the corpus size, architecture, and interface.

Among various types of corpora discussed in the literature (Biber & Reppen, 2015; McEnery & Hardie, 2012; McEnery & Wilson, 2001; Sinclair, 1996; Waliński, 2005) one that is particularly relevant to this study is *reference corpus*, i.e. one that is designed to provide comprehensive information about a language. Although in reality no corpus can ever hope to be representative of a language (Biber, Conrad & Reppen, 1998, Part IV; Fillmore, 1992; McEnery & Wilson, 2001, pp. 77–78), reference corpora attempt to provide users with as much of a complete picture of the language as possible. To that end, the reference corpus collects a large number of overlapping language varieties, which share the bulk of their respective vocabularies and syntactic rules, but are differentiated by specific vocabulary items and individual phraseology. Moreover, it includes a maximum number of such linguistic features as formality, preparedness, and broad subject-matter.

The reference corpus follows a model of balance and representativeness, which defines a number of parameters for the inclusion of as many sociolinguistic variables as possible, and prescribes the proportions of each selected text type (Biber, Conrad, & Reppen, 1998; Sinclair, 1996, 2005; see Burnard, 2000 for a reference guide to the British National Corpus). Typical procedures used for achieving maximum representativeness in the compilation of reference corpora include the application of *sampling frame*, i.e. the boundaries of language variety in question, and *stratification*, i.e. a hierarchical structure of corpus texts in terms of genres and channels of communication (Biber, 1993). These parameters are executed through *probabilistic sampling procedures*, which are augmented with an array of *statistical measures* that ensure maximal degree of representativeness of the corpus for a linguistic variety. Biber (1993) adds that the actual construction of a representative corpus proceeds in cycles implementing *pilot-study analyses* at subsequent stages of compilation to monitor outcomes at staging posts, and implement necessary revisions in the structure on the way towards the final product.

Another important aspect of corpus compilation procedures involves enhancing basic linguistic content of the corpus with *annotation*, which can be essentially defined as “the practice of adding interpretative linguistic information to a corpus” (Leech, 2005, p. 17). Annotation also refers to the end-product of this process, thus an *annotated corpus* is one that is enhanced with various types of additional information that increases its usefulness for research. At the linguistic level, one common type of corpus annotation is *part-of-speech tagging* (POS tagging), which involves addition of tags indicating the part of speech to words in the corpus. Apart from POS tagging, there are other types of annotation

corresponding to different levels of linguistic analysis of texts, e.g. phonetic annotation, semantic annotation, pragmatic annotation, etc. (see Garside, Leech & McEnery, 1997; Gries & Berez, 2017 for reviews). Corpus annotation extends considerably the range of research questions that a corpus can readily address.

However, some researchers, most notably John Sinclair (2003a, 2004, pp. 190–191), would rather not engage in corpus annotation. Sinclair’s principle to “trust the text” is based on the awareness that grouping lexical forms into lemmas and part-of-speech categories can hide semantic patterns. If natural language data are annotated with categories derived from non-corpus studies, we are likely to pay attention to those pre-established categories, instead of original patterns, which effectuates in a methodological vicious circle. Moreover, annotated information is always suspect, since it reflects preferences, or even errors, of annotators. Therefore, it is the pure text that should be the primary focus of linguistic investigation.

#### 4.5 Corpus linguistic workbench

The next two chapters of this book employ a basic corpus linguistic workbench to examine the use of motion verbs in coextension path expressions. The problem of *corpus-based* versus *introspection-based* approaches to linguistic study have been debated ever since Noam Chomsky questioned the relevance of collecting corpus evidence for linguistic analysis as inadequate for reflecting any more than a fraction of the infinite nature of language:

Any natural corpus will be skewed. Some sentences won’t occur because they are obvious, others because they are false, still others because they are impolite. The corpus, if natural, will be so widely skewed that the description would be no more than a mere list. (Chomsky, 1962, p. 159 cited in McEnery & Wilson, 2001, p. 10)

Since that time it has been demonstrated, however, that corpora reveal facts about language that go unnoticed by native speakers (Biber & Reppen, 2015; McEnery & Wilson, 2001; Sinclair, 1991, 2004). For instance, McEnery and Wilson (2001, p. 11) demonstrate that Chomsky’s intuition that the verb *perform* cannot have a mass-noun object is not entirely right. According to Chomsky, in the interaction with Hill (1962, p. 29), “one can *perform a task* but one cannot *perform labour*”. However, examples found in the British National Corpus show that one can “perform magic”, and numerous examples of the exact phrase “perform labor” can be easily found nowadays using a web-search engine, especially with respect to the work of prisoners of war compelled to perform forced labor.

Moreover, corpus data allow for *testing hypotheses* in an objectively verifiable way. For example, to compare the language use patterns for words *run* and *jog* (cf. Taylor, 1996), one needs to know how many times each word occurs in the corpus, how many different words form collocations with each of these verbs, etc.

The frequency data retrieved from corpora can additionally be verified through a *concordance analysis*<sup>70</sup> to exclude matches resulting from coincidental sharing of linguistic patterns with other types of expressions. Such data are easily accessible from corpora, which enables us to investigate how speakers actually *use* language in natural contexts, rather than study what is theoretically possible in language (Biber, Conrad & Reppen, 1998, pp. 3–11).

For the corpus-based examination of verbs in fictive motion expressions, this study employs the *British National Corpus*, which is a flagship example of the reference corpus for English. Additionally, identification of synonyms and near-synonyms for verbs to be examined in the study was executed with the aid of the Princeton *WordNet* (Fellbaum, 1998, 2017) and *VerbNet* (Palmer, Bonial, & Hwang, 2017), which are discussed in separate sections below.

#### 4.5.1 The British National Corpus

The British National Corpus (henceforth, the BNC) is a 100 million word collection of samples of both spoken and written British English from a wide range of sources. The written part of the corpus (90%) includes extracts from a wide selection of regional and national publications, including specialist periodicals and journals for all ages and interests, popular fiction, academic books, unpublished informal communication, and many other kinds of text. The spoken part (10%) consists of orthographic transcriptions of impromptu, informal conversations collected in a demographically balanced way, as well as other spoken language samples collected in a variety of contexts. The texts are not limited to any particular subject field, genre or register (Aston & Burnard, 1998; Burnard, 2000; see [www.natcorp.ox.ac.uk](http://www.natcorp.ox.ac.uk) for more information). Although originally planned as fully representative and balanced, the BNC does not entirely meet this plan. It is because natural languages are primarily spoken, but 90% of the BNC consists of written texts. However, as pointed out by Biber (1993), the linguistic representativeness is more important than the representativeness of the spoken/written mode. Moreover, in many cases a salient written expression is likely to have a bigger impact on speakers' linguistic systems than a stream of words spoken in conversation.

When it was first published in the mid-1990s the BNC was considered a very big corpus because it consisted of 100 million words. However, when compared to the Corpus of Contemporary American English (currently over 560 million words), Sketch Engine's enTenTen corpus (currently about 15 billion words), or the Bank of

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<sup>70</sup> It is noteworthy that Sinclair (1991, 2003b) views *concordancing* as being superior to any other method in corpus linguistics, since "it not only brings reliable data, but what is more, frequently uncovers unexpected facts about language" (Sinclair, 1991, p. 42; see also Stubbs, 1995).

English (about 45 billion words), the BNC seems relatively small nowadays. Nevertheless, the reason behind picking this corpus for the investigation of fictive motion expressions is twofold. First, this is probably the most famous reference corpus for English used by numerous researchers in a multitude of studies and widely regarded as the standard reference for English. As emphasized by McEnery and Wilson (2001, p. 32), an essential aspect of the linguistic corpus is the principle of *standard reference* for the language variety it represents, which presupposes wide availability of the corpus to other researchers, who can attest, verify, and expand studies based on its linguistic contents. It also means that the corpus is *finite*,<sup>71</sup> i.e. no more texts are added to it after its final compilation. Because of the wide availability and the stability of corpus data, any variation between this study and other studies may result from the methodology contained in research, but not from differences in the linguistic data under examination. Second, the use of fictive motion is a stable linguistic phenomenon, therefore there is no need to worry about its underrepresentation in the corpus that is relatively old. The corpus was accessed via the *SlopeQ for the BNC*, which is a search engine for the British National Corpus data with a convenient web-interface (see Waliński & Pezik, 2007) available as a part of resources provided by the Clarin project (see Pezik, 2015 for more information).

#### 4.5.2 WordNet

Besides the BNC, the research discussed in this book employs Princeton's *WordNet*. As discussed by Fellbaum (1998, 2006, 2017), the idea of WordNet as a large lexical database of English was conceived at Princeton University in 1986. WordNet was conceived as a model of the structure of the human mental lexicon. It was originally intended to test theories of human semantic memory in the field of Artificial Intelligence (see Miller, 1995; Miller & Fellbaum, 2007). Essentially, WordNet is a semantic network linking words and groups of words by means of conceptual-semantic and lexical relations. The basic building blocks of WordNet are sets of cognitive *synonyms* (called "synsets"), each expressing a distinct concept. Each synset contains a brief definition and, typically, one or more

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<sup>71</sup> The idea of a constantly changing *monitor corpus* has been introduced by Sinclair (1996), who views the assumption of a finite limit of a corpus size as an unnecessary restriction. Although the monitor corpus also has a relatively steady balance of components, over time new data are constantly added to it in order to monitor ongoing changes in language. It is particularly useful for lexicography, since it allows for identification of new words, tracking changes in lexical meaning, and movements in word usage. See Davies, 2010 for a discussion about the Corpus of Contemporary American English (COCA) as the first reliable monitor corpus of English.

sentences illustrating the basic usage.<sup>72</sup> The resulting network of related words and concepts can be explored with a web-browser using the online version at: [wordnetweb.princeton.edu/perl/webwn](http://wordnetweb.princeton.edu/perl/webwn) or downloaded free of charge for offline use.

WordNet consists of four separate components, each containing synsets for words from the major open syntactic categories: nouns, verbs, adjectives, and adverbs. Although each member of a given synset essentially relates to the same concept, they are not necessarily interchangeable in all possible contexts, e.g. *hit* and *strike*, or *big* and *large*, etc. Membership of words in a given synset illustrates the phenomenon of *synonymy*. Membership of a word in multiple synsets illustrates the phenomenon of *polysemy*. For example, the word *trunk* appears in WordNet in synsets referring to {trunk, tree trunk}, {trunk, torso}, and {trunk, proboscis}.

Since WordNet groups words together based on their meanings, at first glance it resembles a thesaurus. It is, however, a much more sophisticated tool, which links not just word forms, but also specific senses of words. It explicitly distinguishes and labels lexical semantic relations, whereas the groupings of words in a thesaurus follow only meaning similarity. As a result, words found in close proximity to one another in the network are semantically disambiguated. In WordNet, verb synsets are arranged into hierarchies that express increasingly specific manners characterizing an event. The manners are elaborated along several different dimensions, which include, for instance, *speed* {move}-{run}-{jog}, *medium* {move}-{swim} or *intensity* {like}-{love}-{idolize}. Additional links among verbs encode the *necessary entailment* of different events. For instance, {listen} entails {hear}, because when someone listens to a sound they necessarily hear the sound. Another kind of entailment holds among events that follow a *temporal order*, such as {succeed} and {try} (to succeed). *Causation* is expressed between pairs like {give} and {have}. Other relations marked in WordNet include *backward entailment*, e.g. {divorce}-{marry} and *presupposition*, e.g. {buy}-{pay}. In each case, the entailment is unidirectional: the event expressed by the first verb necessarily entails that expressed by the second verb, but not the other way round (Fellbaum, 1990, 1999, 2017).

Although WordNet's focus has shifted from its psycholinguistic origins, its design is still regarded as a valid approach to representing the meanings of words. Princeton WordNet version 3.0, released in December 2006, contains 117,000 synsets, comprising more than 81,000 noun synsets, 13,600 verb synsets, 19,000 adjective synsets, and 3,600 adverb synsets (Fellbaum, 2017; see [wordnet.princeton.edu](http://wordnet.princeton.edu) for more information).<sup>73</sup>

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<sup>72</sup> As noted by Fellbaum (2006), because in 1986 digital corpora were not widely available, the contents of Princeton WordNet were derived largely from its creators' intuitions. Subsequently, illustrative sentences have been added to it from web data.

<sup>73</sup> A wordnet for Polish has been developed at Wrocław University of Technology. The creators of *plWordNet* dismissed the idea of translating indiscriminate mapping of

### 4.5.3 VerbNet

VerbNet is a comprehensive lexicon of English verbs developed at University of Colorado on the basis of Levin's (1993) proposal of English verb classes and alternations. Levin's classification divides 3,024 verbs (4,186 senses) into 192 classes according to their participation in 79 syntactic patterns. A given verb's class membership is determined by its compatibility with certain syntactic alternations. Although the primary basis of the classification is syntactic, the verbs of a given class share semantic properties, too. A fundamental thesis in Levin's proposal assumes that the syntactic frames of a particular verb are a reflection of the underlying semantics, i.e. that the syntactic behavior of a verb is largely determined by its meaning. However, the specific relationship between syntax and semantics is left implicit. VerbNet identifies syntactic patterns and semantic roles "characteristic of the verbs in each class and makes explicit the connections between the syntactic patterns and the underlying semantic relations that can be inferred for all members of the class" (Palmer, Bonial, & Hwang, 2017, p. 317).

In VerbNet, the classes of verb are organized with respect to both the syntactic and semantic behavior. Essentially, it expands on Levin's proposal by making the syntactic-semantic relationship more explicit through the assignment of *thematic roles* (Carlson, 1984; Fillmore, 1968; Gruber, 1976; Jackendoff, 1972) to each syntactic argument in a given verb class in order to specify the semantic relation between a predicate and each of its arguments. Moreover, VerbNet also includes *semantic predicates*, such as *motion*, *contact*, or *cause*, which denote relations between participants and events as basic semantic concepts (Kipper, Korhonen, Ryant, & Palmer, 2008). Recently, the thematic roles in VerbNet have been more explicitly re-defined, updated for consistency across classes, and situated in a thematic role hierarchy that specifies the relations between thematic roles. Moreover, the semantic predicates are also being re-evaluated and updated to improve their consistency across classes, making it easier to use VerbNet for a variety of applications. Additionally, efforts are taken to empirically validate the syntactic behavior of verbs outlined in VerbNet against actual usage across a variety of language corpora (Palmer, Bonial, & Hwang, 2017).

The classes of verbs in VerbNet are organized hierarchically and numbered. Classes with shared class numbers have certain common semantic and syntactic properties. Each individual class may include one or more subclasses. Each subclass inherits information from its parent class, including compatibility with the parent

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Princeton WordNet into Polish, and instead decided to build the Polish wordnet from scratch by first developing the synsets and their language-internal relations, and only later generating equivalence relations to Princeton WordNet (see Piasecki, Broda, & Szpakowicz, 2009 for more information).

class' syntactic frames, thematic roles, and semantic and syntactic restrictions. Moreover, the subclass adds information about additional syntactic frames, thematic roles, or restrictions. Verb members of a subclass are thus compatible with all the behavioral patterns of the parent class and, at the same time, are compatible with some additional frames or thematic role information of their subclass. The hierarchical nature of each class allows for refinement of the information about verb behavior in Levin's classification, where generalizations typically applied to "most verbs". Levin's original classes comprise most of the classes currently found in VerbNet numbered 9.1 from to 57. These numbers stem from the original section numbers indicating the verbs classes in Levin (1993) work.

Currently, VerbNet classes are numbered as high as 109.1. Classes 58–109.1 were added in several iterations of VerbNet's expansion (Kipper, et al., 2008; see Palmer, Bonial, & Hwang, 2017 for a review). Verbs of Motion are included in the Class 51 of VerbNet, which includes 10 subclasses: 51.1 escape verbs, 51.2 leave verbs, 51.3.1 roll verbs, 51.3.2 run verbs, 51.4.1 vehicle verbs, 51.4.2 non-vehicle verbs, 51.5 waltz verbs, 51.6 chase verbs, 51.7 accompany verbs, and 51.8 reach verbs. Hwang, Palmer, and Zaenen (2013) evaluate the current status of representation of motion paths in VerbNet. They conclude that currently VerbNet does not offer a consistent way of handling the path of motion required for representing change of location. However, by identifying and classifying the existing path phrases, they suggest a more explicit and semantically informed representation of paths with respect to verbs expressing change of location.

VerbNet is also used to investigate creative uses of motion verbs (Hwang & Palmer, 2015), such as the *caused-motion construction*, e.g. "Kate blinked the snow off her eyelashes" (Goldberg, 1995, 2006, 2013; cf. Kay, 2005, 2013; see also Waliński, 2016b). VerbNet version 3.2, released in March 2014, includes about 4,500 verb lemmas, 8,537 verb senses, 273 main verb classes, and 214 subclasses. The unified verb index for the system is available at [verbs.colorado.edu/verb-index/](http://verbs.colorado.edu/verb-index/).

#### 4.6 Retrieving fictive motion expressions from corpora

Because at the syntactic level fictive motion expressions are practically indistinguishable from actual motion expressions, they are problematic to pick out selectively from corpora. For this reason, the examination of verbal semantics in coextension paths was implemented with a procedure that involves looking for landmarks that can potentially feature in coextension paths in combination with motion verbs.

Selecting suitable landmarks followed observations that coextension paths usually describe elongated or spatially extended objects (Langacker, 2005; Matlock, 2004b). Even if the object is not inherently long, it should have at least the option of

spatial extension. For instance, the sentence “The table goes from the kitchen wall to the door” inclines us to conceptualize a long and narrow table, probably oval or rectangular, rather than a small round coffee table (Matlock, 2004b, p. 227). Starting with a few prototypical objects, such as “road”, “wire”, “fence”, “coast”, etc., WordNet was consulted to find hyperonyms, hyponyms, and other sister terms in order to identify spatially extended entities that are potentially fit for descriptions with fictive motion. For the purpose of the present study the following four categories of landmarks were distinguished:

(1) *Travelable paths*: “alley, artery, avenue, boulevard, bridge, flyover, footpath, highway, lane, motorway, overpass, passage, passageway, path, pathway, pavement, railway, road, roadway, route, street, subway, thoroughfare, track, trail, tunnel, underpass, viaduct, walkway, way”. These spatial entities are distinguished by Matsumoto (1996a) as paths intended for traveling by people.

(2) *Travelable environmental entities*: “beach, canyon, cliff, coast, coastline, crag, desert, escarpment, field, forest, glacier, glen, grassland, gulf, gully, hill, island, land, littoral, meadow, mountain, plateau, ravine, ridge, scarp, seashore, shore, valley, wasteland, wilderness”. These natural extended landmarks can also be traveled, however, they were not built for this purpose.

(3) *Non-travelable connectors*: “cable, conduit, conveyor, duct, hose, line, pipe, pipeline, tube, wire”. These elongated objects are used for transmitting energy or transporting substances over long distance. However, they are classified by Matsumoto (1996a) as non-travelable paths because they are not traveled by people.

(4) *Non-travelable barriers*: “barrage, barricade, barrier, dam, fence, hedge, hedgerow, palisade, rampart, wall”. These spatially extended entities typically serve as barriers and are not normally used for traveling, but they often stretch over a relatively substantial distance.

Altogether, 80 landmarks were selected for analysis, including 60 landmarks for travelable paths and 20 landmarks for non-travelable paths. This selection seems to be reasonably adequate for the purpose of investigating coextension path expressions. Enumerating all landmarks that can potentially feature in this context is impossible, if only due to the unlimited creativity of linguistic expressions. In the ensuing chapters, these landmarks are used in linguistic patterns to identify coextension path expressions with directional, manner, and instrumental verbs of motion.

## Chapter 5

# Directionality in fictive motion

If one wished to identify the most characteristically verbal of all the verbs, therefore, one would turn to the verbs of motion, the verbs that describe how people and things change their places and their orientations in space.

G. A. Miller & P. N. Johnson-Laird (1976), *Language and Perception*, p. 527

### 5.1 Cognitive encoding of directionality

In physics, geometry, and cartography space is unitary, metric, and measured precisely in formal units. In contrast, human conceptions of space tend to be constructed predominantly around spatial entities, which are located and oriented in terms of rough relations among them (Tversky, 2003, 2005, 2009). Talmy (1983, 2000a, Ch. 3) points out that linguistic representations of space rely on topological relations that remain constant irrespective of changes in sizes, distances, and shapes of the objects (see also Landau & Jackendoff, 1993). Research on the linguistic representation of space has found that expressing spatial relations with arithmetic and geometric precision is hardly ever used, and is comprehended vaguely by ordinary language users (Leibowitz, Guzy, Peterson, & Blake, 1993; see Landau, Dessalegn, & Goldberg, 2010 for a broader discussion).

The basic functional principle of spatial descriptions is based on the distinction between *figure* and *ground* (Talmy, 1975a; 2000a, Ch. 5), where the entity to be located is the *figure*, and the object that provides the reference point for location is the *ground*, (cf. *referent* and *relatum* in Miller & Johnson-Laird, 1976, p. 323; Levelt, 1996, p. 78; see also *trajector* and *landmark* in Langacker, 1987; 2008a, p. 70). Because spatial descriptions typically include both elements, expressing spatial relations in language is based on specifications of figure–ground relations. When the figure and ground are contiguous, it is often sufficient to say that “figure is *at* ground”, where “at” expresses some kind of a contiguity relation, e.g. containment, adjacency, etc. (Talmy, 1983; 2000a, Ch. 3; 2005b). However, when the figure and

ground are displaced, their relationship is expressed in relation to a certain frame of reference. In this case, a *direction* can be specified<sup>74</sup> “as a vector along one of the axes provided by a frame of reference” (Zlatev, 2007, p. 332).

The *frame of reference* (cf. *perspective system* in Levelt, 1996), is “a system of spatial coordinates that allows an individual to establish her/his orientation with respect to the surrounding environment” (Tommasi & Laeng, 2012, p. 572). Brewer and Pears (1993) explain the notion of frame of reference in accessible terms by using an example of glasses worn on someone’s nose: do the glasses change their location or not, when a person goes from one room to another? The answer depends on the frame of reference – the nose or room. Depending on the perspective taken in a particular situation, the reference frame may include a coordinate system, a point of view, an origin, a reference object, and terms of reference (Levinson, 2003).

As pointed out by Levinson (1996, 2003), spatial thinking discussed in cognitive literature is rooted in two millennia of Western philosophical thought, which results in egocentric, relativistic, and anthropomorphic spatial concepts functioning in psychology and linguistics. The *egocentric* view, originally postulated by Protagoras (Barnes, 1982, pp. 430–432), puts *ego* in the centre of the universe. Consequently, spatial thinking is predominantly *relativistic*, i.e. relative (or *deictic*) to our position, not external points of reference. Moreover, spatial coordinates are discussed according to six *primary directions*: up/down, front/back, and left/right,<sup>75</sup> based on the *anthropomorphic* planes of human body distinguished by Aristotle (350 BC/1995b). These concepts have been widely regarded as universal and repeatedly used in all kinds of studies on spatial language and cognition (e.g. Clark, 1973, p. 28; Lyons, 1977, pp. 690–691; Miller & Johnson-Laird, 1976, pp. 380 & 394–395; Piaget & Inhelder, 1948/1956; Talmy, 1983).

However, Levinson (2003; see also Levinson & Wilkins, 2006a) discusses a number of worldwide languages that do not work in the relativistic manner. He argues that in the context of spatial frames of reference the tradition in which the human body is the source of all our notions of orientation and direction results from the European perspective, which is a major ethnocentric error. He demonstrates that in certain contexts it is not always possible to

<sup>74</sup> As noted by Zlatev (2007, p. 332), in most cognitive semantic analyses, the concept of direction tends to be subsumed under the category “path” and is sometimes referred to as *imperfective path*.

<sup>75</sup> In the space around the body, the *up/down* and *front/back* axes are associated with a greater perceptual and functional salience in our conceptions of the spatial world than the *left/right* axis, because they are correlated respectively with the asymmetric axis of the world set by gravity, and the asymmetric axis of the human body (Tversky, 2003).

distinguish *deictic*, i.e. viewer-centered, and *intrinsic*, i.e. object-centered frames of reference in a principled way. Consequently, Levinson (1996, 2003) proposes a more universal reformulation of the traditionally distinguished<sup>76</sup> frames of reference used for discussing spatial concepts.

According to this proposal, the *intrinsic frame of reference* is based on an object-centered coordinate system, where the coordinates are determined by the inherent or intrinsic features, e.g. sidedness or facets, of the object used as the ground for reference (Levinson, 2003, p. 41). The origin of the coordinate system is a specific object. Locations of spatial entities in question are described in relation to the object's intrinsic front, back, left, right, top, and bottom. For example, in the sentence "The remote is in front of the TV" the *front* is understood in terms of the TV's natural front side, i.e. the screen. The use of this frame requires that all participants have a common understanding of the intrinsic sides of the reference object. Levinson notes that the reference object can also be a person, therefore the intrinsic frame includes some cases previously included in the traditional *deictic* classification (e.g. Levelt, 1996).

The *relative frame of reference* is roughly equivalent to the traditionally distinguished deictic frame of reference. This frame presupposes a certain viewpoint, which is the origin of the coordinate system identified by the location of one of the participants, the speaker or the addressee. As emphasized by Levinson (2003, p. 43) calling it deictic is confusing because the viewer does not need to be *ego*<sup>77</sup> (see Tversky & Hard, 2009). In this frame, a spatial relation between the *figure* and *ground* is specified by using coordinates fixed on the viewpoint used to assign directions. For example, comprehending the sentence "The ball is to the left of the tree" depends on knowing how the perceiver is

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<sup>76</sup> See Levinson, 2003, Table 2.1 and the relevant discussion (pp. 25–34) for a concise survey of spatial frames of reference distinguished across modalities in philosophy, brain sciences, psychology, and linguistics.

<sup>77</sup> People frequently find themselves in situations where taking another's perspective is used for effective social interaction. For example, when one person asks another in a conversation where something is located, the respondent may favor the interlocutor's perspective to their own. Tversky and Hard (2009) found that people spontaneously adopt another person's perspective when describing spatial scenes including a presence of another person, without any demand to communicate to that person. They used a questionnaire that included a photograph of a bottle and a book on a table, with or without a person behind the table. When answering a question: "In relation to the bottle, where is the book?" the mere presence of a person in the photograph encouraged many respondents to take that other person's spatial perspective rather than their own, despite the cognitive difficulty of reversing left and right.

oriented (facing/backwards) with respect to the tree. Thus, comprehending spatial relations specified in the relative frame of reference involves three elements: an origin, i.e. the viewpoint, the figure, and the ground used for reference. Levinson (2003, p. 43) adds that the perceptual basis for this frame is not necessarily visual, therefore calling it *viewer-centered* is potentially misleading.

The *absolute frame of reference* relates the figure to an external reference ground. This frame requires maintaining orientation with respect to some antecedently fixed bearings in space (Levinson, 2003, p. 48). The origin of the coordinate system is external to the scene. All languages use such a system in the vertical dimension for specifying *up* and *down* with reference to gravity.<sup>78</sup> Another common extrinsic coordinate system includes the *cardinal directions*: north, south, east, west, which is based on the Sun's position or the Earth's magnetic field. Absolute frames of reference can be observed in well documented cases of worldwide languages that use such systems on the horizontal plane, e.g. Mayan language *Tzeltal* (Brown, 2006); Australian language *Kuuk Thaayorre* (Boroditsky & Gaby, 2010; Gaby, 2012); Papuan language *Yupno* (Núñez, et al., 2012).

Taylor and Tversky (1996) support Levinson's distinction by pointing out that intrinsic, relative, and absolute frames of reference correspond largely to route, survey, and mixed perspectives used by people in spatial descriptions. The *route perspective* takes a changing viewpoint from within the environment, which resembles a mental tour through the surrounding space. The *survey perspective* takes a bird's eye view, which resembles viewing the surrounding space from the top of a hill. The first type provides a set of directions for way-finding in the environment, while the second type provides an overview of the spatial layout. The *mixed perspective* mixes both viewpoints. These perspectives reflect natural ways of interacting with the environment. However, as noted Taylor and Tversky (1996), there are some exceptions<sup>79</sup> that break the correspondences proposed by Levinson. For example, it is possible for the relative frame to be object centered, e.g. "from the entrance, the ticket office is right of the elevator" (see Bennardo, 2004). The basic reference frames together with their alternative variants are illustrated in Figure 5.1.

<sup>78</sup> Aristotle (350 BC/1995, *Physics*, 208b9–208b26) attributed particular importance to *up* and *down*, as anchored respectively to the celestial spheres and the centre of the earth, which indicates that he recognized the difference between *absolute* and *relative* directions.

<sup>79</sup> Bennardo (2004) adds that the appearance of a second object in the field of the viewer creates a double possibility of relating the object in question either to the viewer or the second object. To account for this alternative variants Bennardo (2004) proposes distinguishing *translation* and *reflection* subtypes of the basic relative frame of reference.

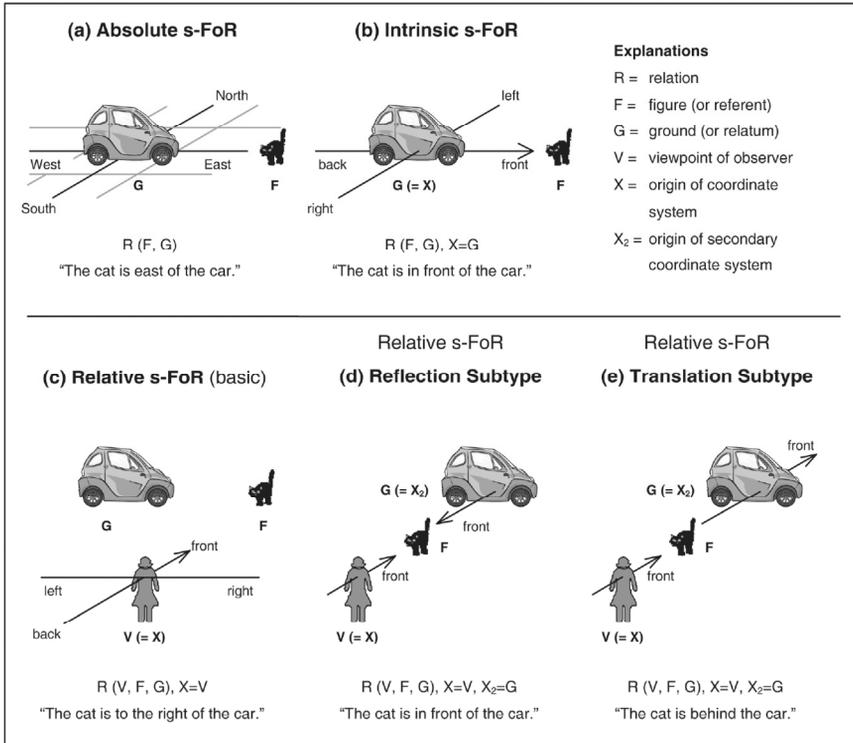


Figure 5.1 Spatial frames of reference

As summarized by Zlatev (2007), in spite of the possibility of such exceptions, the division proposed by Levinson has been widely accepted<sup>80</sup> due to its elegance and simplicity. Frames of reference not only enable us to locate and orient entities included in them, but they also integrate different spaces in the human mind into a common space.

Logan and Sadler (1996) argue that space is configured mentally in relation to reference frames using a number of additional parameters including orientation, direction, origin, spatial template, and scale. The *orientation* parameter refers to the association of a set of orthogonal axes with the vertical (above/below) and

<sup>80</sup> In Langacker's (1987, 2008a) Cognitive Grammar, the notion of frame of reference corresponds roughly to the concept of *non-basic domain*, and is generally subsumed in the notion of *domain* (Langacker, 2008a, pp. 44–47). Langacker views the reference points and other geometric notions as constituting the *domain* for the definition of a spatial expression. Cognitive Grammar discusses processes involved in the perception of *trajectory* vs. *landmark* under the label of *focusing*, which involves processing background/foreground relations (Langacker, 2008a, pp. 57–65).

horizontal (front/back and left/right) dimensions. The *direction* parameter specifies the relevant endpoint of a given axis (i.e. the front vs. the back endpoint of the horizontal axis). The *origin* indicates where the reference frame is imposed on the reference object. The *spatial template* parses the space around the reference object into regions for which the spatial term offers an appropriate (or not) characterization of the located object's placement (see Carlson, Regier, & Covey, 2003). The *scale* parameter indicates the units of distance to be applied to space. Logan and Sadler (1996) add that not all spatial terms refer to all parameters of a reference frame. For example, "near" is somewhat more generic than "left/right", since it refers to *distance* and *origin*, but not *direction* and *orientation*. Apprehension of linguistic representations of space, involves not only processing interactions between these parameters and the frames of reference, but also a wider context and specific linguistic elements present in the utterance (see Carlson, 2010 for a review).

Landau, Dessalegn, and Goldberg (2010) discuss two central mechanisms in the interaction between language and space. One embraces *selectivity*, i.e. linguistic tendency to encode certain selected distinctions and not others in the linguistic representations of space (cf. *schematization* in Talmy, 2000a, p. 177). The other involves *enrichment*, which is the capability of language to expand the representational power by allowing us to go beyond what is available directly to senses. Enrichment occurs because language has the representational power to encode certain properties of space that are available to the visual-spatial system only in transient form. Whereas selectivity reflects the power of language in narrowing down attention to selected aspects of spatial representation, enrichment shows that language has the power to bind fragmentary spatial representations into coherent wholes.

## 5.2 Semantic models of directionality

Every language has a system of formal linguistic devices used to encode direction. In English, direction can be expressed with practically all major syntactic categories. For instance, verbs can be used to specify the direction in which an object/person is oriented or moving, e.g. "She faced the town hall", "He entered the forest". Prepositions can describe the location of a figure in a particular direction with respect to a ground, e.g. "The car is behind the house", or the direction in which an entity is moving, e.g. "She walked into the room". The direction in which an entity is moving can also be encoded with adverbs in combination with a motion verb, e.g. "The soldiers marched inland". The noun *direction* literary signifies direction. Adjectives can encode the direction in which an object is oriented,

e.g. “the overturned car”, “the downward path” (Slack & van der Zee, 2003). These syntactic categories typically occur in phrases and clauses indicating more or less specifically the direction in which an object is oriented or moving (see Eschenbach, 2005 for a comparison between English and German). In some inflected languages, direction can also be quite specifically encoded by case marking (see Svorou, 1994).

The syntax and morphology available within the linguistic system do not impose significant constraints on encoding directionality. However, there exist some restrictions on linguistic directional encoding. For instance, the sentence “?Sally walked out of the library from the reception to the entrance”, especially if read without any pauses or changes of intonation indicating a conjunction, sounds ill-formed to native speakers of English (Bohnenmeyer, 2003, p. 94). The reason why this sentence sounds odd relates to an apparently universal constraint on the syntax-to-meaning mapping in directional encoding, which essentially forbids mapping of multiple directions to a single clause (Bohnenmeyer, 2003; see also Bohnemeyer, et al., 2007). There are also language-specific constraints on specifying directionality. For instance, in German ill-formedness occurs when a verb describing an object’s translocation is combined with an adverb referring to a rotation of the same object, as in “?Paul geht rechtsherum” [Paul walks clockwise]. This sentence might be interpreted as specifying a path of motion around an obstacle, but this is acceptable only in very specific contexts (Schmidtke, Tschander, Eschenbach, & Habel, 2003; see also Habel, 2005). Such constraints on the linguistic representation of direction indicate that there are spatial primitives underlying the linguistic encoding of directionality and a reference system used for their interpretation.

The spatial primitives of directionality have been postulated in various terms, such as axes, vectors, or topological distinctions (see van der Zee & Slack, 2003 for an edited collection of studies; Zwarts, 2017 for a concise review). Zwarts (2003) proposes a formal semantic model of directional representations based on *vectors*. On this account, vector representations are based on a geometry in which both direction and distance are regarded as basic values. The location of an entity within this geometry is given by a vector from a known point of location. To assign values to the distance and direction components of a vector, a coordinate system is required (Cartesian or polar, see Zwarts & Gärdenfors, 2016 for a more recent proposal based on polar convexity). Zwarts’ model integrates the semantics of four spatial domains: size, orientation, shape, and spatial parts, which provides a robust foundation for a diverse range of models in spatial domains (see also O’Keefe, 1996, 2003 for an alternative vector-based model of directionality based on the spatial coding of cells in the hippocampus).

On the basis of evidence from spatial impairment, Landau (2003) argues that directional linguistic reference is based on *axial representations*, which are engaged in both linguistic and non-linguistic tasks. She points out that children with Williams syndrome, who typically have normal verbal abilities but impaired spatial abilities, tend to confuse the above/below and left/right linguistically encoded directions, which indicates that there are separate cognitive systems for representing axes and direction within one axis. She argues that the axial representations are more suitable for representing direction in language than vector-based representations, which are more relevant to spatial tasks rather than directional linguistic reference. Carlson, Regier, and Covey (2003) propose to reconcile the axis and vector approaches. They assume that both axis and vector representations are necessary for defining spatial relations. Whereas an axial system is required for defining the spatial frames of reference, a vector representation is required for characterizing the spatial templates.

Gambarotto and Muller (2003) propose to approach regions of space as the primitives for building a geometric representation of direction: directional encoding relates to objects, and objects occupy regions of space. By defining basic topological relations between objects occupying regions in space according to *Region Connection Calculus* (RCC) (see Randell, Cui, & Cohn, 1992; Cohn, Bennett, Gooday, & Gotts, 1997), they demonstrate that *topological distinctions* can be used to capture a geometric representation of direction as defined in relation to regions, as well as orientation and distance (see also Mani & Pustejovsky, 2012). In contrast to the above-reviewed proposals approaching axes and/or vectors as cognitive entities, this geometric framework aims at a formal representation of direction more suitable for computational applications and cognitive robotics, rather than an explication of directional representations in the mind.

Zwarts (2017) postulates a synthesis of formal semantic modeling based on topological and geometrical concepts with research on force-dynamics, polysemy, prototypes, and cross-linguistic variation. He attributes the possibility of a merger between these two lines of studies to a proper division of labor between semantics and pragmatics, as well as developing richer ontologies, and taking into account the role of conceptual spaces and semantic maps in categorization.

### 5.3 Directionality in linguistic encoding of motion

Research on directionality more often focuses on static (locative) than dynamic directional expressions, i.e. those expressing motion in a direction specified by an expression. It probably stems from the view that the dynamic sense of directional expressions can be derived from insights gained on the interpretation of the static meanings. This assumption goes back to the highly-influential work of Miller and

Johnson-Laird (1976), who state that “the strategy for indicating the location of moving objects is built on the strategy for locating stationary objects” (Miller & Johnson-Laird, 1976, p. 407). The premise that the dynamic uses are closely related to the static ones is justified, for instance, by the fact that the goal (or source) regions are defined in a similar way in both kinds of contexts.

Winterboer, Tenbrink, and Moratz (2013) examine this assumption in the restricted context of linguistic movement instructions given to a robot, which take imperative forms and do not involve changes in the spatial frames of reference since they never refer to an entity other than the addressee (the robot). They point out that in some scenarios the interpretation of dynamic utterances potentially involves aspects different from those discussed in the literature for static directional expressions. For instance, a robot moving around in a scene when told to “turn left” or “turn right” may interpret the instruction either as a rotation on the spot or as a change of movement into the specified direction.<sup>81</sup> The expected movement cannot be derived from knowledge about the static uses of directional expressions. Thus, in some dynamic contexts, movements into a newly specified region after a turn need to be differentiated from rotational movements, in which expressions *left/right* do not specify a future direction to move into, but only a reorientation towards the left/right side.

Klippel, Tenbrink, and Montello (2013) analyze a corpus of instructions given by native speakers of English describing how to go along a route on a map. They focus on conceptualizations of direction change at intersections, taking into account the angle of direction change, the structure of an intersection, e.g. T-intersection, fork, roundabout, etc., and additional salient features, such as prominent landmarks.<sup>82</sup> They observe that the primary means used to indicate a change of direction are projective terms, such as *left*, *right*, and *straight*. However, in order to render direction at complex junctions more precisely, people often apply modifications of the projective terms. For instance, a turn can be qualified by a modification specifying direction, e.g. *turn sharply/slightly right*. A direction can be specified in degrees, e.g. *turn exactly 90 degrees* or with clock directions, e.g. *turn to three o'clock*. Instead of modifiers and measures, ordering concepts can also be used, e.g. *take the second exit*.

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<sup>81</sup> A similar situation occurs in route descriptions, e.g. in city guides or tourist trail descriptions. However, in this context, people instructed to “turn left” typically search for the first intersection of the current path with another path situated on the left-hand side, and then turn to follow that path in a more-or-less forward direction (see Gryl, Moulin, & Kettani, 2002).

<sup>82</sup> Some environmental elements are more cognitively prominent than others: they may be larger, or famous, or more central to our activities. These elements, termed *landmarks* by Lynch (1960), are tied in cognition to other less distinguished elements, such as paths, links, and nodes. They tend to be used as reference elements for constructing spatial relations (Lynch, 1960; see also Levelt, 1996).

If landmarks are present, they are often used to identify the direction to take, e.g. *turn left where the statue is*. Moreover, a change of direction can also be characterized with motion verbs. Klippel, Tenbrink, and Montello (2013) divide the verbs used in route descriptions into three basic categories: (a) neutral verbs, e.g. *go, move, turn*; (b) verbs that indicate that the route's course needs to be followed, e.g. *follow along, continue*; and (c) verbs that inherently indicate an angle of direction change, e.g. *veer*. The verbs that indicate an angle of direction change typically serve to indicate deviations from the prototypical axis, which resembles the modifications of projective term.

Nikanne and van der Zee (2013) argue that motion verbs in Finnish and Dutch can represent path curvature at three different levels: neutrally, globally, or locally. The verbs encoding *neutral path curvature*, e.g. the Finnish verb *mennä* [to go], or *siirtyä* [to change place], in their lexical semantics do not make reference to the shape of a path, but just express that a figure moves from one location to another. The verbs encoding *global path curvature*, e.g. the Finnish verb *kaartaa* [to go along a curved path], focus on the overall shape of a path of motion. The verbs encoding *local path curvature*, e.g. the Finnish verb *mutkitella* [to zigzag/to slalom], focus on the fine-grained aspects of a figure's path of motion. The path of motion described with a verb expressing neutral path curvature, although straight by default, can be in fact of any shape—straight, slightly curved, or even zigzag. The path of motion described with a verb that focuses on the global shape of a path may (or may not) make smaller curves at a fine-grained level, as long as the global shape of the path can be interpreted as one curve. Local curvature verbs refer to relatively small iterating curves along the path of motion, but do not make any statements about the global shape of the path. For instance, in the sentence “John zigzagged down the hill” the verb expresses a fine-grained angular curvature at the local level and the adjunct indicates that there is a global path (of indeterminate shape) along which John travels. The global path may be straight, but also curved or hook-shaped, as shown in Figure 5.2.

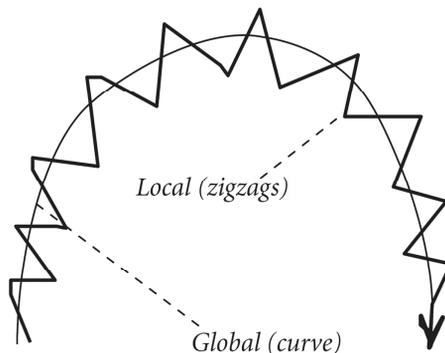


Figure 5.2 Combination of local and global path curvatures

The distinction among neutral, global, and local paths is also relevant to verbs of motion manner used to express refined curvature distinctions, which are discussed in Chapter 6. Nikanne and van der Zee (2013) conclude that in relation to this distinction the lexical semantics of Dutch and Finnish verbs of motion does not combine the local and global path curvatures simultaneously or alternately. They add that the division can in principle be generalized to other languages, including English (see van der Zee, Nikanne, & Sassenberg, 2010), however, other typologically different languages must be examined in order to determine whether the three levels of curvature are universal.

#### 5.4 Directional motion verbs

As discussed in Section 1.7, Talmy (1985, 2000b, Part 1) points out that languages tend to conflate in verbs either Path or Manner. Generally, English verbs of motion tend to conflate manner, but still there is a substantial lexicon of verbs that designate paths and their directionality. In a series of publications, Levin and Rappaport Hovav (1991, 1992, 2006, 2013, 2014; Rappaport Hovav & Levin, 2010) argue for the hypothesis that verb meanings can be systematically categorized as *manner* or *result*, with *directionality* counting as the result for motion verbs. They assume that a core meaning of a verb contains a single semantic component of manner or result, which they term *manner/result complementarity*. As a result of the complementary distribution, a given verb should be classified as either a manner verb or as a result verb, but not both<sup>83</sup> (Rappaport Hovav & Levin, 2010, p. 22).

According to Levin and Rappaport Hovav (2013, 2014; Rappaport Hovav & Levin, 2010), what is essential for this distinction to hold is that *lexicalized meaning*, i.e. a verb's core meaning, must be distinguished from *contextual meaning*. "Crucially, a verb's lexicalized meaning is to be distinguished from additional facets of meaning that can be inferred from a particular use of that verb in context and from the choice of noun phrases serving as arguments of the verb" (Levin & Rappaport Hovav, 2013, p. 49). Due to conventions of carrying out certain actions, a verb tends to be associated with a variety of co-occurring properties. Some verbs, such as *sweep*, lexicalize manners, but may be used to talk about events that are often associated with prototypical results (see *implied fulfillment verbs* in Talmy, 2000b, pp. 265–267). In a parallel fashion, verbs such as *leave* lexicalize

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<sup>83</sup> A similar hypothesis of *lexicalization constraint* was proposed earlier by Kiparsky (1997, p. 490), "A verb can inherently express at most one semantic role (theme, instrument, direction, manner, path...)". However, the discussion on semantic role restrictions in the syntax-semantics interface goes back, at least, to Chomsky's (1981, p. 36) *theta-criterion* (see also Dowty, 1991a; Jackendoff, 1990; Primus, 2016 for a review).

direction, but may be used to talk about results brought about in a conventionally associated manner. Levin and Rappaport Hovav (2014, p. 339) emphasize that not all these co-occurring properties are lexically entailed by the meaning of the verb itself and may not hold of every use of the verb.

In order to provide a semantic explication for the notions of manner and result, Rappaport Hovav & Levin (2006, 2010, pp. 28–33) propose that the result verbs, which include the directed motion verbs, do not have to be telic, however, they must specify *scalar changes*. A scale is a set of degrees or points ordered on a particular dimension. The dimension represents an attribute of an argument of the verb and the degrees indicate the possible values of the attribute (see Kennedy, 2001; Kennedy & Levin, 2008 for a broader discussion). A scalar change involves a change in the value of one of scalar-valued attributes. With directed motion verbs, the scale is composed of a set of contiguous points that together constitute the path of motion. The path extends in a particular direction, which defines the ordering relation.

In English, the directed motion verbs can be subdivided according to the way the ordering relation is defined. In one type of verbs, including *ascend*, *descend*, *fall*, and *rise*, the direction of motion is fully lexicalized by the verb with reference to the pull of gravity. With verbs *come* and *go*, the direction of motion is determined deictically according to whether they get closer to or further on the path from the deictic centre. In another type of motion verbs, which includes *advance*, *arrive*, *depart*, *enter*, *exit*, *leave*, *reach*, *recede*, and *return*, the direction is determined with respect to an external reference object, the semantic ground. Depending on the meaning of individual verbs, the points on the path are ordered according to whether they are closer to or further away from this object.

Rappaport Hovav & Levin (2010, p. 30) add that the claim that the directed motion verbs are scalar finds support in the structure of their scales. They essentially fall into two classes: those associated with two-point scales and those associated with multiple-point scales (see Beavers, 2008). Two-point scales have only two values, i.e. they basically encode having or not having a particular property. The directed motion verbs with an associated two-point scale are *arrive*, *depart*, *enter*, and *exit*. On the other hand, multiple-point scales have many values. The class of directed motion verbs with multiple-point scales is used to describe gradual traversals of the path. It includes *advance*, *descend*, *fall*, *recede*, and *rise*. The multiple-point scales can again be divided into two types: those with closed scales and those with open scales. In the directed motion domain, this property distinguishes between verbs that lexicalize a bounded path, such as *come* and *return*, and verbs that lexicalize an unbounded path, such as *descend* and *rise* (see Rappaport Hovav & Levin, 2010 for further discussion).

The proposal of manner/result complementarity was received critically by some researchers. Goldberg (2010, pp. 46–50) argues that both manner and result are allowed to combine in verbs of motion, as long as there exists a semantic frame that unites both meaning components. For instance, the skiing-associated verb *schuss* means to ski straight downhill (directionality) intentionally and very fast (manner). Consequently, one cannot “?schuss uphill”. Beavers & Koontz-Garboden (2012) also argue that sometimes manner and result can co-occur together as a single indecomposable manner+result root encoded in event structure. They propose to expand the typology of manner/result roots with those that encode manner and result simultaneously.

Levin and Rappaport Hovav (2013, 2014) analyze in detail certain English verbs that apparently violate the manner/result complementarity, such as *climb*, *cut* (Levin & Rappaport Hovav, 2013), and *clean* (Levin & Rappaport Hovav, 2014). In the domain of motion, a widely discussed counterexample to manner/result as two separate roots is the English verb *climb* (e.g. Fillmore, 1982, p. 32; Jackendoff, 1985). One may assume that in sentences such as “John climbed the tree”, the verb expresses both manner (clambering) and direction (upward). However, with reference to animate entities the opposite direction can be specified, e.g. “John climbed down the mountain”, which shows that the verb can be used to lexicalize only the manner of motion. Moreover, with reference to inanimate entities, the verb is used only to lexicalize the direction upward, e.g. “The elevator/temperature climbed”, but not downward, e.g. “?The elevator/temperature climbed down”, which indicates that the verb can be used to lexicalize only the direction of motion. Levin and Rappaport Hovav (2013) argue that once the interpretation of different uses is clearly delineated, it becomes clear that the verb *climb* manifests a certain degree of polysemy, having both manner and result senses. The upward direction is usually inferred due to the default direction of its lexicalized manner.

In her seminal work on *English Verb Classes and Alternations* published earlier, Levin (1993) discusses directional verbs of motion in bulk, under the label of *verbs of inherently directed motion*. She includes the following verbs in this class: *advance*, *arrive*, *ascend*, *climb*, *come*, *cross*, *depart*, *descend*, *enter*, *escape*, *exit*, *fall*, *flee*, *go*, *leave*, *plunge*, *recede*, *return*, *rise*, and *tumble*. She notes that some verbs included in the list, most notably *climb* and *cross*, diverge<sup>84</sup> in some respects from the other

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<sup>84</sup> Rappaport Hovav & Levin (2010, p. 30) note that verbs like *cross* and *traverse*, which are often included in lists of directed motion verbs, lexicalize a path, but not an ordering along the path. For this reason, they cannot be classified as true directed motion verbs. For instance, the verb *cross* is equally applicable whether a traversal is from England to France or from France to England. Nevertheless, *cross* and *traverse* are neither verbs of motion manner. This observation suggests that a more refined verb classification may be required in the future.

members of this class (Levin, 1993, p. 264). She points out that meaning of the verbs of inherently directed motion specifies the direction of motion, even in the absence of an overt directional complement. While for some verbs in this class the specification of direction is deictic, for others it is specified in non-deictic terms. Levin emphasizes that none of the verbs in this class specifies the manner of motion. They differ as to how they can express the goal, source, or path of motion. Depending on the given verb, these properties may be expressed via a prepositional phrase, as a direct object, or both (Levin, 1993, p. 264).

Apart from this generic class, Levin distinguishes additionally three more specific classes of verbs related to directionality. The class of *leave verbs* (Levin, 1993, Ch. 51.2) includes: *abandon*, *desert*, and *leave*. The verbs in this class indicate motion away from a location without specifying the manner of motion. Because the direct object of these verbs indicates the location that has been left, it cannot be expressed in the prepositional phrase (Levin, 1993, p. 264). The class of *chase verbs* (Levin, 1993, Ch. 51.6) includes: *chase*, *follow*, *pursue*, *shadow*, *tail*, *track*, and *trail*. These verbs are typically transitive, with the chaser as subject and the person being chased as object. Some of them allow an intransitive use, with the chaser as subject and a prepositional phrase headed by *after* specifying the object of pursuit (Levin, 1993, p. 270). The class of *accompany verbs* (Levin, 1993, Ch. 51.7) includes: *accompany*, *conduct*, *escort*, *guide*, *lead*, and *shepherd*. They relate to one person taking another person from one place to another. These verbs can be differentiated from one another by the relation holding between the two participants (Levin, 1993, p. 270).

Starting from the observation that direction plays an important role in the semantics of both prepositions and verbs, Zwarts (2008) suggests broad parallels between the realizations of directionality in these parts of speech. After distinguishing two major categories of *locative* and *directional* prepositions, he follows Jackendoff (1983) to point out that directional prepositions largely correspond to Paths. With reference to spatial and aspectual dimensions expressed by prepositions in spatial expressions, Zwarts (2008, p. 84) proposes to distinguish seven classes of directional prepositions. (1) *Source* prepositions impose a locative condition on the initial part of the path, e.g. *from*; (2) *Goal* prepositions indicate the opposite pattern, putting emphasis on the final part of the path, e.g. *into*; (3) *Route* prepositions impose a locative condition on a middle part of the path, e.g. *via*, *past*, *through*, *across*, and *over*; (4) *Comparative* prepositions involve a spatial ordering of the extremes of the path, with *towards* referring to paths that have their endpoint closer to the reference object than their starting point, and *away from* referring to paths going further and further away from the starting point; (5) *Constant* prepositions impose a stable locative condition on all the points of the path, e.g. *through* or *along*. The latter is more complex since it involves reference to a more general geometric

relation holding between the path and object (see Talmy, 1983); (6) *Geometric* prepositions, e.g. *around*, typically involve a circular path enclosing an object on all sides, although the relation is not always so simple (see Zwarts, 2004 for a discussion about the polysemy of *around*); (7) *Periodic* prepositions refer to a repeating pattern, e.g. *around and around, up and down, through and through, over and over*, etc.

Zwarts argues that with reference to properties of connectivity, cumulativity, and reversibility this typology can be used to distinguish fundamental properties of paths characterized by *transitions, cycles, progressions, and continuations* (cf. Jackendoff, 1991; Piñón, 1993). Moreover, he suggests that the characteristics of paths can be extended to the semantics of dynamic verbs, giving a partial typology of “event shapes” as places and paths in the conceptual space of events in a fashion parallel to the informal verb contours discussed by Talmy (1978, 2000a, Ch. 1; see Zwarts, 2008, pp. 98–103 for a broader discussion; Warglien, Gärdenfors, & Westera, 2012 for a proposal of framework for analyzing events and actions based on conceptual spaces and vectors).

Geuder & Weisgerber (2008) propose to divide verbs of motion specifying a particular trajectory or contour in a way parallel to directional prepositions. Their proposal allows to distinguish the following types of directional verbs of motion: (1) *Goal* verbs relate to the end point on the path of motion, e.g. *enter, arrive*; (2) *Source* verbs relate to the starting point on the path of motion, e.g. *exit, depart*; (3) *Route* verbs relate to intermediate points on the path of motion, e.g. *cross* and *pass*; (4) *Comparative* verbs relate to movement closer to/further from a reference object, e.g. *approach*; (5) *Constant* verbs relate to the same average relation of distance between objects in motion, e.g. *follow*, (6) *Holistic* verbs describe a geometric shape of the described motion, e.g. *curl* (see *verbs of coiling* discussed in Section 6.6.2); (7) *Periodic* verbs describe a recurring pattern in the described motion, e.g. *zigzag* (see *verbs of irregular motion* discussed in Section 6.6.5). Please note that the verbs that denote round and oscillating paths appear to fall into the category of *manner verbs* discussed in Chapter 6.

## 5.5 Directionality in fictive motion expressions

Directionality of motion is inextricably connected with coextension path expressions. As pointed out by Langacker (1986, 2005), Matsumoto (1996a, pp. 185–186), and Talmy (1983, 2000a), if the source and goal are switched in fictive motion expressions (see Example 2.2 discussed in Chapter 2), their meaning differs, which cannot be explained without appealing to the directionality of motion. Matsumoto (1996a, pp. 185–186) exemplifies directionality of coextension path expressions with the following sentences.

- (5.1) a. They're on the road that comes into the farm.  
 b. They're on the road that goes into the farm.  
 c. The road lay between Burney and Redding.  
 d. ?The road lay from Burney to Redding

The sentences (5.1a–b) express motion in the opposite direction, which is marked by the use of deictic<sup>85</sup> verbs *come* and *go*, whose meaning is conditioned by the relative position of the speaker and/or hearer with respect to the source and goal of motion (see Fillmore, 1975/1997; Rauh, 1981, 1983). If these sentences represented merely an extent of a path in space, they would be synonymous. The semantic contrast between them cannot be resolved without appealing to the directionality of motion.

A similar observation can be made for the sentences (5.1c–d) used by Matsumoto (1996a, p. 186; cf. Talmy, 1983) to demonstrate that directionality is not found in locative *posture verbs* (Newman, 2002; Newman & Rice, 2004), which are used to denote locations of objects in space. What is noteworthy here is that the sentence (5.1c), which is semantically similar to (5.1d) but does not involve the source and goal, sounds acceptable. This suggests that locative posture verbs like *lie*, *sit*, or *stand*, do not involve directionality related to a change of location, while the verbs of motion do. Langacker (2005, 2008b, 2012, p. 212) emphasizes that the sense of directionality in fictive motion arises on the part of the conceptualizer, who construes the trajector's extent in terms of the path of motion going in a particular direction.

### 5.5.1 Research methodology

This study approaches the question how directional motion verbs are used in coextension path expressions from the perspective of cognitive corpus-based linguistics. As discussed in Chapter 4, this approach to language study focuses on examining how linguistic expressions are actually used in natural contexts, rather than on speculating about what is theoretically possible in language. Coextension path expressions are problematic to single out from corpora because at the syntactic level they are practically indistinguishable from actual motion expressions. For this reason, searching for the use of directionality in coextension paths was executed by looking for combinations of a broad selection of landmarks that can potentially be described with fictive motion with an array of directional motion verbs.

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<sup>85</sup> The function of deictic expressions is to point at their referents (Rauh, 1983, p. 10). Lyons (1977, p. 637) defines deixis as “the location and identification of persons, objects, events, processes and activities being talked about or referred to, in relation to the spatiotemporal context created and sustained by the act of utterance and the participation in it”. Words are *deictic* when their semantic meaning is fixed, but their denotational meaning depends on time and/or place. The *deictic origin* (or *deictic centre*) is the point (e.g. *I*, *here*, *now*) from which we refer to other things. See Fillmore's (1975/1997) and Rauh (1983) for broader discussions.

The landmarks selected for examination include 80 different spatially extended objects, including 60 items for travelable paths and 20 items for non-travelable paths (see Section 4.6 for a full listing). This selection seems to be reasonably adequate for the purpose of retrieving a range of coextension path examples from the British National Corpus. Enumerating all objects that can potentially be described with fictive motion is impossible, if only for the creativity of linguistic expression.

More specifically, the search for the directional expressions of fictive motion was implemented by looking for combinations of the selected landmarks with third-person singular simple present and past forms of directional motion verbs using the following pattern:

LANDMARK (noun sing.) + DIRECTIONAL MOTION VERB (3rd sing. present/past tense)

The directional motion verbs examined in this chapter were selected on the basis of the above-reviewed classifications proposed by Geuder and Weisgerber (2008), Jackendoff (1983); Levin, (1993), Rappaport Hovav and Levin (2010), and Zwarts (2008), with the help of WordNet and VerbNet. A fully systematic classification of motion verbs has not been worked out in linguistics. One reason that stands behind this situation is the difficulty of discerning motion verbs as a separate class. Although Miller and Johnson-Laird (1976, pp. 526–531) suggest that English has a formally identifiable semantic field of motion verbs, they admit that the criteria available for distinguishing motion verbs generate numerous borderline cases and gray areas. On the basis of morphosyntactic considerations, Levin and Rappaport Hovav (1992) conclude that approaching motion verbs as constituting a single formally discernible natural class in English is a wrong assumption. Lucy (1994) arrives at a similar conclusion for motion verbs in Yucatec Maya. The assumption that motion verbs are the “purest and most prototypical forms” of verbs (Miller & Johnson-Laird, 1976, p. 527), implies that other verbs inherit some conceptual and formal properties from them, which makes conceptual/formal distinctions difficult to draw precisely (Wilkins & Hill, 1995, p. 248).

The division used in this study includes (1) *source/goal verbs*, which are used to refer to bounded paths. The next group includes (2) *unbounded path verbs*, which can also be divided into two subgroups of *upward/downward verbs* and *forward/backward verbs*. Then, two verbs, *cross* and *pass*, are distinguished as the separate group of (3) *route verbs*. Another group includes (4) *constant verbs*, which again can be divided into two subgroups of *chase verbs* and *accompany verbs*. Finally, (5) two *deictic verbs* (*come* and *go*), are approached as a separate class. This division does not aspire to be fully exhaustive, however, it seems to be reasonably adequate for the purpose of this study.

### 5.5.2 Source/goal verbs

The first group of motion verbs taken into consideration includes scalar verbs associated with a *two-point scale* (Rappaport Hovav & Levin, 2010), which refer to bounded paths. The meaning of these verbs inherently specifies the direction of motion, even in the absence of an overt directional complement (Levin, 1993, Ch. 51.1). They can be divided into *source verbs* (depart, exit, leave) and *goal verbs* (arrive, enter, reach), which focus respectively on the starting point or the destination of the path of motion (Fillmore, 1975/1997; Geuder & Weisgerber, 2008; Zwarts, 2008). Additionally, the verb *return*, which lexicalizes a bounded path whose goal goes back to the starting point, is also included in this group. These verbs indicate that motion from/to a location takes place without specifying the manner of motion. For these verbs the direction of motion is specified in non-deictic terms.

SOURCE/GOAL VERBS: arrive, depart, enter, exit, leave, reach, return. (7 verbs)

The search for these verbs in fictive motion expressions returned 176 matching sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, 61 sentences were identified as valid examples of coextension paths. For the *goal verbs*, 40 examples were found, including 3 examples for the verb *arrive*, 14 examples for the verb *enter*, 21 examples for the verb *reach*, and 2 examples for the verb *return*. A selection of examples found for these verbs is presented below.

- (5.2) a. Soon the route arrives at Tennyson Down, one of the highlights of the route
- b. Following now the Ilfis tributary of the Emme, the road arrives, 6km further on, at Langnau
- c. A dirt track entered the orchard from the village road and ran down the side of the large house
- d. From here the trail enters forest land taking paths leading to many lovely reed-fringed lakes
- e. Going south from Lochinver, the road reaches a T-junction
- f. In about a kilometre the road reaches a terrace plateau

The examples (5.2a–f) demonstrate that the goal verbs are used in fictive motion to specify that the configuration of a path extends to a certain point, as in (5.2a, b, e), or an area, as in (5.2c, d, f), which is typically a prominent *landmark* (Lynch, 1960; cf. Langacker, 2008a, pp. 70–73). The landmark marks either the final

destination of a path (5.2a, b, f), or a connection point to other paths of motion, e.g. a crossing or a T-junction (5.2e), or a transition area (5.2c), possibly providing connections to other paths (5.2d). For the verb *arrive*, the end point is specified with the preposition *at* (5.2a–b). For the verbs *enter* and *reach*, it is expressed by the direct object (5.2c–f). Notwithstanding the syntactic differences, these verbs convey a similar message in fictive motion expressions. Their individual meanings differ with respect to the degree of crossing the boundary defined by a reference object<sup>86</sup> (see Figure 5.3), however, the corpus data indicate that they are used flexibly by language users.

Two coextension path sentences were found for the verb *return*.

(5.3) a. The route returns to Cat Nab at Saltburn via the roundabout of the A1085 and A174 roads

b. After rounding the head of the Kyle, the old road returns north along the west bank to the bridge

The examples (5.3a–b) demonstrate that this verb can be used in coextension paths in two different senses. One sense, exemplified by the sentence (5.3a), indicates that after taking approximately a circular course a path returns to the starting point. The other sense, exemplified by the sentence (5.3b), indicates that after taking approximately a semicircular course the described object returns to a different point situated further along its path and resumes the previously followed direction.

For the category of *source verbs* 21 examples were found in the corpus, including 2 examples for the verb *depart* and 19 examples for the verb *leave*. A selection of examples found for these verbs is presented below.

(5.4) a. The railway comes into the town from Glasgow after a circuitous journey across Rannoch Moor, and a branch line departs for Mallaig

b. On the south-western part of the circuit though, the line of the later wall departs from that of the early bank, here made of clay and gravel, and assumes an outer course

c. A side road leaves here and climbs steeply to Dent Station

d. To the west of the lodge, the trail leaves the road to cross Kenmure Moss

e. There was neither guardpost nor gate to show where the road left the French Empire to enter the Kingdom of the Netherlands

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<sup>86</sup> As noted by Rappaport Hovav & Levin (2010, p. 30), “arrive and enter both involve a two-point scale, but only with arrive is one of these points inside the boundary defined by the reference object”.

The examples (5.4a–e) demonstrate that the source verbs are used in fictive motion to describe the configuration of a path that extends from a certain point. For the verb *depart*, the sentence (5.4a) describes a railway, but the sentence (5.4b) is relatively more intricate. It comes from the book “The ‘Small Towns’ of Roman Britain” (written by B. Burnham and J. Wachter, published by Batsford in 1990) and describes the configuration of a Roman settlement. Both sentences found for *depart* demonstrate that it can be used in the context of a split in the configuration of a spatial structure. From the split point, the path described with fictive motion extends in a separate direction. The sentences (5.4c–e) demonstrate that although the verb *leave* takes a different syntactic pattern, in which the direct object indicates the location that has been left, it is used to convey a similar message in fictive motion. The direct object may refer to the starting point (5.4a–b) or the starting area (5.4c), from which a path begins the outward course in a certain direction.

Different configurations of paths described with the *source/goal* verbs are summarized schematically in Figure 5.3.

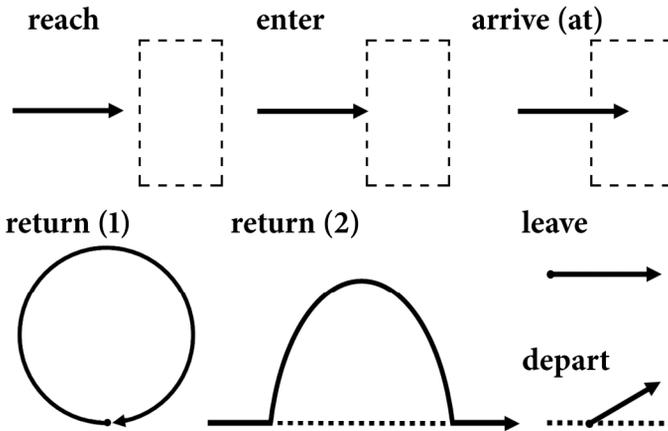


Figure 5.3 Schematic depictions of source and goal verbs in fictive motion

As shown in Figure 5.3, the goal verbs differ with respect to the degree of boundary crossing. The verb *reach* indicates that a boundary has been reached, but not crossed. The verb *enter* indicates a boundary crossing. The verb *arrive (at)* relates to a point inside the boundary (see Podhorodecka, 2007, pp. 123–134 for a comparison of the image-schematic structure of *reach* vs. *arrive at*). As already mentioned, the data found in the corpus demonstrate that these specific meanings are discerned rather vaguely in fictive motion by ordinary speakers. Moreover, the corpus data indicate that the verb *return* is used in fictive motion in two senses. One means that the described path returns to the starting point. The other means that it resumes the previously followed direction further along its configuration.

As far as the source verbs are concerned, the verb *depart* was found to be used to describe a coextension path that extends in a separate direction from a split point (see Podhorodecka, 2007, pp. 88–95 for an analysis of the conceptual schema of *depart from*). The verb *leave* tends to be used to describe a path that is outward bound from the starting point (or area) in a certain direction.

What can be observed in the corpus data is that the *source* verbs are relatively less frequent in fictive motion than the *goal* verbs. Whereas 40 examples were found for the goal verbs, 21 examples were collected for the source verbs. This kind of asymmetry between the source and goal paths has been observed in a number of cognitive studies on the conceptualization of actual motion events (e.g. Lakusta & Landau, 2005; 2012; Papafragou, 2010; Stefanowitsch & Rohde, 2004). These studies demonstrate a preference given to goal (the endpoint), rather than source (the beginning). The data found in the BNC indicate that fictive motion expressions are likely to mirror in this respect the tendency found for actual motion expressions. See (Waliński, 2017a) for a full listing of all sentences retrieved from the corpus for the source/goal verbs.

### 5.5.3 Unbounded path verbs

The second group of directed motion verbs taken under scrutiny includes verbs that lexicalize unbounded paths. They can be approached as scalar verbs with a *multiple-point scale* (Rappaport Hovav & Levin, 2010). Prototypically, they refer to gradual traversals but do not specify the manner of motion, although *climb* is sometimes viewed as lexicalizing both manner and path (Fillmore, 1982, p. 32; Jackendoff, 1985; Levin & Rappaport Hovav, 2013). These verbs can be divided into two subclasses. The first subclass refers to the vertical plane, indicating either the direction *upward* (ascend, climb, rise) or *downward* (descend, drop, fall, dive, plunge, tumble). These verbs specify the direction of motion in absolute terms, with or against the pull of gravity.

UPWARD/DOWNWARD VERBS: ascend, climb, descend, dive, drop, fall, plunge, rise, tumble. (9 verbs)

The search for the upward/downward verbs in fictive motion expressions returned 215 sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, 134 sentences were identified as valid examples of coextension paths, including 4 examples for the verb *ascend*, 32 examples for the verb *climb*, 44 examples for the verb *rise*, 20 examples for the verb *descend*, 20 examples for the verb *drop*, 10 examples for the verb *fall*, 2 examples for the verb *plunge*, 1 example for the verb *tumble*, and 1 example for the verb *dive*. A selection of examples found for the upward verbs is presented below.

- (5.5) a. A paved road ascends the gentle gradient from the east  
 b. The road ascends steeply from the harbour  
 c. The road climbs a long incline through a forest  
 d. The track climbs steadily through the woodland  
 e. The wide street rose gently westward towards the prominent hill  
 f. The land rises most of the way to Aberangell

In the above quoted sentences (5.5a–f), the verb semantics specifies the upward direction of a path. Because the verbs *ascend* and *climb* are transitive, they can be followed by the direct object, as in (5.5a) and (5.5c), unlike the intransitive verb *rise* (5.5e–f). The unboundedness of a path expressed by the verb can be restricted by a prepositional phrase specifying the *source* as in (5.5b), the *goal* as in (5.5f), or both. The angle of inclination can be specified more precisely by a subsequent adverb, e.g. *abruptly*, *sharply*, *steeply* (5.5b), *steadily* (5.5d), *gently* (5.5e), *gradually*, *moderately*. An adverbial/prepositional phrase can additionally specify a coexisting direction on the horizontal plane, as in (5.5e).

A selection of examples found for verbs that lexicalize the downward direction is presented below.

- (5.6) a. The road descends the hill  
 b. After ascending for another half a mile the line dropped steeply into the quarry  
 c. The only street fell steeply down towards the secondary gateway to the Manor  
 d. The narrow road plunges in a series of sharp zigzags  
 e. To my other side the ridge tumbled away from below my hump  
 f. The District Line dived into the earth half-way along the Barons Court Road

The verbs *descend*, *drop*, *fall*, *plunge*, *tumble*, and *dive* in the examples (5.6a–f) are used in fictive motion to specify the downward direction. The unboundedness of a path expressed with these verbs can be restricted by specifying the *source* as in (5.6e), the *goal* as in (5.6b, f), or both with a prepositional phrase. Additional details about the configuration of a coextension path can be provided by an adverbial/prepositional phrase, as in (5.6b–f). For instance, the angle of inclination can be specified by a subsequent adverb, e.g. *steeply* (5.6c), *sharply*. The slope of a path is also indicated, at least to some extent, by the lexical semantics of a verb: a path that *tumbles* seems to be more steeply inclined than a path that just *descends*. The example (5.6d) demonstrates that the upward/downward verbs provide information about the *global* course of a path without specifying fine-grained details about its *local* shape (Nikanne & van der Zee, 2013).

The other group of the unbounded path verbs taken under scrutiny relates to a gradual extension on the horizontal plane. Their semantics specifies either the direction *forward* (advance, proceed) or *backward* (retreat, recede, withdraw). Additionally, the comparative verb *approach*, which refers to a spatial path extending towards a reference object (Geuder & Weisgerber, 2008; Zwarts, 2008), is also included in this group. For these verbs, the direction of motion is specified in relative terms.

FORWARD/BACKWARD VERBS: advance, approach, proceed, retreat, recede, withdraw. (6 verbs)

The search for these verbs in fictive motion expressions returned 20 sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, only 5 sentences were identified as valid examples of coextension paths, including 2 examples for the verb *proceed* and 3 examples for the verb *approach*. Examples found for these verbs are presented below.

- (5.7) a. The route proceeds forward with right edge of field about 30 yds away to reach waymark in hedgerow ahead
- b. The route proceeds from Cat Nab, Saltburn along part of the Cleveland Way and along the cliff edge down to the beach at Cattersty Sands
- c. As the route approaches Queensferry, the rail and road bridges come into view
- d. I knew there would be trouble at that roundabout — the road approaches it at a very acute angle

Both examples found for the verb *proceed* (5.7a–b) indicate that it is used to specify that the described path extends forward, which can be emphasized by a subsequent adverb,<sup>87</sup> as in (5.7a). Although the verb *proceed* lexicalizes an unbounded path, it can be restricted with prepositional phrases specifying the starting point and the destination, as in (5.7b). Moreover, the corpus data demonstrate that the comparative verb *approach* can be used in fictive motion to describe a path whose configuration extends towards a reference landmark (5.7c–d). The angle of approach can be specified with an adverbial/propositional phrase, as in (5.7d). No examples of the *backward* direction used in fictive motion were found in the corpus data.

What can be observed in the corpus data for the unbounded path verbs is a vast disproportion between their use in fictive motion for expressing a direction on the horizontal vs. vertical plane. Whereas 134 sentences were identified as valid

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<sup>87</sup> If overtly specified, the verb *proceed* may also refer to the upward/downward direction, e.g. “We left the Casa del Bosco and proceeded upwards and upwards”.

examples for the upward/downward direction, only 5 valid examples were found for the forward direction (including the verb *approach*) and no examples were found for the backward direction. What additionally emerges from the corpus data is that the semantics of these verbs in fictive motion refers to the *global* direction of a path (Nikanne & van der Zee, 2013), whereas details about its local shape can be specified by adverbials and prepositional phrases. See (Waliński, 2017b) for a full listing of all sentences retrieved from the corpus for the unbounded path verbs.

#### 5.5.4 Route verbs

The third group of directional motion verbs taken under scrutiny includes two *route verbs*, *cross* and *pass*, which relate to intermediate points on the path of motion (Geuder & Weisgerber, 2008; Jackendoff, 1983, p. 165; Zwarts, 2008). These verbs tend to be ascribed to the category of directional motion verbs (e.g. Levin, 1993; Papafragou & Selimis, 2010; Slobin, 1996b). However, as pointed out by Rappaport Hovav and Levin (2010, p. 30), they are not verbs of scalar change. Although they specify motion along a path defined by a particular axis, the direction of motion along the path is not lexicalized by the verb, i.e. they do not impose an ordering relation on the path. However, they are not manner verbs, either, which suggests that they belong to a separate group.

ROUTE VERBS: *cross*, *pass*. (2 verbs)

The search for these verbs in fictive motion expressions returned 175 sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, 145 sentences were identified as valid examples of coextension paths, including 63 examples for the verb *cross* and 82 examples for the verb *pass*. A selection of examples found for the verb *cross* is presented below.

- (5.8) a. At one point the path crosses the River Almond  
 b. Darlington Railway crosses 100 bridge spans  
 c. The road crosses open moorland  
 d. The route crosses through agricultural land  
 e. From York a bridge crosses into the village  
 f. Here the main London Bridge–Brighton railway crossed over the road

In fictive motion, the verb *cross* is used to indicate that the configuration of a path goes through a specific point, typically belonging to an object oriented perpendicularly to the path, e.g. a river, road, etc., as in (5.8a), or multiple points, as in (5.8b).

The verb can also refer to crossing an area (5.8c), which can additionally be emphasized with the preposition *through*, as in (5.8d). The end point (goal) can be specified with a prepositional phrase, as in (5.8e), which makes this expression telic. The prepositional phrase can also provide details about a relation between the crossing figure and the ground being crossed on the vertical plane, as in (5.8f).

A selection of examples found for the verb *pass* is presented below.

- (5.9) a. The road passes the farm of Braida Garth
- b. After 2 miles road passes three houses
- c. The route passes through spectacular countryside
- d. The Pennine Way passes within ten miles of the village, and the coast to coast path passes right through
- e. A short mile further on, the road passes over the stream
- f. From Castle Cary the Way passes to the left of the George Hotel into Paddock Drain

In coextension path expressions, the verb *pass* specifies that the spatial configuration of a path goes beside a specific point as in (5.9a), or a series of points, as in (5.9b). However, when followed by the preposition *through*, the verb can be used to specify that the configuration of a path goes through a point or an area (5.9c), which approximately parallels the meaning of *crossing*. This is particularly visible in the example (5.9d), which includes both senses. Various relations between the described path and a reference ground can be specified with prepositional phrases, e.g. “along the bottom of a gorge”, “below the shapely peaks”, “beneath the giant tower”, “behind the youth hostel”, “under the river”, “over the stream” (5.9e). The unboundedness of a path lexicalized by the verb can be restricted by adpositional phrases providing details about the source and/or the goal of a path, as in (5.9f).

What can be observed in the corpus data is that the frequency of both *route verbs* in coextension paths is relatively proportional (63 valid examples found for the verb *cross* vs. 82 for the verb *pass*). They follow correspondent syntactic patterns in fictive motion expressions. Despite the fact that their semantics differs, when modified with appropriate prepositions, they can replace each other in some contexts to express parallel configurations, e.g. “The path crosses the field” vs. “The path passes through the field” or “The road passes the farm” vs. “The road crosses beside the farm”. See (Waliński, 2017c) for a full listing of all sentences retrieved from the corpus for the route verbs.

### 5.5.5 Constant verbs

The next group of motion verbs analyzed in this chapter includes the verbs labeled by Geuder & Weisgerber (2008) as *constant verbs*. They express an approximately stable spatial relation between two moving objects without specifying the manner of motion. They can be divided into two classes. The first class includes *chase verbs* (Levin, 1993, Ch. 51.6), which are typically transitive, with the chaser as the subject and the object of pursuit as the direct object.

CHASE VERBS: follow, pursue, shadow, tail, track, trail. (6 verbs)

The search for the chase verbs in fictive motion expressions returned 144 sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, 58 sentences were identified as valid examples of coextension paths, including 57 examples for the verb *follow* and 1 example for the verb *pursue*. A selection of examples found for these verbs is presented below.

- (5.10) a. The route follows the shepherd's track
- b. This 97 mile circular route follows the towpaths of six different canals
- c. From here the path follows the river bank downstream
- d. The road follows the valley of the River Rawthey along the base of the Howgill Fells
- e. A footpath follows the south coast to the most westerly point of the peninsula
- f. On leaving Croydon, the road pursued a straight course over the wide expanse of open scrubland

In fictive motion, the verb *follow* specifies that the configuration of a path is aligned with another reference landmark expressed by the direct object. The configuration can be specified by referring to an alignment with a single landmark, as in (5.10a), or multiple landmarks, as in (5.10b). However, the configuration of a path can additionally be specified with a subsequent adverbial/prepositional phrase. For instance, in (5.10c) the adverb *downstream* specifies the direction of the path in relation to the river bank serving as a reference landmark. In the example (5.10d) additional details about the alignment are provided by the subsequent prepositional phrase starting with *along*. The example (5.10e) demonstrates that a prepositional phrase can also specify the goal of a path. The only example found for the verb *pursue* (5.10f) shows that it can be used to express an alignment with a course or direction.

The other class of the constant verbs includes *accompany verbs* (Levin, 1993, Ch. 51.7). In actual motion expressions, they relate to one person accompanying another from place to place. They can be differentiated from one another by the nature of the relation between the two participants, but not by the manner of motion.

ACCOMPANY VERBS: accompany, conduct, convoy, escort, guide, lead, shepherd, usher. (8 verbs)

The search for the accompany verbs in fictive motion expressions returned 247 sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, 149 sentences were identified as valid examples of coextension paths, all for the verb *lead*. A selection of examples found for this verb is presented below.

- (5.11) a. A track leads south on the other side of the road
- b. A minor road leads up into the mountains / A twisting road led down into the bushes
- c. The footpath led across the fields / A walled track leads along the flanks of Great Coum
- d. A short path leads down amongst trees / The road led between lemon groves
- e. A bridge leads over a shallow stream / A track leads under a railway bridge
- f. A gravel road leads through the jungle / A gated road leads past scattered farms
- g. A footpath leads from the back of the hotel to Scheffau village

In the corpus data retrieved from the BNC for the verb *lead*, the spatial configuration of a path is in each case expressed by an adverbial/prepositional phrase used to specify all sorts of spatial relations. For instance, the *direction* of a path can be specified in *cardinal terms*, as in (5.11a). Adverbials can also be used to indicate the *upward* or *downward* direction, as in (5.11b). Moreover, a subsequent prepositional phrase can specify the *across* or *along* relation (5.11c), the *among* or *between* relation (5.11d), the *over* or *under* relation (5.11e), the crossing (*through*) or passing (*past*) relation (5.11f), as well as the *source* and/or *goal* of the path, as in (5.11g).

Moreover, as shown in examples (5.12a–c) below, adverbials can be used to specify the course of a path at the *global* level, e.g. *straight* (5.12a), *uphill* (5.12b), or *downhill* (5.12c), and an additional prepositional phrase can specify the route of the path at the *local* level, which makes the verb *neutral* as to expressing a path configuration (see Nikanne & van der Zee, 2013).

- (5.12) a. The path leads straight into the river
- b. A curving path led uphill between gravestones to the church entrance
- c. The gravel track led downhill into a narrow belt of silver birch and rowan

The data found in the BNC demonstrate that the verb *lead* is extremely versatile in coextension paths. In fictive motion, the original semantics of the verb is erased and it functions as a generic verb of motion, similar to *go* in actual motion. In fictive motion expressions, the verb *lead* is used to mean that the described object “extends in a certain direction”, which indicates that it undergoes *semantic bleaching* (Langacker, 2006; see Seuren, 2013, pp. 17–19; Traugott, 2006 for reviews). Because in fictive motion expressions the verb indicates only the basic extension in space, it must always be accompanied by an adverbial/prepositional phrase, which provides the path-related information (Matsumoto, 1996a).

The corpus data indicate that the above-discussed two types of constant verbs offer two distinct approaches to describing objects with fictive motion. The chase verbs, represented in the corpus data predominantly by the verb *follow*, specify the configuration of a spatially extended object in terms of its alignment with a reference landmark or direction. On the other hand, the accompany verbs, represented in the corpus data by the verb *lead*, specify the configuration of a path with a wide variety satellite expressions including adverbials and prepositional phrases. In more general term, the difference between the chase and accompany verbs can be attributed to a different *construal* (Langacker, 2008a, Ch. 3) of the object described by the speaker. In coextension path expressions including the verb *follow*, the described object is *profiled*<sup>88</sup> (Langacker, 2008a, pp. 66–70) more inertly, as following the configuration of another spatially extended object serving as the landmark. On the other hand, in fictive motion expressions including the verb *lead*, the described object is profiled more actively, as leading the path configuration in a particular course or direction. See (Waliński, 2017d) for a full listing of all sentences retrieved from the corpus for the chase and accompany verbs.

### 5.5.6 Deictic verbs

The final group of directional verbs taken under scrutiny includes *deictic verbs*. This term is usually applied in linguistics to a small set of verbs, whose interpretation relies on the location relative to participants of the communicative act. In English

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<sup>88</sup> Langacker (2008a, p. 66) defines *profiling* as what “stands out as the specific focus of attention within [an expression’s] immediate scope” (see also Langacker, 2012).

this set<sup>89</sup> includes two motion verbs *come* and *go*. Interpreting deictic motion verbs involves perspective-taking, which differentiates them from other motion verbs. According to Talmy (1985, 2000b), deictic motion verbs belong to Path-conflating verbs. He defines them in rather generic terms: “the deictic component of Path typically has only the two member notions ‘toward the speaker’ and ‘in a direction other than the speaker’” (Talmy, 2000b, p. 56).

Fillmore (1975/1997, 1982, 1983) demonstrates the complexity of *coming* and *going* in terms of the deictic parameters of person, place and time. The parameter of *person* includes the speaker and the addressee. The parameter of *place* refers to the source and the goal of motion. The parameter of *time* includes the coding time, i.e. the time of utterance, and the reference time, i.e. the temporal point or period of the event described in a clause. Using these parameters, Fillmore (1975/1997, 1983) proposes a set of “appropriateness conditions” for the use of *come* and *go* in English. He points out that although their uses are largely overlapping, there is a certain area of uses in which only *go* is allowed, and a relatively more restricted area of uses in which only *come* can be used.

The use of the deictic motion verbs has been a popular topic in linguistic studies. Goddard (1997) analyzes the semantics of coming and going using the Natural Semantic Metalanguage (NSM) approach (Wierzbicka, 1996, 2006; Goddard, 2008, 2011; Goddard & Wierzbicka, 2014). His analysis essentially confirms that the lexical semantics of *come* and *go* are compatible with the appropriateness conditions proposed by Fillmore. Rauh (1981) demonstrates that in German, the deictic feature of the verbs *kommen* (come) and *gehen* (go) can be neutralized, if an expression contains an adverbial indicating the source/goal of movement. Wilkins and Hill (1995) question the assumption that *come* and *go* manifest a universal deictic opposition. They argue that what is universally recognized as *go* is not an inherently deictic expression. However, due to systemic opposition with *come*, it often takes on a deictic interpretation through pragmatic attribution. Radden’s (1996) analysis of properties of *come* and *go* demonstrates that the deictic characteristics of these motion verbs is well-suited to be mapped onto a change of state in metaphorical expressions.<sup>90</sup>

<sup>89</sup> The set of English deictic verbs includes, besides *come* and *go*, also *bring* and *take* (Fillmore, 1975/1997; Miller & Johnson-Laird, 1976, p. 539), which are among the most frequently used verbs in common speech (see Biber, Johansson, Leech, Conrad, & Finegan, 1999, pp. 373–380).

<sup>90</sup> Both *come* and *go* have a large number of idiomatic or metaphorical uses in which they refer not to motion but a change of state (e.g. *to come to one’s senses*, *to go awry*). By comparing idiomatic expressions of *come* with those of *go*, Clark (1974) hypothesizes that the deictic motion verbs have evaluative meanings and in figurative and idiomatic uses. The normal state (positive) tends to be the destination of *come*, and abnormal state (negative) tends to be the destination of *go*. In other words, *come* tends to denote entrance into a normal state, whereas *go* departure from a normal state. However, Radden (1996) provides many counterexamples to

Other studies analyzed the role of the deictic center, speaker, addressee, and the entailment of arrival in *come* and *go*. Oshima (2006) proposes to use a contextually salient set of *reference points* instead of a specific entity serving as the deictic center to predict the use of deictic verbs in the discourse. Nakazawa (2007) presents a cross-linguistic analysis of deictic verbs in Chinese, English, Japanese, and Korean, as well as other languages discussed in the literature, to show that the actual characterization of the deictic center is far more complex than suggested by Talmy as “toward the speaker”. In his subsequent study (Nakazawa, 2009), demonstrates that interpretations of deictic verbs across languages coincide with the entailment of arrival, or the lack thereof, which is inherent to the semantics of deictic motion verbs. More recently, Barlew (2017) demonstrates a link between the lexical semantics and pragmatics in the meaning of *come* in English and Bulu, which relates to perspective taking.

DEICTIC VERBS: *come*, *go*. (2 verbs)

The search for these verbs in fictive motion expressions returned 401 sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, 120 sentences were identified as valid examples of coextension paths, including 23 examples for the verb *come* and 97 examples for the verb *go*. A selection of examples found for the verb *come* is presented below.

- (5.13) a. The pipeline comes from Loch Katrine to supply water from Glasgow
- b. The path came out of the wood at the other end within a very short distance of her own house
- c. The railway comes into the town from Glasgow
- d. A mile beyond Arnisdale the road comes to a full stop at the crofts of Corran
- e. The railway line came round and in front, actually just in the front here

In fictive motion, the semantics of the verb *come* suggests that the described object extends towards the deictic centre, which actually reflects the conceptualizer’s direction of mental scanning in building up a cognitive representation of the spatial configuration of a path (Langacker, 2005, p. 168; Matsumoto, 1996a, p. 186). In the corpus data, the specific configuration of a coextension path expressed with the verb *come* is specified by prepositional and adverbial phrases. A prepositional phrase can indicate the starting point of a path (5.13a), or a place where a path emerges out of the surroundings (5.13b). A prepositional phrase can also specify both the goal and source (5.13c). As demonstrated by (5.13d), the end point of a path is not necessarily the location of the speaker. An adverbial phrase can also specify that a path leading towards the deictic centre takes a circular course, as in (5.13e).

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this principle. Schönefeld’s (2013) collocation analysis indicates that the deictic motion verbs have acquired semantic prosodies in figurative expressions.

The examples found in the corpus indicate that while the deictic orientation of a path can generally be predicted from the verb semantics, the orientation of a path towards the location of the speaker can only be recognized if a fictive motion expression does not indicate the goal of motion. It is because the adverbial/prepositional phrase can anchor the deictic centre in a place other than the location of the speaker. This can be explained by anchoring rules explicated for the verb *come* by Barlew (2017). The *perspective-only anchoring* rule states that the use of *come* is accepted, if the speaker's anchor perspective is centered at the destination, even if the speaker himself/herself is not located at that place. The *complement-defined anchoring* rule states that the location on which the speaker's anchor perspective is centered is defined in terms of the path-prepositional complement of *come* (Barlew, 2017, p. 326). Accordingly, interpreting the meaning of *come* in discourse involves the retrieval of a salient perspective from the context and the evaluation of the anchoring implication according to that perspective.

The verb *go* was found to be used much more frequently in fictive motion. The higher rate of occurrence can be attributed to a wider range of its senses, which expand far beyond the deictic meaning. As pointed out by Wilkins and Hill (1995, p. 215), *come* and *go* "do not always, or even typically, occur as a basic linguistically defined two-element subsystem of a language". Their mutual opposition in deictic terms arises from the pragmatic attribution through the traditional interpretation. According to tables provided in Biber, et al. (1999, pp. 373–378), the verb *go* ranks third in terms of frequency among all lexical verbs in English (after *say* and *get*) and is particularly common in conversation and fiction. It systematically outranks *come*, which occupies the seventh overall position, across all analyzed registers. A selection of examples found for the verb *go* in fictive motion is presented below.

- (5.14) a. The road goes forward along Glen Tarbert / [In the other direction] the valley goes back for miles and miles
- b. The path goes left towards a metal gate / The route goes right to Dunsdale Farm
- c. The connecting wire goes straight up your back / The trail goes steeply down
- d. The route goes north to follow the road going to the west
- e. A bridge goes across the river / The main route goes along a narrow elevated ridge
- f. From the river the trail goes to Beeston Crag / From Meadow Car Park, the way goes towards Felbrigg
- g. The railway line goes into a shallow tunnel / The tube goes inside the tank's hood
- h. The last section of the path goes over Alderton Hill / The road goes under the recent extension of the runway
- i. Cliff Lane goes past the old school / The road goes through the woodlands
- j. The path goes on to pass through Binswood / The main road goes on to cross the river

In fictive motion, the verb *go* can be considered a *generic motion verb* (see Langacker, 1991/2002, p. 155), which makes it very flexible. With an accompanying adverbial/adpositional phrase it can be used to describe spatial objects extending in the six primary directions: *forward* or *back* (5.14a), *left* or *right* (5.14b), *up* or *down* (5.14c). A direction can be also specified in cardinal terms, as in (5.14d). An adverbial/adpositional phrase can specify the path course that goes *around*, *behind*, *across* or *along* (5.14e), as well as *straight* or *steeply* (5.14c). Adpositional phrases can also indicate both the source and/or the goal of the path (*from...to*) or the direction (*from...towards*) of its course, as in (5.14f). A prepositional phrase can be used to specify that a path enters *into/inside* an area (Lakoff & Núñez, 2000, pp. 39–40; Dewell, 2005), as in (5.14g). However, no examples of the *out of* relation were found (cf. the example (5.13b) found for the verb *come*). A prepositional phrase used with the verb *go* can also specify the configuration of a path with respect to other spatial objects on the vertical plane (*over/under*), as in (5.14h), as well as the relation of passing (*past*) or crossing (*through*), as in (5.14i). In fictive motion, the verb can also take the “GO-to-VP” construction (Matsumoto, 2010; Newman & Lin, 2007), in which the infinitival clause following the verb expresses a purpose, such as *following* (5.14d), *passing* (5.14j), *crossing* (5.14j) or *joining* another path.

The data retrieved from the corpus indicate that in fictive motion the verb *go* essentially means that the described object extends from one location to/towards another. However, because the verb as such does not provide any details about the spatial configuration of a path, the direction and other details relevant to the configuration of a path in space must always be expressed by an adverbial/prepositional phrase (Matsumoto, 1996a). This property of conflating only the essence of motion can be attributed to *semantic bleaching* (Langacker, 2006; Lichtenberk, 1991; Sweetser, 1988; see Seuren, 2013, pp. 17–19 for an overview; Traugott, 2006 for positioning in the context of semantic change). See (Waliński, 2017e) for a full listing of all sentences retrieved from the corpus for the deictic verbs of motion.

## 5.6 Directionality in fictive motion

Altogether, 40 directional verbs of motion were analyzed in this chapter. For the selected landmarks, 6,400 combinations were checked (80 landmarks × 80 past/present verb forms). For this pattern, 1,378 sentences were found in the BNC. They were reviewed to exclude coincidental matches, for instance, compound nominals, e.g. “desert rose”, “mountain guides”, “railway tracks”, or sentences like “There is little natural forest left in western Europe”, etc. As a result, 672 sentences were recognized as valid examples of coextension paths. They include

examples of fictive motion expressions for the following 24 verbs: *approach* (3), *arrive* (3), *ascend* (4), *climb* (32), *come* (23), *cross* (63), *depart* (2), *descend* (20), *dive* (1), *drop* (20), *enter* (14), *fall* (10), *follow* (57), *go* (97), *lead* (149), *leave* (19), *pass* (82), *plunge* (2), *proceed* (2), *pursue* (1), *reach* (21), *return* (2), *rise* (44), and *tumble* (1). Queries used to retrieve the examples from the BNC are listed in Appendix to this chapter. Full listings of all sentences retrieved from the corpus, with those recognized as valid instances of fictive motion marked, are publically available for download as research reports for *source/goal verbs* (Waliński, 2017a), *unbounded path verbs* (Waliński, 2017b), *relations of routing* (Waliński, 2017c), *chase* and *accompany verbs* (Waliński, 2017d), and *deictic verbs of motion* (Waliński, 2017e) in coextension path expressions.

What emerges from the above-presented survey is that the directional verbs are used in fictive motion to express several types of spatial relations, which are summarized in the following Table 5.1.

Table 5.1 Summary of spatial relations expressed with directional verbs in fictive motion

<b>Spatial relation</b>	<b>Verb (no. of examples)</b>
generic extension in space	go (97), lead (149)
crossing / passing	cross (63), pass (82)
source / goal	leave (19), depart (2) / arrive (3), enter (14), reach (21)
upwards / downwards	ascend (4), climb (32), rise (44) / descend (20), dive (1), drop (20), fall (10), plunge (2), tumble (1)
forwards	proceed (2)
towards another landmark	approach (3)
to(wards) the deictic centre	come (23)
return to the starting point or a previously followed direction	return (2)
alignment with another landmark	follow (57)
alignment with a direction	pursue (1)

Table 5.1 lists basic types of spatial relations expressed with the directional verbs in fictive motion. According to the data found in the BNC, within this category of predicates, the verb most frequently used in coextension paths is *lead*. With 149 examples, it noticeably outscores *go*, which ranks second, with 97 examples found in the corpus. What links these two verbs is that they are essentially stripped of their semantics in fictive motion. They indicate that the path occupied by the described object extends in a certain direction. However, neither the direction or goal is conflated by the verb semantics. Because the lexical semantics of *lead* and *go* in fictive motion does not convey any information about the configuration of a path in space, these verbs must always be accompanied in coextension path expressions with a satellite phrase providing details about the path (Matsumoto, 1996a, p. 194).

Both *lead* and *go* can be considered *neutral* as to expressing the course of a path in space (Klippel, Tenbrink, & Montello, 2013; Nikanne & van der Zee, 2013). However, because *go* tends to be associated with the deictic perspective (Fillmore, 1975/1997, 1983; Rauch, 1981; Wilkins & Hill, 1995), it was not found to express configurations construed as extending towards the deictic centre. Coextension paths conceptualized as emerging “out of” the background surroundings towards the deictic centre tend to be expressed with the verb *come*, which was found 23 times in the corpus data.

In terms of frequency in the corpus data, the neutral verbs are followed by *pass* and *cross*, which rank second and third, with 82 and 63 examples found respectively in the corpus. Both of them are very flexible in fictive motion. Not only can *cross* and *pass* replace each other in coextension paths (*pass through/across* vis-à-vis *cross beside/next to*), but they can also express a variety of relations between the path and the ground being crossed specified with prepositional/adverbial phrases.

What links the next group of directional verbs in fictive motion expressions is that their lexical semantics specifies the course of a path as extending *upwards/downwards*, in spite of different syntactic patterns they follow. For the upward direction, this group includes the verbs *rise*, *climb*, and *ascend*, for which 80 examples were found in the BNC. For the downward direction, this group includes the verbs *descend*, *drop*, *fall*, *plunge*, *tumble*, and *dive*, represented by 54 examples. However, the frequency of the latter three in the corpus data indicates that they tend to be used more occasionally in fictive motion.

From the perspective of the corpus data, the verbs whose semantics lexicalizes an unbounded path on the horizontal plane appear to be relatively scarce in fictive motion. No examples of verbs expressing the *backward* direction were found. The *forward* direction is represented by 2 examples found for the verb *proceed* and 3 examples found for the verb *approach* used to express that a coextension path extends towards a reference landmark. It is noteworthy that although the lexical semantics of these verbs expresses an unbounded path, it can be restricted by specifying the source/goal with a prepositional phrase.

Another group of predicates used in fictive motion expressions includes verbs that express bounded paths. The *goal verbs* lexicalize paths that extend to a reference landmark. They include *arrive (at)*, *enter*, and *reach*. Moreover, the verb *return*, can be used in fictive motion expressions to specify that the described path either returns to the starting point or resumes the previously followed direction further along its course in space. On the other hand, the *source verbs* lexicalize paths that extend from a reference landmark. They are represented by the verbs *leave* and *depart*. Their frequency indicates that they are not as frequent in fictive motion as the goal verbs, which appears to mirror a general preference given to goal rather than source expressions in the conceptualization of actual motion events (Lakusta & Landau, 2005; 2012; Papafragou, 2010; Stefanowitsch & Rohde, 2004).

Another verb frequently used in fictive motion expressions is *follow* represented by 57 examples in the corpus data. It specifies an overall path configuration in terms of alignment with another reference landmark expressed by the direct object. The verb *pursue*, which was found once in the corpus data, can be used in a somewhat similar way. However, it was found to express the alignment of a path with a direction instead of a reference landmark.

What can additionally be observed in the corpus data is that a series of directional verbs belonging to different categories can be used to describe more complex configurations of a path, as shown in the examples (5.16a–b) below.

(5.16) a. The last section of the path goes over Alderton Hill, passes through Gretton and climbs over Langley Hill

b. After passing a pier and following the water's edge for a mile, the road climbs to a higher level and reaches a bridge

In the example (5.16a) the path configuration is characterized with the *above/across path-segment profiling* expressed by “go over” (Dewell, 1994; Kreitzer, 1997; Lakoff, 1987a, pp. 416–461), which is followed by *crossing*, curiously enough expressed with “pass through”, and then the upward direction is specified with the verb “climb”. In the example (5.16b) the path configuration initially includes *passing* and *alignment* with a reference landmark, then the path “climbs” *upwards*, and finally “reaches” the *goal*. Conjunctions of this kind work as long as their composition is not tautological or provides contradictory information about a path configuration in space (see Nikanne & van der Zee, 2013 for a review of restrictions on motion verb combinations in Dutch and Finnish).

What emerges from the analysis of the corpus data at this stage of the study is that the verbal semantics in fictive motion can be successfully accounted for in terms of Jackendoff's (1983, 1990, 2002) conceptual semantic model discussed in Section 2.6. Jackendoff argues that the verbs used in fictive motion expressions are, as a matter of fact not verbs of motion, but instead verbs of *extent*. Accordingly, coextension paths should be approached as expressions of state, which express the *state of spatial extension*. The above-presented survey of directional verbs in fictive motion demonstrates that they are used to describe *bounded paths*, which are typically expressed with the source and goal verbs, *unbounded paths* extending in all sorts of directions on the horizontal and vertical plane, and *routes*, which are expressed either directly or in terms of alignment with another reference landmark. Thus, coextension path expressions with directional motion verbs can be interpreted as signifying that the described object *extends* over the particular PATH in space. The next step in the analysis is to see if this model fares equally well with verbs of motion manner, which are discussed in the following chapter.

## Appendix to Chapter 5

### LISTINGS OF CORPUS QUERIES

This study is based on the BNC World edition published in 2001. The corpus was searched with *SlopeQ for the BNC*, which is a search engine for the British National Corpus data. A vertical bar symbol (|) indicates logical “AND”. For example, the query “road goes|went” substitutes for two separate queries “road goes” and “road went”.

a) Search for coextensions paths including SOURCE/GOAL VERBS: *arrive, depart, enter, exit, leave, reach, return*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|row|palisade|rampart|wall  
arrives|arrived|departs|departed|enters|entered|exits|exited|leaves|left|reaches|reached|returns|returned

b) Search for coextensions paths including UPWARD/DOWNWARD VERBS: *ascend, climb, descend, dive, drop, fall, plunge, rise, tumble*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|row|palisade|rampart|wall  
ascends|ascended|climbs|climbed|descends|descended|dives|dived|dove|drops|dropped|falls|fell|plunges|plunged|rises|rose|tumbles|tumbled

c) Search for coextensions paths including FORWARD/BACKWARD VERBS: *advance, approach, proceed, retreat, recede, withdraw*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|row|palisade|rampart|wall  
advances|advanced|approaches|approached|proceeds|proceeded|retreats|retreated|recedes|receded|withdraws|withdrew

d) Search for coextensions paths including ROUTE VERBS: *cross, pass*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedgegrow|palisade|rampart|wall crosses|crossed|passes|passed

e) Search for coextensions paths including CHASE VERBS: *follow, pursue, shadow, tail, track, trail*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedgegrow|palisade|rampart|wall

follows|followed|pursues|pursued|shadows|shadowed|tails|tailed|tracks|tracked|trails|trailed

f) Search for coextensions paths including ACCOMPANY VERBS: *accompany, conduct, convoy, escort, guide, lead, shepherd, usher*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedgegrow|palisade|rampart|wall

accompanies|accompanied|conducts|conducted|convoys|convoyed|escorts|escorted|guides|guided|leads|led|shepherds|shepherded|ushers|ushered

g) Search for coextensions paths including DEICTIC VERBS: *come, go*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedgegrow|palisade|rampart|wall comes|came|goes|went

## Chapter 6

# Manner and instrument in fictive motion

A squirrel walking in its wheel is performing a movement that can be very fast, but the wheel is not fastened to its axle and so moves under the squirrel's feet such that the squirrel does not obtain any displacement and always ends up in the same spot. His fate is comparable to that of a cycling mannequin who pedals incessantly on a suspended bicycle in a sports shop window. The wheels spin in midair because they have no contact with the ground. The cyclist makes a movement, but he undertakes no displacement.

L. Tesnière (1959/2015), *Elements of Structural Syntax*, p. 311

### 6.1 Manner in motion semantics

The notion of *manner* has not been fully systematized in the semantic studies of motion. Tesnière (1959/2015, pp. 311–313) makes a distinction between *movement* and *displacement* (cf. Descartes, 1644/1985b, Part II). He defines displacement as the goal pursued and movement as the means of obtaining the displacement. He points out that it is possible to imagine their disassociation, i.e. to imagine displacement without movement (sitting immobile in a train compartment throughout the entire journey), as well as movement without displacement (a squirrel running in a wheel). If the problem is reduced to its essentials, displacement is *extrinsic*. It focuses on the space in which a change of location occurs. On the other hand, movement is *intrinsic*, which means that the nature of movement is tied to the physical conditions of its subject.

The movement of each creature depends not on the destination, but on its physical possibilities and realities. This is why there are as many different movements as there are different bodies and why they are as complex as the structure of these bodies. These movements are expressed in vocabulary by an indefinite number of highly specialized verbs, such as *marcher* 'walk', *courir* 'run', *trotter* 'trot', *galoper* 'gallop', *sauter* 'jump', *sautiller* 'hop', *ramper* 'crawl', *slither* 'fly', *nager* 'swim', etc. (Tesnière, 1959/2015, p. 311)

He adds that whereas the movement can be pretty and graceful, for example, the movement of a dancer, the displacement depends on solid geometry in space, thus does not have any aesthetic, only mathematical value.

Miller & Johnson-Laird (1976, pp. 547–554) associate different manners of movement with agents of motion, more specifically with the body as the conceptual core for bodily movements. Since various body parts are capable of characteristic movements, they are used as a model for describing motions. As another psychological dimension relevant to differentiating the manners of motion they distinguish velocity.

In his initial publication on the lexicalization patterns of motion events, Talmy (1985, p. 128) defined the manner of motion as “a subsidiary action or state that a Patient manifests concurrently with its main action or state”. Slobin (2006, p. 62) points out that this designation is rather generic and may serve as an umbrella term for a number of various dimensions, for instance *motor pattern*, e.g. hop, jump, skip; *rate of motion*, e.g. walk, run, sprint; *attitude*, e.g. amble, saunter, stroll; *force dynamics*, e.g. step, tread, tramp, and so forth. However, an extensive body of experimental research conducted subsequently on the lexicalization patterns across different languages (e.g. Gennari, Sloman, Malt, & Fitch, 2002; Papafragou, Hulbert, & Trueswell, 2008; Papafragou, Massey, & Gleitman, 2002, 2006; see Section 1.8) focused predominantly on how and to what extent the Satellite- and Verb-framed languages encode respectively Path or Manner without paying much attention to lexical meanings of different verbs of motion (see Pourcel, 2010 for a criticism).

Oakley (2007, pp. 231–232) points out that diagrams used for image-schematic representation of motion in cognitive linguistic literature (e.g. Dewell, 1994; Langacker, 1987, 2008a; Mandler, 1992) typically include simple (straight or curved) lines that mark the trajectory. However, such representations omit to distinguish between different manners of motion. He adds that although the manner of movement seems to be an important element of the image schema theory, it remains largely underspecified, which overlooks even the basic distinctions between SELF-MOTION and CAUSED MOTION, as well as ANIMATE MOTION and INANIMATE MOTION recognized by Mandler (1992, 2004) as fundamental to our conceptions of motion. Slobin (2004, p. 255) describes the state of affairs in motion studies rather harshly: “*Manner* covers an ill-defined set of dimensions that modulate motion, including motor pattern, rate, rhythm, posture, affect, and evaluative factors”. More recently, Mani and Pustejovsky (2012, p. 48) remark in more diplomatic terms that “Using the notion of ‘manner’ to distinguish types of movement in language has been a mixed bag, at best”.

Dodge and Lakoff (2005) accentuate that motion descriptions convey information which expands beyond the basic schemas of motion discussed in Section 1.5. For instance, sentences such as “She *sprinted*” or “We *strolled* arm in arm” do not specify the properties of the movers or their destinations. Instead, *sprint* indicates that the mover is running fast and *stroll* indicates that the mover is walking slowly and leisurely. Some verbs of this type describe basic manners of human gait, e.g. *amble*, *march*, *saunter*, *stride*, etc., others describe types of running, e.g. *jog*, *run*, *sprint*, etc., yet some others refer to various forms of jumping, e.g. *jump*, *hop*, *leap*, etc. They specify information related to the basic gait or general rhythm of muscular activity of the mover, which in some cases indicates also different speeds of motion. Another distinguishing element relates to the amount of effort needed to execute motion, which is often correlated with modifications of gait in response to adverse conditions of the surroundings. For instance, the verb *slog* typically indicates some sort of wet or marshy surface. Dodge and Lakoff (2005, p. 68) propose that different types of semantic information related to mover, gait, speed, effort, and body part can be approached as elements constituting collectively a more complex schema of LOCOMOTION. They assume that this schema enables us, for instance, to infer that if a person is *trudging*, they are not *running*, but moving in a manner more effortful than it would be if they were *strolling*, and so on.

Johnson (2007, p. 21) points out that a *walk* is defined not only by the internal structure of SOURCE–PATH–GOAL image schema, but also by specific dynamic qualities. He distinguishes four essential *qualitative dimensions* of bodily movements: (1) *tension* – different motions involve different levels of exertion and energy; (2) *linearity* – every move creates a path of motion (actual and projected), e.g. linear or curved, jagged or smooth, up or down; (3) *amplitude* – motions can be performed with various amplitudes, which, depending on the available space, may be contractive or expansive; (4) *projection* – violent propulsions have different vectoral quality from gradual, continuous exertions of force (Johnson, 2007, pp. 22–24).

Jackendoff (2012, p. 1142) emphasizes the need to identify various manners of motion. He points out that English verbs used to refer to different manners of motion can be ascribed to several subcategories, which include: (1) types of motion that can be attributed to any sort of object, e.g. *bounce*, *float*, *glide*, *roll*, *slide*, etc.; (2) types of locomotion, e.g. *fly*, *run*, *swim*, *slither*, *walk*, etc.; (3) specific types of bipedal locomotion, e.g. *waddle*, *dance*, *stagger*, *shuffle*, *limp*, *jog*, *sprint*, etc.; (4) types of motion without changing overall position, e.g. *rotate*, *shake*, *twirl*, *wave*, *wiggle*, etc.; (5) types of shape change, e.g. *elongate*, *grow*, *shrink*, *widen*, *twist*, etc. He emphasizes that spatial structure must provide means for encoding and identifying each of these motion types.

As discussed in Section 1.7, the S-languages tend to convey the semantics of manner with a wide variety of different verbs. Slobin (1997, p. 459) proposes to distinguish “a ‘two-tiered’ lexicon of manner verbs: the neutral, everyday verbs – like *walk*, *fly*, and *climb*, and the more expressive or exceptional verbs – like *dash*, *swoop*, and *scramble*. In the S-languages, the second tier is extensive and elaborated, making distinctions that do not play a role in the considerably smaller second tiers of V-languages”. Slobin (2004, 2006) suggests that in the S-languages the first-tier verbs can be approached as classificatory<sup>91</sup> with reference to distinguishing basic types of creatures: birds *fly*, fish *swim*, humans *walk*, snakes *slither*, etc. In English, which belongs to the S-language group, they are accompanied by a large collection of the second-tier verbs, which elaborate manner details.

## 6.2 Semantic models of motion manner

In his decompositional approach to semantics, Jackendoff (1983, 1990; see Section 2.6) discerns different classes of motion verbs whose members differ primarily by information about manner. In the initial publication, Jackendoff (1983), assumes that verbs of locomotion, such as *walk*, *run*, *lope*, *jog*, *sprint*, *scurry* share a common element, which is basically movement in physical space (optionally along a path). At the same time, these verbs represent a particular visual and/or motor pattern that specifies a characteristic gait and speed. However, he sees their semantic distinctions as difficult to pin down other than impressionistically: “In this respect they resemble the color words, which also are grammatically homogeneous and can be really distinguished only by ostension” (Jackendoff, 1983, p. 149).

However, in his subsequent book on the semantic structures, Jackendoff (1990) offers a solution for the distinction between different verbs of motion manner. He proposes to distinguish two basic components of lexical meaning: (1) *Conceptual Structure*, which captures the syntactically relevant aspects of a word’s meaning (see Section 2.9); and (2) *3D model representation*, which he proposes to ground in Marr’s (1982/2010) theory of vision. The theory assumes that visual categories can be encoded in the format of 3D model structures, which include a viewpoint-independent geometric representations composed of a part-whole structure and an axis around which it structured. These two components can be parameterized to distinguish between different three-dimensional objects/manners of motion (see Jackendoff, 1996b, 2012; Landau & Jackendoff, 1993; Marr & Vaina, 1982).

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<sup>91</sup> In contrast, Verb-framed languages typically use a neutral verb of motion to designate a creature’s normal manner of movement: birds *go*, fish *go*, cats *go*, etc. Manner verbs are used only when manner of motion is foregrounded, but even then birds can *soar* or *flap* only if no boundaries are crossed (Özçalışkan, 2013; Slobin & Hoiting, 1994).

Jackendoff (1990, pp. 34, 88) argues that this approach should enable us to distinguish between verbs such as *run*, *jog*, and *lope*, which are syntactically parallel, i.e. share the same conceptual structure, but at the same time differ in the 3D model representations. Because for Jackendoff it is the conceptual structure that constitutes the proper object of semantic enquiry,<sup>92</sup> further inquires into the manner of motion have been effectively suspended in his later studies.

Jackendoff's (1990) approach to the manner of motion is criticized by Taylor (1996), who argues that the difference between *jogging* and *running* cannot be distinguished exclusively on the basis of the 3D model representations, i.e. in terms of the shape of movements that a person makes. He suggests that a full account of the semantics of these verbs should be characterized against a stereotyped conception (or an *idealized cognitive model* (ICM) in Lakoff's (1987a) terms). On this account, the activity of jogging is associated with a certain lifestyle, which emphasizes fitness and physical well-being among its values and attitudes. This lifestyle, which is embraced typically by the middle class members in affluent societies,<sup>93</sup> provides for a number of characteristics of jogging, as opposed to running.

The jogger jogs for exercise; jogging is not a competitive activity; one does not jog to beat a world record, or even to beat one's fellow joggers. Neither does one jog in order to arrive at some destination. (If the stereotypical jogger needs to get some place, he takes the BMW.) Of course, when jogging, the jogger has to jog somewhere, in the sense that he has, perforce, to jog along some route, and past various places along this route. But the specific route, and the specific places that the jogger passes, are quite incidental to the activity *per se* (Taylor, 1996, p. 26).

On the other hand, running has a much broader range of uses. Essentially, it is a manner of locomotion whose essential aspect is speed. Although one can run for exercise, which provides a degree of overlap between the verbs *run* and *jog*, typically one runs to a place because they need to get there quickly, which provides the basis for running as a competitive sporting activity. Taylor (1996, p. 28) points out that it has some consequences for the syntactic environments in which the respective verbs occur. For instance, one can obviously "run a race", which is genuinely transitive permitting passivization, but not "?jog a race". Accordingly, we can say "The race will be run tomorrow", but the statement "?The race will be jogged tomorrow" sounds conceptually incoherent because it contradicts the noncompetitive nature of jogging.

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<sup>92</sup> Jackendoff (1990, p. 88) emphasizes that "visual distinctions of 'manner of motion' (or at least a great many of them) are not the business of conceptual structure at all", therefore they are relegated to the lexicon, which deals with a more refined shape/manner structure encoding.

<sup>93</sup> Taylor (1996, p. 26) notes that "People in dirt-poor third-world communities, who have to trek long distances each day just to get water and fuel, are not likely to take up jogging".

In broader terms, Taylor's (1996) study demonstrates that although at a more fine-grained level of analysis the differences between the verbs of motion manner cannot be fully accounted for by coupling the syntactically relevant aspects with the 3D model representations.

In his reply, Jackendoff (1996a) admits that he overlooked the syntactic difference between "run/\*jog a race". He adds, however, that this transitive use of the verb *run* is highly limited and in this case the verb does not refer to running *per se*. At the same time, Jackendoff (1996a) sees other parts of the commentary, which demonstrate conceptual oddness without syntactic violations, as resulting from selectional constraints (cf. Katz & Fodor, 1963; Resnik, 1996; Wilks, 1975), but not flaws in the conceptual conditions of his framework. Jackendoff (1996a, p. 104) explains that he proposed to use Marr's (1982/2010) model because it offered a detailed and perceptually motivated solution to encode these aspects of word meaning that expand beyond the standard feature decomposition. He adds that this line of formal investigation has not been actively pursued after Marr's premature death.<sup>94</sup>

The problem of mapping different motion manners onto different geometric and topological properties was taken up more recently by Mani and Pustejovsky (2012). In their computational approach to motion semantics, the manner is not considered a unique factor in characterizing motion, but instead is viewed as a specification or modification of other basic semantic components: "There is no manner field in defining motion. The characterization of manner is merely the modification of other aspects of the motion frame" (Mani & Pustejovsky, 2012, p. 49).

As an important part of their proposal of formal description, they adopt the model called Region Connection Calculus 8 (RCC-8) used for defining static spatial relations (Randell, Cui, & Cohn, 1992; Cohn, Bennett, Gooday, & Gotts, 1997). It identifies eight jointly exhaustive and pairwise disjoint relations between two spatial regions X and Y illustrated in Figure 6.1: (1) Disconnected (DC); (2) Externally Connected (EC); (3) Partial Overlap (PO); (4) Equal (EQ) – X and Y occupy the exact same Euclidean space; (5) Tangential Proper Part (TPP) – X is inside Y and touches the boundary of Y; (6) Non-tangential Proper Part (NTPP) – X is inside Y and does not touch the boundary of Y; (7) Tangential Proper Part Inverse (TPPi) – Y is inside X and touches the boundary of X; (8) Non-tangential Proper Part Inverse (NTPPi) – Y is inside X and does not touch the boundary of X.

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<sup>94</sup> David Marr died of leukemia in 1980 at the age of 35. His book *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information* was published posthumously in 1982. It was subsequently re-issued by the MIT Press in 2010.

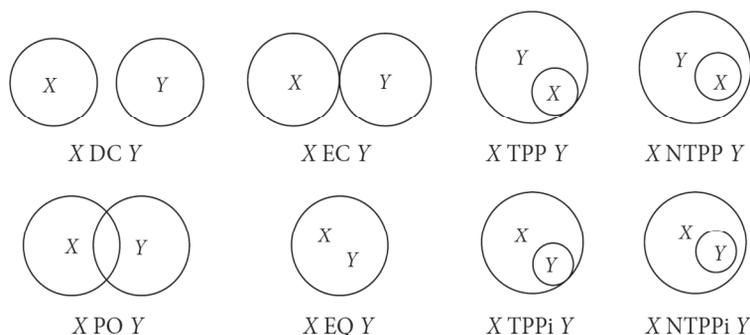


Figure 6.1 RCC-8 calculus relations

On the basis of the RCC-8 topological constraints that hold between the Figure and Ground during the movement, Mani and Pustejovsky (2012, Ch. 2.4) propose to differentiate different manner predicates. For example, while the verb *slide* is characterized by the mover being Externally Connected (EC) with respect to the earth, for the verb *fly* the mover is Disconnected (DC) with respect to the earth. Additional manners can be distinguished by taking into account whether the topological relation is constant throughout the process of motion. For instance, with the verb *bounce* the mover is Externally Connected (EC) with respect to the ground, which is followed by it being Disconnected (DC) with respect to the ground. By additionally taking into consideration whether the movement involves all of the figure or only a part thereof, distinguishing four basic classes of motion (translation, rotation, oscillation, deformation), and taking into account the medium in which the figure moves (air, water, solid), it is possible to bring out some of the different manners of a movement.

It must be borne in mind, however, that the formal description of motion semantics proposed by Mani and Pustejovsky (2012) was developed for the sake of an elaborate componential model of representation applicable in computational applications. Some qualitative properties of motion such as *speed* or *effort* are not covered in their approach. They do not address directly representations of fictive/metaphorical motion, either, although these are considered worthwhile topics to be tackled in future studies (Mani & Pustejovsky, 2012, pp. 144–145).

As already mentioned in the previous chapter, an important line in the investigation of motion verb semantics is carried out by Levin and Rappaport Hovav (1991, 1992, 2006, 2013, 2014; Rappaport Hovav & Levin, 1998, 2010). Levin and Rappaport Hovav (2005; Rappaport Hovav & Levin, 1998) assume that the semantic structure of verbs can be decomposed into two basic components: a generic component representing an event type, such as ACT/DO, CAUSE, BECOME, GO or

STAY, which they term *event schema*, and an idiosyncratic component of verb meaning, which they term *root* (cf. Jackendoff, 1990; Hale & Keyser, 2002). A root's most important property is its ontological type, which includes a relatively small set of properties such as state, result, thing, surface/container, manner, and instrument. Roots may be integrated into event structures in two ways: a root may fill an argument position associated with a primitive predicate or it may serve as a modifier of a predicate (Levin & Rappaport Hovav, 2005, pp. 70–75).

Levin and Rappaport Hovav (2005, p. 72) propose that modifier roots might be appropriate for distinguishing verbs of motion manner, such as *walk*, *run*, *skip*, and *jog*. Because manners can be viewed as modifiers of activity predicates, a root of the ontological type “manner” is represented as a modifier. A common representation<sup>95</sup> for the verbs of manner is [x ACT<MANNER>], e.g. *jog*: [x ACT<JOG>]. On this account, all manner of motion verbs share the basic event structure template consisting of the predicate ACT and a manner root.

Rappaport Hovav and Levin (2010) propose that a verb root can only be associated with a single category in an event schema: “a root has only one ontological category even if the meaning components that determine its categorization are themselves very complex” (Rappaport Hovav & Levin, 2010, p. 34; see Section 5.4). Although a root of manner can involve many meaning components, it is still associated with a single ontological category because the actual content of the root does not matter. For instance, the motion manner verb *tango*, which basically means to perform this specific dance, is obviously associated with more lexical entailments than the verb *dance* itself. However, from the perspective of their common ontological category *tango* is no more complex than *dance*: both are manner verbs.

### 6.3 Verbs of motion manner

According to Levin and Rappaport Hovav (2006, 2013, 2014; Rappaport Hovav & Levin, 1998, 2010) verbs of motion manner specify *non-scalar changes*. A non-scalar change cannot be specified in terms of an ordered set of values of a single attribute. Non-scalar changes typically involve a combination of multiple changes for which there is no single, privileged scale of change. As non-scalar, verbs of motion manner are not lexically associated with any particular change. Although they entail change,

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<sup>95</sup> Levin and Rappaport Hovav (2005, p. 77) note that in their approach, the primitive predicate ACT is modified by a manner root, which contrasts with Hale and Keyser's (1993, 2002) analysis of comparable verbs. Hale and Keyser treat the root as the argument of the predicate DO, roughly comparable to ACT, as in [x DO <JOG>]. This approach receives support from Basque and some other languages, where the counterparts of activity verbs are expressed using the verb meaning ‘do’ plus a noun.

as all dynamic verbs do, the change is not directed along a particular path. For instance, the manner verb *walk* describes an action involving a specific pattern of movements of legs, which are different from the pattern associated with *run*, but collectively these movements do not represent a motion in a particular direction (see Goddard, Wierzbicka, & Wong, 2017). Neither is any one element in the pattern privileged as being the starting point of motion: one can start running by moving the left or the right leg first (see Dowty, 1979/1991a, p. 171 for a parallel observation with respect to *waltzing*).

In her earlier work, Levin (1993, p. 264), characterizes verbs of motion manner as follows: “These verbs describe motion that typically, though not necessarily, involves displacement, but none of them specifies an inherent direction as part of its meaning. All of these verbs have meanings that include a notion of manner or means of motion”. Levin (1993, pp. 264–270) distinguishes two classes of these verbs that differ from each other in terms of the specific manner or means.

- (1) *Roll verbs* generally relate to manners of motion characteristic of inanimate entities. They describe motion that typically (though not always) involves displacement. None of them indicates the direction of motion without an additional prepositional phrase. Many of the *roll verbs* that describe motion around an axis take a restricted range of prepositions describing the path of motion (Levin, 1993, Ch. 51.3.1). Examples include: *bounce, drift, drop, float, glide, roll, slide, swing, coil, revolve, rotate, spin, turn, twist, whirl, and wind*.
- (2) *Run verbs* typically describe different manners of motion of animate entities, but some of them may be used to describe the movement of inanimate entities, too. Generally they describe displacement in a particular manner or by a particular means without specifying the direction of motion, unless they are accompanied by an explicit directional phrase. Examples include: *crawl, creep, dart, dash, fly, gallop, hasten, hike, hop, hurry, jog, journey, jump, leap, march, parade, plod, prowl, race, roam, run, rush, skip, sneak, speed, stagger, stomp, stride, stroll, stumble, sweep, swim, tiptoe, travel, trek, waddle, walk, wander, and zigzag*. Levin (1993, Ch. 51.3.2) notes that this category probably requires a further subdivision.

Levin (1993, Ch. 51.5) distinguishes also a related class of *waltz verbs*, which are zero-related to names of dances and mean roughly “perform the dance”. She notes that basically any dance name gives rise to a zero-related verb of this type and that verbs taking their names from dances involving partners appear to show slightly different behavior from those that do not. Examples include: *dance, jive, polka, samba, tango, waltz*, etc. Although distinguishing classes of manner verbs on the basis of syntactically salient properties of the verb with reference to argument and

adjunct makes a rational line of studies, there is no fully established consensus among scholars as to the types of semantic components relevant to the manner of motion (see Slobin, et al., 2014 for a relatively recent discussion).

Goddard, Wierzbicka, and Wong (2017; see also Goddard, 2011, Ch. 9.1) propose to use the methodology of Natural Semantic Metalanguage (NSM) (Wierzbicka, 1996, 2006; Goddard, 2008, 2011; Goddard & Wierzbicka, 2014) for the examination of motion manner verbs across languages. They present detailed semantic explications of the conceptual semantics of two manner verbs *walk* and *run* in English and their nearest counterparts in German. They argue that previous attempts to describe these meanings taken by other researchers (e.g. Jackendoff, 1990), use metalanguage<sup>96</sup> that is “too dependent on technical or English-specific concepts to plausibly represent the naive conceptualisation of ordinary speakers” (Goddard, Wierzbicka, & Wong, 2017, p. 304).

They assume that verbs of human locomotion can be expected to follow a semantic template similar to other physical activity verbs (see Goddard, 2011, Ch. 9), which falls into four broad sections: (1) Lexicosyntactic Frame, (2) Prototypical Scenario, (3) Manner, and (4) Potential Outcome. On this account, verbs *walk* and *run* share a common Lexicosyntactic Frame, which is based around the prime DO with its obligatory primary argument (‘someone X’) coupled with a second component MOVE that specifies a result of the action being carried out. For both walking and running the frame is: *someone X is doing something somewhere for some time; because of this, this someone is moving in this place during this time as this someone wants*. Also the Potential Outcome, which describes the consequence of the activity continuing for some time is parallel for these verbs: “*this someone can be far from the place where this someone was before*”.

According to Goddard, Wierzbicka, and Wong (2017), two elements differentiate the verbs *walk* and *run* from each other. One is the Prototypical Scenario. Although for both verbs it is getting to another place not far away, for walking it is “*after some time*”, whereas for running “*after a short time*”, which emphasizes a sense of urgency involved in running (see Taylor, 1996, pp. 26–28). The other element differentiating these verbs in the NSM descriptions is the Manner section, which describes a coordinated set of body-part movements and the effect they have on the body as a whole. Following earlier Nida’s (1975, p. 120) and Miller and

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<sup>96</sup> As characterized succinctly by Goddard, Wierzbicka, and Wong (2017, p. 307): “The NSM approach is a conceptualist approach to meaning, whose method of analysis is reductive paraphrase. Its primary tool is a vocabulary of 65 posited universal semantic primes (such as SOMEONE, SOMETHING, PEOPLE, WANT, DO, SAY, KNOW, MOVE, TOUCH, TIME~WHEN, PLACE~WHERE, BECAUSE, CAN, and others). Semantic primes are regarded as conceptual elements. Consequently, a reductive paraphrase into semantic primes (termed an ‘explication’) can be regarded equally as a linguistic analysis and as a conceptual analysis”.

Johnson-Laird's (1976, pp. 551–552) specifications,<sup>97</sup> the explications differ with respect to the foot movement pattern. In walking, “*one foot touches the ground*” and “*during this time the other foot moves for a short time above the ground*”, and then “*touches the ground in another place...in front of this someone's body*”. In running, “*one foot moves for a very short time above the ground*”, then it is “*in front of this someone's body*”, and then “*it touches the ground for a very short time*”, which emphasizes the feet moving quickly above the ground. For both *walk* and *run* their respective Manner explications specify that the activity has an iterative structure, i.e. someone “*does something with the legs many times*”, which causes them to move repetitively (Goddard, Wierzbicka, & Wong, 2017, pp. 317–318; see Figure 6.2 for the full semantic explication of *running*).

[B] <i>Running</i> : Someone X is <i>running</i> someone X is doing something somewhere for some time because of this, this someone is moving in this place during this time as this someone wants	LEXICOSYNTACTIC FRAME
often when someone does this in a place, it is like this: – this someone wants to be in another place <u>after a short time</u> – this other place is not very far from the place where this someone is	PROTOTYPICAL SCENARIO
when someone does this, this someone does something with the legs [m] many times because of this, this someone's legs [m] move <u>quickly [m]</u> many times in the same way when this is happening, this someone's feet [m] touch the ground [m] at many times in many places it happens like this: – <u>at some time one foot [m] moves for a very short time above the ground [m]</u> – <u>after this, this foot [m] is in front [m] of this someone's body</u> – <u>after this, it touches the ground [m] for a very short time</u> – after this, the other foot [m] moves in the same way because of this, after this, this someone's body is in front [m] of the place where it was before	MANNER
if someone does this for some time, after this, this someone can be somewhere else far from the place where this someone was before	POTENTIAL OUTCOME

Figure 6.2 Semantic explication of *running* in the NSM metalanguage

Goddard, Wierzbicka, and Wong (2017) conclude that the NSM approach provides a methodology suitable for the semantic analysis of fine-grained differences among the verbs of motion manner across languages, which Jackendoff (1990) puts outside the scope of description in propositional symbolic terms. Although the proposed

<sup>97</sup> Nida (1975, p. 120) specifies walking as “one foot always on surface” and running as “one foot not always on surface”. Similarly, Miller and Johnson-Laird (1976, pp. 551–552) specify that “The two dimensions by which the walk and run sets of verbs are distinguished are the relative speed of the locomotion and whether the feet are typically on the ground at the same time or not”.

semantic explications are rather long (211 words for walking and 219 words for running, respectively, with about 30 different semantic primes), Goddard, Wierzbicka, and Wong (2017) emphasize that they are meant to provide a cognitively realistic account of a way of conceptualizing different manners of motion.<sup>98</sup> They add that typically most of the semantic detail implicit in the meaning of motion manner verbs is processed in everyday speaking and thinking of fluent language users as chunks, without conscious attention to the semantic content.

#### 6.4 Empirical studies on motion manner

The review of various theoretical frameworks proposed for the manner of motion demonstrates that it has attracted a keen interest of semanticists for decades. However, despite the profusion of studies, the semantics of manner in motion verbs has not been fully systematized. One problem, as pointed out by Slobin (2004, p. 255; Slobin, et al., 2014, p. 704), is that the property of manner is often approached in the linguistic literature as an all-embracing category that covers a heterogeneous collection of verbs, such as *crawl*, *creep*, *dance*, *float*, *jump*, *limp*, *roll*, *run*, *shuffle*, *slide*, *stroll*, *slither*, *swim*, etc., which, apart from basic motor patterns, express also effort, posture, rhythm, speed and other dimensions that characterize motion. There is still no commonly agreed consensus as to the types of dimensions relevant to the manner of motion.

Manners of human locomotion have recently been examined in a number of empirical cognitive studies. In a series of experiments, Malt and colleagues (Malt, et al., 2008; 2010; 2014) examined differences in expressing manners of locomotion across speakers of English, Dutch, Spanish, and Japanese. In order to elicit motion descriptions, they used video-clips of an actor performing various gaits, such as shuffling, strolling, trudging, trotting, and running. They found in all four languages an abrupt discontinuity between walking and running as two basic gaits of bipedal locomotion, which are perceptually distinct to an observer.<sup>99</sup> However, within these two gaits the languages were found to employ a gradient continuum for naming patterns, for instance, *jog* for slow, *run* for typical, and *sprint* for the fastest gaits. Overall, the results indicate that the underlying dimensions of some specific manners of motion are likely to be flexible and gradient rather than discrete.

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<sup>98</sup> The reductive paraphrase into the NSM metalanguage is not intended to reduce the semantic complexity of the original meaning, but to articulate it component by component. Goddard, Wierzbicka, and Wong (2017, p. 331) admit, however, that a metalanguage of semantic features and formulas is nothing but a paraphrase of a natural language.

<sup>99</sup> The German verb *laufen* presents a problem for an abrupt discontinuity between walking and running because it can be used to refer to both relatively slow running and, in appropriate contexts, walking (see Goddard, Wierzbicka, & Wong, 2017; Phelps & Duman, 2012).

Vulchanova, Martinez, and Vulchanov (2013) used a similar free naming task based on video-clips for Bulgarian, English, Italian, Norwegian, and Russian. They obtained results similar to Malt and colleagues (Malt, et al., 2008; 2010; 2014). They conclude that clear perceptual discontinuities tend to correspond to clear lexical distinctions across languages. The data analyzed in the study indicate that the linguistic encoding of motion may be based on a system of conceptual features, which reflect physical parameters, acknowledged to influence motion categorization both in visual perception and in linguistic semantics. The following parameters are proposed for a fine-grained feature analysis of the representation of biological motion descriptions: medium, phase, velocity, posture, method of propulsion, species, path orientation, and figure orientation.

Slobin, Ibarretxe-Antunano, Kopecka, and Majid (2014) also used a free naming task to elicit descriptions of movement based on video-clips for Basque, English, French, Polish, and Spanish. The sampling of motion events examined in their study included walking, running, bounce-and-recoil movements, and crawling. Whereas Vulchanova, Martinez, and Vulchanov (2013) examined both human and animal motion, this study focused explicitly on patterns of human locomotion. Most gaits of motion were captured in natural settings by filming various people moving in real environments (unlike in Malt, et al., 2008; 2010; 2014). The results also demonstrate a primary split between walking and non-walking gaits, with two major clusters of *running* and *walking*, as well as clear nodes of *crawling* and *jumping*. By additionally examining descriptions of the motion manners submitted by labelers and employing elaborate statistical measures, Slobin, et al. (2014) found that the components relevant to the conceptual granularity of human locomotion verbs include not only universally evident perceptions, such as posture, velocity, rhythm, effort, and motor patterns of legs and feet, but also subjective evaluations of the attitude and inner state of the moving person.

The empirical examination of the manner semantics in the human locomotion conducted in the above-reviewed cross-linguistic cognitive studies (Malt, et al., 2008; 2010; 2014; Slobin, et al., 2014; Vulchanova, et al., 2013) indicates that the verbs approached thus far collectively as the verbs of motion manner are more likely to represent radial sets with conceptual continua formed around prototypes (Lewandowska-Tomaszczyk, 2007; see also Lakoff, 1987a, esp. Ch. 6; Rosch, 1978), rather than discrete, Aristotelian categories with clear-cut borders between members.

Another problem, pointed out by Goddard, Wierzbicka, and Wong (2017, p. 306), is that the research on the semantics of manner in motion verbs has been predominantly carried out at a rather generic macro-level with either the implicit assumption that the fine-grain differences among lexical meanings of motion manner verbs are self-evident and natural (e.g. Levin, 1993; Talmy, 1985, 2000b, 2007b) or by explicitly delegating them outside the scope of linguistic analysis

(e.g. Jackendoff, 1990; Mani & Pustejovsky, 2012). In those scattered studies where a detailed analysis of lexical meanings of motion manner verbs is carried out, it tends to be limited to a comparison of selected verb pairs (e.g. *jog* and *run* in Taylor, 1996; *walk* and *run* in Goddard, Wierzbicka, & Wong, 2017). A large portfolio of fine-grain semantic studies on the verbs of motion manner has yet to be compiled.

## 6.5 Polysemy of motion manner verbs

Fillmore and Atkins (2000) demonstrate polysemy of the verb *crawl*. Starting from examining definitions of the verb in six dictionaries,<sup>100</sup> they list the following senses of the verb illustrated with abridged examples drawn from the BNC: (1) of person: dragging body, e.g. “with a last effort he crawled up the path”; (2) of person: on hands and knees, e.g. “I crawled smartly after him”; (3) of baby: manner of motion, e.g. “the moment a child can crawl, everything...”; (4) of traffic: move slowly, e.g. “cars crawl along at fifteen miles per hour”; (5) of insects, crabs, etc.: manner of motion, e.g. “a beetle began to crawl up his leg”; (6) of snakes, worms, etc.: manner of motion, e.g. “larvae of worms crawl up the blades of grass”; (7) of person: grovel, fawn, e.g. “the way you crawl to them makes me sick”; (8) of place: be swarming with, e.g. “the area was crawling with caterpillars”; (9) of skin, etc.: creeping sensation, e.g. “his skin crawled and his hair prickled on his neck”.

They point out that even these 9 different sense distinctions taken from dictionaries omit to distinguish some other senses of the verb *crawl* that crop up in the corpus data. For instance, (10) other types of non-human creatures, such as cats, hedgehogs, or injured animals may be said to crawl, e.g. “A cat can crawl through any hole it can get its head through”; (11) inanimate entities, such as clouds, fog, steam, or darkness may be said to crawl, e.g. “Darkness crawled through the suburbs like a flood of black ink”; (12) the verb can be used to emphasize the abject nature of the event, e.g. “They had nothing for it but to crawl back to Mr Scully”; (13) people travelling in slowly moving vehicles may also be said metonymically to be crawling, e.g. “Nicola took over an hour to crawl the three miles from Holhorn”; (14) the verb is also used to emphasize the slowness of activities, e.g. “The party’s share of the vote crawled up to barely 35 per cent”; (15) periods of time may be said to *crawl by*, or *crawl past*, if they seem to be interminable, e.g. “The weeks crawled by...”, “The morning crawled past”.<sup>101</sup>

<sup>100</sup> Fillmore and Atkins (2000) analyzed four major British learners' dictionaries: the Cambridge International Dictionary of English, the Collins-Cobuild Dictionary of English, the Longman Dictionary of Contemporary English, the Oxford Advanced Learner's Dictionary (all editions published in 1995), and two dictionaries published earlier: American Heritage Dictionary of the English Language (1992) and Collins English Dictionary (1991).

<sup>101</sup> Some other senses distinguished by Fillmore and Atkins (2000) were left out for the sake of brevity.

What can be observed in the above-listed senses of *crawl* is that they refer to different objects. Essentially, senses 1, 2, 3, 7, 9, 12, 13 refer to humans. Senses 5, 6, 10 refer to animate creatures. Senses 4, 8, 11, 14, 15 refer to inanimate entities. However, within this basic distinction there are some important differences. With reference to human gaits, the verb may be used to refer to adults (1 and 2), specifically to babies (3), social aspects (7, 12), body parts (9), or involve a metonymical extension related to vehicles (13). With reference to animals, the verb may be used to refer to insects, which have more than four legs (5), snakes, which do not have legs at all (6), and four-legged animals (10). With reference to inanimate entities, the verb may relate to concrete objects (4), places (8), shapeless objects (11), activities (14), and abstract notions (15).

In broader terms, Fillmore and Atkins (2000) demonstrate that the meanings of motion manner verbs are centered around certain prototypes rather than discrete categories with sharp borders. Fillmore and Atkins (2000, p. 100) emphasize that trying to classify word-meanings in respect to cases where the prototype fits and then classifying the varieties of departures from the prototype is a “slippery work” because there are no objective criteria for the analysis of a word into senses. For this reason, without access to empirical linguistic data, it is impossible to state unequivocally which of the senses of a given verbs of motion manner can be relevant, through metonymical and metaphorical extensions, to expressions of fictive motion.

## 6.6 Motion manner verbs in fictive motion

A discussion on the role of manner semantics in fictive motion was started by Matsumoto (1996a), who observes that both English and Japanese exhibit certain similarities with respect to some aspects of motion that must be expressed, as well as some aspects of motion that cannot be expressed in coextension paths. These aspects, or *conditions* as he terms them, effectuate in certain restrictions on the kinds of motion verbs that can occur in fictive motion sentences, as well as accompanying adpositional and adverbial phrases.

Firstly, Matsumoto (1996a) argues that coextension path expressions in both English and Japanese are subject to the *path condition*, which states that “some property of the path of motion must be expressed in fictive motion sentences” (Matsumoto, 1996a, p. 194). The condition posits that if the verb itself does not convey information about the path, a concomitant adverbial or adpositional phrase must be used to describe it, which is demonstrated in (6.1).

- (6.1) a. John began to *run*.  
 b. ? The road began to *run*.  
 c. The road began to *run along the shore*.

Sentences (6.1a–c) demonstrate that when the verb *run*, which does not encode any information about the path,<sup>102</sup> is used to represent actual motion, as in (6.1a), it does not require any prepositional or adverbial phrase describing some property of the path. Comparing it to (6.1b) demonstrates that fictive motion requires some path-related information to be always present, which can be provided by a prepositional phrase, as in (6.1c).

However, when a verb does provide information about the path of motion, an additional phrase is not required, as shown in (6.2).

(6.2) a. The road began to *ascend/descend*.

b. The road began to *twist*.

These examples demonstrate that verbs of motion that encode some property of the path directly do not require any adpositional or adverbial phrases in fictive motion sentences. For instance, verbs *ascend* and *descend* (6.2a) enable us to infer a slope, while the verb *twist* (6.2b) enables us to infer turns of the path. For that reason, they do not require any additional complementation to express coextension paths.

Secondly, Matsumoto (1996a) proposes the *manner condition*, which states that “no property of the manner of motion can be expressed unless it is used to represent some correlated property of the path” (Matsumoto, 1996a, p. 194). It is illustrated in (6.3).

(6.3) a. The path *zigzags* up the hill.

b. ?The path *rolls* up the hill.

These sentences demonstrate that if a manner-conflating verb is used to express fictive motion, the information on manner conveyed by the verb must be related to some property of the path. For instance, in (6.3a) the verb *zigzag* enables us to infer the overall shape of the path. However, the manner of motion conflated in the verb *roll* in (6.3b) is difficult to relate to any specific property of the path. For that reason, it is unlikely to feature in coextension path expressions. Matsumoto (1996a, pp. 195–203) argues that the manner condition restricts the manner information irrespective of whether it is encoded in the verb or in adverbials.

As already mentioned in Section 2.8, Matlock (2004b) argues that *travelable paths*, i.e. paths that can be traversed, tolerate manner verbs to a greater extent than paths not normally associated with motion (see also Matsumoto, 1996a for a comparison between English and Japanese). For instance, the fictive motion sentence (6.4a) includes the verb *crawl*, which is used to describe a highway that

<sup>102</sup> The verb *run* obviously expresses a manner of motion, however, the aspect of the specific manner has been bleached in fictive motion, and it expresses generic motion, similar to that of *go* (Langacker, 2006, 2008, p. 530; see Section 6.6.4).

tends to be congested during rush hours. The sentence (6.4b) includes the verb *race*, which has the opposite meaning and can be used to describe a highway that does not have much traffic.

(6.4) a. The highway *crawls* through the city.

b. The highway *races* through the city.

In these sentences the verb of motion manner does not describe actual motion or a spatial configuration of the path, but the property of *speed* is used to convey information about how motion is known to occur along the path.

Matlock (2004b, p. 232) points out that the semantics of manner verbs in fictive motion potentially enables us to infer various properties of the path, which may expand far beyond the association with speed. For instance, in the sentence “The footpath *staggers* from the bar to the outhouse” the semantic information included in the verb *stagger* is used to describe an erratic shape of the footpath. Although the verb is not typically used in fictive motion expressions, it fits in this contexts because bars are associated with drinking and drunk people tend to walk in an erratic fashion. The use of the verb *stagger* in this context may be attributed to the specific metonymy MANNER OF MOTION ALONG A PATH FOR CONFIGURATION OF THE PATH. Matlock (2004b, p. 232) admits that although such coextension path expressions may sound somewhat poetic and less conventional, they are perfectly acceptable in the right context.

Consequently, even if some expressive or exceptional verbs of motion manner (labeled by Slobin, 1997, p. 459 as *second tier* verbs), seem initially inconceivable to be associated directly with a configuration of the path of motion, they may be associated, through metonymical or metaphorical extensions, with some less common properties of the path. In such scenarios, the spatial configuration of the path of motion can be specified with additional prepositional or adverbial phrases, e.g. “over the hill”, “inland”, etc. This sanctions, at least potentially, the use of more elaborate manner semantics in fictive motion expressions to signal some specific properties the path.

### 6.6.1 Research methodology

To see how the use of manner semantics in coextension path expressions relates to the linguistic practice, this study approaches this problem from the empirical corpus-based perspective in a way parallel to that used in the previous chapter for examining directionality. The examination is implemented by looking for combinations of landmarks that can potentially be described with fictive motion with a selection of motion manner verbs. The landmarks used for the examination include the same selection of 80 landmarks as used in the previous chapter, including *travelable* and *non-travelable paths*, which seems to be reasonably adequate for the purpose of retrieving examples of coextension paths from the BNC.

More specifically, the search for manner verbs in coextension path expressions was implemented by looking for combinations of the selected landmarks with third-person singular simple present and past forms of the verbs of motion manner using the following pattern:

LANDMARK (noun sing.) + MANNER MOTION VERB (3rd sing. present/past tense)

Because a satisfying classification of the verbs of motion manner has not been found in the existing studies (see Slobin, et al., 2014 for a review of the situation), the division of manner verbs used in this study was worked out on the basis of the above-reviewed classifications proposed by Levin (1993, pp. 263–269) and, in relation to manners of human gait, by Slobin, et al. (2014), as well as WordNet and VerbNet. Additional pointers were provided by the discussion about schematic structural elements involved in the cognitive schema of LOCOMOTION contributed by Dodge & Lakoff (2005). A starting point for dividing manner verbs is the split between *roll* and *run* verbs proposed by Levin (1993, Ch. 51.3). However, although Levin (1993, p. 267) admits that the class of *run verbs* needs to be subdivided, she does not provide any further sub-categorization.<sup>103</sup> The idea how to subdivide these verbs is based on the empirical findings of Slobin, et al. (2014), who observed two major clusters of running and walking, as well as clear nodes of crawling and jumping. The sub-categorization proposed here is loosely based on that division, dropping some originally postulated categories and introducing others.<sup>104</sup>

The verbs of motion manner analyzed in this study include (1) *verbs of rolling*, which are divided into two subgroups of *verbs of sliding* and *verbs of coiling* (following Levin's (1993) proposal). The next group includes (2) *verbs of walking*, which are subdivided into three subtypes: *verbs of normal walking*, *verbs of relaxed walking*, and *verbs of labored progress*, which largely corresponds to the findings of Slobin, et al. (2014). Another group includes (3) *verbs of running*, which are further subdivided into three subtypes: *verbs of rapid movement*, *verbs of dashing*, and *verbs of running gait*. Finally, (4) *verbs of unsteady movement* are distinguished as

<sup>103</sup> An earlier sub-classification of motion manners was proposed by Snell-Hornby (1983, pp. 83, 133–147), who divides them into four major types of walking and running: (1) leisurely, aimless; (2) measured, laborious; (3) clumsy, unsteady; (4) nimble, with energy.

<sup>104</sup> Slobin, et al. (2014, p. 717) propose to distinguish the following major human gait types for English: (1) *basic level*: walk, run; (2) *normal pace walking*: clop, cruise, dance, hike, march, pace, etc.; (3) *relaxed walking*: amble, meander, saunter, stroll, wander; (4) *labored progress*: bumble, creep, dawdle, lumber, mope, plod, etc.; (5) *impaired walking*: hobble, limp, stagger, stumble; (6) *quadrupedal movement*: crawl, walk-on-all-fours; (7) *running*: gallop, jog, prance, sprint, trot; (8) *rapid movement*: bob, charge, dart, frolic, hurry, hustle, jaunt, etc.; (9) *smooth movement*: float, slide, slither, squirm; (10) *punctuated, repeatable movement*: bounce, bound, hop, jump, leap, skip, etc.

a separate group, which again includes three subtypes: *verbs of jumping*, *verbs of dancing*, and *verbs of irregular motion*. This division may not be fully exhaustive and clear-cut, but it seems to be reasonably adequate for the purpose of this study.

### 6.6.2 Verbs of rolling

The first group of manner verbs taken under inspection includes *verbs of rolling* (Levin, 1993, Ch. 51.3.1), which refer to “manners of motion that are characteristic of inanimate entities (i.e., where there is not necessarily protagonist control on the part of the moving entity)” (Levin, 1993, p. 265). None of these verbs specifies the direction of motion, unless accompanied by an additional prepositional or adverbial phrase. Levin (1993, pp. 264–265) subdivides them further into two subclasses. The first subclass includes *verbs of sliding*, which describe the motion that occurs smoothly and is typically not externally controllable by the Agent of motion.

VERBS OF SLIDING: drift, float, glide, slide, slither, swing. (6 verbs)

The search for these verbs in fictive motion expressions returned 27 matching sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, 11 sentences were identified as valid examples of coextension paths, with 9 sentences found for the verb *swing*, 1 for the verb *slide*, and 1 for the verb *slither*.

- (6.5) a. Estate land swings round in a crescent to the east, up to the A19
- b. The track swings to the right almost immediately after the bridge
- c. We stopped at a gap in the hedge as the road swung round to the left

The data retrieved from the BNC for the verb *swing* indicate that it is used in fictive motion to describe a smooth curve in a path. The verb is in each case accompanied by an additional phrase providing more specific information about the direction of the curve, such as “left”, “to the right”, “to the east”, etc., which indicates that the verb refers to a single bend in a path. In some sentences, it is followed by the adverb *round*, e.g. “round in a crescent to the east”, as in (6.5a), or simply “round to the left”, as in (6.5c), which indicates that the verb *swing* tends to be used to refer to a relatively gentle, approximately C-shaped, curvature of a path.

- (6.6) a. We were distracted by a lorry appearing where the road slid out of the dunes
- b. As the road slithers around Milkovici and into the regional capital of Mostar the illusion is crushed under the weight of ruins

Only one example was found in the BNC for the verb *slide*. This sole instance (6.6a) demonstrates that it can be used to describe a path that emerges through a smooth transition out of the surroundings (see Dewell, 2005; Lakoff & Nunez, 2000, pp. 39–40). Only one example was also found for the verb *slither*. In the sentence (6.6b) it is coupled with the adverb *around* to describe the smooth circular course of the road around a town.

The other subclass of the *verbs of rolling* taken into consideration includes *verbs of coiling*. They describe motion around an axis and take a restricted range of prepositions relating to the specific path of motion around an axis (Levin, 1993, p. 265). The verb *roll*, which demonstrates properties of both the sliding and coiling class, is included in this batch.

VERBS OF COILING: coil, curl, revolve, roll, rotate, spin, spiral, swivel, turn, twirl, twist, whirl, wind, pivot. (14 verbs)

For these verbs, 157 matching concordance lines were returned from the BNC. After a review, 104 concordance lines were identified as valid examples of coextension path expressions. Specifically, 51 sentences were recognized as valid examples for the verb *turn*, 41 for the verb *wind*, 8 for the verb *twist*, 2 for the verb *curl*, 1 for the verb *coil*, and 1 for the verb *roll*.

A selection of examples found for the verb *turn* is presented below.

- (6.7) a. The road turns sharply left in a hairpin bend
- b. After a mile the path turned sharply south
- c. The road turned abruptly inland and up hill to Albert Terrace

The examples found in the corpus data show that the verb *turn* is typically used to describe a single bend in a path. Information about the direction of a bend is specified by an adverbial/prepositional phrase, such as “east”, “westwards”, “due north”, “left/right”, “off to the left/right”, “down to”, “inland”, etc. In some examples found in the corpus, the verb *turn* is followed by the adverb *sharply* (or just *sharp*) or *abruptly*, e.g. “sharply left in a hairpin bend” (6.7a), “sharply south” (6.7b), “sharp right”, “abruptly inland” (6.7c), etc. This indicates that it tends to be used to describe a sharper curvature of a path, approximately L-shaped, as opposed to the gentler curvature described with the verb *swing*. However, on the basis of the linguistic data alone it is impossible to state precisely how systematic this difference is.

- (6.8) a. The road winds through woodlands of birch and alder
- b. The road winds along the coast past the Atlantis Hotel
- c. The road winds steadily higher through the splendid beech trees

The corpus data indicate that while the verbs *swing* and *turn* are typically used to refer to a single bend in a path, the verb *wind* tends to be used to describe the characteristics of a stretch. Among adverbial/prepositional phrases following this verb no examples of *left/right* or *to the left/right* were found (as opposed to *swing* and *turn*). Although some examples of the *up/down* directionality were found, e.g. “downwards”, “down to the coast”, “up the mountainside”, “upwards to the hotel”, they refer to the global direction of a path, not a particular bend. In multiple examples, the verb is followed by the preposition *through* or *along*, e.g. “through woodlands” (6.8a), “through the Park”, “along the coast” (6.8b), “along the cliff edge”, which is not as vividly present for the verbs *swing* and *turn*. Moreover, the data show that the verb *wind* can be followed by the adverb *steadily*, as in (6.8c), which indicates the continuity of a path. Overall, the data retrieved from the BNC indicate that the verb *wind* is used to describe a stretch of a path, rather than a single turn. The stretch is composed of multiple turns, forming approximately an S-shaped contour.

- (6.9) a. The road twists abruptly down past the villages of Bilheres and of Bielle  
 b. The metal road ... twisted between pine-clad hills for more than a mile  
 c. The road twisted away in both directions

Examples found in the corpus for the verb *twist* indicate that it is used in fictive motion in a way parallel to the verb *wind*. No examples of *left/right* or *to the left/right* were found among adverbial/prepositional phrases following this verb in the corpus data. Some examples of the *up/down* directionality were found, e.g. “uphill”, “abruptly down”, but they refer to the global direction of a path, as in (6.9a), rather than a single bend. This verb also tends to be used to describe a stretch of a path, which is indicated by accompanying prepositional phrases, such as “for more than a mile” (6.9b) or “in both directions” (6.9c). A possible contrast distinguishing the verbs *wind* and *twist* from each other in fictive motion expressions may be that the latter refers to sharper, approximately Z-shaped, turns forming an irregular zigzag, rather than gentler swings, which can be ascribed to the former. However, the linguistic data alone are not sufficient to claim for this difference to be systematic.

- (6.10) a. Blackberry Hill curled down then to my right and up again  
 b. The coast road curled and shed its cast-offs  
 c. Narrow and deeply potholed, the road coiled without any protective barriers

Only two examples were found in the corpus for the verb *curl*. Both of them indicate that this verb is used in fictive motion expressions to characterize a spiral course of a path, as in (6.10a–b). It is noteworthy that whereas in the sentence (6.10a) the verb *curl* is followed by the phrase that describes the path configuration, in the sentence (6.10b) the verb semantics serves as the only means used to portray the shape of the path.

A somewhat similar behavior can be observed for the verb *coil* in (6.10c). Although the road described in this sentence is introduced as “narrow and full of potholes”, it is the verb semantics that provides information about the spatial course of the path, whose contour resembles a spiral coil. The prepositional phrase “without any protective barriers”, which follows the verb in this sentence, provides details about the characteristics of the road other than its course in space. Taken together, the examples (6.10b–c) demonstrate that the verbs of motion manner which enable us to infer the overall characteristics of a path do not require any adpositional/adverbial complementation in coextension path expressions (Matsumoto, 1996a, p. 194).

(6.11) The road rolled over a hill and curled down among flesh-pink dunes

The example (6.11) found in the BNC for the verb *roll* is particularly arresting since it appears to contradict the *manner condition* proposed by Matsumoto (1996a, p. 194). The condition restricts the manner information in fictive motion expressions to relevant properties of a path, irrespective of whether it is encoded in the verb or in adverbials. While for the verbs *swing*, *turn*, *wind*, *twist*, *curl*, and *coil* discussed so far it is relatively straightforward to relate the semantics of motion manner to the configuration of a path, for *roll* it is difficult to infer any property of the path from the verb semantics, even in the wider context presented in (6.12) below:

(6.12) The air was warm and uncharacteristically still. Palm trees and crescent-shaped dunes seemed to waver in the heat. The road rolled over a hill and curled down among flesh-pink dunes. Seen from a hill, the dunes stretched as far as the deep blue of the horizon, above which were a few streaks of cirrus cloud.

An investigation of the origins of the passage reveals that it comes from the book “Wheelbarrow Across The Sahara” written by Geoffrey Howard (published by Alan Sutton Publishing in 1990). In 1975, the author walked almost 2000 miles across the Sahara Desert, from Beni Abbes in Algeria to Kano in Nigeria, carrying supplies of food and water in a specially built wheelbarrow. He aimed to be the first man to cross the Sahara on foot, which took him 94 days. Once we learn this background, the use of the verb *roll* by the person who for a long time experienced the wheelbarrow rolling through the desert ceases to be conceptually astounding.

Although the verb *roll* does not seem to fit the manner condition proposed by Matsumoto (1996, p. 194), the configuration of the road is specified with the prepositional phrase “over a hill”. What enables us to accept, at least to some extent, this use of *roll* in this instance of fictive motion is the specific context of the journey in which it is used. In this particular context, the verb acquires the property of a generic verb of motion similar to that of *go*. See (Waliński, 2018a) for a full listing of all sentences retrieved from the corpus for the verbs of rolling.

### 6.6.3 Verbs of walking

The second category of motion manner verbs analyzed in the study includes verbs that refer to various manners of walking. Some of them can be used to refer to the movement of animate entities other than humans. The first subgroup distinguished among these verbs includes *verbs of normal walking*, which takes place at an approximately typical pace.

VERBS OF NORMAL WALKING: file, hike, march, mince, pace, ramble, sashay, step, stray, stride, strut, swagger, tiptoe, tramp, tread, trek, waddle, walk. (18 verbs)

The search for these verbs in fictive motion returned 53 matching sentences from the BNC. However, instead of the expected noun+verb pattern, most of them included compound nominals, e.g. “beach walks”, “mountain hikes”, “street marches”, etc. Only one sentence in the set was recognized as a valid example of coextension path for the verb *stray*.

- (6.13) a. The trail strayed round and eventually reached the small clearing  
 b. ?The trail strayed straight and eventually reached the small clearing

The conceptual motivation behind the example (6.13a) found for the verb *stray* is not immediately obvious. It is difficult to map the manner of motion conflated in this verb directly onto a specific configuration of the path. This is because the use of *stray* in fictive motion can be assumed to be motivated by the *construal* of the speaker for whom the trail diverges from the subjectively expected course of the path (Langacker, 2008a, p. 530; see also Waliński, 2016a). Clearly, to evoke the conceptualization of straying the spatial configuration of a path must manifest some kind of deviation in the first place. In the sentence (6.13a), the deviation is marked with the adverb *round*, which indicates that the path takes an indirect, roundabout route to destination. Replacing it with the adverb *straight*, as in (6.13b), makes the

sentence sound odd.<sup>105</sup> The deviation of the path is then additionally marked in the sentence by the subsequent adverb *eventually* used in the following clause, which indicates that the goal was not reached as early as expected. What the lexical semantics of the verb *stray* contributes to the information about properties of a path is that the trajectory manifests some kind of subjectively construed divergence from the expected spatial configuration.

The second subgroup of the walking verbs includes *verbs of relaxed walking*, which refer to various types of walking taking place in a relaxed manner, usually at a slower than typical pace.

VERBS OF RELAXED WALKING: amble, maunder, mosey, parade, perambulate, potter, promenade, roam, rove, saunter, stroll, traipse, wander. (13 verbs)

For these verbs, 6 matching concordance lines were retrieved from the BNC. After a review to exclude coincidental matches, 3 sentences were recognized as valid examples of coextension paths, including 2 for the verb *wander* and 1 for the verb *amble*.

(6.14) a. A pathway ambles up beside art galleries and chic boutiques to the domed church

b. The Way wanders through the lovely old village of Kinver

Sentences (6.14a–b) found in the BNC for the verbs *amble* and *wander* demonstrate that the use of manner verbs in fictive motion can expand beyond the semantics of spatial configuration. To fully explain the meaning of these sentences one needs to take into account their context. The sentence for the verb *amble* (6.14a) comes from the booklet “Citalia Italy complete” (published by CIT England in 1992), which provides holiday information for Italian destinations. The sentence for the verb *wander* (6.14b) comes from the periodical “Outdoor Action” (published by Hawker Consumer Publications in 1991), which provides guidance about tourist attractions in England. Both are parts of larger route descriptions for walks on offer in excursion areas.

In this context, these verbs of motion manner are used to signal that a certain kind of recreational walking is known to occur along the described path. More specifically, the verb *amble* in the sentence (6.14a) conveys the information that the pathway described in the sentence is used by holidaymakers for relaxed walks along art galleries and chic boutiques. The verb *wander* in the sentence (6.14b)

<sup>105</sup> No examples of *stray|strays|strayed|straying* followed directly by the adverb *straight* were found in the BNC. Only examples of *straying from* a straight path were found, e.g. “The little bushes would tangle his feet and trip him as soon as he strayed from the straight path”.

conveys the information that the path described in the sentence is used by sightseers for relaxed walks to a lovely old village. In these sentences the semantics of manner conflated in the respective verbs relates both to the spatial configuration of a path (in the generic sense of spatial extension) and the way the conceptualizer associates the path with actual motion, which indicates the presence of *conceptual integration* (Fauconnier, 1997, pp. 177–181; Fauconnier & Turner, 2002). Although such expressions are less conventional, they are perfectly acceptable in the context of tourist route descriptions.

The third subgroup of the walking verbs includes *verbs of labored progress*, which refer to various types of plodding taking place in an effortful manner at a slower than normal pace, which typically happens in response to adverse conditions of the surroundings (see Dodge & Lakoff, 2005, p. 68).

VERBS OF LABORED PROGRESS: bumble, clomp, clump, crawl, creep, dawdle, dodder, footslog, inch, lumber, mope, plod, plough, shamble, shuffle, slog, slouch, stump, sulk, toddle, toil, trudge, trundle, wade. (24 verbs)

The search for these verbs in fictive motion expressions returned 11 matching sentences from the BNC. After a review to exclude coincidental matches, only 1 sentence was recognized as a coextension path expression for the verb *creep*.

(6.15) The coastline crept low, green with intermittent houses, each a different interpretation of the same dream: sea life in the sun.

In the sentence (6.15) the verb *creep* is coupled with the adverb *low* to describe the depressed location of a coastline in relation to the vantage point. This sentence comes from the novel “The Possession of Delia Sutherland” written by Barbara Neil (published by Bloomsbury in 1994). We may conjecture that the verb *creep* was chosen by the author to build up an imposing scenery that fits into the general atmosphere of the passage. See (Waliński, 2018b) for a full listing of all sentences retrieved from the corpus for the verbs of walking.

#### 6.6.4 Verbs of running

The third group of motion manner verbs analyzed in the study includes *verbs of running*. They resemble verbs of walking but generally refer to faster movement. They can be used to refer to human motion, but some of them are used to describe the movement of animals, and some others, especially *verbs of dashing*, can also be used to refer to the movement of inanimate entities.

The first subgroup distinguished among these verbs includes *verbs of rapid movement*, which refer to various kinds of moving fast.

VERBS OF RAPID MOVEMENT: dart, flounce, frolic, hustle, jaunt, nip, prance, race, scamper, scurry, scuttle, skitter. (12 verbs)

The search for these verbs in fictive motion expressions returned 36 matching sentences from the BNC. However, instead of the expected noun+verb pattern, mostly compound nominals, e.g. “street races”, “track races”, etc., were found. After a review none of them was recognized as a valid example of coextension path.

The second subgroup of the *verbs of running* includes *verbs of dashing*, which refer to rushing (see Levin, 1993, Ch. 53.2) and dashing at high velocities. Some of these verbs are also used to refer to motion of inanimate entities.

VERBS OF DASHING: blast, bolt, bowl, bustle, careen, career, dash, flash, hurtle, pelt, rush, scoot, scud, shoot, spurt, streak, sweep, tear, whisk, whizz, whoosh, zoom. (22 verbs)

The search for these verbs in fictive motion returned 21 matching sentences from the BNC. After a review of coincidental matches, 6 sentences in the set were recognized as valid examples of coextension path for the verb *sweep*.

- (6.16) a. The avenue sweeps expansively westward through more of Victorian villalands  
 b. The new road sweeps along an incline behind Shieldaig  
 c. The old turnpike road sweeps down through Widdale  
 d. The main street sweeps southward up the hill

The data retrieved from the corpus for the verb *sweep* indicate that it tends to be used to portray an expansive course of a longer stretch of a path. The extensive characteristics of a stretch can be emphasized by the adverb *expansively*, which follows the verb in the example (6.16a). The verb semantics indicates that a path follows a smoothly extended arc, which relates to the essential characteristics of sweeping typically involving smooth motion that marks a gentle curve on the surface. In the corpus data, the verb tends to be accompanied by an adverbial/prepositional phrase providing details about the global direction of a path, such as “westward” (6.16a), “down” (6.16c), or “southward up the hill” (6.16d). In some sentences found in the corpus data the verb is additionally followed by the prepositions *through* or *along* (6.16a–c).

The third subgroup of the *verbs of running* includes *verbs of running gait*, which refer to different variants of running.

VERBS OF RUNNING GAIT: gallop, jog, lope, run, sprint, trot. (6 verbs)

The search for these verbs in fictive motion expressions returned 219 matching sentences from the BNC. The resulting concordance was reviewed to exclude coincidental matches. As a result, 173 concordance lines were identified as valid examples of coextension paths, all of them for the verb *run*.

- (6.17) a. A low stone wall ran across the far side of the square
- b. The old coast road ran parallel to the shoreline
- c. A road runs in front of the farm
- d. A railway runs behind the hotel
- e. Loops of wiring and cable ran overhead, loosely tacked at intervals to the unpainted ceiling
- f. The service pipe runs underground
- g. The road ran straight across the desert for twenty miles
- h. From Sedorf the road runs round the south-west corner of Lake Uri to Isleten
- i. Falmouth's main shopping street runs narrowly and crookedly along the waterfront
- j. The Cleveland Way runs in a gigantic 107 mile horseshoe from Helmsley, north to Saltburn, then south along the coast to Filey

The corpus data indicate that the verb *run* is extremely versatile in coextension path expressions. Adverbial/prepositional phrases following this verb were found to express all kinds of spatial configurations. The verb is used in fictive motion to describe paths extending *along*, *between*, *beside*, *near*, *from...to*, *into*, *up*, *down*, *through*, *across* (6.17a), *parallel to* (6.17b), *in front of* (6.17c), *behind* (6.17d), *overhead* (6.17e), and *underground* (6.17f). It can be used to refer to path configurations that extend *straight* (6.17g), as well as paths that go *round* (6.17h) or *crookedly* (6.17i). The verb is flexible enough to describe U-turns whose shape follows the shape of “a gigantic horseshoe”, as in (6.17j). However, no examples of the *left/right* directionality were found among adverbial phrases following this verb, except for *right* being used to emphasize a configuration, e.g. “right through it”, “right across the country”. This indicates that *run* tends to be used to describe the characteristics of longer stretches of a path.

The data retrieved from the corpus indicate that in fictive motion the verb *run* is essentially stripped of the semantics relating to the specific manner of human gait. This aspect of conflating generic motion, similar to that *go*, instead of the specific manner of human gait is viewed by Langacker (2006, 2008a, p. 530) as a result of *semantic bleaching* (Seuren, 2013, pp. 17–19; Sweetser, 1988; Traugott, 2006). When used to express the configuration of a coextension path the verb approximately means that the described object “extends in space”. Consequently, the configuration of a path must always be specified by an adverbial/adpositional phrase (Matsumoto, 1996a), which is reflected in the corpus data. In fictive motion the lexical semantics of *run* does not make any reference to the shape or curvature of a path, which makes the verb *neutral* (Klippel, Tenbrink, & Montello, 2013; Nikanne & van der Zee, 2013). See (Waliński, 2018c) for a full listing of all sentences retrieved from the corpus for the verbs of running.

### 6.6.5 Verbs of unsteady movement

The final group of motion manner verbs taken into consideration includes *verbs of unsteady movement*. They generally refer to movement that takes place in a bouncy, twisty or punctuated manner either on the horizontal or vertical plane. None of these verbs specifies the global direction of motion, unless accompanied by an additional prepositional or adverbial phrase.

The first analyzed subgroup includes *verbs of jumping*, which generally refer to various forms of jumping and punctuated movement.

VERBS OF JUMPING: bounce, bound, caper, cavort, frisk, gambol, hop, hurdle, jolt, jump, leap, lollop, romp, skip, somersault, spring, stomp, vault. (18 verbs)

The search for these verbs in fictive motion expressions returned 20 matching sentences from the BNC, however, none of them was recognized as a valid example of coextension path.

The second subgroup includes *verbs of dancing* (see *waltz verbs* in Levin, 1993, Ch. 51.5). Apart from the generic verb *dance*, they are zero-related to names of dances and describe roughly specific manners of motion relevant to performing various dances.

VERBS OF DANCING: boogie, bop, dance, disco, foxtrot, jig, jitterbug, jive, mosh, pirouette, pogo, polka, quickstep, rumba, rock, samba, shimmy, tango, waltz. (19 verbs)

For these verbs, 8 matching concordance lines were retrieved from the BNC, but none of them was recognized as a valid example of coextension paths.

The third subgroup of the *verbs of unsteady movement* includes *verbs of irregular motion*, which refer to various forms of non-uniform movement.

VERBS OF IRREGULAR MOTION: falter, flounder, hobble, limp, lurch, meander, reel, stagger, stumble, zigzag. (10 verbs)

For these verbs, 11 matching concordance lines were returned from the BNC. After a review, 9 sentences in the set were recognized as valid examples of coextension paths, 5 for the verb *meander* and 4 for the verb *zigzag*.

- (6.18) a. The rugged coast path meanders among tall cliffs
- b. The railway meandered down to the beach
- c. A four-mile path meanders round the lake
- d. The path zigzagged between dry rises in the land
- e. A narrow path zigzagged steeply down from in front of the colonnade to the shore
- f. The path zigzags steeply uphill

The corpus data indicate that the verbs *meander* and *zigzag* tend to be used in fictive motion to describe the shape of a stretch of a path. In the corpus data, the verb *meander* is followed by the prepositions *among*, e.g. “among tall cliffs” (6.18a), “among the springs”, *along*, e.g. “along this stretch”, and *round* “round the lake”. The verb *zigzag* is followed by the preposition *between*, e.g. “between dry rises in the land” (6.18c), and the phrase *in front of*, e.g. “in front of the small houses”. Both these verbs were found to be followed by the adverbials *down/up/uphill* (6.18b, e, f), which refer to the global direction of a path, while the verb semantics specifies the shape of a path at the local level (see Nikanne & van der Zee, 2013). The global configuration of a path can also be specified by a prepositional phrase providing details about the source and goal of the path (6.18b, e). A circular course of a path at the global level can be specified with the adverb *round*, as in (6.18c).

The corpus data indicate that these two verbs manifest similar characteristics in fictive motion. They are used to describe a swinging or twisting course of a stretch of a path. It is plausible to assume that the lexical semantics of the verb *meander* refers to the pattern composed of multiple gentler, approximately S-shaped, turns forming the contour of a path. The lexical semantics of the verb *zigzag* can be assumed to refer to the pattern composed of multiple sharper, approximately Z-shaped, turns forming the contour of a path. The overall characteristics of the verbs *meander* and *zigzag* in fictive motion expressions is similar to the verbs *swing*

and *twist*, discussed earlier. Intuitively, it is plausible to assume that what distinguishes these pairs of verbs in coextension paths is the regularity of a pattern. For the verbs *meander* and *zigzag* the pattern can be assumed to be more regular and apparent than for the verbs *swing* and *twist*, where the pattern may not be as regular or vividly present. However, the linguistic data alone are not sufficient to state how systematic this difference is. See (Waliński, 2018d) for a full listing of all sentences retrieved from the corpus for the verbs of unsteady movement.

## 6.7 Manner semantics in fictive motion

Altogether, 162 verbs of motion manner were analyzed in this chapter, including 20 verbs of rolling, 55 verbs of walking, 40 verbs of running, and 47 verbs of unsteady movement. For the selected landmarks, 25,920 combinations were checked, including 3,200 combinations for the verbs of rolling (80 landmarks  $\times$  40 past/present verb forms), 8,800 combinations for the verbs of walking (80 landmarks  $\times$  110 past/present verb forms), 6,400 combinations for the verbs of running (80 landmarks  $\times$  80 past/present verb forms), and 7,520 combinations for the verbs of unsteady movement (80 landmarks  $\times$  94 past/present verb forms). For these patterns, 569 sentences were found in the BNC. They were reviewed to exclude coincidental matches, for instance, compound nominals, e.g. “beach walks”, “mountain hikes”, “street marches”, or sentences like “One of the men in the street ran to open the door, then another man pushed him”, etc. As a result, 308 sentences were recognized as valid examples of coextension paths. They include examples of fictive motion expressions with the following 17 verbs: *amble* (1), *coil* (1), *creep* (1), *curl* (2), *meander* (5), *roll* (1), *run* (173), *slide* (1), *slither* (1), *stray* (1), *sweep* (6), *swing* (9), *turn* (51), *twist* (8), *wander* (2), *wind* (41), and *zigzag* (4). Queries used to identify the examples are listed in Appendix to this chapter. Full listings of all sentences retrieved from the corpus, with those recognized as valid instances of fictive motion marked, are publically available for download as research reports for *verbs of rolling* (Waliński, 2018a), *verbs of walking* (Waliński, 2018b), *verbs of running* (Waliński, 2018c), and *verbs of unsteady movement* (Waliński, 2018d) in coextension path expressions.

What emerges from the above-presented analysis is that only a relatively small portion of motion manner verbs are used systematically in fictive motion expressions. Only 17 out of 162 analyzed verbs were found in the corpus data. Moreover, some verbs of motion manner are used in fictive motion expressions more systematically than others. A brief summary of the verbs that were found to appear in the BNC more than once is presented in the following Table 6.1.

Table 6.1 Summary of manner verbs found to occur systematically in fictive motion

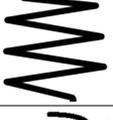
Manner verb	Adverbial and prepositional phrases	Prototypical shape
swing (9)	left, north, round, to the left, to the right, southwestwards, etc.	
turn (51)	aside, away from, down to, east, inland, left across, north towards, off to, right, round, sharp left, sharp right, sharply east, to the left/right, westwards, etc.	
wind (41)	along, around, away from, between, down to, downwards, gradually upwards, inland, round, steadily higher, through, etc.	
twist (8)	away in both directions, between, down, uphill, etc.	
meander (5)	along, among, down to, round	
zigzag (4)	between, in front of, steeply down	
curl (2)	down (then to my right and up again)	
sweep (6)	along, away under, down through, expansively westward through, past, southward up	
run (173)	across, along, below, beneath, north, west, up, down, from...to, into, in front of, behind, beside, near, parallel to, between, over, through, round, straight, towards, etc.	

Table 6.1 lists nine verbs of motion manner that were found to occur at least twice in the British National Corpus in fictive motion expressions. Each verb is listed along with the number of valid examples recognized in the corpus data

followed by a selection of adverbial/prepositional phrases accompanying it in the BNC. The *shape* column illustrates the prototypical spatial configuration described by the respective verb.

The verbs *swing* and *turn* tend to be used to refer to a single bend in a path. The lexical semantics of the verb *swing* indicates a gentle curve in a path, approximately C-shaped, whereas the lexical semantics verb of the verb *turn* indicates that the described bend is sharper, approximately L-shaped. On the other hand, the verbs *wind* and *twist* tend to be used to describe a longer stretch of a path, rather than a single bend. The lexical semantics of these verbs indicates that the verb *wind* is more likely to refer to a swinging course of the stretch of a path composed of multiple gentler, approximately S-shaped bends, whereas the verb *twist* is more likely to refer to the stretch of a path composed of multiple sharper, approximately Z-shaped turns. Both these verbs are used to refer to the local shape of a path, whereas the global direction is specified with adverbial/adpositional phrases.

The verbs *meander* and *zigzag* are used in fictive motion expressions similarly to the verbs *wind* and *twist*. The lexical semantics of the verb *meander* indicates that a path is composed of multiple gentler swings, whereas the lexical semantics of the verb *zigzag* indicates that a path is composed of multiple sharper twists. The difference between the verbs *wind* and *meander* and the verbs *twist* and *zigzag*, respectively, can be assumed to relate to the regularity and vividness of a pattern. However, as already mentioned, the linguistic data alone are not sufficient to determine how sharp these distinctions are. The verb *curl* is used to refer to the overall shape of a stretch of a path whose contour resembles a spiral. The verb *coil* (found only once in the corpus data) can be used in a similar fashion to refer to a spiral shape of a path.

Both *run* and *sweep* are used in fictive motion expressions to refer to the course of a path that extends onwards. The lexical semantics of *sweep* indicates that the path course follows a smoothly extended arch. In contrast, the meaning of *run* in fictive motion is bleached of the semantics relating to the specific manner of human gait. In fictive motion, the verb essentially expresses the basic property of extension in space, which resembles the generic semantics of *go*. The data indicate that the verb *run* is used in coextension paths not only more frequently than the other 161 verbs of motion manner, but more frequently than any other verb of motion analyzed in this study.

Similar explications in terms of spatial contours can be proposed for some other verbs of motion manner that were found to be represented less systematically in the corpus data. The verb *slide* can be used in fictive motion to describe a smooth transition of a path from the surroundings into another characteristic background. The verb *slither* can be used to describe a smoothly-curved configuration of a path around an area. The verb *creep* can be used to refer to a depressed

configuration of a path in relation to the viewer. The verb *stray* can be used in fictive motion to indicate that the trajectory of a path manifests some divergence from the subjectively expected course.

However, not all sentences found in the corpus for the verbs of motion manner can be explained exclusively in terms of spatial contours. The examples (6.14a–b) found for the verbs *amble* and *wander* demonstrate that in fictive motion the semantics of manner verbs can provide information expanding beyond the spatial configuration of a path. Both *wander* and *amble* refer to manners of relaxed walking. The corpus data indicate that in the context of tourist route descriptions, these verbs can be used in fictive motion expressions to signal that a specific kind of recreational walking is known to occur along a path. In sentences of this kind, the semantics of manner conflated in the verb relates both to the spatial extension of a path and the way the conceptualizer associates the path with a specific type of recreational walking through *conceptual integration* (Fauconnier, 1997, pp. 177–181; Fauconnier & Turner, 2002). Such uses expand partly beyond the *manner condition* (Matsumoto, 1996a; see Section 6.6), because the information conveyed by the verb is associated with a property of the path in two aspects. One is the generic aspect of extension in space, which fulfills the manner condition, the other can be spelled out approximately as “convenient for relaxed walks”, which relates to actual motion known to occur along a path.

Another intriguing example that appears to contradict the manner condition was found in the BNC for the verb *roll*. The lexical semantics of this verb in the sentence (6.11) “The road rolled over a hill and curled down among flesh-pink dunes” does not add anything specific in terms of configuration or extent to the information about the described road conflated in the satellite phrase. However, this verb is used here idiosyncratically by Geoffrey Howard, the first person to cross the Sahara on foot, who carried the supplies necessary to survive along the way in a wheelbarrow. His account of the journey creates a unique context, in which the verb functions as a generic verb of spatial extension similar to *run*. This is discussed further in the concluding chapter. However, before continuing the discussion, the category of instrumental motion verbs, which are closely related to the semantics of manner, must be examined first to finish the survey.

## 6.8 Entanglement of manner and instrument

It has long been recognized that the semantics of instrument and manner are not easily disentangled because they are closely tied to each other in the action described by a predicate. Essentially, manner and instrument share a common conceptual ground and participate in the action described by the verb simultaneously in a coordinate manner (Dirven, 1993; Mari, 2006; Wierzbicka, 1996).

However, some semantic studies on motion verbs approach manner and instrument as largely separate aspects. For instance, Frawley (1992, pp. 178–179) distinguishes *manner* from *conveyance* (vehicular and non-vehicular). Ikegami (1969, pp. 61–63 & 75–79) discusses verbs of motion *with components of manner* separately from those *with components of means*. Levin (1993, pp. 267–268) groups the already discussed *verbs of motion manner* separately from instrumental verbs, which she labels *verbs of motion using a vehicle*. Although a link between the semantics of manner and instrument in verbs of motion is recognized by scholars, there seems to be no universally agreed specification as to how close or separate they are.

Dirven (1993, pp. 89–91) sees the domains of manner, means, and instrument as forming a conceptual continuum. At one end of the continuum, he puts conceptualizations of *manner*, which tend to be more abstract. At the opposite end, he puts conceptualizations of *instrument*, which tend to be more concrete. The concept of *means* is situated somewhere between these two poles, although it seems to be located closer to the concept of instrument. Dirven discusses the conceptual continuum with reference to English prepositions. He argues that the preposition *with* covers both the concept of manner and instrument. It typically expresses manner when followed by abstract nouns, e.g. “with care”, and instrument when followed by concrete nouns, e.g. “with scissors”. The preposition *on*, which prototypically refers to physical contact with supporting surfaces or entities, cannot be fully ascribed to either end of the manner/means/instrument continuum. For expressions such as *on foot* and *on horseback* neither a manner interpretation or an instrument interpretation can be excluded. Expressions denoting means allowing the passage of entities may involve concrete objects, e.g. *by boat/bike* or substances, e.g. *by air/sea*. The latter are located somewhere between the two extremes of the continuum.

Goddard and Wierzbicka (2009; see also Goddard, 2011, Ch. 9.3) demonstrate that the semantics of verbs designating everyday physical activities in English, Polish, and Japanese ties the kind of instrument used in the action with the manner in which the instrument is used. Their study shows that the meaning of physical activity verbs reflects that people use an instrument because it is suitable for a specific purpose, and at the same time they use the instrument in the manner that enables them to accomplish the purpose.

A close relatedness between manner and instrument occurs for non-vehicular verbs of motion. For instance, the verb *drive* expresses a certain manner of motion, which can additionally be specified by instrumental modifiers, e.g. *drive by car*. However, in sentences such as “Every morning Kevin drives to work through the suburbs of London”, the meaning of *drive* is understood as “vehicle-propelled overland locomotion using car”. The link between manner and instrument can also be observed for vehicular verbs of motion. For instance, the verb *bicycle* essentially

denotes the instrument of motion, but at the same time specifies the manner of “self-propelled overland locomotion”, in which cycling takes place. Because the semantics of instrument and manner of motion form a semantic cline, it is virtually impossible to entirely separate one from the other (see also Levin & Rappaport Hovav, 1991, 2005; Rappaport Hovav & Levin, 1998).

## 6.9 Instrumental motion verbs in fictive motion

Given that fictive motion is *experientially grounded* (Langacker, 2005) and *mentally simulated* (Gibbs & Matlock, 2008; Matlock, 2004a, 2017; Matlock & Bergmann, 2015), we can reasonably assume that coextension path expressions should avoid referencing to the semantics of instrument. It is not only because the objects described with fictive motion are stationary. More importantly, in fictive motion expressions there is no Agent capable of making use of an instrument of motion. This can be exemplified by contrasting sentences for *actual motion* (6.19a) with *fictive motion for travelable paths* (6.19b) and *non-travelable paths* (6.19c).

- (6.19) a. Ann goes to London by car / Tom goes to London by train  
 b. ?This road goes to London by car / ?This railway goes to London by train  
 c. ?This wall / fence goes all the way down to the river by [car / train, etc.]

The avoidance of referencing to the semantics of instrument is particularly conspicuous for those fictive motion sentences that refer to *non-travelable paths*, such as (6.19c), for which it is difficult to come up with any sensible instrument of motion.

### 6.9.1 Research methodology

This study approaches the problem of instrumentality in coextension path expressions from the empirical corpus-based perspective in a way parallel to that already used in the previous section for the manner semantics. The examination is implemented by looking for combinations of landmarks that can potentially be described with fictive motion with an array of instrumental motion verbs. The landmarks include the same selection of 80 landmarks as used in the search for the semantics of manner discussed in the previous section.

Specifically, the search for instrumentality in fictive motion expressions was implemented by looking for combinations of the selected landmarks with third-person singular simple present and past forms of the instrumental motion verbs using the following pattern:

LANDMARK (noun sing.) + INSTRUMENTAL MOTION VERB (3rd sing. present/past tense)

A starting point for selecting instrumental verbs of motion to be examined in this section was the classification of instrumental motion verbs proposed by Levin (1993, Ch. 51.4), who labels them *verbs of motion using a vehicle* and divides into two categories of verbs that are *vehicle names* and verbs that are *not vehicle names* (Levin, 1993, pp. 267–268). Levin adds that these verbs describe translocation of an entity, but no specific direction of motion is specified unless there is an explicit directional phrase present.

The first subclass of instrumental verbs taken under inspection includes *verbs of motion using a vehicle* (Levin, 1993, Ch. 51.4.1; see also Clark & Clark, 1979), which are zero-related to nouns that are vehicle names. They express motion using the particular type of a vehicle named by the noun.

INSTRUMENTAL VERBS THAT ARE VEHICLE NAMES: balloon, bicycle, bike, boat, bobsled, bus, cab, canoe, caravan, chariot, coach, cycle, dogsled, ferry, gondola, helicopter, jeep, jet, kayak, moped, motor, motorbike, motorcycle, parachute, punt, raft, rickshaw, rocket, skate, skateboard, ski, sled, sledge, sleigh, taxi, toboggan, tram, trolley, yacht. (39 verbs)

The search for these verbs in fictive motion expressions returned 94 matching sentences from the BNC. The concordance was reviewed to exclude coincidental matches. Instead of the expected noun+verb pattern, sentences retrieved from the BNC included compound nominals, e.g. “coastline boats”, “island ferries”, “line coaches”, “mountain bikes”, etc. As a result, no examples of coextension path sentences with the instrumental verbs that are vehicle names were identified in the BNC.

The other subclass of instrumental verbs taken under scrutiny includes *verbs that are not vehicle names* (Levin, 1993, Ch. 51.4.2). They are not directly derived from vehicle names, but some of them are zero-related to nouns that name parts used in propelling these vehicles.

INSTRUMENTAL VERBS THAT ARE NOT VEHICLE NAMES: cruise, drive, fly, oar, paddle, pedal, ride, row, sail, tack. (10 verbs)

For these verbs, 27 matching concordance lines were retrieved from the BNC. A review of the resulting concordance revealed mostly compound nominals, e.g. “hedge rows”, “island cruises”, “trail rides”, etc., instead of the expected noun+verb pattern. Only one sentence in the set was recognized as a valid example of coextension path for the verb *cruise*. It is presented in a wider context below.

(6.20) Charlotte took her ticket, and went on into the enclosure of Aurae Phiala. Once round the low barrier of the gatehouse and the prefabricated museum building, with her back turned on the plateau along which the road cruised towards distant Silcaster, the shallow, silver-green bowl of the book-jacket opened before her, wide and tranquil.

In the passage (6.20) the verb *cruise* is followed by the propositional phrase providing specific information about the direction of the path “towards distant Silcaster”. An investigation of the origins of the passage reveals that it comes from the short story “City of Gold and Shadows” written by Ellis Peters (published by Macmillan in 1973).

The conceptual motivation behind the use of this particular verb is not entirely clear. We may speculate that the verb *cruise* was used by the author to build up a tranquil scenery that fits into the general atmosphere of the passage. An association of the verb *cruise* with instrumentality cannot be denied. At the same time, it obviously relates to the manner of motion conflated in the verb, as well. Even in the wider context provided by the passage (6.20), it is difficult to decide to what extent the use of *cruise* in this case is related to manner, i.e. smooth and slow movement, and to what extent it relates, by metonymical extension, to instrumentality associated with vehicles travelling on roads.

### 6.10 Instrumentality in fictive motion

Altogether, 49 instrumental verbs of motion manner were analyzed in this section, 39 for the *verbs that are vehicle names* and 10 for the *verbs that are not vehicle names*. The list for the former class is not exhaustive. Clark and Clark (1979) point out that it is impossible to enumerate all instrumental verbs of motion because, in principle, any vehicle name can be used as a verb of this type.<sup>106</sup> For the selected landmarks, 7,840 combinations were checked, including 6,240 combinations for the vehicular verbs (80 landmarks × 78 past/present verb forms) and 1,600 combinations for the non-vehicular verbs (80 landmarks × 20 past/present verb forms). For these patterns, 121 sentences were retrieved from the BNC, however, only 1 sentence was recognized as a valid example of coextension path. Corpus queries used to obtain results discussed in this section are listed in Appendix to this chapter. See (Waliński, 2018e) for a full listing of all sentences retrieved from the corpus for the instrumental verbs of motion.

The results indicate that instrumental motion verbs are not normally used in coextension path expressions. Given that some common instrumental verbs of motion, such as *drive* or *ride*, are naturally associated with *roads*, *streets*, *highways*, and many other kinds of travelable paths, this may be somewhat surprising. Despite their apparent relatedness, such uses were not found in the linguistic performance of British speakers reflected in the BNC. Additionally, taking into consideration that

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<sup>106</sup> Clark and Clark (1979, List 8A) demonstrate that instrumental verbs of motion may include, for instance, verbs derived from proper names of transportation vehicles, e.g. *Buick*, *Concorde*, or names of common carriers, e.g. *Greyhound*, *TWA*.

instrumental motor adverbials, such as *by car*, *by train*, *on foot*, etc., do not fit conceptually into descriptions of either travelable or non-travelable paths, which was demonstrated with examples in (6.20), it is reasonably justified to argue for *instrument condition* of fictive motion (originally postulated in Waliński, 2015b). The condition essentially forbids structuring fictive motion sentences with semantic patterns conflating instrumentality. Because the semantics of instrument and manner are inextricably linked to each other, the instrument condition overlaps, at least partly, with the *manner condition* put forward by Matsumoto (1996, p. 194). For this reason, the condition must be stated in a parallel fashion to claim that no property of motion instrument can be expressed in a coextension path expression, unless it is used to represent some specifically correlated property of a path.

The example (6.20) found for the verb *cruise* indicates that the instrument condition is not absolutely rigid and can be overridden in some contexts. However, it is difficult to relate the semantics of *cruising* in the above-quoted passage to any specific property of the path, which demonstrates that the conceptual motivation behind the subjective conceptualization the speaker is not always fully transparent in fictive motion expressions. Moreover, because the conceptual motivation for the use of this particular verb is not entirely clear, instead of being unequivocal evidence for the use of instrumentality in fictive motion, it rather shows that it is not entirely possible to disentangle the semantics of instrument from manner.

Moreover, the passage (6.20) allows for some speculation on circumstances that may contribute to overriding the instrument condition. It indicates that the instrumental verbs of motion can potentially appear in sentences that involve an *experiential basis* for a conceptualization of fictive motion (Langacker, 2005, pp. 175–176), which was already observed for the verb *roll* in the example (6.11) discussed in Section 6.6.2. In such scenarios, fictive motion is experiential in the sense that it reflects what a person experiences (or experienced earlier) through a *local view* (cf. *local frame* in Talmy, 2000, Ch. 2) while moving along a path (or scanning it visually) at a given moment (cf. *Type II* in Matsumoto, 1996). Curiously enough, in (6.20) the experiencer is not the protagonist, but the narrator of the story depicting a spatial scene for the reader. This demonstrates that the perspective mode and the scope of attention are not necessarily correlated in coextension path expressions (see Matsumoto, 1996, p. 205). The summary of findings from Chapters 5 and 6 is presented in the following chapter.

## Appendix to Chapter 6

### LISTINGS OF CORPUS QUERIES

This study is based on the BNC World edition published in 2001. The corpus was searched with *SlopeQ for the BNC*, which is a search engine for the British National Corpus data. A vertical bar symbol (|) indicates logical “AND”. For example, the query “road runs|run” substitutes for two separate queries “road runs” and “road run”.

a) Search for coextensions paths including VERBS OF SLIDING: *drift, float, glide, slide, slither, swing*.  
 alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedgegrow|palisade|rampart|wall

drifts|drifted|floats|floated|glides|glided|slides|slid|slithers|slithered|swings|swung

b) Search for coextensions paths including VERBS OF COILING: *coil, curl, loop, revolve, roll, rotate, spin, spiral, swivel, turn, twirl, twist, whirl, wind, pivot*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedgegrow|palisade|rampart|wall  
 coils|coiled|curls|curled|revolves|revolved|rolls|rolled|rotates|rotated|spins|spun|spirals|spiraled|swivels|swiveled|turns|turned|twirls|twirled|twists|twisted|whirls|whirled|winds|wound|pivots|pivoted

c) Search for coextensions paths including VERBS OF NORMAL WALKING: *file, hike, march, mince, pace, ramble, sashay, step, stray, stride, strut, swagger, tiptoe, tramp, tread, trek, waddle, walk*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedgegrow|palisade|rampart|wall

files|filed|hikes|hiked|marches|marched|minces|minced|paces|paced|rambles|rambled|sashays|sashayed|steps|stepped|strays|strayed|strides|strode|struts|strutted|swaggers|swaggered|tiptoes|tiptoed|tramps|tramped|treads|treaded|treks|trekked|waddles|waddled|walks|walked

d) Search for coextensions paths including VERBS OF RELAXED WALKING: *amble, maunder, meander, parade, potter, promenade, roam, rove, saunter, stroll, traipse, wander.*

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|hedgerow|palisade|rampart|wall

ambles|ambled|maunders|maundered|moseys|moseyed|parades|paraded|perambulates|perambulated|potters|potted|promenades|promenaded|roams|roamed|roves|roved|saunters|sauntered|strolls|strolled|traipses|traipsed|wanders|wandered

e) Search for coextensions paths including VERBS OF LABORED PROGRESS: *bumble, clomp, clump, crawl, creep, dawdle, dodder, footslog, inch, lumber, mope, plod, plough, shamble, shuffle, slog, slouch, stump, sulk, toddle, toil, trudge, trundle, wade.*

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|hedgerow|palisade|rampart|wall

bumbles|bumbled|clomps|clomped|clumps|clumped|crawls|crawled|creeps|crept|dawdles|dawdled|dodders|doddered|footslogs|footslogged|inches|inched|lumpers|lumbered|mopes|moped|plods|plodded|ploughs|ploughed|shambles|shambled|shuffles|shuffled|slogs|slogged|slouches|slouched|stumps|stumped|sulks|sulked|toddles|toddled|toils|toiled|trudges|trudged|trundles|trundled|wades|waded

f) Search for coextensions paths including VERBS OF RAPID MOVEMENT: *dart, flounce, frolic, hustle, jaunt, nip, prance, race, scamper, scurry, scuttle, skitter.*

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|hedgerow|palisade|rampart|wall

darts|darted|flounces|flounced|frolics|frolicked|hustles|hustled|jaunts|jaunted|nips|nipped|prances|pranced|races|raced|scampers|scampered|scurries|scurried|scuttles|scuttled|skitters|skittered

g) Search for coextensions paths including VERBS OF DASHING: *blast, bolt, bowl, bustle, careen, career, dash, flash, hurtle, pelt, rush, scoot, scud, shoot, spurt, streak, sweep, tear, whisk, whizz, whoosh, zoom.*

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|esc

arpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|row|palisade|rampart|wall

blasts|blasted|bolts|bolted|bowls|bowled|bustles|bustled|careens|careened|careers|careered|dashes|dashed|flashes|flashed|hurtles|hurtled|pelts|pelted|rushes|rushed|scoots|scouted|scuds|scudded|shoots|shot|spurts|spurred|streaks|streaked|sweeps|swept|tear|tore|whisks|whisked|whizzes|whizzed|whooshes|whooshed|zooms|zoomed

h) Search for coextensions paths including VERBS OF RUNNING GAIT: *gallop, jog, lope, run, sprint, trot*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|row|palisade|rampart|wall gallops|galloped|jogs|jogged|lopes|loped|runs|ran|sprints|sprinted|trots|trotted

i) Search for coextensions paths including VERBS OF JUMPING: *bounce, bound, caper, cavort, frisk, gambol, hop, hurdle, jolt, jump, leap, lollop, romp, skip, somersault, spring, stomp, vault*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|row|palisade|rampart|wall bounces|bounced|bounds|bounded|capers|capered|cavorts|cavorted|frisks|frisked|gambols|gambolled|hops|hopped|hurdles|hurdled|jolts|jolted|jumps|jumped|leaps|leapt|lollops|lolloped|romps|romped|skips|skipped|somersaults|somersaulted|springs|sprang|stomps|stomped|vaults|vaulted

j) Search for coextensions paths including VERBS OF DANCING: *boogie, bop, dance, disco, foxtrot, jig, jitterbug, jive, mosh, pirouette, pogo, polka, quickstep, rumba, rock, samba, shimmy, tango, waltz*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|row|palisade|rampart|wall

boogies|boogied|bops|bopped|dances|danced|discos|discoed|foxtrots|foxtrotted|jigs|jigged|jitterbugs|jitterbugged|jives|jived|moshes|moshed|pirouettes|pirouetted|pogos|pogoed|polkas|polkaed|quicksteps|quickstepped|rumbas|rumbaed|rocks|rocked|sambas|sambaed|shimmies|shimmied|tangos|tangoed|waltzes|waltzed

k) Search for coextensions paths including VERBS OF IRREGULAR MOTION: *falter, flounder, hobble, limp, lurch, meander, reel, stagger, stumble, zigzag*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|hedgerow|palisade|rampart|wall

falters|faltered|flounders|floundered|hobbles|hobbled|limps|limped|lurches|lurched|meanders|meandered|reels|reeled|stagger|staggered|stumbles|stumbled|zigzags|zig-zags|zigzagged

l) Search for coextensions paths including INSTRUMENTAL VERBS THAT ARE VEHICLE NAMES: *balloon, bicycle, bike, boat, bobsled, bus, cab, canoe, caravan, chariot, coach, cycle, dogsled, ferry, gondola, helicopter, jeep, jet, kayak, moped, motor, motorbike, motorcycle, parachute, punt, raft, rickshaw, rocket, skate, skateboard, ski, sled, sledge, sleigh, taxi, toboggan, tram, trolley, yacht*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|hedgerow|palisade|rampart|wall

balloons|ballooned|bicycles|bicycled|bikes|biked|boats|boated|bobsleds|bobsleded|buses|bused|cabs|cabbed|canoes|canoed|caravans|caravanned|chariots|charioted|coaches|coached|cycles|cycled|dogsleds|dogsleded|ferries|ferried|gondolas|gondoled|helicopters|helicoptered|jeeps|jeeped|jets|jetted|kayaks|kayaked|mopeds|mopedded|motors|motored|motorbikes|motorbiked|motorcycle|s|motorcycled|parachutes|parachuted|punts|punted|rafts|rafted|rickshaws|rickshawed|rockets|rocketed|skates|skated|skateboards|skateboarded|skis|skied|sleds|sledded|sledges|sledged|sleighs|sleighed|taxis|taxied|toboggans|tobogganed|trams|trammed|trolleys|trolleyed|yachts|yachted

m) Search for coextensions paths including INSTRUMENTAL VERBS THAT ARE NOT VEHICLE NAMES: *cruise, drive, fly, oar, paddle, pedal, ride, row, sail, tack*.

alley|artery|avenue|boulevard|bridge|flyover|footpath|highway|lane|motorway|overpass|passage|passageway|path|pathway|pavement|railway|road|roadway|route|street|subway|thoroughfare|track|trail|tunnel|underpass|viaduct|walkway|way|beach|canyon|cliff|coast|coastline|crag|desert|escarpment|field|forest|glacier|glen|grassland|gulf|gully|hill|island|land|littoral|meadow|mountain|plateau|ravine|ridge|scarp|seashore|shore|valley|wasteland|wilderness|cable|conduit|conveyor|duct|hose|line|pipe|pipeline|tube|wire|barrage|barricade|barrier|dam|fence|hedge|hedge|hedgerow|palisade|rampart|wall

cruises|cruised|drives|drove|flies|flew|oars|oared|paddles|paddled|pedals|pedaled|rides|rode|rows|rowed|sails|sailed|tacks|tacked

## Observations and conclusions

The mere wording, as it is given in writing, is not the complete expression of the thought, but the knowledge of certain accompanying conditions of utterance, which are used as means of expressing the thought, [and] are needed for its correct apprehension.

G. Frege (1918/1956), *The Thought: A Logical Inquiry*, p. 296

### 7.1 Frequency of verbs in fictive motion

The study presented in this book is the first attempt to systematize the cognitive semantics of verbs used in fictive motion on the basis of empirical data drawn from linguistic corpora. Despite obvious limitations originating from the scope of the analyzed linguistic material and the straightforward methodological workbench applied to probe the data, the results discussed in the previous chapters allow for presenting some panoramic observations about the characteristics of verbs used in coextension path expressions.

One observation that emerges from the data analyzed in the study is that in English only a fraction of motion verbs are used systematically to express coextension paths. Out of 251 verbs taken into consideration only 42, which is about 17%, were found in the BNC in fictive motion expressions. Moreover, the distribution of the distinguished verbal categories in fictive motion was found to be disproportional. The corpus data indicate that verbs used more frequently in coextension paths are the directional verbs of motion, i.e. ones that prototypically express bounded and unbounded paths. Out of 40 verbs taken into consideration for this category 24 (60%) were found in the corpus data. On the other hand, the verbs conflating manner are employed more selectively in fictive motion. Out of 162 verbs analyzed for this category only 17 (10%) were found in the corpus data. Verbs used most sparsely in fictive motion expressions are the instrumental verbs of motion. Only 1 out of 49 verbs of this kind was found in the corpus. Moreover, the conceptual motivation behind the sole example found for this category of verbs is not entirely transparent. Respective shares of these verbal categories in the overall number of examples found in the corpus amount to 69% for the directional verbs of motion and 31% for the verbs of motion manner.

Overall, the corpus data indicate that the structuring fictive motion expressions involves building up *gestalt* conceptions of objects situated in space with respect to their expansion and configuration (Jackendoff, 1983, 1990, 2002; Langacker, 1986, 2005, 2008a, 2012; Talmy, 1996, 2000, Ch. 2). For these conceptions to be meaningful and coherent, the choice of verbs employed to express coextension paths cannot be haphazard (Matlock, 2004b; Matsumoto, 1996a). This is additionally indicated by negative evidence collected in the study, which demonstrates that some commonly used verbs of motion, such as *drive*, *jump*, *step*, *walk*, etc. are not used to express coextension paths.

Another observation that emerges from the data is that some verbs are used in fictive motion far more systematically than others, which is indicated by their frequencies found in the corpus. The frequency of all verbs found in the coextension path expressions retrieved from the BNC is listed in Table 7.1

Table 7.1 Frequency of motion verbs used to express coextension paths found in the BNC

NO.	VERB	FREQ.	%	NO.	VERB	FREQ.	%
1.	run	173	17,7%	22.	ascend	4	0,4%
2.	lead	149	15,2%	23.	zigzag	4	0,4%
3.	go	97	9,9%	24.	approach	3	0,3%
4.	pass	82	8,4%	25.	arrive	3	0,3%
5.	cross	63	6,4%	26.	curl	2	0,2%
6.	follow	57	5,8%	27.	depart	2	0,2%
7.	turn	51	5,2%	28.	plunge	2	0,2%
8.	rise	44	4,5%	29.	proceed	2	0,2%
9.	wind	41	4,2%	30.	return	2	0,2%
10.	climb	32	3,3%	31.	wander	2	0,2%
11.	come	23	2,3%	32.	amble	1	0,1%
12.	reach	21	2,1%	33.	coil	1	0,1%
13.	descend	20	2,0%	34.	creep	1	0,1%
14.	drop	20	2,0%	35.	cruise	1	0,1%
15.	leave	19	1,8%	36.	dive	1	0,1%
16.	enter	14	1,4%	37.	pursue	1	0,1%
17.	fall	10	1,0%	38.	roll	1	0,1%
18.	swing	9	0,9%	39.	slide	1	0,1%
19.	twist	8	0,8%	40.	slither	1	0,1%
20.	sweep	6	0,6%	41.	stray	1	0,1%
21.	meander	5	0,5%	42.	tumble	1	0,1%

Table 7.1 lists all the verbs that were found to occur in the fictive motion expressions retrieved from the corpus sorted by frequency. The table shows that while some verbs were found to occur more than 100 times in the data, many others were identified only once. At the same time, 209 other motion verbs taken into consideration were not found in the data retrieved from the corpus. From the perspective of the frequency of occurrence and the lexical-semantic properties, certain categories of verbs used to express coextension paths can be distinguished, which are discussed in the following sections.

## 7.2 Generic verbs of fictive motion

The first category of verbs that emerges from the corpus data includes these verbs whose semantics is stripped of the original meaning in fictive motion. The verbs found to manifest this property in coextension paths are *go*, *lead*, and *run*. First, if taken together, their frequency in the data amounts to 43% of all sentences identified in the corpus (419 out of 981 examples). However, not only do they occupy the top three positions in the ranking of frequency. More importantly, in fictive motion their meaning is reduced to expressing generic motion, similar to that of *go* in actual motion expressions, which translates into the basic property of extension in space.

A closer look at essential qualities of these verbs in the data indicates that they manifest two basic properties in coextension path expressions. One property is that they are extremely versatile. They were found to be used to express a wide range of spatial relations, which include *directions* specified either in relative or absolute terms both on the vertical/horizontal plane, *bounded paths* including the source and/or goal of motion, as well as the relation of *routing*, e.g. *go across*, *lead along*, *go past*, *run through*, etc., and *geometric configurations*, e.g. *lead straight*, *run around*, etc. (Geuder & Weisgerber, 2008; Jackendoff, 1983, Ch. 9; Zwarts, 2008). Although these verbs are not typically used to describe twists and turns in a path, the data found in the corpus indicate that they are flexible enough to be used for this purpose, too, e.g. “The path goes left towards a metal gate”, “The Stone Lane leads to the right”. Their generic semantics makes them *neutral* as to expressing a path configuration in space (Klippel, Tenbrink, & Montello, 2013; Nikanne & van der Zee, 2013). Moreover, in most scenarios, they can substitute for one another without a significant change of the overall meaning of a coextension path expression.

However, the non-specific meaning of these verbs in fictive motion results in the other basic property, which restricts their autonomous use in coextension paths. Because a coextension path expression must in each case specify some property of a path (according to the *path condition* proposed by Matsumoto,

1996a), the verbs *go*, *lead*, and *run* cannot be used in fictive motion without an adpositional/adverbial complementation, which conveys information about the configuration of a path.

Additionally, what emerges from the data collected in the study is that while the verb *go* can be approached as the most generic verb of actual motion (see Langacker, 2006; Lewandowska-Tomaszczyk, 1987; Lichtenberk, 1991; Wilkins & Hill, 1995), the most generic verbs of fictive motion are *run* and *lead*. Firstly, this is indicated by their frequencies in the corpus data, which markedly exceed the frequency of *go*. Secondly, the analysis of the data indicates that the use of *go* in fictive motion is somewhat more restricted because of the deictic interpretation it tends to be associated with, due to the pragmatic attribution with *come* (Wilkins & Hill, 1995). The verb was not found in the data to express spatial configurations conceptualized as emerging out of the background towards the deictic centre. Therefore, while *go* obviously takes an important share in the conceptual repertoire of the generic verbs used to express fictive motion, in the light of the data found in the corpus, it appears to be less central to expressing coextension paths than *lead* and *run*.

While the generic characteristics of *run* in fictive motion has been pointed out in previous studies (e.g. Langacker, 2008a, pp. 529–530), no other study scrutinized for the preparation of this book noticed that the verb *lead* demonstrates a similar robustness in English expressions of fictive motion. This observation bears some implications for the practice of teaching English as a foreign language (see Cadierno, 2008; Cadierno & Robinson, 2009; Hasko, 2010), as a hint for students who may ponder which verbs are preferred in the English discourse to express coextension paths,<sup>107</sup> and for the practice of translation, as guidance for translators seeking optimal equivalents (Waliński, 2015a).

A separate question that arises from this observation is how these verbs have come to acquire their generic meaning in fictive motion. Langacker (2006) suggests that the change of status for individual conceptual elements, such as the verbs of motion which lose their original semantics in fictive motion expressions can be attributed to *semantic bleaching*. Seuren (2013, p. 18) defines this phenomenon as “a process whereby words, expressions or constructions lose elements of their original truth-conditional, emotive or attitudinal meaning and become standardized as expressive means for less idiosyncratic semantic categories”. From this perspective, especially the meanings of *lead* and *run* in fictive motion have become

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<sup>107</sup> A discussion on the topic of teaching fictive motion expressions was held with Jerzy Tomaszczyk (personal communication, October, 2010, during a conference in Bertinoro, Italy), who argued, on the basis of his linguistic intuition, that English speakers manifest a tendency to express fictive motion with the verb *run*, whereas *go* is not equally prevalent in expressions of this kind.

weakened, or “bleached” in the processes of lexicalization, through which they lost their specific content meaning of expressing the manner of movement. However, they have not become totally devoid of their original meaning, as the term “bleaching” might suggest. Rather, in the context of fictive motion, they have become more abstract verbs conceptually ascribed to expressing the generic property of extension in space (Seuren, 2013; Sweetser, 1988; Traugott, 2006).

Seuren (2013, pp. 17–18) argues that the lexicon is replete with lexical items bleached of an original meaning and adapted to new syntactic-semantic structures. He attributes an important role in this respect to metaphorical conceptualizations, which, over the course of language development, lost their original meaning in a long forgotten past (see *dead metaphors* in Allan, 2009; Lakoff, 1987b; Pawelec, 2006). Such expressions have become non-transparent in the sense that speakers no longer recognize their origins. Instead, handed down through the ages, they have become *conventionalized* and *entrenched* (Langacker, 2008a, 2014) in the minds of speakers. In the case of *lead* and *run* used in coextension path expressions, the semantics of manner they convey in expressions of actual motion is no longer present. Consequently, they can be interpreted as a kind of fossilized structures, which are used by speakers without much awareness of why these verbs are used to express what they do (Gibbs, 2007; see also Moon, 1998).

Therefore, the use of these verbs in fictive motion expressions can be viewed as established through the processes of language acquisition and social transfer. Blomberg and Zlatev (2014) propose to view fictive motion from the perspective of Husserl’s (1939/1970) notion of *sedimentation of meaning*, reviewed recently by Woelert (2011). Husserl (1939/1970) points out that when a linguistic expression becomes a commonly adopted way of referring to a certain state of affairs, that state becomes established in the minds of speakers in a specific manner. In that process, the original experiences underlying the state of affairs normally become *sedimented* and, in the aftermath, the meaning is adopted without any of the self-evidence of original activity. As the language community develops, such linguistic sedimentations serve as a scaffold for the construal of states of affairs. Once linguistic conceptualizations have been established in this fashion, they “become more and more an immediately available, unquestioned (and sometimes even unquestionable) element of the language user’s conceptual repertoire” (Woelert, 2011, p. 119). Woelert (2011) argues that the process of sedimentation entails implicit creation of widespread, conventionalized structures of meaning – a kind of “superindividual memory”, which frees us from the complexity of comprehending everything constantly anew. Thanks to this readily available cognitive scaffold we do not need to actively attend to the original embodied experience to understand or produce fictive motion sentences.

However, following Blomberg and Zlatev (2014), it must be emphasized that the sedimentation of meaning does not completely sever the connection to the original motivating experiences, which still constitute part of the meaning of fictive motion expressions. For this reason, coextension paths including the generic verbs of fictive motion can be approached as a kind of subjectively conceptualized and probably, at least in some instances, cognitively simulated motion, not as completely fossilized idiomatic structures, whose meaning cannot be processed on the basis of their constituent parts.

### 7.3 Paths and shapes

Another category of verbs that emerges from the data analyzed in the study includes the broad category of directional motion verbs, which are used to express bounded and unbounded paths. The data indicate that the two most frequently used verbs in this category are *pass* and *cross*, which occupy respectively the 4th and 5th position on the frequency list. They express the relations of *routing* (Geuder & Weisgerber, 2008; Jackendoff, 1983, p. 165; Zwarts, 2008), which relate to intermediate points on the path of motion. Their frequency in the corpus data, if taken together, amounts to 15% of all fictive motion examples identified in the corpus with the selected procedure (145 out of 981 examples). These two verbs manifest parallel syntactic patterns and their distribution in the data collected in the study is relatively proportional. They tend to be used to specify that the spatial configuration of a path either passes or goes through a specific point. Interestingly, in numerous scenarios, if followed by the appropriate prepositional phrase, they can function interchangeably in coextension path expressions. The relation of crossing can be expressed by using *pass through/across*, and the relation of passing can be expressed with *cross beside/next to*. The high frequency of these verbs in the corpus data indicates that the routing relations are among the most prevalent spatial conceptions expressed with fictive motion.

Another prominent spatial conception that can be observed in the corpus data is the relation of spatial *alignment*, which tends to be expressed with the verb *follow*. This verb occupies the 6th position on the frequency list and amounts to 6% of all examples of coextension paths identified in the corpus data. The analysis indicates that it is used in fictive motion expressions to construe the described object somewhat inertly by *profiling* (Langacker, 2008a, pp. 66–70) its spatial configuration in terms of alignment of the described trajector with another reference object. Consequently, the use of this construal depends on the presence of a spatially extended landmark in the vicinity of the described path. Moreover, the landmark must be prominent enough to provide the conceptual ground for a conceptualization of this kind to take place.

The next group of verbs that can be distinguished in this category includes the verbs whose semantics conflates directionality by referring to an *unbounded path* of motion. They are typically used in coextension paths to indicate that the described object extends on the vertical plane upwards, e.g. *ascends, climbs, rises*, or downwards, e.g. *descends, dives, drops, falls, plunges, tumbles*. Since the semantics of these verbs specifies the direction of motion in absolute terms, with or against the pull of gravity, they can be used in coextension path expressions without an adverbial/prepositional phrase, as in “The lane climbs a shallow hill” or “The road descends the hill”. Taken together, their frequency in the corpus data amounts to 14% of all identified examples (134 out of 981 identified expressions). In contrast, the unbounded path verbs whose semantics conflates the direction forward or backward on the horizontal plane appear to be used rather occasionally in fictive motion. The frequency of examples identified in the corpus for the verbs *approach* and *proceed* amounts to 0.5% of all examples identified in the BNC. No examples were found for the backward direction. Although these verbs prototypically express an unbounded path, in fictive motion expressions the path configuration can be restricted by a prepositional phrase that specifies the source and/or goal of motion.

However, the conceptions of source and goal tend to be expressed in fictive motion with the *bounded path* verbs, which constitute another major class in the category of directional motion verbs. Their lexical semantics conflates the source of motion, e.g. *depart, leave*, or the goal of motion, e.g. *arrive (at), enter, reach, return*. They are used in fictive motion to indicate that the configuration of a path extends from a certain point (the source) or to a certain point (the goal). Taken together, their frequency in the data amounts to 6% of all examples identified in the corpus (61 out of 981 examples). What is noteworthy, the higher proportion of the goal verbs found in the fictive motion expressions identified in the corpus appears to parallel a preference given to the goal, rather than the source observed in cognitive studies on the conceptualization of actual motion events (Lakusta & Landau, 2005; 2012; Papafragou, 2010; Stefanowitsch & Rohde, 2004).

Looking at the use of directional verbs of motion in fictive motion expressions from a broader perspective leads to the conclusion that they lend themselves well to interpretation in terms of Jackendoff's (1983, 1990, 2002) conceptual semantic model discussed in Section 2.6. Jackendoff (1983, Ch. 9) proposes to approach expressions of fictive motion from the conceptual perspective of [PATHS], whose internal structure consists of the path-function coupled with a reference object or place. The [PATHS] play a variety of roles both in expressing events and states. Their role in fictive motion expressions involves an object that extends over the [PATH].

According to Jackendoff (1983, pp. 165–168), with respect to the path's relationship to the reference object or place, [PATHS] include three categories: (1) *bounded paths*, which specify *source-paths* and *goal-paths*; (2) *directions*, in which the reference object or place is not included in the path, but would, if it were extended further; and (3) *routes*, in which the reference object or place is related to some point on the path. On the grounds of this model, it is plausible to approach the directional verbs used in fictive motion expressions as *verbs of extent*, which signify that the described object occupies a position in space, rather than moves. The relation of *alignment* can be approached a specific case in the category of routes or distinguished as a separate type of the path's relationship to the reference object.

The next important observation that emerges from the corpus data analyzed in the study is that while the directional verbs are used in fictive motion to express paths, the verbs of motion manner tend to be used to specify shapes. The basic shape described with the manner verbs in fictive motion expressions refers to a single turn in the path's course, which was found to be expressed with the verbs *turn* and *swing*. The choice of the latter is more likely to occur in situations when the described path follows a gentler curvature. Taken together, the frequency of these two verbs in the corpus data amounts to 6% of all collected examples (60 out of 981). On the other hand, longer stretches of a path characterized by twists and turns tend to be expressed with the verbs *wind* and *meander*, which are used to express that the described object includes multiple gentler swings, and the verbs *twist* and *zigzag*, which are typically used to specify that the described object includes multiple sharper turns. Taken together, their frequency in the data also amounts to 6% of all examples identified in the corpus (58 out of 981 examples). These verbs of motion manner are used in coextension path expressions to specify the *local shape* of a path's configuration in space (Nikanne & van der Zee, 2013), while the global direction tends to be specified with an adverbial/adpositional phrase.

Other shapes expressed with manner verbs in fictive motion include the spiral course of a path, which was found to be expressed with the verbs *curl* and *coil*, and the extension onwards following a smooth arch, which was found to be expressed with the verb *sweep*. Taken together, their frequency in the data amounts to 1% of examples identified in the corpus (9 out of 981 examples). Moreover, single examples were found for some other verbs of motion manner. The verbs *slide* and *slither* were found to be used to express a smooth transition of a path out of/around another characteristic background. The verb *stray* was found to be used to express the conceptualization in which the trajectory of a path manifests some divergence from the subjectively expected course.

Viewed from a broader perspective, the use of manner verbs in fictive motion expressions can be interpreted in terms of Jackendoff's (1983, 1990, 2002) conceptual model only if it is coupled with an additional semantic model capable of mapping spatial shapes onto geometric and topological properties of physical objects. Proposals of this kind include the *3D model representation* based on Marr's (1982/2010) theory of vision, which was proposed by Jackendoff (1990; 1996b, 2012; Landau & Jackendoff, 1993) and the more recent proposal of Mani and Pustejovsky (2012) based on *Region Connection Calculus 8* (Randell, Cui, & Cohn, 1992; Cohn, Bennett, Gooday, & Gotts, 1997).

However, the verbs of motion manner used in fictive motion expressions lend themselves well to interpretation in terms of Langacker's (1986, 2005, 2008a, Ch. 14) cognitive model of *mental scanning* discussed in Section 2.2. The model assumes that fictive motion involves sequential/summary scanning along the path occupied by an object in space by which the conceptualizer builds up a full conception the object's configuration. In the structuring of fictive motion, the conceptualizer scans mentally along the object's expanse. What emerges from the mental scanning along the path is a conceptualization of the entire configuration of the object as a unitary *gestalt* (Langacker, 2005, p. 176, 2008a, p. 111, 2012, p. 205). In some scenarios, it can be conceptually mapped onto a particular shape, such as an arch, spiral, turn, zigzag or a series of swings or twists. On other occasions, the mental scanning can invoke the conceptualization of a smooth transition or a divergence from the subjectively expected course. These stable gestalt conceptions constitute the subjective counterparts of spatial contours of actual motion, which function in memory as simultaneously available wholes. Viewed from a different angle, this demonstrates the mechanism of linguistic *enrichment* of space (Landau, Dessalegn, & Goldberg, 2010), which is the capability of language to go beyond what is encoded in fragile form in the visual-spatial system by binding fragmentary spatial representations into coherent *gestalts*.

#### 7.4 Beyond paths and shapes in fictive motion

Although the models of fictive motion proposed by Jackendoff (1983, 1990, 2002) and Langacker (1986, 2005, 2008a, Ch. 14) can be used to account for 99.5% of examples found in the corpus data, some coextension path expressions found in the BNC cannot be fully explained in terms of paths and shapes, which is another major observation that emerges from the analysis of the data. One type of such fictive motion expressions includes those sentences in which the lexical semantics of a verb is

additionally mapped onto the property of actual motion that is known to take place along the described path. Expressions of this kind were found for the verbs of walking *wander* and *amble* (6.14a–b), which are repeated below as (7.1a–b). Such expressions are probably less conventional in everyday conversations, however, they occur in wide circulation in tourist guides. Additional sentences of this kind, identified with Google Books Ngram Viewer, are shown in the following examples (7.1c–f).

(7.1) a. A pathway ambles up beside art galleries and chic boutiques to the domed church

b. The Way wanders through the lovely old village of Kinver

c. The path ambles up amongst alpenrose and bilberry bushes, slowly gaining height as the gorge narrows and becomes more defined (*Mont Blanc Walks* by Hilary Sharp, Cicerone Press, 2015)

d. The path ambles along through neglected terraces, without much altitude change, occasionally obstructed by debris and vegetation (*The Dodecanese and the East Aegean Islands* by Marc Dubin, Rough Guides, 2002)

e. An unlikely dirt road wanders beside an orchard and takes you to the overlook, a view of the confluence of the Okanogan and Columbia rivers (*Discovering the Pleasures and Treasures of Highway 97* by Jim Couper, Heritage House, 2006)

f. The path wanders between the fence and the cliff top, its position giving views of the Calf of Man (*Isle of Man Coastal Path* by Aileen Evans, Cicerone Press, 2018)

In this type of fictive motion expressions, the semantics of manner conflated in the verb relates both to the spatial extension of a path and the way the conceptualizer associates the path with actual motion, more specifically manners of recreational walking. Such uses expand beyond the strict understanding of the *manner condition* proposed by Matsumoto (1996a; see Section 6.6), which assumes that any moving entity is suppressed in fictive motion.<sup>108</sup> In examples (7.1a–f) the information conveyed by the verb is associated with the path in two aspects. One is the basic aspect of extension in space, which fulfills the manner condition. The other can be spelled out approximately as “convenient for relaxed walks”, which expands the meaning of a verb in fictive motion beyond the semantics of spatial configuration of a path.

<sup>108</sup> Matsumoto (1996a, pp. 196–197) ascribes the possibility of this kind of verbs to be used in fictive motion sentences to imaginative capabilities of the speaker and assumes that they have a “somewhat poetic flavor”.

The use of this type of manner verbs in coextension path expressions lends itself to interpretation in terms of the model of fictive motion as *conceptual integration* (Fauconnier, 1997; Fauconnier & Turner, 2002) discussed in Section 2.5, and its modern extension offered by Lewandowska-Tomaszczyk (2010, 2012, 2017) as the *approximation and re-conceptualization theory*. The semantics of manner conflated in the verb relates both to the spatial extension of a path and the way the conceptualizer associates the path with recreational walking known to occur along the path, which takes place through *conceptual blending* (Fauconnier, 1997, pp. 177–181; Fauconnier & Turner, 2002). Such sentences involve blending of the static construal of an object's spatial extent with the image schematic understanding of the trajector moving to a specific landmark, and the manner in which this movement takes place, which fuses at least four different mental spaces simultaneously to form the resulting mental construction.

However, for the conceptual integration to work effectively in the processing expressions of this kind, a common reference point (cf. *common ground* in Allan, 2013; Clark, 1996) must be first established between mental spaces of the speaker and addressee. This *common communicative platform*, as termed by Lewandowska-Tomaszczyk (2012), allows for a conceptual communicative overlap between the mental spaces of the interactants within a certain *tolerance space*, which is established dynamically in communication. The tolerance space is bounded by certain contextually defined *tolerance thresholds* that constrain the proliferation of meanings beyond a certain degree of *resemblance* (Lewandowska-Tomaszczyk, 2017). What defines the tolerance space for the sentences (7.1a–f) is the context in which they are used, i.e. tourist guide descriptions of walks on offer in excursion areas. In this context, the interactants can refer inferentially to certain properties of the path associated with recreational activities. These properties remain meaningful as long as they are shared by the speakers. Thus, to fully understand this kind of fictive motion expressions, the recipient must unpack the blend into its constituent input spaces (Coulson, 2001; Coulson & Oakley, 2005, p. 1533). However, even if the signaled meaning is not detected by the recipient, it may be considered a *marginal departure* (Lewandowska-Tomaszczyk, 2012, p. 179) because it is relevant but not crucial for the purpose of communication (see Lewandowska-Tomaszczyk, 2012, 2017 for a broader discussion on *approximate understanding, tolerance spaces and thresholds*, and *re-conceptualization* in communication). In other words, even if the signaled association of a path with a type of recreational walking is not grasped by the addressee, the basic aspect of spatial extension conflated in the verb is sufficient to prevent a communication breakdown.

In more general terms, the use of verbs that convey multiple properties of a path in fictive motion expressions, especially in certain specific contexts, may be attributed to the basic linguistic motivating principle of *economy*<sup>109</sup> (Croft, 2003, Ch. 4), which is a likely reason why expressions such as (7.1a), rather than (7.2) are used as the conventionalized way of expressing spatial configurations in this context.

(7.2) A pathway extends upwards beside art galleries and chic boutiques to the domed church and it offers a convenient walking space for relaxed ambling along its expanse.

Comparing these two options shows that, at least in some specific contexts, it is more economical to describe the spatial configuration of a path with a specific verb used in fictive motion instead of more elaborate structures (see also Matsumoto, 1996a; Talmy, 2000a, Ch. 2, 2011, p. 632). As emphasized by Matlock (2004b, p. 232), although sentences of this kind are less conventional than most other fictive motion expressions, they sound perfectly acceptable in the appropriate context.

The most challenging to explain, however, are those single examples found in the corpus data for which the motivation behind the use of a verb is not immediately obvious. They appear to belong to a category of creative, novel uses, in which a path configuration is construed in an entirely subjective way. Such examples were found in the BNC for the verbs *roll* (6.11) and *cruise* (6.20), which are repeated below as (7.3a–b) for the sake of clarity.

(7.3) a. The road rolled over a hill and curled down among flesh-pink dunes

b. The road cruised towards distant Silcaster

The sentence (7.3a) demonstrates that the *manner condition* proposed by Matsumoto (1996, p. 194) does not operate rigidly in natural language. Even in the wider context provided by the passage quoted in (6.12) it is initially impossible to state the conceptual motivation behind the use of the verb *roll* in the sentence (7.3a) since its lexical semantics is difficult to map onto a correlated property of the described path. However, once we learn that it was used to describe the configuration of a road by the person who crossed the Sahara desert on foot using a wheelbarrow, the verb ceases to be utterly unacceptable. It is plausible to assume that the memoir of this particular journey establishes a specific tolerance space,

<sup>109</sup> Croft (2003, p. 102) [(Croft, 2003)] defines *economic motivation* essentially as “the principle that the expressions should be minimized where possible.” He adds that the concept extends far back in linguistics, and is manifested in a number of different theories, including *Grice’s Maxim of Quantity* (Grice, 1989, p. 26) and *Zipf’s Law* (Piantadosi, 2014; Powers, 1998; Zipf, 1949).

which enables the reader to re-conceptualize this verb as an *allowable substitution* (Lewandowska-Tomaszczyk, 2012, p. 170). The verb *roll* is used in this context as a generic verb of fictive motion, parallel to *run* or *lead*, in spite of the manner condition that essentially forbids using verbs conflating information unrelated to some property of the path in fictive motion expressions.

In a similar fashion, the example (7.3b) demonstrates that the *instrument condition* (Waliński, 2015b) can be overridden in natural language. Again, even in the wider context provided by the passage quoted in (6.20) it is difficult to state precisely why the verb *cruise* was used in this sentence to express the coextension path. The verb semantics relates to the manner of motion, i.e. smooth and slow movement, but at the same time, by metonymical extension, to the instrumentality of motion, i.e. vehicles travelling on roads. Again, the passage in which it is used establishes a specific tolerance space, which enables the reader to re-conceptualize it as an allowable substitution. However, in this case the verb *cruise* is not used as a generic verb of fictive motion, but was employed by the author to create an imaginative scene that fits into the general atmosphere of the story. Viewed from the perspective of the data collected in the study, instances of overriding the manner/instrument conditions appear to be incidental, rather than systematic. The creative discourse from which these examples originate suggests that such idiosyncratic uses of fictive motion are more likely to appear in creative writing, rather than everyday speech. In such cases, the particular context establishes a common communicative platform between the interactants, which extends the tolerance threshold to the degree that allows for the re-conceptualization of a verb that would not normally be used in fictive motion (see also Langacker, 2005, pp. 168–169, 2008, pp. 501–503).

## 7.5 Conclusions

As discussed throughout this volume, the investigation of fictive motion has been advancing gradually since the mid-1980s. During these 35 years, different conceptual models and methodological approaches have been used to study this cognitive-linguistic phenomenon. They range from rational linguistic analyses and cross-linguistic comparisons to empirical psycholinguistic experiments, eye-tracking studies, and more recently, important insights contributed by neuro-imaging. However, despite the growing body of research, we are still at the beginning of the road to pin down precisely how the conceptual mappings in fictive motion arise and by what cognitive mechanisms they are driven.

The corpus-based analysis of verbs used to express coextension paths presented in this volume indicates that the cognitive linguistic models of fictive motion proposed by Jackendoff (1983, 1990, 2002), Langacker (1986, 2005, 2008a, Ch. 14),

and Fauconnier (1997; Fauconnier & Turner, 2002), despite the important differences reviewed in Chapter 2, esp. Section 2.6, can be approached as complementary, rather than contradictory to one another. They put in their respective loci of attention different categories of verbs used in coextension path expressions. Viewed from this perspective, fictive motion emerges as a multi-layered cognitive-linguistic phenomenon, whose semantic complexity varies between particular sentences and occasions of use by incorporating different categories of verbs to express different aspects of meaning, including paths, shapes, and, especially in some specific contexts, conceptual blends with actual motion. It appears that the complex phenomenon of fictive motion does not necessarily have to be explained from the perspective of a single model. Moreover, it seems that the models proposed in the cognitive linguistic literature could be interfaced together to form an umbrella framework, which would provide a comprehensive account for different instances of coextension paths used in different contexts.

A question that cannot be fully answered on the basis of the results obtained in this study is to what extent our cognitive ability to mentally simulate motion conveyed by the verb plays a crucial role in structuring fictive motion expressions, which was discussed in Chapter 3. However, the labyrinthine picture of fictive motion that emerges from the analysis of the data suggests that it cannot be claimed unconditionally that “People readily simulate motion with fictive motion just as they do in all sorts of other cognitive domains” (Matlock, Ramscar, & Boroditsky, 2004, p. 52). Rather, depending on the particular use and the wider linguistic context, a fictive motion expression can be interpreted either as a simple representation of the state of spatial extension, or more figuratively through the summary scanning based on a simulation of actual motion—as required to grasp the meaning in relation to the semantic attributes conflated in the verb and its satellites.

Brain studies of Cacciari, et al. (2011) and Romero Lauro, et al. (2013) demonstrate that the activation in the motor cortex during the comprehension of sentences that contain motion verbs without conveying any actual movement depends on the abstractness of meaning as well as the conventionalization of use. As these factors increase, which is particularly typical for highly fossilized idiomatic structures, the less motor activation is found (see also Desai, Conant, Binder, Park, & Seidenberg, 2013 for results obtained for action idioms). These findings suggest that, in comparison to the processing of actual motion, figurative uses of motion verbs activate motion semantics in a graded manner. Thus, an important factor that most likely contributes to differences in the conceptual processing fictive motion expressions is the extent to which particular patterns are conventionalized.

However, the relationship between conventionality and metaphoric structure is complex and difficult to draw precisely (Gibbs, 1994; Müller, 2008). With continued use, once-novel metaphors become familiarized. As a result, their meanings are probably understood via processes different from those when they were first encountered (Bowdle & Gentner, 2005; Gentner & Bowdle, 2001; Glucksberg, 2001, 2003; see Cardillo, Watson, Schmidt, Kranjec, & Chatterjee, 2012 for data obtained from fMRI). This suggests that once a particular pattern becomes *conventionalized* and *entrenched* in the minds of speakers (Langacker, 2008a, 2014), the degree of motion semantics it conveys is no longer as vivid as it may have been originally. This is congruent with the *graded salience hypothesis* (Giora, 1997, 2003), which assumes that the *salient meanings*, i.e. conventional, frequent, familiar, enhanced by prior context, are processed first, without having to process the less salient literal meaning. Thus, the salience of motion semantics in coextensions path expressions is likely to depend not only on individual comprehension strategies, but also on the degree of cultural-linguistic conventionalization of certain fictive motion patterns. Put simply, we expect roads to *run*, *lead* or *follow*, rather than *drive*, *jump* or *walk*, which indicates that in the processing structures of this kind, experiential motivations interact with linguistic conventions. Moreover, the results of the study indicate that speakers are likely to simulate selected aspects of motion, in particular those that are relevant to what they intend to express with a coextension path utterance (path, direction, shape), while disregarding others (agent, instrument, cause), which makes fictive motion a kind of “deficient” motion from the perspective of cognitive processing.

Moreover, the conceptualization of fictive motion expressions is likely to be affected by knowledge of foreign languages (Tomczak & Evert, 2015), and countless other factors, both objective and subjective, that apply to a particular instance of interactional discourse (Lewandowska-Tomaszczyk, 2012, 2017). Furthermore, in situations when a subjective experience of motion does occur for a fictive motion expression, there is a wide range of possible variants as to its strength, character, clarity, homogeneity, and what is conceptualized as moving (see variants listed by Blomberg & Zlatev, 2014). Since still very little is known about how exactly mental simulations take place or what aspects of simulation can be triggered by what sorts of language, it is hoped that the observations presented in this study will contribute some constructive ideas to future empirical research in this domain.

The systematic cognitive linguistic investigation of fictive motion on the basis of empirical linguistic data started with this volume is far from being finished. Another crucial aspect of coextension path expressions that expands beyond the scope of the

research presented in this book is the use of satellite expressions in fictive motion. While there are hundreds, if not thousands, of cognitive linguistic studies devoted to the semantics of prepositions in linguistic representations of space, time, and motion (see Bączkowska, 2011; Waliński, 2014b, Ch. 6 for reviews), the topic of adverbials used in motion expressions appears to be relatively underrepresented. Some interesting examples spotted in the analysis of the data for this study, such as “The road led *enticingly* to the crossroads” or “The road led *giddily* downwards”, indicate that they may be worth giving a closer look in future explorations.

What emerges from the data collected in this study is that a plausible point of departure for advancing studies on fictive motion is to approach it from the perspective of the essential types of spatial relations and the degree of conventionalization of use. Subsequent studies conducted in this direction could benefit from the application of more efficient algorithms for mining fictive motion expressions from corpora (see Liu, Shang, & Han, 2017; Hwang & Palmer, 2015), which would eliminate the need of reviewing the linguistic material retrieved from a corpus to exclude instances of coincidental matches. Finally, as discussed in Section 2.7, fictive motion expressions are constrained not only by cognitive but also linguistic factors. Since coextension path expressions function within a particular language, they are subject to restrictions imposed by the particular lexical-grammatical system and accommodate to language specific conventions (Blomberg, 2015; Bohnenmeyer, 2010; Matsumoto, 1996a; Stosic, Fagard, Sarda, & Colin, 2015). Consequently, it would be advantageous to conduct cross-linguistic studies to see whether the verbal categories of fictive motion uncovered in this study can be attested across other languages, especially those that manifest contrasting lexicalization patterns of motion events.

## Bibliography

- Alexander, H. G. (Ed.). (1956). *The Leibniz-Clarke Correspondence: Together with Extracts from Newton's Principia and Optiks*. Manchester: Manchester University Press.
- Allan, K. (2009). An Inquest into Metaphor Death: Exploring the Loss of Literal Senses of Conceptual Metaphors. *Cognitive Semiotics*, 5(1–2).  
<https://doi.org/10.1515/cogsem.2013.5.12.291>
- Allan, K. (2013). What is Common Ground? In A. Capone, F. Lo Piparo, & M. Carapezza (Eds.), *Perspectives on Linguistic Pragmatics* (Vol. 2, pp. 285–310). Cham: Springer.
- Aloni, M., & Dekker, P. J. E. (Eds.). (2016). *The Cambridge Handbook of Formal Semantics*. Cambridge: Cambridge University Press.
- Altmann, G. T. M. (2004). Language-mediated eye movements in the absence of a visual world: The 'blank screen paradigm.' *Cognition*, 93(2), B79–B87.  
<https://doi.org/10.1016/j.cognition.2004.02.005>
- Altmann, G. T. M., & Kamide, Y. (2007). The real-time mediation of visual attention by language and world knowledge: Linking anticipatory (and other) eye movements to linguistic processing. *Journal of Memory and Language*, 57(4), 502–518.  
<https://doi.org/10.1016/j.jml.2006.12.004>
- Altmann, G. T. M., & Kamide, Y. (2009). Discourse-mediation of the mapping between language and the visual world: Eye movements and mental representation. *Cognition*, 111(1), 55–71. <https://doi.org/10.1016/j.cognition.2008.12.005>
- Amagawa, T. (1997). Subjective Motion in English and Japanese: A Case Study of *Run* and *Hashiru*. *Tsukuba English Studies*, 16, 33–50.
- Anderson, S. E., & Spivey, M. J. (2009). The enactment of language: Decades of interactions between linguistic and motor processes. *Language and Cognition*, 1(01), 87–111.  
<https://doi.org/10.1515/LANGCOG.2009.005>
- Aquinas, St. Thomas. (1269/1999). *Commentary on Aristotle's Metaphysics* [written c. 1269]. (R. J. Blackwell, R. J. Spath, W. E. Thirkel, & P. H. Conway, Trans.). Notre Dame, IN: Dumb Ox Books.
- Aristotle. (350BC/1995a). On the Soul [written c. 350BC]. In J. Barnes (Ed.), *The complete works of Aristotle* (Vol. 1). Princeton, NJ: Princeton University Press.
- Aristotle. (350BC/1995b). Physics [written c. 350BC]. In J. Barnes (Ed.), *The complete works of Aristotle* (Vol. 1). Princeton, NJ: Princeton University Press.
- Aske, J. (1989). Path Predicates in English and Spanish: A Closer Look. In *Proceedings of the Fifteenth Annual Meeting of the Berkeley Linguistics Society* (pp. 1–14). Berkeley, CA: Berkeley Linguistics Society.
- Aston, G., & Burnard, L. (1998). *The BNC Handbook: Exploring the British National Corpus with SARA*. Edinburgh: Edinburgh University Press.
- Athanasiadou, A., Canakis, C., & Cornillie, B. (Eds.). (2006). *Subjectification: Various Paths to Subjectivity*. Berlin: Mouton de Gruyter.
- Aziz-Zadeh, L., & Damasio, A. (2008). Embodied semantics for actions: Findings from functional brain imaging. *Journal of Physiology-Paris*, 102(1–3), 35–39.  
<https://doi.org/10.1016/j.jphysparis.2008.03.012>

- Bączkowska, A. (2011). *Space, Time & Language: A Cognitive Analysis of English Prepositions*. Bydgoszcz: Wydawnictwo Uniwersytetu Kazimierza Wielkiego.
- Baker, R. K., Pettigrew, T. L., & Poulin-Dubois, D. (2014). Infants' ability to associate motion paths with object kinds. *Infant Behavior and Development*, 37(1), 119–129. <https://doi.org/10.1016/j.infbeh.2013.12.005>
- Ballard, K. E. (1960). Leibniz's Theory of Space and Time. *Journal of the History of Ideas*, 21(1), 49–65. <https://doi.org/10.2307/2707998>
- Barlew, J. (2017). *The semantics and pragmatics of perspectival expressions in English and Bulu: The case of deictic motion verbs* (Ph.D. Dissertation). Ohio State University, Ohio.
- Barnes, J. (1982). *The Presocratic Philosophers*. London: Routledge & Kegan Paul.
- Barsalou, L. W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences*, 22(4), 577–660. <http://doi.org/10.1017/S0140525X99002149>
- Barsalou, L. W. (2003). Situated simulation in the human conceptual system. *Language and Cognitive Processes*, 18(5–6), 513–562. <https://doi.org/10.1080/01690960344000026>
- Barsalou, L. W. (2008). Grounded Cognition. *Annual Review of Psychology*, 59(1), 617–645. <https://doi.org/10.1146/annurev.psych.59.103006.093639>
- Barsalou, L. W. (2009a). Simulation, situated conceptualization, and prediction. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1521), 1281–1289. <https://doi.org/10.1098/rstb.2008.0319>
- Barsalou, L. W. (2009b). Situating concepts. In P. Robbins & M. Aydede (Eds.), *The Cambridge Handbook of Situated Cognition* (pp. 236–263). Cambridge: Cambridge University Press.
- Barsalou, L. W. (2010). Grounded Cognition: Past, Present, and Future. *Topics in Cognitive Science*, 2(4), 716–724. <https://doi.org/10.1111/j.1756-8765.2010.01115.x>
- Barsalou, L. W., Santos, A., Simmons, W. K., & Wilson, C. D. (2008). Language and simulation in conceptual processing. In M. de Vega, A. M. Glenberg, & A. C. Graesser (Eds.), *Symbols and Embodiment: Debates on meaning and cognition* (pp. 245–283). Oxford: Oxford University Press.
- Batki, A., Baron-Cohen, S., Wheelwright, S., Connellan, J., & Ahluwalia, J. (2000). Is there an innate gaze module? Evidence from human neonates. *Infant Behavior and Development*, 23(2), 223–229. [https://doi.org/10.1016/S0163-6383\(01\)00037-6](https://doi.org/10.1016/S0163-6383(01)00037-6)
- Beavers, J. (2008). Scalar complexity and the structure of events. In J. Dölling, T. Heyde-Zybatow, & M. Schäfer (Eds.), *Event structures in linguistic form and interpretation* (pp. 245–265). Berlin: Walter de Gruyter.
- Beavers, J., & Koontz-Garboden, A. (2012). Manner and Result in the Roots of Verbal Meaning. *Linguistic Inquiry*, 43(3), 331–369. [https://doi.org/10.1162/LING\\_a\\_00093](https://doi.org/10.1162/LING_a_00093)
- Beavers, J., Levin, B., & Wei Tham, S. (2010). The typology of motion expressions revisited. *Journal of Linguistics*, 46(02), 331–377. <https://doi.org/10.1017/S0022226709990272>
- Bedny, M., & Caramazza, A. (2011). Perception, action, and word meanings in the human brain: The case from action verbs. *Annals of the New York Academy of Sciences*, 1224(1), 81–95. <https://doi.org/10.1111/j.1749-6632.2011.06013.x>
- Behnke, E. A. (2011). Husserl's Phenomenology of Embodiment. In J. Fieser & B. Dowden (Eds.), *Internet Encyclopedia of Philosophy*. Retrieved on 21.09.2014 from <http://www.iep.utm.edu/husspemb/>
- Bennardo, G. (2004). Linguistic untranslatability vs. conceptual nesting of frames of reference. In K. Forbus, D. Gentner, & T. Regier (Eds.), *Proceedings of the 26th Annual Conference of the Cognitive Science Society* (pp. 102–107). Mahwah, NJ: Lawrence Erlbaum.

- Benussi, V. (1913). *Psychologie der Zeitauffassung*. Heidelberg: Carl Winter.
- Bergen, B. K. (2012). *Louder Than Words: The New Science of How the Mind Makes Meaning*. New York: Basic Books.
- Bergen, B. K. (2016). Embodiment, simulation and meaning. In N. Riemer (Ed.), *The Routledge Handbook of Semantics* (pp. 142–157). London: Routledge.
- Bergen, B. K., & Chang, N. (2013). Embodied Construction Grammar. In T. Hoffmann & G. Trousdale (Eds.), *The Oxford Handbook of Construction Grammar* (pp. 168–190). Oxford: Oxford University Press.
- Bergen, B. K., Chan Lau, T.-T., Narayan, S., Stojanovic, D., & Wheeler, K. (2010). Body part representations in verbal semantics. *Memory & Cognition*, 38(7), 969–981. <https://doi.org/10.3758/MC.38.7.969>
- Bergen, B. K., Lindsay, S., Matlock, T., & Narayanan, S. (2007). Spatial and Linguistic Aspects of Visual Imagery in Sentence Comprehension. *Cognitive Science*, 31(5), 733–764. <https://doi.org/10.1080/03640210701530748>
- Bergson, H. (1922/2002). Duration and Simultaneity [First published in 1922 as *Durée et simultanéité*]. (L. Jacobson, Trans.). In *Henri Bergson: Key Writings*. (K. Ansell-Pearson & J. Mullarkey, Eds.). New York: Continuum.
- Berlin, B., & Kay, P. (1969). *Basic Color Terms: Their Universality and Evolution*. Berkeley, CA: University of California Press.
- Biber, D. (1993). Representativeness in Corpus Design. *Literary and Linguistic Computing*, 8(4), 243–257. <https://doi.org/10.1093/lc/8.4.243>
- Biber, D., & Reppen, R. (Eds.). (2015). *The Cambridge Handbook of English Corpus Linguistics*. Cambridge: Cambridge University Press.
- Biber, D., Conrad, S., & Reppen, R. (1998). *Corpus Linguistics: Investigating Language Structure and Use*. Cambridge: Cambridge University Press.
- Biber, D., Johansson, S., Leech, G. N., Conrad, S., & Finegan, E. (1999). *Longman Grammar of Spoken and Written English*. Harlow: Pearson Longman.
- Binder, J. R., Desai, R. H., Graves, W. W., & Conant, L. L. (2009). Where Is the Semantic System? A Critical Review and Meta-Analysis of 120 Functional Neuroimaging Studies. *Cerebral Cortex*, 19(12), 2767–2796. <https://doi.org/10.1093/cercor/bhp055>
- Binnick, R. I. (1991). *Time and the Verb: A Guide to Tense and Aspect*. New York: Oxford University Press.
- Blake, F. R. (1930). A Semantic Analysis of Case. *Language*, 6(4), 34. <https://doi.org/10.2307/521984>
- Blomberg, J. (2014). *Motion in Language and Experience: Actual and Non-actual motion in Swedish, French and Thai* (Ph.D. Dissertation). Lund University, Lund.
- Blomberg, J. (2015). The expression of non-actual motion in Swedish, French and Thai. *Cognitive Linguistics*, 26(4), 657–696. <https://doi.org/10.1515/cog-2015-0025>
- Blomberg, J., & Zlatev, J. (2014). Actual and non-actual motion: Why experientialist semantics needs phenomenology (and vice versa). *Phenomenology and the Cognitive Sciences*, 13(2), 395–418. <https://doi.org/10.1007/s11097-013-9299-x>
- Bloom, P., & Keil, F. C. (2001). Thinking Through Language. *Mind and Language*, 16(4), 351–367. <https://doi.org/10.1111/1468-0017.00175>
- Bohnenmeyer, J. (2003). The Unique Vector Constraint: The Impact of Direction Changes on the Linguistic Segmentation of Motion Events. In E. van der Zee & J. Slack (Eds.), *Representing Direction in Language and Space* (pp. 86–110). Oxford: Oxford University Press.

- Bohnmeyer, J. (2010). The Language-Specificity of Conceptual Structure: Path, Fictive Motion, and Time Relations. In B. Malt & P. Wolff (Eds.), *Words and the Mind* (pp. 111–137). Oxford University Press.
- Bohnmeyer, J., Enfield, N. J., Essegbey, J., Ibarretxe-Antunano, I., Kita, S., Lüpke, F., & Ameka, F. K. (2007). Principles of event segmentation in language: The case of motion events. *Language*, 83(3), 495–532. <https://doi.org/10.1353/lan.2007.0116>
- Boroditsky, L. (2000). Metaphoric structuring: Understanding time through spatial metaphors. *Cognition*, 75(1), 1–28. [https://doi.org/10.1016/S0010-0277\(99\)00073-6](https://doi.org/10.1016/S0010-0277(99)00073-6)
- Boroditsky, L. (2001). Does Language Shape Thought?: Mandarin and English Speakers' Conceptions of Time. *Cognitive Psychology*, 43(1), 1–22. <https://doi.org/10.1006/cogp.2001.0748>
- Boroditsky, L. (2011). How Language Shapes Thought. *Scientific American*, 304(2), 62–65. <https://doi.org/10.1038/scientificamerican0211-62>
- Boroditsky, L., & Gaby, A. (2010). Remembrances of Times East: Absolute Spatial Representations of Time in an Australian Aboriginal Community. *Psychological Science*, 21(11), 1635–1639. <https://doi.org/10.1177/0956797610386621>
- Boroditsky, L., & Ramscar, M. (2002). The Roles of Body and Mind in Abstract Thought. *Psychological Science*, 13(2), 185–189. <https://doi.org/10.1111/1467-9280.00434>
- Bowdle, B. F., & Gentner, D. (2005). The Career of Metaphor. *Psychological Review*, 112(1), 193–216. <https://doi.org/10.1037/0033-295X.112.1.193>
- Bower, G. H., & Morrow, D. G. (1990). Mental models in narrative comprehension. *Science*, 247(4938), 44–48. <https://doi.org/10.1126/science.2403694>
- Brandt, L. (2009). Subjectivity in the act of representing: The case for subjective motion and change. *Phenomenology and the Cognitive Sciences*, 8(4), 573–601. <https://doi.org/10.1007/s11097-009-9123-9>
- Brewer, B., & Pears, J. (1993). Introduction: Frames of reference. In N. Eilan, R. A. McCarthy, & B. Brewer (Eds.), *Spatial Representation: Problems in Philosophy and Psychology* (pp. 25–30). Oxford: Oxford University Press.
- Brezina, V. (2018). *Statistics in Corpus Linguistics: A Practical Guide*. Cambridge: Cambridge University Press.
- Britton, A., Setchi, R., & Marsh, A. (2013). Intuitive interaction with multifunctional mobile interfaces. *Journal of King Saud University - Computer and Information Sciences*, 25(2), 187–196. <https://doi.org/10.1016/j.jksuci.2012.11.002>
- Broccias, C., & Hollmann, W. B. (2007). Do we need summary and sequential scanning in (Cognitive) grammar? *Cognitive Linguistics*, 18(4), 487–522. <https://doi.org/10.1515/COG.2007.026>
- Brown, A., & Gullberg, M. (2008). Bidirectional crosslinguistic influence in L1-L2 encoding of manner in speech and gesture: A Study of Japanese Speakers of English. *Studies in Second Language Acquisition*, 30(2), 225–251. <https://doi.org/10.1017/S0272263108080327>
- Brown, P. (2006). A sketch of the grammar of space in Tzeltal. In S. C. Levinson & D. P. Wilkins (Eds.), *Grammars of Space: Explorations in Cognitive Diversity* (pp. 230–272). Cambridge: Cambridge University Press.
- Brunyé, T. T., Ditman, T., Mahoney, C. R., Augustyn, J. S., & Taylor, H. A. (2009). When You and I Share Perspectives: Pronouns Modulate Perspective Taking During Narrative Comprehension. *Psychological Science*, 20(1), 27–32. <https://doi.org/10.1111/j.1467-9280.2008.02249.x>

- Bueti, D., & Walsh, V. (2009). The parietal cortex and the representation of time, space, number and other magnitudes. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1525), 1831–1840. <https://doi.org/10.1098/rstb.2009.0028>
- Burnard, L. (Ed.). (2000). *Reference Guide for the British National Corpus (World Edition)*. Oxford: Oxford University Computing Services.
- Burnett, P. (1978). Time Cognition and Urban Travel Behavior. *Geografiska Annaler, Series B, Human Geography*, 60(2), 107. <https://doi.org/10.2307/490634>
- Bybee, J. L. (2006). From Usage to Grammar: The Mind's Response to Repetition. *Language*, 82(4), 711–733. <https://doi.org/10.1353/lan.2006.0186>
- Bybee, J. L. (2010). *Language, Usage and Cognition*. Cambridge: Cambridge University Press.
- Cacciari, C., Bolognini, N., Senna, I., Pellicciari, M. C., Miniussi, C., & Papagno, C. (2011). Literal, fictive and metaphorical motion sentences preserve the motion component of the verb: A TMS study. *Brain and Language*, 119(3), 149–157. <https://doi.org/10.1016/j.bandl.2011.05.004>
- Cadierno, T. (2008). Learning to talk about motion in a foreign language. In P. Robinson & N. C. Ellis (Eds.), *Handbook of Cognitive Linguistics and Second Language Acquisition* (pp. 239–275). New York: Routledge.
- Cadierno, T., & Robinson, P. (2009). Language typology, task complexity and the development of L2 lexicalization patterns for describing motion events. *Annual Review of Cognitive Linguistics*, 7, 245–276. <https://doi.org/10.1075/arcl.7.10cad>
- Cann, R. (1993). *Formal Semantics: An Introduction*. Cambridge: Cambridge University Press.
- Cantlon, J. F., & Brannon, E. M. (2006). Shared System for Ordering Small and Large Numbers in Monkeys and Humans. *Psychological Science*, 17(5), 401–406. <https://doi.org/10.1111/j.1467-9280.2006.01719.x>
- Cappelle, B., & Declerck, R. (2005). Spatial and temporal boundedness in English motion events. *Journal of Pragmatics*, 37(6), 889–917. <https://doi.org/10.1016/j.pragma.2004.10.012>
- Cardillo, E. R., Watson, C. E., Schmidt, G. L., Kranjec, A., & Chatterjee, A. (2012). From novel to familiar: Tuning the brain for metaphors. *NeuroImage*, 59(4), 3212–3221. <https://doi.org/10.1016/j.neuroimage.2011.11.079>
- Carlson, G. N. (1984). Thematic roles and their role in semantic interpretation. *Linguistics*, 22(3), 259–280. <https://doi.org/10.1515/ling.1984.22.3.259>
- Carlson, L. A. (2010). Encoding Space in Spatial Language. In K. S. Mix, L. B. Smith, & M. Gasser (Eds.), *The Spatial Foundations of Language and Cognition* (pp. 157–183). Oxford: Oxford University Press.
- Carlson, L. A., Regier, T., & Covey, E. (2003). Defining Spatial Relations: Reconciling Axis and Vector Representations. In E. van der Zee & J. Slack (Eds.), *Representing Direction in Language and Space* (pp. 111–131). Oxford: Oxford University Press.
- Casasanto, D. (2008). Who's Afraid of the Big Bad Whorf? Crosslinguistic Differences in Temporal Language and Thought. In P. Indefrey & M. Gullberg (Eds.), *Time to Speak: Cognitive and Neural Prerequisites for Time in Language* (pp. 63–79). Oxford: Wiley-Blackwell.
- Casasanto, D. (2010). Space for thinking. In V. Evans & P. A. Chilton (Eds.), *Language, Cognition and Space: The State of the Art and New Directions* (pp. 453–478). London: Equinox.
- Casasanto, D., & Boroditsky, L. (2008). Time in the mind: Using space to think about time. *Cognition*, 106(2), 579–593. <https://doi.org/10.1016/j.cognition.2007.03.004>

- Cermisoni, R., Actis-Grosso, R., Stucchi, N., & Antonelli, M. (2010). Space and Time in Benussi Tau Effect. *Proceedings of the 26th Annual Meeting of the International Society for Psychophysics*, 26, 483–488.
- Chatterjee, A. (2010). Disembodying cognition. *Language and Cognition*, 2(01), 79–116. <https://doi.org/10.1515/langcog.2010.004>
- Chipman, S. F. (Ed.). (2017). *The Oxford Handbook of Cognitive Science*. Oxford: Oxford University Press.
- Chomsky, N. (1962). A transformational approach to syntax. In A. A. Hill, (Ed.), *Third Texas Conference on Problems of Linguistic Analysis in English: May 9-12 1958* (pp. 124–158). Austin, TX: University of Texas.
- Chomsky, N. (1965). *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- Chomsky, N. (1975). *Reflections on Language*. New York: Pantheon Books.
- Chomsky, N. (1981). *Lectures on Government and Binding: The Pisa Lectures*. Dordrecht: Foris.
- Chomsky, N. (1986). *Knowledge of Language: Its Nature, Origin, and Use*. New York: Praeger.
- Chomsky, N. (1995). *The Minimalist Program*. Cambridge, MA: MIT Press.
- Cienki, A. J. (1997). Some Properties and Groupings of Image Schemas. In M. Verspoor, K. Yi, & E. Sweetser (Eds.), *Lexical and Syntactical Constructions and the Construction of Meaning* (pp. 3–15). Amsterdam: John Benjamins.
- Cienki, A. J. (1998). STRAIGHT: An image schema and its metaphorical extensions. *Cognitive Linguistics*, 9(2), 107–150. <https://doi.org/10.1515/cogl.1998.9.2.107>
- Clark, A. (2006). Language, embodiment, and the cognitive niche. *Trends in Cognitive Sciences*, 10(8), 370–374. <https://doi.org/10.1016/j.tics.2006.06.012>
- Clark, E. V. (1974). Normal States and Evaluative Viewpoints. *Language*, 50(2), 316–332. <https://doi.org/10.2307/412440>
- Clark, E. V., & Clark, H. H. (1979). When Nouns Surface as Verbs. *Language*, 55(4), 767–811.
- 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.
- Clark, H. H. (1996). *Using Language*. Cambridge: Cambridge University Press.
- Clausner, T. C. (2005). Image schema paradoxes: Implications for cognitive semantics. In B. Hampe (Ed.), *From Perception to Meaning: Image Schemas in Cognitive Linguistics* (pp. 93–110). Berlin: Mouton de Gruyter.
- Clausner, T. C., & Croft, W. (1999). Domains and image schemas. *Cognitive Linguistics*, 10(1), 1–31. <https://doi.org/10.1515/cogl.1999.001>
- Cohen, J., Hansel, C. E. M., & Sylvester, J. D. (1953). A New Phenomenon in Time Judgment. *Nature*, 172(4385), 901–901. <https://doi.org/10.1038/172901a0>
- Cohen, J., Hansel, C. E. M., & Sylvester, J. D. (1955). Interdependence in judgments of space, time and movement. *Acta Psychologica*, 11, 360–372. [http://dx.doi.org/10.1016/S0001-6918\(55\)80098-4](http://dx.doi.org/10.1016/S0001-6918(55)80098-4)
- Cohn, A. G., Bennett, B., Gooday, J., & Gotts, N. M. (1997). Qualitative Spatial Representation and Reasoning with the Region Connection Calculus. *GeoInformatica*, 1(3), 275–316. <https://doi.org/10.1023/A:1009712514511>
- Comrie, B. (1976). *Aspect*. Cambridge: Cambridge University Press.
- Connell, L. (2007). Representing object colour in language comprehension. *Cognition*, 102(3), 476–485. <https://doi.org/10.1016/j.cognition.2006.02.009>
- Connell, L., & Lynott, D. (2009). Is a bear white in the woods? Parallel representation of implied object color during language comprehension. *Psychonomic Bulletin & Review*, 16(3), 573–577. <https://doi.org/10.3758/PBR.16.3.573>

- Conway, L. G., Repke, M. A., & Houck, S. C. (2016). Psychological Spacetime: Implications of Relativity Theory for Time Perception. *SAGE Open*, 6(4), 1–14. <https://doi.org/10.1177/2158244016674511>
- Coulson, S. (2001). *Semantic leaps: Frame-shifting and conceptual blending in meaning construction*. Cambridge: Cambridge University Press.
- Coulson, S., & Oakley, T. (2000). Blending basics. *Cognitive Linguistics*, 11(3–4), 175–196. <https://doi.org/10.1515/cogl.2001.014>
- Coulson, S., & Oakley, T. (2005). Blending and coded meaning: Literal and figurative meaning in cognitive semantics. *Journal of Pragmatics*, 37(10), 1510–1536. <https://doi.org/10.1016/j.pragma.2004.09.010>
- Coulson, S., & Van Petten, C. (2007). A special role for the right hemisphere in metaphor comprehension? ERP evidence from hemifield presentation. *Brain Research*, 1146, 128–145. <https://doi.org/10.1016/j.brainres.2007.03.008>
- Coventry, K. R., Lynott, D., Cangelosi, A., Monrouxe, L., Joyce, D., & Richardson, D. C. (2010). Spatial language, visual attention, and perceptual simulation. *Brain and Language*, 112(3), 202–213. <https://doi.org/10.1016/j.bandl.2009.06.001>
- Croft, W. (2003). *Typology and Universals, 2nd Ed.* Cambridge: Cambridge University Press.
- Croft, W., Barðdal, J., Hollmann, W. B., Sotirova, V., & Taoka, C. (2010). Revising Talmy's typological classification of complex event constructions. In H. C. Boas (Ed.), *Contrastive Studies in Construction Grammar* (pp. 201–235). Amsterdam: John Benjamins.
- Croft, W., & Cruse, D. A. (2004). *Cognitive Linguistics*. Cambridge: Cambridge University Press.
- Dąbrowska, E., & Divjak, D. (Eds.). (2015). *Handbook of Cognitive Linguistics*. Berlin: De Gruyter Mouton.
- Dancygier, B. (Ed.). (2017). *The Cambridge Handbook of Cognitive Linguistics*. Cambridge: Cambridge University Press.
- Dancygier, B., & Sweetser, E. (2014). *Figurative language*. New York: Cambridge University Press.
- Davidse, K., Vandelandotte, L., & Cuyckens, H. (Eds.). (2010). *Subjectification, Intersubjectification and Grammaticalization*. Berlin: De Gruyter Mouton.
- Davidson, D. (1963/2001a). Actions, Reasons, and Causes [First published in 1963]. In *Essays on Actions and Events, 2nd Ed.* (pp. 3–19). Oxford: Clarendon Press.
- Davidson, D. (1967/2001b). The Logical Form of Action Sentences [First published in 1967]. In *Essays on Actions and Events, 2nd Ed.* (pp. 105–122). Oxford: Clarendon Press.
- Davidson, D. (1971/2001c). Agency [First published in 1971]. In *Essays on Actions and Events, 2nd Ed.* (pp. 43–62). Oxford: Clarendon Press.
- Davies, M. (2009). The 385+ million word *Corpus of Contemporary American English* (1990–2008+): Design, architecture, and linguistic insights. *International Journal of Corpus Linguistics*, 14(2), 159–190. <https://doi.org/10.1075/ijcl.14.2.02dav>
- Davies, M. (2010). The *Corpus of Contemporary American English* as the first reliable monitor corpus of English. *Literary and Linguistic Computing*, 25(4), 447–464. <https://doi.org/10.1093/llc/fqq018>
- Davies, M. (2015). Corpora: An introduction. In D. Biber & R. Reppen (Eds.), *The Cambridge Handbook of English Corpus Linguistics* (pp. 11–31). Cambridge: Cambridge University Press.
- De Smedt, H., & Verstraete, J.-C. (2006). Coming to terms with subjectivity. *Cognitive Linguistics*, 17(3), 365–392. <https://doi.org/10.1515/COG.2006.011>

- De Smedt, J., & De Cruz, H. (2011). The role of material culture in human time representation: Calendrical systems as extensions of mental time travel. *Adaptive Behavior*, 19(1), 63–76. <https://doi.org/10.1177/1059712310396382>
- Declerck, R. (2007). Distinguishing between the aspectual categories “(a)telic”, “(im)-perfective” and “(non)bounded.” *Kansas Working Papers in Linguistics*, 29, 48–64. <https://doi.org/10.17161/KWPL.1808.1787>
- Deignan, A. (2005). *Metaphor and Corpus Linguistics*. Amsterdam: John Benjamins.
- Deignan, A. (2008). Corpus Linguistics and Metaphor. In R. W. Gibbs (Ed.), *The Cambridge Handbook of Metaphor and Thought* (pp. 280–294). Cambridge: Cambridge University Press.
- Demonte, V., & McNally, L. (Eds.). (2012). *Telicity, Change, and State: A cross-categorical view of event structure*. Oxford: Oxford University Press.
- Depraetere, I. (1995). On the necessity of distinguishing between (un)boundedness and (a)telicity. *Linguistics and Philosophy*, 18(1), 1–19. <https://doi.org/10.1007/BF00984959>
- Deroy, O. (Ed.). (2017). *Sensory Blending: On Synaesthesia and Related Phenomena*. New York: Oxford University Press.
- Desagulier, G. (2017). *Corpus Linguistics and Statistics with R: Introduction to Quantitative Methods in Linguistics*. New York: Springer.
- Desai, R. H., Conant, L. L., Binder, J. R., Park, H., & Seidenberg, M. S. (2013). A piece of the action: Modulation of sensory-motor regions by action idioms and metaphors. *NeuroImage*, 83, 862–869. <https://doi.org/10.1016/j.neuroimage.2013.07.044>
- Descartes, R. (1637/1985a). Discourse on the Method. In J. Cottingham, R. Stoothoff, & D. Murdoch (Trans.), *The Philosophical Writings of Descartes* (pp. 111–151). Cambridge: Cambridge University Press.
- Descartes, R. (1644/1985b). Principles of Philosophy. In J. Cottingham, R. Stoothoff, & D. Murdoch (Trans.), *The Philosophical Writings of Descartes* (pp. 177–292). Cambridge: Cambridge University Press.
- Deutscher, G. (2010). *Through the Language Glass: Why the World Looks Different in Other Languages*. New York: Metropolitan Books.
- Dewell, R. B. (1994). Over again: Image-schema transformations in semantic analysis. *Cognitive Linguistics*, 5(4), 351–380. <https://doi.org/10.1515/cogl.1994.5.4.351>
- Dewell, R. B. (2005). Dynamic patterns of CONTAINMENT. In B. Hampe (Ed.), *From Perception to Meaning: Image Schemas in Cognitive Linguistics* (pp. 369–393). Berlin: Mouton de Gruyter.
- Dirven, R. (1993). Dividing up physical and mental space into conceptual categories by means of English prepositions. In C. Zelinsky-Wibbelt (Ed.), *The Semantics of Prepositions: From Mental Processing to Natural Language Processing* (pp. 73–97). Berlin: Mouton de Gruyter.
- Dirven, R., & Verspoor, M. (Eds.). (2004). *Cognitive Exploration of Language and Linguistics, Second Revised Edition*. Amsterdam: John Benjamins.
- DiSalle, R. (2006). *Understanding Space-time: The Philosophical Development of Physics from Newton to Einstein*. Cambridge: Cambridge University Press.
- DiSalle, R. (2016). Space and Time: Inertial Frames. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2016). Stanford, CA: Stanford University. Retrieved on 02.12.2017 from <https://plato.stanford.edu/archives/win2016/entries/spacetime-iframes/>

- Ditman, T., Brunyé, T. T., Mahoney, C. R., & Taylor, H. A. (2010). Simulating an enactment effect: Pronouns guide action simulation during narrative comprehension. *Cognition*, 115(1), 172–178. <https://doi.org/10.1016/j.cognition.2009.10.014>
- Dodge, E., & Lakoff, G. (2005). Image schemas: From linguistic analysis to neural grounding. In B. Hampe (Ed.), *From Perception to Meaning: Image Schemas in Cognitive Linguistics* (pp. 57–91). Berlin: Mouton de Gruyter.
- Dove, G. (2009). Beyond perceptual symbols: A call for representational pluralism. *Cognition*, 110(3), 412–431. <https://doi.org/10.1016/j.cognition.2008.11.016>
- Dowden, B. (2009). Zeno's Paradoxes. In J. Fieser & B. Dowden (Eds.), *Internet Encyclopedia of Philosophy*. Retrieved on 11.09.2013 from <https://www.iep.utm.edu/zeno-par/>
- Dowty, D. R. (1979/1991a). *Word Meaning and Montague Grammar: The Semantics of Verbs and Times in Generative Semantics and in Montague's PTQ* [First published in 1979]. Dordrecht: Kluwer Academic Publishers.
- Dowty, D. R. (1991b). Thematic proto-roles and argument selection. *Language*, 67(3), 547–619. <https://doi.org/10.1353/lan.1991.0021>
- Duchowski, A. T. (2007). *Eye Tracking Methodology: Theory and Practice, 2nd Ed.* London: Springer.
- Duff, A. (1981). *The Third Language: Recurrent Problems of Translation into English*. New York: Pergamon Press.
- Earman, J. (1992). *World Enough and Space-Time: Absolute Versus Relational Theories of Space and Time*. Cambridge, MA: MIT Press.
- Einstein, A. (1905/1952a). On the Electrodynamics of Moving Bodies [First published in 1905 as *Zur Elektrodynamik bewegter Körper*]. In W. Perrett & G. B. Jeffery (Trans.), *The Principle of Relativity: A Collection of Original Papers on the Special and General Theory of Relativity* (pp. 35–65). New York: Dover.
- Einstein, A. (1916/1952b). The Foundation of the General Theory of Relativity. [First published in 1916 as *Die Grundlage der allgemeinen Relativitätstheorie*]. In W. Perrett & G. B. Jeffery (Trans.), *The Principle of Relativity: A Collection of Original Papers on the Special and General Theory of Relativity* (pp. 109–164). New York: Dover.
- Engberg-Pedersen, E. (1999). Space and Time. In J. Allwood & P. Gärdenfors (Eds.), *Cognitive Semantics: Meaning and Cognition* (pp. 131–152). Amsterdam: John Benjamins.
- Engelbert, M., & Carruthers, P. (2010). Introspection. *Wiley Interdisciplinary Reviews: Cognitive Science*, 1(2), 245–253. <https://doi.org/10.1002/wcs.4>
- Eschenbach, C. (2005). Contextual, Functional, and Geometric Components in the Semantics of Projective Terms. In L. A. Carlson & E. van der Zee (Eds.), *Functional Features in Language and Space* (pp. 71–91). Oxford: Oxford University Press.
- Evans, V. (2003). *The Structure of Time: Language, meaning and temporal cognition*. Amsterdam: John Benjamins.
- Evans, V. (2009). *How Words Mean: Lexical Concepts, Cognitive Models, and Meaning Construction*. Oxford: Oxford University Press.
- Evans, V. (2012). Cognitive linguistics. *Wiley Interdisciplinary Reviews: Cognitive Science*, 3(2), 129–141. <https://doi.org/10.1002/wcs.1163>
- Evans, V. (2013). *Language and Time: A Cognitive Linguistics Approach*. Cambridge: Cambridge University Press.
- Evans, V. (2014). *The Language Myth: Why Language Is Not an Instinct*. Cambridge: Cambridge University Press.

- Evans, V. (2017). Cognitive Linguistics. In S. E. F. Chipman (Ed.), *The Oxford Handbook of Cognitive Science* (pp. 283–300). Oxford: Oxford University Press.
- Evans, V., & Green, M. (2006). *Cognitive Linguistics: An Introduction*. Mahwah, NJ: Lawrence Erlbaum.
- Fabiszak, M. (2008). Corpus frequency as a guide to metaphor labelling. In Z. Wąsik & T. Komendziński (Eds.), *Metaphor and Cognition* (pp. 149–162). Frankfurt am Main: Peter Lang.
- Fabiszak, M., & Konat, B. (2013). Zastosowanie korpusów językowych w językoznawstwie kognitywnym. In P. Stalmaszczyk (Ed.), *Metodologie językoznawstwa. Ewolucja języka. Ewolucja teorii językoznawczych*. (pp. 131–142). Łódź: Wydawnictwo Uniwersytetu Łódzkiego.
- Fauconnier, G. (1985/1994). *Mental Spaces: Aspects of Meaning Construction in Natural Language* [First published in 1985 by MIT Press]. Cambridge: Cambridge University Press.
- Fauconnier, G. (1997). *Mappings in Thought and Language*. Cambridge: Cambridge University Press.
- Fauconnier, G. (2007). Mental Spaces. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford Handbook of Cognitive Linguistics* (pp. 351–376). Oxford: Oxford University Press.
- Fauconnier, G., & Lakoff, G. (2009). On Metaphor and Blending. *Cognitive Semiotics*, 5(1–2). <https://doi.org/10.1515/cogsem.2013.5.12.393>
- Fauconnier, G., & Turner, M. (1998). Conceptual Integration Networks. *Cognitive Science*, 22(2), 133–187. [https://doi.org/10.1207/s15516709cog2202\\_1](https://doi.org/10.1207/s15516709cog2202_1)
- Fauconnier, G., & Turner, M. (2000). Compression and global insight. *Cognitive Linguistics*, 11(3–4), 283–304. <https://doi.org/10.1515/cogl.2001.017>
- Fauconnier, G., & Turner, M. (2002). *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*. New York: Basic Books.
- Fauconnier, G., & Turner, M. (2008). Rethinking metaphor. In R. W. Gibbs (Ed.), *The Cambridge Handbook of Metaphor and Thought* (pp. 53–66). Cambridge: Cambridge University Press.
- Fellbaum, C. (1990). English Verbs as a Semantic Net. *International Journal of Lexicography*, 3(4), 278–301. <https://doi.org/10.1093/ijl/3.4.278>
- Fellbaum, C. (Ed.). (1998). *WordNet: An Electronic Lexical Database*. Cambridge, MA: MIT Press.
- Fellbaum, C. (1999). The Organization of Verbs and Verb Concepts in a Semantic Net. In P. Saint-Dizier (Ed.), *Predicative Forms in Natural Language and in Lexical Knowledge Bases* (pp. 93–109). Dordrecht: Springer. [https://doi.org/10.1007/978-94-017-2746-4\\_3](https://doi.org/10.1007/978-94-017-2746-4_3)
- Fellbaum, C. (2006). WordNet(s). In K. Brown (Ed.), *Encyclopedia of Language & Linguistics, Second Edition* (pp. 665–670). Oxford: Elsevier. <https://doi.org/10.1016/B0-08-044854-2/00946-9>
- Fellbaum, C. (2017). WordNet: An Electronic Lexical Resource. In S. E. F. Chipman (Ed.), *The Oxford Handbook of Cognitive Science* (pp. 301–314). Oxford: Oxford University Press.
- Filipović, L. (2007). *Talking About Motion: A Crosslinguistic Investigation of Lexicalization Patterns*. Amsterdam: John Benjamins.
- Fillmore, C. J. (1968). The case for case. In E. Bach & R. T. Harms (Eds.), *Universals in Linguistic Theory* (pp. 1–88). New York: Holt, Rinehart, and Winston.
- Fillmore, C. J. (1975/1997). *Lectures on Deixis* [First published in 1975 as *Santa Cruz Lectures on Deixis 1971*]. Stanford, CA: CSLI Publications.

- Fillmore, C. J. (1982). Towards a Descriptive Framework for Spatial Deixis. In R. J. Jarvella & W. Klein (Eds.), *Speech, Place, and Action: Studies of Deixis and Related Topics* (pp. 31–59). New York: John Wiley.
- Fillmore, C. J. (1983). How to know whether you're coming or going. In G. Rauh (Ed.), *Essays on deixis* (pp. 219–227). Tübingen: Gunter Narr.
- Fillmore, C. J. (1985). Frames and the semantics of understanding. *Quaderni Di Semantica*, 6(2), 222–254.
- Fillmore, C. J. (1992). "Corpus linguistics" or "Computer-aided armchair linguistics." In J. Svartvik (Ed.), *Directions in Corpus Linguistics: Proceedings of Nobel Symposium 82, Stockholm, 4-8 August 1991* (pp. 35–60). Berlin: Mouton de Gruyter.
- Fillmore, C. J., & Atkins, B. T. S. (2000). Describing polysemy: The case of "crawl." In Y. Ravin & C. Leacock (Eds.), *Polysemy: Theoretical and Computational Approaches* (pp. 91–110). Oxford: Oxford University Press.
- Fischer, K. (2010). Quantitative Methods in Cognitive Semantics. In D. Glynn & K. Fischer (Eds.), *Quantitative Methods in Cognitive Semantics: Corpus-Driven Approaches* (pp. 43–59). Berlin: De Gruyter Mouton.
- Fitch, W. T., Hauser, M. D., & Chomsky, N. (2005). The evolution of the language faculty: Clarifications and implications. *Cognition*, 97(2), 179–210. <https://doi.org/10.1016/j.cognition.2005.02.005>
- Fodor, J. A. (1975). *The Language of Thought*. Cambridge, MA: Harvard University Press.
- Fodor, J. A. (1983). *The Modularity of Mind: An Essay on Faculty Psychology*. Cambridge, MA: MIT Press.
- Fodor, J. A. (2008). *LOT 2: The Language of Thought Revisited*. Oxford: Clarendon Press.
- Foglia, L., & Wilson, R. A. (2013). Embodied cognition. *Wiley Interdisciplinary Reviews: Cognitive Science*, 4(3), 319–325. <https://doi.org/10.1002/wcs.1226>
- Frankish, K., & Ramsey, W. (Eds.). (2012). *The Cambridge Handbook of Cognitive Science*. Cambridge: Cambridge University Press.
- Frawley, W. (1992). *Linguistic Semantics*. Hillsdale, NJ: Lawrence Erlbaum.
- Frege, G. (1892/1960). On Sense and Reference [Originally published as *Über Sinn und Bedeutung* in 1892]. In P. Geach & M. Black (Eds.), *Translations from the Philosophical Writings of Gottlob Frege, 2nd Ed.* (pp. 56–78). Oxford: Basil Blackwell.
- Frege, G. (1918/1956). The Thought: A Logical Inquiry [Originally published as *Der Gedanke* in 1918]. *Mind*, 65(1), 289–311. <https://doi.org/10.1093/mind/65.1.289>
- Gaby, A. (2012). The Thaayorre think of time like they talk of space. *Frontiers in Psychology*, 3, 300. <https://doi.org/10.3389/fpsyg.2012.00300>
- Galton, A. (2011). Time flies but space does not: Limits to the spatialisation of time. *Journal of Pragmatics*, 43(3), 695–703. <https://doi.org/10.1016/j.pragma.2010.07.002>
- Gamborotto, P., & Muller, P. (2003). Ontological Problems for the Semantics of Spatial Expressions in Natural Language. In E. van der Zee & J. Slack (Eds.), *Representing Direction in Language and Space* (pp. 144–165). Oxford: Oxford University Press.
- Ganis, G., & Schendan, H. E. (2011). Visual imagery. *Wiley Interdisciplinary Reviews: Cognitive Science*, 2(3), 239–252. <https://doi.org/10.1002/wcs.103>
- Garside, R., Leech, G. N., & McEnery, T. (1997). *Corpus Annotation: Linguistic Information from Computer Text Corpora*. London: Longman.
- Geeraerts, D. (2006). Methodology in Cognitive Linguistics. In G. Kristiansen, M. Achard, R. Dirven, & F. J. Ruiz de Mendoza Ibáñez (Eds.), *Cognitive Linguistics: Current Applications and Future Perspectives* (pp. 21–49). Berlin: Mouton de Gruyter.

- Geeraerts, D. (2010). The doctor and the semantician. In D. Glynn & K. Fischer (Eds.), *Quantitative Methods in Cognitive Semantics: Corpus-Driven Approaches* (pp. 63–78). Berlin: De Gruyter Mouton.
- Geeraerts, D., & Cuyckens, H. (Eds.). (2007). *The Oxford Handbook of Cognitive Linguistics*. Oxford: Oxford University Press.
- Gehrke, B. (2008). *Ps in Motion: On the semantics and syntax of P elements and motion events* (Ph.D. Dissertation). Utrecht University, Utrecht.
- Gennari, S. P., Sloman, S. A., Malt, B. C., & Fitch, W. T. (2002). Motion events in language and cognition. *Cognition*, 83(1), 49–79. [https://doi.org/10.1016/S0010-0277\(01\)00166-4](https://doi.org/10.1016/S0010-0277(01)00166-4)
- Gentner, D., & Bowdle, B. F. (2001). Convention, Form, and Figurative Language Processing. *Metaphor and Symbol*, 16(3–4), 223–247. <https://doi.org/10.1080/10926488.2001.9678896>
- Gentner, D., & Goldin-Meadow, S. (Eds.). (2003). *Language in Mind: Advances in the Study of Language and Thought*. Cambridge, MA: MIT Press.
- Geuder, W., & Weisgerber, M. (2008, March). *Manner of Movement and the Conceptualization of Force*. Slides presented at the Journée d'étude "Il y a manière et manière," Université d'Artois, Arras. Retrieved on 22.05.2018 from [https://semanticsarchive.net/Archive/Tk5YmEwN/MannerMovement\\_slidescompact.pdf](https://semanticsarchive.net/Archive/Tk5YmEwN/MannerMovement_slidescompact.pdf)
- Gibbs, R. W. (1994). *The Poetics of Mind: Figurative Thought, Language, and Understanding*. Cambridge: Cambridge University Press.
- Gibbs, R. W. (2005). *Embodiment and Cognitive Science*. Cambridge: Cambridge University Press.
- Gibbs, R. W. (2007). Idioms and Formulaic Language. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford Handbook of Cognitive Linguistics* (pp. 697–725). Oxford: Oxford University Press.
- Gibbs, R. W. (2017). *Metaphor Wars: Conceptual Metaphors in Human Life*. Cambridge: Cambridge University Press.
- Gibbs, R. W., & Matlock, T. (2008). Metaphor, imagination, and simulation. In R. W. Gibbs (Ed.), *The Cambridge Handbook of Metaphor and Thought* (pp. 161–176). Cambridge: Cambridge University Press.
- Gijssels, T., & Casasanto, D. (2017). Conceptualizing Time in Terms of Space: Experimental Evidence. In B. Dancygier (Ed.), *The Cambridge Handbook of Cognitive Linguistics* (pp. 651–668). Cambridge: Cambridge University Press.
- Gill, M. L., & Lennox, J. G. (Eds.). (1994). *Self-Motion: From Aristotle to Newton*. Princeton, N.J: Princeton University Press.
- Giora, R. (1997). Understanding figurative and literal language: The graded salience hypothesis. *Cognitive Linguistics*, 8(3), 183–206. <https://doi.org/10.1515/cogl.1997.8.3.183>
- Giora, R. (2003). *On Our Mind: Salience, Context, and Figurative Language*. New York: Oxford University Press.
- Glebkina, V. (2015). Is conceptual blending the key to the mystery of human evolution and cognition? *Cognitive Linguistics*, 26(1). <https://doi.org/10.1515/cog-2014-0067>
- Gleitman, L., & Papafragou, A. (2012). New Perspectives on Language and Thought. In K. J. Holyoak & R. G. Morrison (Eds.), *The Oxford Handbook of Thinking and Reasoning* (pp. 543–568). Oxford: Oxford University Press.

- Gleitman, L., & Papafragou, A. (2013). Relations Between Language and Thought. In D. Reisberg (Ed.), *The Oxford Handbook of Cognitive Psychology* (pp. 504–523). Oxford: Oxford University Press.
- Glenberg, A. M. (1997). What memory is for. *Behavioral and Brain Sciences*, 20(1), 1–55.
- Glenberg, A. M. (2010). Embodiment as a unifying perspective for psychology. *Wiley Interdisciplinary Reviews: Cognitive Science*, 1(4), 586–596. <https://doi.org/10.1002/wcs.55>
- Glenberg, A. M., & Gallese, V. (2012). Action-based language: A theory of language acquisition, comprehension, and production. *Cortex*, 48(7), 905–922. <https://doi.org/10.1016/j.cortex.2011.04.010>
- Glenberg, A. M., & Kaschak, M. P. (2002). Grounding language in action. *Psychonomic Bulletin & Review*, 9(3), 558–565. <https://doi.org/10.3758/BF03196313>
- Glenberg, A. M., & Robertson, D. A. (1999). Indexical understanding of instructions. *Discourse Processes*, 28(1), 1–26. <https://doi.org/10.1080/01638539909545067>
- Glenberg, A. M., & Robertson, D. A. (2000). Symbol Grounding and Meaning: A Comparison of High-Dimensional and Embodied Theories of Meaning. *Journal of Memory and Language*, 43(3), 379–401. <https://doi.org/10.1006/jmla.2000.2714>
- Glucksberg, S. (2001). *Understanding Figurative Language: From Metaphors to Idioms*. Oxford: Oxford University Press.
- Glucksberg, S. (2003). The Psycholinguistics of Metaphor. *Trends in Cognitive Sciences*, 7(2), 92–96. [https://doi.org/10.1016/S1364-6613\(02\)00040-2](https://doi.org/10.1016/S1364-6613(02)00040-2)
- Glynn, D. (2010). Corpus-driven Cognitive Semantics: Introduction to the field. In D. Glynn & K. Fischer (Eds.), *Quantitative Methods in Cognitive Semantics: Corpus-Driven Approaches* (pp. 1–41). Berlin: De Gruyter Mouton.
- Glynn, D., & Fischer, K. (Eds.). (2010). *Quantitative Methods in Cognitive Semantics: Corpus-Driven Approaches*. Berlin: De Gruyter Mouton.
- Glynn, D., & Robinson, J. A. (Eds.). (2014). *Corpus Methods for Semantics: Quantitative studies in polysemy and synonymy*. Amsterdam: John Benjamins.
- Głaz, A. (2014). When -ities collide: Virtuality, actuality, reality. In K. Rudnicka-Szozda & A. Szwedek (Eds.), *Cognitive Linguistics in the Making* (pp. 77–88). Frankfurt am Main: Peter Lang.
- Goddard, C. (1997). The semantics of coming and going. *Pragmatics*, 7(2), 147–162. <https://doi.org/10.1075/prag.7.2.02god>
- Goddard, C. (Ed.). (2008). *Cross-Linguistic Semantics*. Amsterdam: John Benjamins.
- Goddard, C. (2011). *Semantic Analysis: A Practical Introduction* (2nd ed.). Oxford: Oxford University Press.
- Goddard, C., & Wierzbicka, A. (2014). *Words and meanings: Lexical semantics across domains, languages and cultures*. Oxford: Oxford University Press.
- Goddard, C., Wierzbicka, A., & Wong, J. (2017). “Walking” and “running” in English and German: The conceptual semantics of verbs of human locomotion. *Review of Cognitive Linguistics*, 14(2), 303–336. <https://doi.org/10.1075/rcl.14.2.03god>
- Goldberg, A. E. (1995). *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: University of Chicago Press.
- Goldberg, A. E. (2003). Constructions: A new theoretical approach to language. *Trends in Cognitive Sciences*, 7(5), 219–224. [https://doi.org/10.1016/S1364-6613\(03\)00080-9](https://doi.org/10.1016/S1364-6613(03)00080-9)
- Goldberg, A. E. (2006). *Constructions at Work: The Nature of Generalization in Language*. Oxford: Oxford University Press.

- Goldberg, A. E. (2010). Verbs, Constructions, and Semantic Frames. In M. Rappaport Hovav, E. Doron, & I. Sichel (Eds.), *Lexical Semantics, Syntax, and Event Structure* (pp. 39–58). Oxford: Oxford University Press.
- Goldberg, A. E., & Suttle, L. (2010). Construction grammar. *Wiley Interdisciplinary Reviews: Cognitive Science*, 1(4), 468–477. <https://doi.org/10.1002/wcs.22>
- Goschler, J., & Stefanowitsch, A. (Eds.). (2013). *Variation and Change in the Encoding of Motion Events*. Amsterdam: John Benjamins.
- Grady, J. E. (2005). Image schemas and perception: Refining a definition. In B. Hampe (Ed.), *From Perception to Meaning: Image Schemas in Cognitive Linguistics* (pp. 35–55). Berlin: Mouton de Gruyter.
- Grady, J. E. (2007). Metaphor. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford Handbook of Cognitive Linguistics* (pp. 188–213). Oxford: Oxford University Press.
- Grant, E. (1981). *Much Ado About Nothing: Theories of Space and Vacuum from the Middle Ages to the Scientific Revolution*. Cambridge: Cambridge University Press.
- Grice, H. P. (1989). *Studies in the Way of Words*. Cambridge, MA: Harvard University Press.
- Gries, S. T. (2009). What is Corpus Linguistics? *Language and Linguistics Compass*, 3(5), 1225–1241. <https://doi.org/10.1111/j.1749-818X.2009.00149.x>
- Gries, S. T. (2012). Corpus linguistics, theoretical linguistics, and cognitive/psycholinguistics: Towards more and more fruitful exchanges. In J. Mukherjee & M. Huber (Eds.), *Corpus Linguistics and Variation in English: Theory and Description* (pp. 41–63). Amsterdam: Rodopi.
- Gries, S. T. (2013). *Statistics for Linguistics with R: A Practical Introduction, 2nd Revised Edition*. Berlin: De Gruyter Mouton.
- Gries, S. T. (2015). Quantitative designs and statistical techniques. In D. Biber & R. Reppen (Eds.), *The Cambridge Handbook of English Corpus Linguistics* (pp. 50–72). Cambridge: Cambridge University Press.
- Gries, S. T. (2017). Corpus Approaches. In B. Dancygier (Ed.), *The Cambridge Handbook of Cognitive Linguistics* (pp. 590–606). Cambridge: Cambridge University Press.
- Gries, S. T., & Berez, A. L. (2017). Linguistic Annotation in/for Corpus Linguistics. In N. Ide & J. Pustejovsky (Eds.), *Handbook of Linguistic Annotation* (pp. 379–409). Dordrecht: Springer.
- Gries, S. T., & Divjak, D. (2010). Quantitative approaches in usage-based Cognitive Semantics: Myths, erroneous assumptions, and a proposal. In D. Glynn & K. Fischer (Eds.), *Quantitative Methods in Cognitive Semantics: Corpus-Driven Approaches* (pp. 333–353). Berlin: De Gruyter Mouton.
- Gries, S. T., & Stefanowitsch, A. (Eds.). (2006). *Corpora in Cognitive Linguistics: Corpus-Based Approaches to Syntax and Lexis*. Berlin: Mouton de Gruyter.
- Grondelaers, S., Geeraerts, D., & Speelman, D. (2007). A case for a Cognitive corpus linguistics. In M. Gonzalez-Marquez, I. Mittelberg, S. Coulson, & M. J. Spivey (Eds.), *Methods in Cognitive Linguistics* (pp. 149–169). Amsterdam: John Benjamins.
- Gruber, J. S. (1965). *Studies in Lexical Relations* (Ph.D. Dissertation). MIT, Cambridge, MA.
- Gruber, J. S. (1976). *Lexical Structures in Syntax and Semantics*. Amsterdam: North Holland.
- Gryl, A., Moulin, B., & Kettani, D. (2002). A conceptual model for representing verbal expressions used in route descriptions. In K. R. Coventry & P. Olivier (Eds.), *Spatial Language: Cognitive and Computational Perspectives* (pp. 19–42). Dordrecht: Kluwer.
- Gumperz, J. J., & Levinson, S. C. (Eds.). (1996). *Rethinking Linguistic Relativity*. Cambridge: Cambridge University Press.

- Habel, C. (2005). Verbs and Directions: The Interaction of Geometry and Function in Determining Orientation. In L. A. Carlson & E. van der Zee (Eds.), *Functional Features in Language and Space* (pp. 93–112). Oxford: Oxford University Press.
- Haiman, J. (1980). Dictionaries and encyclopedias. *Lingua*, 50(4), 329–357. [https://doi.org/10.1016/0024-3841\(80\)90089-3](https://doi.org/10.1016/0024-3841(80)90089-3)
- Hale, K. L., & Keyser, S. J. (1993). On Argument Structure and the Lexical Expression of Syntactic Relations. In K. L. Hale & S. J. Keyser (Eds.), *View from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger* (pp. 53–109). Cambridge, MA: MIT Press.
- Hale, K. L., & Keyser, S. J. (2002). *Prolegomenon to a Theory of Argument Structure*. Cambridge, MA: MIT Press.
- Hampe, B. (Ed.). (2005a). *From Perception to Meaning: Image Schemas in Cognitive Linguistics*. Berlin: Mouton de Gruyter.
- Hampe, B. (2005b). Image schemas in Cognitive Linguistics: Introduction. In B. Hampe (Ed.), *From Perception to Meaning: Image Schemas in Cognitive Linguistics* (pp. 35–55). Berlin: Mouton de Gruyter.
- Hampe, B. (2005c). When down is not bad, and up not good enough: A usage-based assessment of the plus–minus parameter in image-schema theory. *Cognitive Linguistics*, 16(1), 81–112. <https://doi.org/10.1515/cogl.2005.16.1.81>
- Harasawa, I. (1994). A pragmatic view of V-te-i-ru and V-te-ar-u. *Journal of Pragmatics*, 22(2), 169–197. [https://doi.org/10.1016/0378-2166\(94\)90066-3](https://doi.org/10.1016/0378-2166(94)90066-3)
- Hasko, V. (2010). The Role of Thinking for Speaking in Adult L2 Speech: The Case of (Non)unidirectionality Encoding by American Learners of Russian. In Z.-H. Han & T. Cadierno (Eds.), *Linguistic Relativity in SLA: Thinking for Speaking* (pp. 34–58). Bristol: Multilingual Matters.
- Hauser, M. D., Chomsky, N., & Fitch, W. T. (2002). The Faculty of Language: What Is It, Who Has It, and How Did It Evolve? *Science*, 298(5598), 1569–1579. <https://doi.org/10.1126/science.298.5598.1569>
- Hawking, S. (1988). *A Brief History of Time: From the Big Bang to Black Holes*. New York: Bantam Books.
- Helson, H. (1930). The tau effect – an example of psychological relativity. *Science*, 71(1847), 536–537. <https://doi.org/10.1126/science.71.1847.536>
- Heylen, K., Tummers, J., & Geeraerts, D. (2008). Methodological issues in corpus-based Cognitive Linguistics. In G. Kristiansen & R. Dirven (Eds.), *Cognitive Sociolinguistics Language Variation, Cultural Models, Social Systems* (pp. 91–128). Berlin: Mouton de Gruyter.
- Higginbotham, J., Pianesi, F., & Varzi, A. (2000). *Speaking of Events*. New York: Oxford University Press.
- Hill, A. A. (Ed.). (1962). *Third Texas Conference on Problems of Linguistic Analysis in English: May 9-12 1958*. Austin, TX: University of Texas.
- Hoffmann, T., & Trousdale, G. (Eds.). (2013). *The Oxford Handbook of Construction Grammar*. Oxford: Oxford University Press.
- Hohenstein, J., Eisenberg, A., & Naigles, L. (2006). Is he floating across or crossing afloat? Cross-influence of L1 and L2 in Spanish–English bilingual adults. *Bilingualism*, 9(03), 249. <https://doi.org/10.1017/S1366728906002616>
- Hostetter, A. B., & Alibali, M. W. (2008). Visible embodiment: Gestures as simulated action. *Psychonomic Bulletin & Review*, 15(3), 495–514. <https://doi.org/10.3758/PBR.15.3.495>

- Huggett, N. (2018). Zeno's Paradoxes. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Summer 2018). Stanford, CA: Stanford University. Retrieved on 23.04.2018 from <https://plato.stanford.edu/archives/sum2018/entries/paradox-zeno/>
- Huggett, N., & Hoefer, C. (2015). Absolute and Relational Theories of Space and Motion. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2015). Stanford, CA: Stanford University. Retrieved on 11.09.2017 from <http://plato.stanford.edu/archives/spr2015/entries/spacetime-theories/>
- Husserl, E. (1939/1970). The Origin of Geometry. In D. Carr (Trans.), *The Crisis of European Sciences and Transcendental Phenomenology: An Introduction to Phenomenological Philosophy* [Original work first published in 1939] (pp. 353–378). Evanston, IL: Northwestern University Press.
- Husserl, E. (1948/1973). *Experience and Judgment: Investigations in a Genealogy of Logic* [First published in 1948 as *Erfahrung und Urteil: Untersuchungen zur Genealogie der Logik*]. (J. S. Churchill & K. Ameriks, Trans.). Evanston: Northwestern University Press.
- Hutchins, E. (2005). Material anchors for conceptual blends. *Journal of Pragmatics*, 37(10), 1555–1577. <https://doi.org/10.1016/j.pragma.2004.06.008>
- Huumo, T. (2005). How fictive dynamicity motivates aspect marking: The riddle of the Finnish quasi-resultative construction. *Cognitive Linguistics*, 16(1). <https://doi.org/10.1515/cogl.2005.16.1.113>
- Huumo, T. (2017). The grammar of temporal motion: A Cognitive Grammar account of motion metaphors of time. *Cognitive Linguistics*, 28(1), 1–43. <https://doi.org/10.1515/cog-2016-0015>
- Hwang, J. D., & Palmer, M. (2015). Identification of caused motion constructions. In *Proceedings of the Fourth Joint Conference on Lexical and Computational Semantics (\*SEM 2015)* (pp. 51–60). Denver, CO: Association for Computational Linguistics.
- Hwang, J. D., Palmer, M., & Zaenen, A. (2013). Representing paths of motion in VerbNet. In T. H. King & V. de Paiva (Eds.), *From Quirky Case to Representing Space: Papers in Honor of Annie Zaenen*. (pp. 155–166). Stanford, CA: CSLI Publications.
- Ikegami, Y. (1969). *The Semological Structure of the English Verbs of Motion* (Linguistic Automation Project). New Haven, CT: Yale University.
- Iwata, S. (1996). Motion and Extent: Two Sides of the Same Coin. *Studia Linguistica*, 50(3), 256–282. <https://doi.org/10.1111/j.1467-9582.1996.tb00351.x>
- Jackendoff, R. (1972). *Semantic Interpretation in Generative Grammar*. Cambridge, MA: MIT Press.
- Jackendoff, R. (1983). *Semantics and Cognition*. Cambridge, MA: MIT Press.
- Jackendoff, R. (1985). Multiple subcategorization and the theta-criterion: The case of climb. *Natural Language and Linguistic Theory*, 3(3), 271–295. <https://doi.org/10.1007/BF00154264>
- Jackendoff, R. (1987). *Consciousness and the Computational Mind*. Cambridge, MA: MIT Press.
- Jackendoff, R. (1990). *Semantic Structures*. Cambridge, MA: MIT Press.
- Jackendoff, R. (1991). Parts and boundaries. *Cognition*, 41(1–3), 9–45. [https://doi.org/10.1016/0010-0277\(91\)90031-X](https://doi.org/10.1016/0010-0277(91)90031-X)
- Jackendoff, R. (1992). *Languages of the Mind: Essays on Mental Representation*. Cambridge, MA: MIT Press.
- Jackendoff, R. (1996a). Conceptual semantics and cognitive linguistics. *Cognitive Linguistics*, 7(1), 93–129. <https://doi.org/10.1515/cogl.1996.7.1.93>

- Jackendoff, R. (1996b). The Architecture of the Linguistic-Spatial Interface. In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and Space* (pp. 1–30). Cambridge, MA: MIT Press.
- Jackendoff, R. (1996c). The Proper Treatment of Measuring Out, Telicity, and Perhaps Even Quantification in English. *Natural Language and Linguistic Theory*, 14(2), 305–354. <https://doi.org/10.1007/BF00133686>
- Jackendoff, R. (1997). *The Architecture of the Language Faculty*. Cambridge, MA: MIT Press.
- Jackendoff, R. (2002). *Foundations of Language: Brain, Meaning, Grammar, Evolution*. Oxford: Oxford University Press.
- Jackendoff, R. (2007). *Language, Consciousness, Culture: Essays on Mental Structure*. Cambridge, MA: MIT Press.
- Jackendoff, R. (2011). What is the human language faculty?: Two views. *Language*, 87(3), 586–624. <https://doi.org/10.1353/lan.2011.0063>
- Jackendoff, R. (2012). Language as a source of evidence for theories of spatial representation. *Perception*, 41(9), 1128–1152. <https://doi.org/10.1068/p7271>
- Jackendoff, R., & Aaron, D. (1991). Review of “More Than Cool Reason: A Field Guide to Poetic Metaphor.” *Language*, 67(2), 320–338. <https://doi.org/10.2307/415109>
- Jackendoff, R., & Pinker, S. (2005). The nature of the language faculty and its implications for evolution of language (Reply to Fitch, Hauser, and Chomsky). *Cognition*, 97(2), 211–225. <https://doi.org/10.1016/j.cognition.2005.04.006>
- Janda, L. A. (2015). Cognitive Linguistics in the Year 2015. *Cognitive Semantics*, 1(1), 131–154. <https://doi.org/10.1163/23526416-00101005>
- Janiak, A. (2012). Kant’s Views on Space and Time. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2012). Stanford, CA: Stanford University. Retrieved on 22.07.2013 from <http://plato.stanford.edu/archives/win2012/entries/kant-spacetime/>
- Jaszczolt, K. M. (2009). *Representing Time: An Essay on Temporality as Modality*. Oxford: Oxford University Press.
- Johnson, M. (1987). *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago: University of Chicago Press.
- Johnson, M. (2007). *The Meaning of the Body: Aesthetics of Human Understanding*. Chicago: University of Chicago Press.
- Johnson-Laird, P. N. (1983). *Mental Models: Towards a Cognitive Science of Language, Inference, and Consciousness*. Cambridge, MA: Harvard University Press.
- Johnson-Laird, P. N. (1989). *The Computer and the Mind: An Introduction to Cognitive Science*. Cambridge, MA: Harvard University Press.
- Kadosh, R. C., & Gertner, L. (2011). Synesthesia: Gluing Together Time, Number, and Space. In S. Dehaene & E. M. Brannon (Eds.), *Space, Time and Number in the Brain* (pp. 123–132). London: Academic Press.
- Kahneman, D. (2011). *Thinking, Fast and Slow*. New York: Farrar, Straus and Giroux.
- Kahneman, D., Slovic, P., & Tversky, A. (Eds.). (1982). *Judgment Under Uncertainty: Heuristics and Biases*. New York: Cambridge University Press.
- Kalisz, R. (2001). *Językoznawstwo kognitywne w świetle językoznawstwa funkcjonalnego* [Cognitive Linguistics From the Perspective of Functional Linguistics]. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego.
- Kant, I. (1768/1968). Concerning the Ultimate Foundation of the Differentiation of Regions in Space [First published in 1768]. In G. B. Kerferd & D. E. Walford

- (Trans.), *Selected Pre-Critical Writings and Correspondence with Beck* (pp. 36–43). Manchester: Manchester University Press.
- Kant, I. (1787/2003). *Critique of Pure Reason* [First published in 1787 as *Kritik der reinen Vernunft*]. (N. Kemp Smith, Trans.). New York: Palgrave Macmillan.
- Kardela, H. (2006a). Koncepcja umysłu ucieleśnionego w kognitywizmie. In W. Dziarnowska & A. Klawiter (Eds.), *Mózg i jego umysły* (pp. 217–243). Poznań: Wydawnictwo Zysk i S-ka.
- Kardela, H. (2006b). Metodologia językoznawstwa kognitywnego. In P. Stalmaszczyk (Ed.), *Metodologie językoznawstwa współczesnego: Podstawy teoretyczne* (pp. 196–233). Łódź: Wydawnictwo Uniwersytetu Łódzkiego.
- Kaschak, M. P., & Glenberg, A. M. (2000). Constructing Meaning: The Role of Affordances and Grammatical Constructions in Sentence Comprehension. *Journal of Memory and Language*, 43(3), 508–529. <https://doi.org/10.1006/jmla.2000.2705>
- Kaschak, M. P., Madden, C. J., Theriault, D. J., Yaxley, R. H., Aveyard, M. E., Blanchard, A. A., & Zwaan, R. A. (2005). Perception of motion affects language processing. *Cognition*, 94(3), B79–B89. <https://doi.org/10.1016/j.cognition.2004.06.005>
- Katz, J. J., & Fodor, J. A. (1963). The Structure of a Semantic Theory. *Language*, 39(2), 170. <https://doi.org/10.2307/411200>
- Kay, P. (2005). Argument structure constructions and the argument-adjunct distinction. In M. Fried & H. C. Boas (Eds.), *Grammatical Constructions: Back to the Roots* (pp. 71–98). Amsterdam: John Benjamins.
- Kay, P. (2013). The Limits of (Construction) Grammar. In T. Hoffmann & G. Trousdale (Eds.), *The Oxford Handbook of Construction Grammar* (pp. 32–48). Oxford: Oxford University Press.
- Kay, P., & Kempton, W. (1984). What Is the Sapir-Whorf Hypothesis? *American Anthropologist*, 86(1), 65–79. <https://doi.org/10.1525/aa.1984.86.1.02a00050>
- Kennedy, C. (2001). Polar opposition and the ontology of “degrees.” *Linguistics and Philosophy*, 24, 33–70. <https://doi.org/10.1023/A:1005668525906>
- Kennedy, C., & Levin, B. (2008). Measure of change: The adjectival core of degree achievements. In L. McNally & C. Kennedy (Eds.), *Adjectives and Adverbs: Syntax, Semantics, and Discourse* (pp. 156–182). Oxford: Oxford University Press.
- Kennedy, J. M. (1997). How the Blind Draw. *Scientific American*, 276(1), 76–81. <https://doi.org/10.1038/scientificamerican0197-76>
- Kenny, A. (1963/2003). *Action, Emotion, and Will* [First published in 1963]. London: Routledge.
- Kiefer, M., & Pulvermüller, F. (2012). Conceptual representations in mind and brain: Theoretical developments, current evidence and future directions. *Cortex*, 48(7), 805–825. <https://doi.org/10.1016/j.cortex.2011.04.006>
- Kiparsky, P. (1997). Remarks on Denominal Verbs. In A. Alsina, J. Bresnan, & P. Sells (Eds.), *Complex Predicates* (pp. 473–499). Stanford, CA: CSLI Publications.
- Klippel, A., Tenbrink, T., & Montello, D. R. (2013). The role of structure and function in the conceptualization of direction. In M. Vulchanova & E. van der Zee (Eds.), *Motion Encoding in Language and Space* (pp. 102–119). Oxford: Oxford University Press.
- Kipper, K., Korhonen, A., Ryant, N., & Palmer, M. (2008). A large-scale classification of English verbs. *Language Resources and Evaluation*, 42(1), 21–40. <https://doi.org/10.1007/s10579-007-9048-2>

- Korzybski, A. (1933/1995). *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics, 5th Ed.* [First published in 1933]. Brooklyn, New York: Institute of General Semantics.
- Kosman, A. L. (1969). Aristotle's Definition of Motion. *Phronesis*, 14(1), 40–62. <https://doi.org/10.1163/156852869X00037>
- Kosman, A. L. (1987). Aristotle's Definition of Change. *History of Philosophy Quarterly*, 4(1), 3–16.
- Kosslyn, S. M. (2005). Mental images and the Brain. *Cognitive Neuropsychology*, 22(3–4), 333–347. <https://doi.org/10.1080/02643290442000130>
- Kosslyn, S. M., Ganis, G., & Thompson, W. L. (2001). Neural foundations of imagery. *Nature Reviews Neuroscience*, 2(9), 635–642. <https://doi.org/10.1038/35090055>
- Kosslyn, S. M., Ganis, G., & Thompson, W. L. (2003). Mental imagery: Against the nihilistic hypothesis. *Trends in Cognitive Sciences*, 7(3), 109–111. [https://doi.org/10.1016/S1364-6613\(03\)00025-1](https://doi.org/10.1016/S1364-6613(03)00025-1)
- Kövecses, Z. (2005). *Metaphor in Culture: Universality and Variation*. Cambridge: Cambridge University Press.
- Kövecses, Z. (2010). *Metaphor: A Practical Introduction, 2nd Ed.* New York: Oxford University Press.
- Kövecses, Z. (2015). *Where Metaphors Come from: Reconsidering Context in Metaphor*. New York: Oxford University Press.
- Kreitzer, A. (1997). Multiple levels of schematization: A study in the conceptualization of space. *Cognitive Linguistics*, 8(4), 291–326. <https://doi.org/10.1515/cogl.1997.8.4.291>
- Krzyszowski, T. P. (1993). The axiological parameter in preconceptual image schemata. In R. A. Geiger & B. Rudzka-Ostyn (Eds.), *Conceptualizations and Mental Processing in Language* (pp. 307–329). Berlin: Mouton de Gruyter.
- Krzyszowski, T. P. (1997). *Angels and Devils in Hell: Elements of Axiology in Semantics*. Warszawa: Energeia.
- Kučera, H., & Francis, W. N. (1967). *Computational analysis of present-day American English*. Providence: Brown University Press.
- Laeng, B., & Teodorescu, D.-S. (2002). Eye scanpaths during visual imagery reenact those of perception of the same visual scene. *Cognitive Science*, 26(2), 207–231. [https://doi.org/10.1016/S0364-0213\(01\)00065-9](https://doi.org/10.1016/S0364-0213(01)00065-9)
- Lakoff, G. (1987a). *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind*. Chicago: University of Chicago Press.
- Lakoff, G. (1987b). The Death of Dead Metaphor. *Metaphor and Symbolic Activity*, 2(2), 143–147. [https://doi.org/10.1207/s15327868ms0202\\_5](https://doi.org/10.1207/s15327868ms0202_5)
- Lakoff, G. (1993). The contemporary theory of metaphor. In A. Ortony (Ed.), *Metaphor and Thought, 2nd Ed* (pp. 202–251). Cambridge: Cambridge University Press.
- Lakoff, G., & Johnson, M. (1980). *Metaphors We Live By*. Chicago: University of Chicago Press.
- Lakoff, G., & Johnson, M. (1999). *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*. Chicago: University of Chicago Press.
- Lakoff, G., & Núñez, R. E. (2000). *Where Mathematics Comes from: How the Embodied Mind Brings Mathematics into Being*. New York: Basic Books.
- Lakoff, G., & Turner, M. (1989). *More Than Cool Reason: A Field Guide to Poetic Metaphor*. Chicago: University of Chicago Press.
- Lakusta, L., & Landau, B. (2005). Starting at the end: The importance of goals in spatial language. *Cognition*, 96(1), 1–33. <https://doi.org/10.1016/j.cognition.2004.03.009>

- Lakusta, L., & Landau, B. (2012). Language and Memory for Motion Events: Origins of the Asymmetry Between Source and Goal Paths. *Cognitive Science*, 36(3), 517–544. <https://doi.org/10.1111/j.1551-6709.2011.01220.x>
- Landau, B. (2003). Axes and Direction in Spatial Language and Spatial Cognition. In E. van der Zee & J. Slack (Eds.), *Representing Direction in Language and Space* (pp. 18–38). Oxford: Oxford University Press.
- Landau, B., & Jackendoff, R. (1993). “What” and “where” in spatial language and spatial cognition. *Behavioral and Brain Sciences*, 16(02), 217–265. <https://doi.org/10.1017/S0140525X00029733>
- Landau, B., Dessalegn, B., & Goldberg, A. M. (2010). Language and space: Momentary interactions. In V. Evans & P. A. Chilton (Eds.), *Language, Cognition and Space: The State of the Art and New Directions* (pp. 51–78). London: Equinox.
- Langacker, R. W. (1986). Abstract Motion. In *Proceedings of the Twelfth Annual Meeting of the Berkeley Linguistics Society* (pp. 455–471). Berkeley, CA: Berkeley Linguistics Society.
- Langacker, R. W. (1987). *Foundations of Cognitive Grammar*, Vol. 1: *Theoretical Prerequisites*. Stanford, CA: Stanford University Press.
- Langacker, R. W. (1990). Subjectification. *Cognitive Linguistics*, 1(1), 5–38. <https://doi.org/10.1515/cogl.1990.1.1.5>
- Langacker, R. W. (1991). *Foundations of Cognitive Grammar*, Vol. 2: *Descriptive Application*. Stanford, CA: Stanford University Press.
- Langacker, R. W. (1991/2002). *Concept, Image, and Symbol: The Cognitive Basis of Grammar*, 2nd Ed. [First edition published in 1991]. Berlin: Mouton de Gruyter.
- Langacker, R. W. (1999). Virtual reality. *Studies in the Linguistic Sciences*, 29(2), 77–103.
- Langacker, R. W. (2005). Dynamicity, fictivity, and scanning: The imaginative basis of logic and linguistic meaning. In D. Pecher & R. A. Zwaan (Eds.), *Grounding Cognition: The Role of Perception and Action in Memory, Language, and Thinking* (pp. 164–197). Cambridge: Cambridge University Press.
- Langacker, R. W. (2006). Subjectification, grammaticization, and conceptual archetypes. In A. Athanasiadou, C. Canakis, & B. Cornillie (Eds.), *Subjectification: Various Paths to Subjectivity* (pp. 17–40). Berlin: De Gruyter.
- Langacker, R. W. (2008a). *Cognitive Grammar A Basic Introduction*. Oxford: Oxford University Press.
- Langacker, R. W. (2008b). Cognitive Grammar as a basis for language instruction. In P. Robinson & N. C. Ellis (Eds.), *Handbook of Cognitive Linguistics and Second Language Acquisition* (pp. 66–88). New York: Routledge.
- Langacker, R. W. (2008c). Sequential and summary scanning: A reply. *Cognitive Linguistics*, 19(4), 533–607. <https://doi.org/10.1515/COGL.2008.022>
- Langacker, R. W. (2009a). A dynamic view of usage and language acquisition. *Cognitive Linguistics*, 20(3). <https://doi.org/10.1515/COGL.2009.027>
- Langacker, R. W. (2009b). *Gramatyka kognitywna: Wprowadzenie*. (E. Tabakowska & others, Trans.). Kraków: TAIWPN Universitas.
- Langacker, R. W. (2012). Linguistic manifestations of the space-time (dis)analogy. In L. Filipović & K. M. Jaszczolt (Eds.), *Space and Time in Languages and Cultures: Language, culture, and cognition* (pp. 191–215). Amsterdam: John Benjamins.
- Langacker, R. W. (2013). *Essentials of Cognitive Grammar*. Oxford: Oxford University Press.

- Langacker, R. W. (2014). Culture and Cognition, Lexicon and Grammar. In M. Yamaguchi, D. Tay, & B. Blount (Eds.), *Approaches to Language, Culture, and Cognition: the Intersection of Cognitive Linguistics and Linguistic Anthropology* (pp. 27–49). London: Palgrave Macmillan.
- Langacker, R. W. (2015). Construal. In E. Dąbrowska & D. Divjak (Eds.), *Handbook of Cognitive Linguistics* (pp. 120–142). Berlin: De Gruyter Mouton.
- Leech, G. N. (2004). *Meaning and the English Verb, 3rd Ed.* New York: Routledge.
- Leech, G. N. (2005). Adding Linguistic Annotation. In W. Martin (Ed.), *Developing Linguistic Corpora: A Guide to Good Practice* (pp. 17–29). Oxford: Oxbow Books.
- Leibowitz, H. W., Guzy, L. T., Peterson, E., & Blake, P. T. (1993). Quantitative perceptual estimates: Verbal versus nonverbal retrieval techniques. *Perception, 22*(9), 1051–1060. <https://doi.org/10.1068/p221051>
- Levelt, W. J. M. (1996). Perspective Taking and Ellipsis in Spatial Descriptions. In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and Space* (pp. 77–108). Cambridge, MA: MIT Press.
- Levin, B. (1993). *English Verb Classes and Alternations: A Preliminary Investigation*. Chicago: University of Chicago Press.
- Levin, B., & Rappaport Hovav, M. (1991). Wiping the slate clean: A lexical semantic exploration. *Cognition, 41*(1–3), 123–151. [https://doi.org/10.1016/0010-0277\(91\)90034-2](https://doi.org/10.1016/0010-0277(91)90034-2)
- Levin, B., & Rappaport Hovav, M. (1992). The lexical semantics of verbs of motion: The perspective from unaccusativity. In I. M. Roca (Ed.), *Thematic Structure*. Berlin: De Gruyter.
- Levin, B., & Rappaport Hovav, M. (1994). A preliminary analysis of causative verbs in English. *Lingua, 92*, 35–77. [https://doi.org/10.1016/0024-3841\(94\)90337-9](https://doi.org/10.1016/0024-3841(94)90337-9)
- Levin, B., & Rappaport Hovav, M. (2005). *Argument Realization*. Cambridge: Cambridge University Press.
- Levin, B., & Rappaport Hovav, M. (2006). Constraints on the complexity of verb meaning and VP structure. In H.-M. Gärtner, S. Beck, R. Eckardt, R. Musan, & B. Stiebels (Eds.), *In Between 40 and 60 Puzzles for Krifka*. Berlin: ZAS. Retrieved on 06.03.2018 from <http://www.zas.gwz-berlin.de/fileadmin/material/40-60-puzzles-for-krifka/>
- Levin, B., & Rappaport Hovav, M. (2013). Lexicalized Meaning and Manner/Result Complementarity. In B. Arsenijević, B. Gehrke, & R. Marin (Eds.), *Studies in the Composition and Decomposition of Event Predicates* (Vol. 93, pp. 49–70). Dordrecht: Springer. [https://doi.org/10.1007/978-94-007-5983-1\\_3](https://doi.org/10.1007/978-94-007-5983-1_3)
- Levin, B., & Rappaport Hovav, M. (2014). Manner and result: A view from *clean*. In R. Pensalfini, M. Turpin, & D. Guillemin (Eds.), *Studies in Language Companion Series* (Vol. 147, pp. 337–358). Amsterdam: John Benjamins Publishing Company. <https://doi.org/10.1075/slcs.147.14lev>
- Levinson, S. C. (1996). Frames of Reference and Molyneux's Question: Crosslinguistic Evidence. In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and Space* (pp. 109–169). Cambridge, MA: MIT Press.
- Levinson, S. C. (2003). *Space in Language and Cognition: Explorations in Cognitive Diversity*. Cambridge: Cambridge University Press.
- Levinson, S. C., & Wilkins, D. P. (Eds.). (2006a). *Grammars of Space: Explorations in Cognitive Diversity*. Cambridge: Cambridge University Press.

- Levinson, S. C., & Wilkins, D. P. (2006b). Patterns in the data: Towards a semantic typology of spatial description. In S. C. Levinson & D. P. Wilkins (Eds.), *Grammars of Space: Explorations in Cognitive Diversity* (pp. 512–552). Cambridge: Cambridge University Press.
- Levinson, S. C., & Wilkins, D. P. (2006c). The background to the study of the language of space. In S. C. Levinson & D. P. Wilkins (Eds.), *Grammars of Space: Explorations in Cognitive Diversity* (pp. 1–23). Cambridge: Cambridge University Press.
- Lewandowska-Tomaszczyk, B. (1987). Conceptual Analysis, Linguistic Meaning and Verbal Interaction. *Acta Universitatis Lodzianis*. Łódź: Łódź University Press.
- Lewandowska-Tomaszczyk, B. (1996). Cross-linguistic and language-specific aspects of semantic prosody. *Language Sciences*, 18(1–2), 153–178. [https://doi.org/10.1016/0388-0001\(96\)00013-7](https://doi.org/10.1016/0388-0001(96)00013-7)
- Lewandowska-Tomaszczyk, B. (2007). Polysemy, Prototypes, and Radial Categories. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford Handbook of Cognitive Linguistics* (pp. 139–169). Oxford: Oxford University Press.
- Lewandowska-Tomaszczyk, B. (Ed.). (2008a). *Asymmetric Events*. Amsterdam: John Benjamins.
- Lewandowska-Tomaszczyk, B. (2008b). Czym jest język? Dzisiejsze kontrowersje w paradygmatach generatywnych i kognitywnych. In P. Stalmaszczyk (Ed.), *Metodologie językoznawstwa: współczesne tendencje i kontrowersje* (pp. 9–26). Kraków: Lexis.
- Lewandowska-Tomaszczyk, B. (2010). Re-conceptualization and the emergence of discourse-meaning as a theory of translation. In B. Lewandowska-Tomaszczyk & M. Thelen (Eds.), *Meaning in Translation* (pp. 105–148). Frankfurt am Main: Peter Lang.
- Lewandowska-Tomaszczyk, B. (2011). Events as They Are. In P. Stalmaszczyk (Ed.), *Turning Points in the Philosophy of Language and Linguistics* (pp. 35–64). Frankfurt am Main: Peter Lang.
- Lewandowska-Tomaszczyk, B. (2012). Approximative Spaces and the Tolerance Threshold in Communication. *International Journal of Cognitive Linguistics*, 2(2), 165–183.
- Lewandowska-Tomaszczyk, B. (2017). Partial Perception and Approximate Understanding. *Research in Language*, 15(2), 129–152. <https://doi.org/10.1515/rela-2017-0009>
- Lewandowska-Tomaszczyk, B., & Dziwirek, K. (Eds.). (2009). *Studies in Cognitive Corpus Linguistics*. Frankfurt am Main: Peter Lang.
- Lichtenberk, F. (1991). Semantic Change and Heterosemy in Grammaticalization. *Language*, 67(3), 475–509. <https://doi.org/10.2307/415035>
- Liu, J., Shang, J., & Han, J. (2017). *Phrase Mining from Massive Text and Its Applications*. San Rafael, CA: Morgan & Claypool.
- Locke, J. (1689/1995). *An Essay Concerning Human Understanding* [First published in 1689]. Amherst, NY: Prometheus Books.
- Logan, G. D., & Sadler, D. D. (1996). A Computational Analysis of the Apprehension of Spatial Relations. In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and Space* (pp. 493–529). Cambridge, MA: MIT Press.
- Logothetis, N. K. (2008). What we can do and what we cannot do with fMRI. *Nature*, 453(7197), 869–878. <https://doi.org/10.1038/nature06976>
- Loucks, J., & Pederson, E. (2011). Linguistic and non-linguistic categorization of complex motion events. In J. Bohnemeyer & E. Pederson (Eds.), *Event Representation in Language and Cognition* (pp. 108–133). Cambridge: Cambridge University Press.

- Lourenco, S. F., & Longo, M. R. (2010). General Magnitude Representation in Human Infants. *Psychological Science*, 21(6), 873–881. <https://doi.org/10.1177/0956797610370158>
- Lourenco, S. F., & Longo, M. R. (2011). Origins and Development of Generalized Magnitude Representation. In S. Dehaene & E. M. Brannon (Eds.), *Space, Time and Number in the Brain* (pp. 225–244). Elsevier.
- Louw, B. (1993). Irony in the Text or Insincerity in the Writer? — The Diagnostic Potential of Semantic Prosodies. In M. Baker, G. Francis, & E. Tognini-Bonelli (Eds.), *Text and Technology: In Honour of John Sinclair* (pp. 157–176). Amsterdam: John Benjamins. <https://doi.org/10.1075/z.64.11lou>
- Louw, B., & Milojkovic, M. (2014). Semantic prosody. In P. Stockwell & S. Whiteley (Eds.), *The Cambridge Handbook of Stylistics* (pp. 263–280). Cambridge: Cambridge University Press.
- Lovejoy, A. O. (1936). *The Great Chain of Being: A Study of the History of an Idea*. Cambridge, MA: Harvard University Press.
- Lucy, J. A. (1992a). *Grammatical Categories and Cognition: A Case Study of the Linguistic Relativity Hypothesis*. Cambridge: Cambridge University Press.
- Lucy, J. A. (1992b). *Language Diversity and Thought: A Reformulation of the Linguistic Relativity Hypothesis*. Cambridge: Cambridge University Press.
- Lucy, J. A. (1994). The role of semantic value in lexical comparison: Motion and position roots in Yucatec Maya. *Linguistics*, 32(4–5), 623–656. <https://doi.org/10.1515/ling.1994.32.4-5.623>
- Lucy, J. A. (1997). Linguistic Relativity. *Annual Review of Anthropology*, 26(1), 291–312. <https://doi.org/10.1146/annurev.anthro.26.1.291>
- Lynch, K. (1960). *The Image of the City*. Cambridge, MA: MIT Press.
- Lyons, J. (1977). *Semantics* (Vols. 1–2). Cambridge: Cambridge University Press.
- MacEachren, A. M. (1980). Travel Time as the Basis of Cognitive Distance. *The Professional Geographer*, 32(1), 30–36. <https://doi.org/10.1111/j.0033-0124.1980.00030.x>
- Mach, E. (1883/2013). *The Science of Mechanics: A Critical and Historical Exposition of its Principles* [First German edition in 1883]. (T. J. McCormack, Trans.). Cambridge: Cambridge University Press.
- Mahon, B. Z., & Caramazza, A. (2008). A critical look at the embodied cognition hypothesis and a new proposal for grounding conceptual content. *Journal of Physiology-Paris*, 102(1–3), 59–70. <https://doi.org/10.1016/j.jphysparis.2008.03.004>
- Majid, A., Bowerman, M., Kita, S., Haun, D. B. M., & Levinson, S. C. (2004). Can language restructure cognition? The case for space. *Trends in Cognitive Sciences*, 8(3), 108–114. <https://doi.org/10.1016/j.tics.2004.01.003>
- Malt, B. C., Ameel, E., Imai, M., Gennari, S. P., Saji, N., & Majid, A. (2014). Human locomotion in languages: Constraints on moving and meaning. *Journal of Memory and Language*, 74, 107–123. <https://doi.org/10.1016/j.jml.2013.08.003>
- Malt, B. C., Gennari, S. P., & Imai, M. (2010). Lexicalization patterns and the world-to-words mapping. In B. C. Malt & P. Wolff (Eds.), *Words and the Mind: How Words Capture Human Experience* (pp. 29–57). New York: Oxford University Press.
- Malt, B. C., Gennari, S. P., Imai, M., Ameel, E., Tsuda, N., & Majid, A. (2008). Talking About Walking: Biomechanics and the Language of Locomotion. *Psychological Science*, 19(3), 232–240. <https://doi.org/10.1111/j.1467-9280.2008.02074.x>

- Malt, B. C., & Wolff, P. (Eds.). (2010). *Words and the Mind: How Words Capture Human Experience*. New York: Oxford University Press.
- Mandler, J. M. (1992). How to build a baby: II. Conceptual primitives. *Psychological Review*, 99(4), 587–604. <https://doi.org/10.1037/0033-295X.99.4.587>
- Mandler, J. M. (2004). *The Foundations of Mind: Origins of Conceptual Thought*. Oxford: Oxford University Press.
- Mandler, J. M. (2005). How to build a baby: III. Image schemas and the transition to verbal thought. In B. Hampe (Ed.), *From Perception to Meaning: Image Schemas in Cognitive Linguistics* (pp. 137–165). Berlin: Mouton de Gruyter.
- Mandler, J. M. (2010). The spatial foundations of the conceptual system. *Language and Cognition*, 2(01), 21–44. <https://doi.org/10.1515/langcog.2010.002>
- Mandler, J. M. (2012). On the Spatial Foundations of the Conceptual System and Its Enrichment. *Cognitive Science*, 36(3), 421–451. <https://doi.org/10.1111/j.1551-6709.2012.01241.x>
- Mandler, J. M., & Cánovas, C. P. (2014). On defining image schemas. *Language and Cognition*, 6(04), 510–532. <https://doi.org/10.1017/langcog.2014.14>
- Mani, I., & Pustejovsky, J. (2012). *Interpreting Motion: Grounded Representations for Spatial Language*. Oxford: Oxford University Press.
- Mani, I., Pustejovsky, J., & Gaizauskas, R. (Eds.). (2005). *The Language of Time: A Reader*. New York: Oxford University Press.
- Mari, A. (2006). What do the notions of instrumentality and of manner have in common? In P. Saint-Dizier (Ed.), *Syntax and Semantics of Prepositions* (pp. 263–287). Dordrecht: Springer.
- Marr, D. (1982/2010). *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information* [First published in 1982]. Cambridge, MA: MIT Press.
- Marr, D., & Vaina, L. (1982). Representation and Recognition of the Movements of Shapes. *Proceedings of the Royal Society B: Biological Sciences*, 214(1197), 501–524. <https://doi.org/10.1098/rspb.1982.0024>
- Martin, A. (2007). The Representation of Object Concepts in the Brain. *Annual Review of Psychology*, 58(1), 25–45. <https://doi.org/10.1146/annurev.psych.57.102904.190143>
- Martin, A., & Caramazza, A. (2003). Neuropsychological and Neuroimaging Perspectives on Conceptual Knowledge: An Introduction. *Cognitive Neuropsychology*, 20(3–6), 195–212. <https://doi.org/10.1080/02643290342000050>
- Martínez-Losa, N. J. (2006). Towards a typology of fictive motion events: Review of existing proposals and presentation of new perspectives. *Interlinguistica*, 17, 562–569.
- Matlock, T. (2001). *How real is fictive motion?* (Ph.D. Dissertation). University of California, Santa Cruz.
- Matlock, T. (2004a). Fictive motion as cognitive simulation. *Memory & Cognition*, 32(8), 1389–1400. <https://doi.org/10.3758/BF03206329>
- Matlock, T. (2004b). The conceptual motivation of fictive motion. In G. Radden & K.-U. Panther (Eds.), *Studies in Linguistic Motivation* (pp. 221–248). Berlin: Mouton de Gruyter.
- Matlock, T. (2006). Depicting fictive motion in drawings. In J. Luchjenbroers (Ed.), *Cognitive Linguistics Investigations* (pp. 67–85). Amsterdam: John Benjamins.
- Matlock, T. (2010). Abstract motion is no longer abstract. *Language and Cognition*, 2(2), 243–260. <https://doi.org/10.1515/langcog.2010.010>

- Matlock, T. (2017). Metaphor, Simulation, and Fictive Motion. In B. Dancygier (Ed.), *The Cambridge Handbook of Cognitive Linguistics* (pp. 477–490). Cambridge: Cambridge University Press.
- Matlock, T., & Bergmann, T. (2015). Fictive motion. In E. Dąbrowska & D. Divjak (Eds.), *Handbook of Cognitive Linguistics* (pp. 546–562). Berlin: De Gruyter Mouton.
- Matlock, T., & Richardson, D. C. (2004). Do eye movements go with fictive motion? In K. Forbus, D. Gentner, & T. Regier (Eds.), *Proceedings of the 26th Annual Conference of the Cognitive Science Society* (pp. 909–914). Mahwah, NJ: Lawrence Erlbaum.
- Matlock, T., Holmes, K. J., Srinivasan, M., & Ramscar, M. (2011). Even Abstract Motion Influences the Understanding of Time. *Metaphor and Symbol*, 26(4), 260–271. <https://doi.org/10.1080/10926488.2011.609065>
- Matlock, T., Ramscar, M., & Boroditsky, L. (2003). The experiential basis of meaning. In R. Alterman & D. Kirsh (Eds.), *Proceedings of the 25th Annual Conference of the Cognitive Science Society* (pp. 792–797). Mahwah, NJ: Lawrence Erlbaum.
- Matlock, T., Ramscar, M., & Boroditsky, L. (2004). The experiential basis of motion language. In A. S. da Silva, A. Torres, & M. Gonçalves (Eds.), *Linguagem, Cultura e Cognição, ou a Linguística Cognitiva, Vol. 2* (pp. 43–57). Coimbra: Almedina.
- Matlock, T., Ramscar, M., & Boroditsky, L. (2005). On the Experiential Link Between Spatial and Temporal Language. *Cognitive Science*, 29(4), 655–664. [https://doi.org/10.1207/s15516709cog0000\\_17](https://doi.org/10.1207/s15516709cog0000_17)
- Matlock, T., Ramscar, M., & Srinivasan, M. (2005). Even the Most Abstract Motion Influences Temporal Understanding. In B. G. Bara, L. W. Barsalou, & M. Bucciarelli (Eds.), *Proceedings of the 27th Annual Conference of the Cognitive Science Society* (p. 2527). Mahwah, NJ: Lawrence Erlbaum.
- Matsumoto, N. (2010). The Pragmatics of Multi-Verb Sequences: The Case of the Verb Go. *Lodz Papers in Pragmatics*, 6(1), 117–143. <https://doi.org/10.2478/v10016-010-0007-9>
- Matsumoto, Y. (1996a). Subjective motion and English and Japanese verbs. *Cognitive Linguistics*, 7(2), 183–226. <https://doi.org/10.1515/cogl.1996.7.2.183>
- Matsumoto, Y. (1996b). Subjective-change expressions in Japanese and their cognitive and linguistic bases. In G. Fauconnier & E. Sweetser (Eds.), *Spaces, Worlds, and Grammar* (pp. 124–156). Chicago: University of Chicago Press.
- Matthews, W. J., & Meck, W. H. (2014). Time perception: The bad news and the good. *Wiley Interdisciplinary Reviews: Cognitive Science*, 5(4), 429–446. <https://doi.org/10.1002/wcs.1298>
- McCloud, S. (1994). *Understanding Comics: The Invisible Art*. New York: HarperPerennial.
- McDonough, J. K. (2014). Leibniz's Philosophy of Physics. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2014). Stanford, CA: Stanford University. Retrieved on 12.06.2017 from <http://plato.stanford.edu/archives/spr2014/entries/leibniz-physics/>
- McEnery, T., & Hardie, A. (2012). *Corpus Linguistics: Method, Theory and Practice*. Cambridge: Cambridge University Press.
- McEnery, T., & Hardie, A. (2013). The History of Corpus Linguistics. In K. Allan (Ed.), *The Oxford Handbook of the History of Linguistics* (pp. 727–746). Oxford: Oxford University Press.
- McEnery, T., & Wilson, A. (2001). *Corpus Linguistics: An Introduction, 2nd Ed.* Edinburgh: Edinburgh University Press.

- McEnery, T., Xiao, R., & Tono, Y. (2006). *Corpus-Based Language Studies: An Advanced Resource Book*. London: Routledge.
- 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(5), 1211–1223. <https://doi.org/10.1037/0278-7393.24.5.1211>
- McWhorter, J. H. (2014). *The Language Hoax: Why the World Looks the Same in Any Language*. Oxford: Oxford University Press.
- Merritt, D. J., Casasanto, D., & Brannon, E. M. (2010). Do monkeys think in metaphors? Representations of space and time in monkeys and humans. *Cognition*, 117(2), 191–202. <https://doi.org/10.1016/j.cognition.2010.08.011>
- Meteyard, L., Cuadrado, S. R., Bahrami, B., & Vigliocco, G. (2012). Coming of age: A review of embodiment and the neuroscience of semantics. *Cortex*, 48(7), 788–804. <https://doi.org/10.1016/j.cortex.2010.11.002>
- Millar, S. (2008). *Space and Sense*. Hove: Psychology Press.
- Miller, G. A. (1995). WordNet: A lexical database for English. *Communications of the ACM*, 38(11), 39–41. <https://doi.org/10.1145/219717.219748>
- Miller, G. A., & Fellbaum, C. (2007). WordNet then and now. *Language Resources and Evaluation*, 41(2), 209–214. <https://doi.org/10.1007/s10579-007-9044-6>
- Miller, G. A., & Johnson-Laird, P. N. (1976). *Language and Perception*. Cambridge, MA: Harvard University Press.
- Minkowski, H. (1908/1952). Space and Time [A translation of an address delivered at the 80th Assembly of German Natural Scientists and Physicians, at Cologne, September 21, 1908]. In W. Perrett & G. B. Jeffery (Trans.), *The Principle of Relativity: A Collection of Original Papers on the Special and General Theory of Relativity* (pp. 71–95). New York: Dover.
- Mishra, R. K., & Singh, N. (2010). Online Fictive Motion Understanding: An Eye-Movement Study With Hindi. *Metaphor and Symbol*, 25(3), 144–161. <https://doi.org/10.1080/10926488.2010.489393>
- Montague, R. (1974). *Formal Philosophy: Selected Papers of Richard Montague*. (R. H. Thomason, Ed.). New Haven, CT: Yale University Press.
- Moon, R. (1998). *Fixed Expressions and Idioms in English: A Corpus-Based Approach*. Oxford: Oxford University Press.
- Moore, K. E. (2014). *The Spatial Language of Time: Metaphor, Metonymy, and Frames of Reference*. Amsterdam: John Benjamins.
- Murphy, G. L. (1996). On metaphoric representation. *Cognition*, 60(2), 173–204. [https://doi.org/10.1016/0010-0277\(96\)00711-1](https://doi.org/10.1016/0010-0277(96)00711-1)
- Murphy, G. L. (1997). Reasons to doubt the present evidence for metaphoric representation. *Cognition*, 62(1), 99–108. [https://doi.org/10.1016/S0010-0277\(96\)00725-1](https://doi.org/10.1016/S0010-0277(96)00725-1)
- Müller, C. (2008). *Metaphors Dead and Alive, Sleeping and Waking: A Dynamic View*. Chicago: University of Chicago Press.
- Nakazawa, T. (2007). A Typology of the Ground of Deictic Motion Verbs As Path-Conflating Verbs: The Speaker, the Addressee, and Beyond. *Poznań Studies in Contemporary Linguistics*, 43(2), 59–82. <https://doi.org/10.2478/v10010-007-0014-3>
- Nakazawa, T. (2009). A Typology of the Path of Deictic Motion Verbs as Path-Conflating Verbs: The Entailment of Arrival and the Deictic Center. *Poznań Studies in Contemporary Linguistics*, 45(3), 385–403. <https://doi.org/10.2478/v10010-009-0022-6>

- Newman, J. (Ed.). (2002). *The Linguistics of Sitting, Standing, and Lying*. Amsterdam: John Benjamins.
- Newman, J., & Lin, J. (2007). The purposefulness of going: A corpus-linguistic study. In J. T. Waliński, K. Kredens, & S. Goźdz-Roszkowski (Eds.), *Corpora and ICT in Language Studies* (pp. 293–308). Frankfurt am Main: Peter Lang.
- Newman, J., & Rice, S. (2004). Patterns of usage for English SIT, STAND, and LIE: A cognitively-inspired exploration in corpus linguistics. *Cognitive Linguistics*, 15(3), 351–396. <https://doi.org/10.1515/cogl.2004.013>
- Newton, I. (1687/1995). *The Principia: Mathematical Principles of Natural Philosophy* [First published in 1687 as *Philosophiae Naturalis Principia Mathematica*]. (A. Motte, Trans.). Amherst, N.Y.: Prometheus Books.
- Nida, E. A. (1975). *A Componential Analysis of Meaning An Introduction to Semantic Structures*. The Hague: Mouton.
- Nikanne, U., & van der Zee, E. (2013). The lexical representation of path curvature in motion expressions: A three-way path curvature distinction. In M. Vulchanova & E. van der Zee (Eds.), *Motion Encoding in Language and Space* (pp. 187–212). Oxford: Oxford University Press.
- Núñez, R. E., & Cooperrider, K. (2013). The tangle of space and time in human cognition. *Trends in Cognitive Sciences*, 17(5), 220–229. <https://doi.org/10.1016/j.tics.2013.03.008>
- Núñez, R. E., Cooperrider, K., Doan, D., & Wassmann, J. (2012). Contours of time: Topographic construals of past, present, and future in the Yupno valley of Papua New Guinea. *Cognition*, 124(1), 25–35. <https://doi.org/10.1016/j.cognition.2012.03.007>
- O’Keefe, J. (1996). The Spatial Prepositions in English, Vector Grammar, and the Cognitive Map Theory. In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and Space* (pp. 277–316). Cambridge, MA: MIT Press.
- O’Keefe, J. (2003). Vector Grammar, Places, and the Functional Role of the Spatial Prepositions in English. In E. van der Zee & J. Slack (Eds.), *Representing Direction in Language and Space* (pp. 69–85). Oxford: Oxford University Press.
- Oakley, T. (2007). Image schemas. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford Handbook of Cognitive Linguistics* (pp. 214–235). Oxford: Oxford University Press.
- Onozuka, H. (2012). Notes on Type I Subjective Motion Expressions in English. *Australian Journal of Linguistics*, 32(2), 239–257. <https://doi.org/10.1080/07268602.2012.674472>
- Oshima, D. Y. (2006). GO and COME Revisited: What Serves as a Reference Point? In *Proceedings of the 32nd Annual Meeting of the Berkeley Linguistics Society* (pp. 287–298). Berkeley, CA: Berkeley Linguistics Society. <https://doi.org/10.3765/bls.v32i1.3466>
- Overgaard, S. (2012). Visual perception and self-movement: Another look. In A. Foolen, U. M. Lüdtke, T. P. Racine, & J. Zlatev (Eds.), *Moving Ourselves, Moving Others: Motion and emotion in intersubjectivity, consciousness and language* (pp. 81–104). Amsterdam: John Benjamins.
- Özçalışkan, Ş. (2013). Ways of crossing a spatial boundary in typologically distinct languages. *Applied Psycholinguistics*, 36(02), 485–508. <https://doi.org/10.1017/S0142716413000325>
- Palmer, J. (2016). Parmenides. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2016). Stanford, CA: Stanford University. Retrieved on 20.02.2018 from <https://plato.stanford.edu/archives/win2016/entries/parmenides/>

- Palmer, J. (2017). Zeno of Elea. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2017). Stanford, CA: Stanford University. Retrieved on 16.03.2018 from <https://plato.stanford.edu/archives/spr2017/entries/zeno-elea/>
- Palmer, M., Bonial, C., & Hwang, J. D. (2017). VerbNet: Capturing English Verb Behavior, Meaning, and Usage. In S. E. F. Chipman (Ed.), *The Oxford Handbook of Cognitive Science* (pp. 315–336). Oxford: Oxford University Press.
- Papafragou, A. (2010). Source-Goal Asymmetries in Motion Representation: Implications for Language Production and Comprehension. *Cognitive Science*, 34(6), 1064–1092. <https://doi.org/10.1111/j.1551-6709.2010.01107.x>
- Papafragou, A., Hulbert, J., & Trueswell, J. (2008). Does language guide event perception? Evidence from eye movements. *Cognition*, 108(1), 155–184. <https://doi.org/10.1016/j.cognition.2008.02.007>
- Papafragou, A., Massey, C., & Gleitman, L. (2002). Shake, rattle, ‘n’ roll: The representation of motion in language and cognition. *Cognition*, 84(2), 189–219. [https://doi.org/10.1016/S0010-0277\(02\)00046-X](https://doi.org/10.1016/S0010-0277(02)00046-X)
- Papafragou, A., Massey, C., & Gleitman, L. (2006). When English proposes what Greek presupposes: The cross-linguistic encoding of motion events. *Cognition*, 98(3), B75–B87. <https://doi.org/10.1016/j.cognition.2005.05.005>
- Papafragou, A., & Selimis, S. (2010). Event categorisation and language: A cross-linguistic study of motion. *Language and Cognitive Processes*, 25(2), 224–260. <https://doi.org/10.1080/01690960903017000>
- Parsons, T. (1990). *Events in the Semantics of English: A Study in Subatomic Semantics*. Cambridge, MA: MIT Press.
- Pawelec, A. (2006). The death of metaphor. *Studia Linguistica Universitatis Iagellonicae Cracoviensis*, 123, 117–121.
- Pecher, D., & Zwaan, R. A. (Eds.). (2005). *Grounding Cognition: The Role of Perception and Action in Memory, Language, and Thinking*. Cambridge: Cambridge University Press.
- Pederson, E. (2017). Approaches to Motion Event Typology. In A. Y. Aikhenvald & R. M. W. Dixon (Eds.), *The Cambridge Handbook of Linguistic Typology* (pp. 574–598). Cambridge: Cambridge University Press.
- Pezik, P. (2015). Spokes – a Search and Exploration Service for Conversational Corpus Data. In *Selected Papers from CLARIN 2014, 99–109 Electronic Conference Proceedings* (pp. 99–109). Linköping University Electronic Press: Linköping University Electronic Press.
- Phelps, K. S., & Duman, S. (2012). Manipulating Manner: Semantic Representations of Human Locomotion Verbs in English and German. In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th Annual Meeting of the Cognitive Science Society* (pp. 857–862). Austin, TX: Cognitive Science Society.
- Piaget, J. (1946/1969). *The Child’s Conception of Time* [First published in 1946 as *Le développement de la notion de temps chez l’enfant*]. (A. J. Pomerans, Trans.). New York: Basic Books.
- Piaget, J. (1946/1970). *The Child’s Conception of Movement and Speed* [First published in 1946 as *Les notions de mouvement et de vitesse chez l’enfant*]. (G. E. T. Holloway & M. J. Mackenzie, Trans.). New York: Basic Books.
- Piaget, J. (1979). Relations Between Psychology and Other Sciences. *Annual Review of Psychology*, 30(1), 1–9. <https://doi.org/10.1146/annurev.ps.30.020179.000245>

- Piaget, J., & Inhelder, B. (1948/1956). *The Child's Conception of Space* [First published in 1948 as *La représentation de l'espace chez l'enfant*]. (F. J. Langdon & J. L. Lunzer, Trans.). New York: Humanities Press.
- Piaget, J., Inhelder, B., & Szeminska, A. (1948/1960). *The Child's Conception of Geometry* [First published in 1948 as *La géométrie spontanée de l'enfant*]. (E. A. Lunzer, Trans.). New York: Basic Books.
- Piantadosi, S. T. (2014). Zipf's word frequency law in natural language: A critical review and future directions. *Psychonomic Bulletin & Review*, 21(5), 1112–1130. <https://doi.org/10.3758/s13423-014-0585-6>
- Piasecki, M., Broda, B., & Szpakowicz, S. (2009). *A Wordnet from the Ground Up*. Wrocław: Oficyna Wydawnicza Politechniki Wrocławskiej.
- Pinker, S. (1994). *The Language Instinct: How the Mind Creates Language*. New York: William Morrow.
- Pinker, S. (2007). *The Stuff of Thought: Language as a Window into Human Nature*. New York: Viking.
- Pinker, S., & Jackendoff, R. (2005). The faculty of language: What's special about it? *Cognition*, 95(2), 201–236. <https://doi.org/10.1016/j.cognition.2004.08.004>
- Piñón, C. J. (1993). Paths and their names. In K. Beals, G. Cooke, D. Kathman, S. Kita, K.-E. McCullough, & D. Testen (Eds.), *Papers from the 29th Regional Meeting of the Chicago Linguistic Society* (pp. 287–303). Chicago: CLS.
- Plato. (388BC/1997). Cratylus [written c. 388 BC]. In J. M. Cooper & D. S. Hutchinson (Eds.), *Plato: Complete Works* (pp. 101–156). Indianapolis, IN: Hackett.
- Podhorodecka, J. (2007). *Evaluative Metaphor: Extended meanings of English motion verbs*. Kraków: Wydawnictwo Naukowe Akademii Pedagogicznej.
- Poincaré, H. (1905/1958). *The Value of Science* [First published in 1905 as *La Valeur de la Science*]. (G. B. Halsted, Trans.). New York: Dover.
- Pourcel, S. (2005). *Relativism in the linguistic representation and cognitive conceptualisation of motion events across verb-framed and satellite-framed languages* (Ph.D. Dissertation). University of Durham, Durham.
- Pourcel, S. (2010). Motion: a conceptual typology. In V. Evans & P. A. Chilton (Eds.), *Language, Cognition and Space: The State of the Art and New Directions* (pp. 419–449). London: Equinox.
- Powers, D. M. W. (1998). Applications and explanations of Zipf's law. In D. M. W. Powers (Ed.), *NeMLaP3/CoNLL98: New Methods in Language Processing and Computational Natural Language Learning* (pp. 151–160). Stroudsburg, PA: Association for Computational Linguistics.
- Price-Williams, D. R. (1954). The Kappa Effect. *Nature*, 173(4399), 363–364. <https://doi.org/10.1038/173363a0>
- Primus, B. (2016). Participant roles. In N. Riemer (Ed.), *The Routledge Handbook of Semantics* (pp. 403–418). London: Routledge.
- Pulvermüller, F. (2005). Brain mechanisms linking language and action. *Nature Reviews Neuroscience*, 6(7), 576–582. <https://doi.org/10.1038/nrn1706>
- Pulvermüller, F., & Fadiga, L. (2010). Active perception: sensorimotor circuits as a cortical basis for language. *Nature Reviews Neuroscience*, 11(5), 351–360. <https://doi.org/10.1038/nrn2811>
- Pustejovsky, J. (1991). The syntax of event structure. *Cognition*, 41(1–3), 47–81. [https://doi.org/10.1016/0010-0277\(91\)90032-Y](https://doi.org/10.1016/0010-0277(91)90032-Y)

- Pylyshyn, Z. W. (2002). Mental imagery: In search of a theory. *Behavioral and Brain Sciences*, 25(2), 157–182.
- Pylyshyn, Z. W. (2003). Return of the mental image: Are there really pictures in the brain? *Trends in Cognitive Sciences*, 7(3), 113–118.  
[https://doi.org/10.1016/S1364-6613\(03\)00003-2](https://doi.org/10.1016/S1364-6613(03)00003-2)
- Quirk, R., Greenbaum, S., Leech, G. N., & Svartvik, J. (1985). *A Comprehensive Grammar of the English Language*. London: Longman.
- Radden, G. (1996). Motion metaphorized: The case of *coming* and *going*. In E. H. Casad (Ed.), *Cognitive Linguistics in the Redwoods* (pp. 423–458). Berlin: De Gruyter Mouton.
- Radden, G., & Dirven, R. (2007). *Cognitive English Grammar*. Amsterdam: John Benjamins.
- Radvansky, G. A., & Zacks, J. M. (2011). Event perception. *Wiley Interdisciplinary Reviews: Cognitive Science*, 2(6), 608–620. <https://doi.org/10.1002/wcs.133>
- Radvansky, G. A., & Zacks, J. M. (2014). *Event cognition*. Oxford: Oxford University Press.
- Ramachandran, V. S., & Anstis, S. M. (1986). The Perception of Apparent Motion. *Scientific American*, 254(6), 102–109.  
<https://doi.org/10.1038/scientificamerican0686-102>
- Ramscar, M., Matlock, T., & Boroditsky, L. (2010). Time, Motion, and Meaning: The Experiential Basis of Abstract Thought. In K. S. Mix, L. B. Smith, & M. Gasser (Eds.), *The Spatial Foundations of Language and Cognition* (pp. 67–82). Oxford: Oxford University Press.
- Ramscar, M., Matlock, T., & Dye, M. (2010). Running down the clock: The role of expectation in our understanding of time and motion. *Language and Cognitive Processes*, 25(5), 589–615. <https://doi.org/10.1080/01690960903381166>
- Randell, D., Cui, Z., & Cohn, A. G. (1992). A spatial logic based on regions and connection. In *Proceedings of the 3rd International Conference on Knowledge Representation and Reasoning* (pp. 165–176). San Mateo, CA: Morgan Kaufmann.
- Rappaport Hovav, M. (2014). Lexical content and context: The causative alternation in English revisited. *Lingua*, 141, 8–29. <https://doi.org/10.1016/j.lingua.2013.09.006>
- Rappaport Hovav, M., Doron, E., & Sichel, I. (Eds.). (2010). *Lexical Semantics, Syntax, and Event Structure*. Oxford: Oxford University Press.
- Rappaport Hovav, M., & Levin, B. (1998). Building Verb Meanings. In M. Butt & W. Geuder (Eds.), *The Projection of Arguments: Lexical and Compositional Factors* (pp. 97–134). Stanford, CA: CSLI Publications.
- Rappaport Hovav, M., & Levin, B. (2010). Reflections on manner/result complementarity. In M. Rappaport Hovav, E. Doron, & I. Sichel (Eds.), *Lexical Semantics, Syntax, and Event Structure* (pp. 21–38). Oxford: Oxford University Press.
- Rauh, G. (1981). On coming and going in English and German. *Poznań Studies in Contemporary Linguistics*, 13, 53–68.
- Rauh, G. (Ed.). (1983). *Essays on deixis*. Tübingen: Gunter Narr.
- Reines, M. F., & Prinz, J. (2009). Reviving Whorf: The Return of Linguistic Relativity. *Philosophy Compass*, 4(6), 1022–1032.  
<https://doi.org/10.1111/j.1747-9991.2009.00260.x>
- Resnik, P. (1996). Selectional constraints: An information-theoretic model and its computational realization. *Cognition*, 61(1–2), 127–159.  
[https://doi.org/10.1016/S0010-0277\(96\)00722-6](https://doi.org/10.1016/S0010-0277(96)00722-6)
- Richardson, D. C., Dale, R., & Spivey, M. J. (2007). Eye movements in language and cognition: A brief introduction. In M. Gonzalez-Marquez, I. Mittelberg, S. Coulson, & M. J. Spivey (Eds.), *Methods in Cognitive Linguistics* (pp. 323–344). Amsterdam: John Benjamins.

- Richardson, D. C., & Matlock, T. (2007). The integration of figurative language and static depictions: An eye movement study of fictive motion. *Cognition*, 102(1), 129–138. <https://doi.org/10.1016/j.cognition.2005.12.004>
- Richardson, D. C., Spivey, M. J., Barsalou, L. W., & McRae, K. (2003). Spatial representations activated during real-time comprehension of verbs. *Cognitive Science*, 27(5), 767–780. [https://doi.org/10.1016/S0364-0213\(03\)00064-8](https://doi.org/10.1016/S0364-0213(03)00064-8)
- Rinck, M. (2005). Spatial Situation Models. In P. Shah & A. Miyake (Eds.), *The Cambridge Handbook of Visuospatial Thinking* (pp. 334–382). Cambridge: Cambridge University Press.
- Robinson, H. (2012). Dualism. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2012). Stanford, CA: Stanford University. Retrieved on 25.09.2014 from <http://plato.stanford.edu/archives/win2012/entries/dualism/>
- Rojo, A., & Valenzuela, J. (2003). Fictive Motion in English and Spanish. *International Journal of English Studies*, 3(2), 125–151.
- Rojo, A., & Valenzuela, J. (2009). Fictive Motion in Spanish: Travellable, non-travellable and path-related manner information. In J. Valenzuela, A. Rojo, & C. Soriano (Eds.), *Trends in Cognitive Linguistics: Theoretical and Applied Models* (pp. 244–260). Frankfurt am Main: Peter Lang.
- Romero Lauro, L. J., Mattavelli, G., Papagno, C., & Tettamanti, M. (2013). She runs, the road runs, my mind runs, bad blood runs between us: Literal and figurative motion verbs: An fMRI study. *NeuroImage*, 83, 361–371. <https://doi.org/10.1016/j.neuroimage.2013.06.050>
- Rosch, E. (1978). Principles of Categorisation. In E. Rosch & B. B. Lloyd (Eds.), *Cognition and Categorisation* (pp. 27–48). Hillsdale, NJ: Lawrence Erlbaum.
- Rossini, P. M., & Rossi, S. (2007). Transcranial magnetic stimulation: Diagnostic, therapeutic, and research potential. *Neurology*, 68(7), 484–488. <https://doi.org/10.1212/01.wnl.0000250268.13789.b2>
- Ruiz de Mendoza Ibáñez, F. J., & Pérez Hernández, L. (2011). The Contemporary Theory of Metaphor: Myths, Developments and Challenges. *Metaphor and Symbol*, 26(3), 161–185. <https://doi.org/10.1080/10926488.2011.583189>
- Rynasiewicz, R. (2014a). Newton's Scholium on Time, Space, Place and Motion. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Summer 2014). Stanford, CA: Stanford University. Retrieved on 15.08.2017 from <http://plato.stanford.edu/entries/newton-stm/scholium.html>
- Rynasiewicz, R. (2014b). Newton's Views on Space, Time, and Motion. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Summer 2014). Stanford, CA: Stanford University. Retrieved on 04.08.2015 from <http://plato.stanford.edu/archives/sum2014/entries/newton-stm/>
- Sachs, J. (1995). *Aristotle's Physics: A Guided Study*. New Brunswick, N.J.: Rutgers University Press.
- Sachs, J. (2005). Aristotle: Motion and its Place in Nature. In J. Fieser & B. Dowden (Eds.), *Internet Encyclopedia of Philosophy*. Retrieved on 24.04.2018 from <https://www.iep.utm.edu/aris-mot/>
- Sampaio, W., Sinha, C., & Sinha, V. D. S. (2009). Mixing and mapping: Motion, path, and manner in Amondawa. In J. Guo, E. Lieven, N. Budwig, S. Ervin-Tripp, K. Nakamura, & Ş. Özçalışkan (Eds.), *Crosslinguistic Approaches to the Psychology of Language: Research in the Tradition of Dan Isaac Slobin* (pp. 427–439). New York: Psychology Press.

- Sandra, D., & Rice, S. (1995). Network analyses of prepositional meaning: Mirroring whose mind—the linguist's or the language user's? *Cognitive Linguistics*, 6(1), 89–130. <https://doi.org/10.1515/cogl.1995.6.1.89>
- Sapir, E. (1929). The Status of Linguistics as a Science. *Language*, 5(4), 207–214. <https://doi.org/10.2307/409588>
- Sarrazin, J.-C., Giraud, M.-D., & Vercher, J.-L. (2008). Coupling kinematics of memory and kinematics of movement: The conditions for a psychological relativity. *Human Movement Science*, 27(3), 532–550. <https://doi.org/10.1016/j.humov.2007.09.003>
- Sarrazin, J.-C., Tonnelier, A., & Alexandre, F. (2005). A model of contextual effect on reproduced extents in recall tasks: The issue of the imputed motion hypothesis. *Biological Cybernetics*, 92(5), 303–315. <https://doi.org/10.1007/s00422-005-0553-3>
- Sato, M. (2010). *Message in the "body": Effects of simulation in sentence production* (Ph.D. Dissertation). University of Hawaii, Mānoa.
- Sato, M., & Bergen, B. K. (2013). The case of the missing pronouns: Does mentally simulated perspective play a functional role in the comprehension of person? *Cognition*, 127(3), 361–374. <https://doi.org/10.1016/j.cognition.2013.02.004>
- Sattig, T. (2006). *The Language and Reality of Time*. Oxford: Clarendon Press.
- Saygin, A. P., McCullough, S., Alac, M., & Emmorey, K. (2010). Modulation of BOLD Response in Motion-sensitive Lateral Temporal Cortex by Real and Fictive Motion Sentences. *Journal of Cognitive Neuroscience*, 22(11), 2480–2490. <https://doi.org/10.1162/jocn.2009.21388>
- Schmidtke, H., Tschander, L., Eschenbach, C., & Habel, C. (2003). Change of Orientation. In E. van der Zee & J. Slack (Eds.), *Representing Direction in Language and Space* (pp. 166–190). Oxford: Oxford University Press.
- Schönefeld, D. (2013). *Go mad – come true – run dry*: Metaphorical motion, semantic preference(s) and deixis. *Yearbook of the German Cognitive Linguistics Association*, 1(1), 215–235. <https://doi.org/10.1515/gcla-2013-0012>
- Semin, G. R., & Smith, E. R. (Eds.). (2008). *Embodied Grounding: Social, Cognitive, Affective, and Neuroscientific Approaches*. Cambridge: Cambridge University Press.
- Semino, E., & Culpeper, J. (Eds.). (2002). *Cognitive Stylistics: Language and Cognition in Text Analysis*. Amsterdam: John Benjamins.
- Seuren, P. A. M. (2013). *From Whorf to Montague: Explorations in the Theory of Language*. Oxford: Oxford University Press.
- Sharifian, F. (2017). *Cultural Linguistics: Cultural Conceptualisations and Language*. Amsterdam: John Benjamins.
- Sheets-Johnstone, M. (2011). *The Primacy of Movement, Expanded 2nd Ed.* Amsterdam: John Benjamins.
- Shibatani, M. (2002). Introduction: Some basic issues in the grammar of causation. In M. Shibatani (Ed.), *The Grammar of Causation and Interpersonal Manipulation* (pp. 1–22). Amsterdam: John Benjamins.
- Sinclair, J. (1991). *Corpus, Concordance, Collocation*. Oxford: Oxford University Press.
- Sinclair, J. (1996). *Preliminary recommendations on Corpus Typology*. (EAGLES Guidelines 1996 No. EAG--TCWG--CTYP/P). Istituto di Linguistica Computazionale, Pisa: Expert Advisory Group on Language Engineering Standards. Retrieved on 15.07.2001 from <http://www.ilc.cnr.it/EAGLES/corpusyp/corpusyp.html>
- Sinclair, J. (2003a). Corpus processing. In P. van Sterkenburg (Ed.), *A Practical Guide to Lexicography* (pp. 179–193). Amsterdam: John Benjamins.
- Sinclair, J. (2003b). *Reading Concordances: An Introduction*. London: Pearson Longman.

- Sinclair, J. (2004). *Trust the Text: Language, Corpus and Discourse*. London: Routledge.
- Sinclair, J. (2005). Corpus and Text — Basic Principles. In W. Martin (Ed.), *Developing Linguistic Corpora: A Guide to Good Practice* (pp. 1–16). Oxford: Oxbow Books.
- Singh, N., & Mishra, R. K. (2010). Simulating Motion in Figurative Language Comprehension. *The Open Neuroimaging Journal*, 4, 46–52.  
<https://doi.org/10.2174/1874440001004010046>
- Slack, J., & van der Zee, E. (2003). The Representation of Direction in Language and Space. In E. van der Zee & J. Slack (Eds.), *Representing Direction in Language and Space* (pp. 1–17). Oxford: Oxford University Press.
- Slobin, D. I. (1987). Thinking for Speaking. In *Proceedings of the Thirteenth Annual Meeting of the Berkeley Linguistics Society* (pp. 435–445). Berkeley, CA: Berkeley Linguistics Society.
- Slobin, D. I. (1996a). From “thought and language” to “thinking for speaking”. In J. J. Gumperz & S. C. Levinson (Eds.), *Rethinking Linguistic Relativity* (pp. 70–96). Cambridge: Cambridge University Press.
- Slobin, D. I. (1996b). Two Ways to Travel: Verbs of Motion in English and Spanish. In M. Shibatani & S. A. Thompson (Eds.), *Grammatical Constructions: Their Form and Meaning* (pp. 195–219). Oxford: Oxford University Press.
- Slobin, D. I. (1997). Mind, Code, and Text. In J. L. Bybee, J. Haiman, & S. A. Thompson (Eds.), *Essays on Language Function and Language Type: Dedicated to T. Givón* (pp. 437–467). Amsterdam: John Benjamins.
- Slobin, D. I. (2003). Language and thought online: Cognitive consequences of linguistic relativity. In D. Gentner & S. Goldin-Meadow (Eds.), *Language in Mind: Advances in the Study of Language and Thought* (pp. 157–192). Cambridge, MA: MIT Press.
- Slobin, D. I. (2004). The Many Ways to Search for a Frog: Linguistic Typology and the Expression of Motion Events. In S. Strömquist & L. T. Verhoeven (Eds.), *Relating Events in Narrative, Vol. 2: Typological and Contextual Perspectives* (pp. 219–257). Hillsdale, NJ: Lawrence Erlbaum.
- Slobin, D. I. (2005). Relating Narrative Events in Translation. In D. D. Ravid & H. B.-Z. Shyldkrot (Eds.), *Perspectives on Language and Language Development* (pp. 115–129). Dordrecht: Kluwer Academic Publishers.
- Slobin, D. I. (2006). What makes manner of motion salient? Explorations in linguistic typology, discourse, and cognition. In M. Hickmann & S. Robert (Eds.), *Space in Languages: Linguistic Systems and Cognitive Categories* (pp. 59–81). Amsterdam: John Benjamins.
- Slobin, D. I. (2009). Relations between Paths of Motion and Paths of Vision. In V. C. Mueller Gathercole (Ed.), *Routes to Language: Studies in Honor of Melissa Bowerman* (pp. 197–222). New York: Psychology Press.
- Slobin, D. I., & Hoiting, N. (1994). Reference to Movement in Spoken and Signed Languages. In *Proceedings of the Twentieth Annual Meeting of the Berkeley Linguistics Society: General Session Dedicated to the Contributions of Charles J. Fillmore* (pp. 487–505). Berkeley, CA: Berkeley Linguistics Society.
- Slobin, D. I., Ibarretxe-Antuñano, I., Kopecka, A., & Majid, A. (2014). Manners of human gait: A crosslinguistic event-naming study. *Cognitive Linguistics*, 25(4).  
<https://doi.org/10.1515/cog-2014-0061>
- Slowik, E. (2017). Descartes’ Physics. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Fall 2017). Stanford, CA: Stanford University. Retrieved on 11.04.2018 from <https://plato.stanford.edu/archives/fall2017/entries/descartes-physics/>

- Smart, J. J. C. (Ed.). (1964). *Problems of Space and Time*. New York: Macmillan.
- Smilek, D., Callejas, A., Dixon, M. J., & Merikle, P. M. (2007). Ovals of time: Time-space associations in synaesthesia. *Consciousness and Cognition*, 16(2), 507–519. <https://doi.org/10.1016/j.concog.2006.06.013>
- Snell-Hornby, M. (1983). *Verb-descriptivity in German and English: A contrastive study in semantic fields*. Heidelberg: Carl Winter Universitätsverlag.
- Solstad, T., & Bott, O. (2017). Causality and Causal Reasoning in Natural Language. In M. Waldmann (Ed.), *The Oxford Handbook of Causal Reasoning* (pp. 619–644). New York, NY: Oxford University Press.
- Sorabji, R. (1988). *Matter, Space and Motion: Theories in Antiquity and Their Sequel*. London: Duckworth.
- Spivey, M. J., & Geng, J. J. (2001). Oculomotor mechanisms activated by imagery and memory: Eye movements to named objects. *Psychological Research*, 65(4), 235–241. <https://doi.org/10.1007/s004260100059>
- Srinivasan, M., & Carey, S. (2010). The long and the short of it: On the nature and origin of functional overlap between representations of space and time. *Cognition*, 116(2), 217–241. <https://doi.org/10.1016/j.cognition.2010.05.005>
- Stanfield, R. A., & Zwaan, R. A. (2001). The Effect of Implied Orientation Derived from Verbal Context on Picture Recognition. *Psychological Science*, 12(2), 153–156. <https://doi.org/10.1111/1467-9280.00326>
- Stefanowitsch, A., & Rohde, A. (2004). The goal bias in the encoding of motion events. In G. Radden & K.-U. Panther (Eds.), *Studies in Linguistic Motivation* (pp. 249–267). Berlin: Mouton de Gruyter.
- Steinman, R. M., Pizlo, Z., & Pizlo, F. J. (2000). Phi is not beta, and why Wertheimer's discovery launched the Gestalt revolution. *Vision Research*, 40(17), 2257–2264. [https://doi.org/10.1016/S0042-6989\(00\)00086-9](https://doi.org/10.1016/S0042-6989(00)00086-9)
- Stewart, D. (2010). *Semantic Prosody: A Critical Evaluation*. New York: Routledge.
- Stocker, K. (2014). The Theory of Cognitive Spacetime. *Metaphor and Symbol*, 29(2), 71–93. <https://doi.org/10.1080/10926488.2014.889991>
- Stocker, K. (2015). Toward an Embodied Cognitive Semantics. *Cognitive Semantics*, 1(2), 178–212. <https://doi.org/10.1163/23526416-00102002>
- Stockwell, P. (2016). Cognitive stylistics. In R. H. Jones (Ed.), *The Routledge Handbook of Language and Creativity* (pp. 218–230). London: Routledge.
- Stosic, D., & Sarda, L. (2009). The many ways to be located: The expression of fictive motion in French and Serbian. In M. B. Vukanović & L. G. Grmuša (Eds.), *Space and Time in Language and Literature* (pp. 39–60). Newcastle upon Tyne: Cambridge Scholars.
- Stosic, D., Fagard, B., Sarda, L., & Colin, C. (2015). Does the road go up the mountain? Fictive motion between linguistic conventions and cognitive motivations. *Cognitive Processing*, 16(S1), 221–225. <https://doi.org/10.1007/s10339-015-0723-8>
- Stubbs, M. (1993). British Traditions in Text Analysis — From Firth to Sinclair. In M. Baker, G. Francis, & E. Tognini-Bonelli (Eds.), *Text and Technology: In Honour of John Sinclair* (pp. 1–33). Amsterdam: John Benjamins. <https://doi.org/10.1075/z.64.02stu>
- Stubbs, M. (1995). Collocations and semantic profiles: On the cause of the trouble with quantitative studies. *Functions of Language*, 2(1), 23–55. <https://doi.org/10.1075/fo1.2.1.03stu>
- Sullivan, K. (2017). Conceptual Metaphor. In B. Dancygier (Ed.), *The Cambridge Handbook of Cognitive Linguistics* (pp. 385–406). Cambridge: Cambridge University Press.

- Svorou, S. (1994). *The Grammar of Space*. Amsterdam: John Benjamins.
- Sweetser, E. (1988). Grammaticalization and Semantic Bleaching. In S. Axmaker, A. Jaisser, & H. Singmaster (Eds.), *Proceedings of the 14th Annual Meeting of the Berkeley Linguistics Society* (pp. 389–405). Berkeley, CA: Berkeley Linguistics Society.  
<https://doi.org/10.3765/bls.v14i0.1774>
- Sweetser, E. (1997). Role and individual interpretations of change predicates. In J. Nuyts & E. Pederson (Eds.), *Language and Conceptualization* (pp. 116–136). Cambridge: Cambridge University Press.
- Szwedek, A. (2009). Conceptualization of space and time. In P. Łobacz, W. Zabrocki, & P. Nowak (Eds.), *Language, Science and Culture: Essays in Honor of Professor Jerzy Bańczerowski on the Occasion of His 70th Birthday* (pp. 317–333). Poznań: Wydawnictwo Naukowe UAM.
- Szwedek, A. (2011). The ultimate source domain. *Review of Cognitive Linguistics*, 9(2), 341–366. <https://doi.org/10.1075/rcl.9.2.01szw>
- Szwedek, A. (2014). The nature of domains and the relationships between them in metaphorization. *Review of Cognitive Linguistics*, 12(2), 342–374.  
<https://doi.org/10.1075/rcl.12.2.04szw>
- Szwedek, A. (2018). Angels and devils lost and regained: A revision of the Great Chain of Being. *Kwartalnik Neofilologiczny*, LXV(1), 3–20.
- Takahashi, K. (2001). Access Path Expressions in Thai. In A. J. Cienki, B. J. Luka, & M. B. Smith (Eds.), *Conceptual and Discourse Factors in Linguistic Structure* (pp. 237–252). Stanford, CA: CSLI Publications.
- Talmy, L. (1975a). Figure and Ground in Complex Sentences. In *Proceedings of the First Annual Meeting of the Berkeley Linguistics Society* (pp. 419–430). Berkeley, CA: Berkeley Linguistics Society.
- Talmy, L. (1975b). Semantics and syntax of motion. In J. P. Kimball (Ed.), *Syntax and Semantics, Vol. 4* (pp. 181–238). New York: Academic Press.
- Talmy, L. (1978). The relation of grammar to cognition: A synopsis. In D. Waltz (Ed.), *Proceedings of the 1978 Workshop on Theoretical Issues in Natural Language Processing* (pp. 14–24). Stroudsburg, PA: Association for Computational Linguistics.
- Talmy, L. (1983). How language structures space. In H. L. Pick & L. P. Acredolo (Eds.), *Spatial Orientation: Theory, Research, and Application* (pp. 225–282). New York: Plenum Press.
- Talmy, L. (1985). Lexicalization patterns: Semantic structure in lexical forms. In T. Shopen (Ed.), *Language Typology and Syntactic Description, Vol. 3: Grammatical Categories and the Lexicon* (pp. 57–149). Cambridge: Cambridge University Press.
- Talmy, L. (1988). Force Dynamics in Language and Cognition. *Cognitive Science*, 12(1), 49–100. [https://doi.org/10.1207/s15516709cog1201\\_2](https://doi.org/10.1207/s15516709cog1201_2)
- Talmy, L. (1988/2007c). The relation of grammar to cognition [First published in 1988]. In V. Evans, B. K. Bergen, & J. Zinken (Eds.), *The Cognitive Linguistics Reader* (pp. 481–544). London: Equinox.
- Talmy, L. (1991). Path to Realization: A Typology of Event Conflation. In *Proceedings of the Seventeenth Annual Meeting of the Berkeley Linguistics Society: General Session and Parasession on The Grammar of Event Structure* (pp. 480–519). Berkeley, CA: Berkeley Linguistics Society.
- Talmy, L. (1996). Fictive Motion in Language and “Ception.” In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and Space* (pp. 211–276). Cambridge, MA: MIT Press.

- Talmy, L. (2000a). *Toward a Cognitive Semantics, Vol. I: Concept Structuring Systems*. Cambridge, MA: MIT Press.
- Talmy, L. (2000b). *Toward a Cognitive Semantics, Vol. II: Typology and Process in Concept Structuring*. Cambridge, MA: MIT Press.
- Talmy, L. (2005a). Leonard Talmy. A windowing to conceptual structure and language, Part I: Lexicalisation and typology [Interview by Iraide Ibarretxe-Antuñano]. *Annual Review of Cognitive Linguistics*, 3(1), 325–347. <https://doi.org/10.1075/arcl.3.17iba>
- Talmy, L. (2005b). The fundamental system of spatial schemas in language. In B. Hampe (Ed.), *From Perception to Meaning: Image Schemas in Cognitive Linguistics* (pp. 199–234). Berlin: Mouton de Gruyter.
- Talmy, L. (2007a). Foreword [Comparing introspection with other methodologies]. In M. Gonzalez-Marquez, I. Mittelberg, S. Coulson, & M. J. Spivey (Eds.), *Methods in Cognitive Linguistics* (pp. xi–xxi). Amsterdam: John Benjamins.
- Talmy, L. (2007b). Lexical typologies. In T. Shopen (Ed.), *Language Typology and Syntactic Description* (2nd ed., pp. 66–168). Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511618437.002>
- Talmy, L. (2009). Main Verb Properties and Equipollent Framing. In J. Guo, E. Lieven, N. Budwig, S. Ervin-Tripp, K. Nakamura, & Ş. Özçalışkan (Eds.), *Crosslinguistic Approaches to the Psychology of Language: Research in the Tradition of Dan Isaac Slobin* (pp. 389–402). New York: Psychology Press.
- Talmy, L. (2011). Cognitive Semantics: An overview. In C. Maienborn, K. von Heusinger, & P. Portner (Eds.), *Semantics: An International Handbook of Natural Language Meaning* (Vol. 1, pp. 622–642). Berlin: Mouton de Gruyter.
- Tanenhaus, M. K., Spivey-Knowlton, M. J., Eberhard, K. M., & Sedivy, J. C. (1995). Integration of visual and linguistic information in spoken language comprehension. *Science*, 268(5217), 1632–1634. <https://doi.org/10.1126/science.7777863>
- Taylor, H. A., & Tversky, B. (1996). Perspective in Spatial Descriptions. *Journal of Memory and Language*, 35(3), 371–391. <https://doi.org/10.1006/jmla.1996.0021>
- Taylor, J. R. (1996). On running and jogging. *Cognitive Linguistics*, 7(1), 21–34. <https://doi.org/10.1515/cogl.1996.7.1.21>
- Taylor, L. J., & Zwaan, R. A. (2009). Action in cognition: The case of language. *Language and Cognition*, 1(01), 45–58. <https://doi.org/10.1515/LANGCOG.2009.003>
- Tesnière, L. (1959/2015). *Elements of structural syntax* [First published in 1959 as *Éléments de syntaxe structurale*]. (T. J. Osborne & S. Kahane, Trans.). Amsterdam: John Benjamins.
- Teubert, W. (2005). My version of corpus linguistics. *International Journal of Corpus Linguistics*, 10(1), 1–13. <https://doi.org/10.1075/ijcl.10.1.01teu>
- Thelen, E. (1995). Motor Development: A New Synthesis. *American Psychologist*, 50(2), 79–95. <https://doi.org/10.1037/0003-066X.50.2.79>
- Thelen, E. (2000). Motor development as foundation and future of developmental psychology. *International Journal of Behavioral Development*, 24(4), 385–397. <https://doi.org/10.1080/016502500750037937>
- Therriault, D. J., & Rinck, M. (2007). Multidimensional situation models. In F. Schmalhofer & C. A. Perfetti (Eds.), *Higher Level Language Processes in the Brain: Inference and Comprehension Processes* (pp. 311–327). Mahwah, NJ: Lawrence Erlbaum.
- Tognini-Bonelli, E. (2001). *Corpus Linguistics at Work*. Amsterdam: John Benjamins.

- Tomczak, E., & Ewert, A. (2015). Real and Fictive Motion Processing in Polish L2 Users of English and Monolinguals: Evidence for Different Conceptual Representations. *The Modern Language Journal*, 99(Supplement), 49–65. <https://doi.org/10.1111/modl.12178>
- Tommasi, L., & Laeng, B. (2012). Psychology of spatial cognition. *Wiley Interdisciplinary Reviews: Cognitive Science*, 3(6), 565–580. <https://doi.org/10.1002/wcs.1198>
- Torralbo, A., Santiago, J., & Lupiáñez, J. (2006). Flexible Conceptual Projection of Time Onto Spatial Frames of Reference. *Cognitive Science*, 30(4), 745–757. [https://doi.org/10.1207/s15516709cog0000\\_67](https://doi.org/10.1207/s15516709cog0000_67)
- Traugott, E. C. (1989). On the Rise of Epistemic Meanings in English: An Example of Subjectification in Semantic Change. *Language*, 65(1), 31–55. <https://doi.org/10.2307/414841>
- Traugott, E. C. (2006). Semantic Change: Bleaching, Strengthening, Narrowing, Extension. In K. Brown (Ed.), *Encyclopedia of Language & Linguistics, Second Edition* (pp. 124–131). Oxford: Elsevier. <https://doi.org/10.1016/B0-08-044854-2/01105-6>
- Traugott, E. C. (2010). (Inter)subjectivity and (inter)subjectification: A reassessment. In K. Davidse, L. Vandelanotte, & H. Cuyckens (Eds.), *Subjectification, Intersubjectification and Grammaticalization* (pp. 29–74). Berlin: De Gruyter Mouton.
- Trojszczak, M. (2016). *Metaphorical reification of mind in linguistic representations. A cognitive study based on Polish and English corpora* (Ph.D. Dissertation). University of Łódź, Łódź.
- Tsujimura, N. (2001). A constructional approach to stativity in Japanese. *Studies in Language*, 25(3), 601–629. <https://doi.org/10.1075/sl.25.3.07tsu>
- Tummers, J., Heylen, K., & Geeraerts, D. (2005). Usage-based approaches in Cognitive Linguistics: A technical state of the art. *Corpus Linguistics and Linguistic Theory*, 1(2), 225–261. <https://doi.org/10.1515/cllt.2005.1.2.225>
- Turner, M. (2007). Conceptual Integration. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford Handbook of Cognitive Linguistics* (pp. 377–393). Oxford: Oxford University Press.
- Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science*, 185(4157), 1124–1131. <https://doi.org/10.1126/science.185.4157.1124>
- Tversky, B. (2001). Spatial schemas in depictions. In M. Gattis (Ed.), *Spatial Schemas and Abstract Thought* (pp. 79–112). Cambridge, MA: MIT Press.
- Tversky, B. (2002). What do Sketches Say about Thinking? In D. Randall, L. James, & S. Tom (Eds.), *Architectures for Intelligent Theory-Based Agents: Papers from 2002 AAAI Spring Symposium* (pp. 140–147). Menlo Park, CA: AAAI Press.
- Tversky, B. (2003). Structures Of Mental Spaces: How People Think About Space. *Environment & Behavior*, 35(1), 66–80. <https://doi.org/10.1177/0013916502238865>
- Tversky, B. (2005). Visuospatial Reasoning. In K. J. Holyoak & R. G. Morrison (Eds.), *The Cambridge Handbook of Thinking and Reasoning* (pp. 209–240). Cambridge: Cambridge University Press.
- Tversky, B. (2009). Spatial Cognition: Embodied and Situated. In P. Robbins & M. Aydede (Eds.), *The Cambridge Handbook of Situated Cognition* (pp. 201–216). Cambridge: Cambridge University Press.
- Tversky, B. (2011). Visualizing Thought. *Topics in Cognitive Science*, 3(3), 499–535. <https://doi.org/10.1111/j.1756-8765.2010.01113.x>

- Tversky, B., & Hard, B. M. (2009). Embodied and disembodied cognition: Spatial perspective-taking. *Cognition*, 110(1), 124–129. <https://doi.org/10.1016/j.cognition.2008.10.008>
- Ugaglia, M. (2016). The Actuality of the Movable (by the Mover): A Relational Interpretation of Aristotle's Definition of Motion. *Rhizomata*, 4(2), 225–256. <https://doi.org/10.1515/rhiz-2016-0012>
- van der Zee, E., & Slack, J. (Eds.). (2003). *Representing Direction in Language and Space*. Oxford: Oxford University Press.
- van der Zee, E., Nikanne, U., & Sassenberg, U. (2010). Grain levels in English path curvature descriptions and accompanying iconic gestures. *Journal of Spatial Information Science*, (1), 95–113. <https://doi.org/10.5311/JOSIS.2010.1.7>
- Vandeloise, C. (1994). Methodology and analyses of the preposition *in*. *Cognitive Linguistics*, 5(2), 157–184. <https://doi.org/10.1515/cogl.1994.5.2.157>
- Vendler, Z. (1957). Verbs and Times. *Philosophical Review*, 66(2), 143–160.
- Vendler, Z. (1967). *Linguistics in Philosophy*. Ithaca, NY: Cornell University Press.
- Verkuyl, H. J. (1993). *A Theory of Aspectuality: The Interaction Between Temporal and Atemporal Structure*. Cambridge: Cambridge University Press.
- Vulchanova, M., Martinez, L., & Vulchanov, V. (2012). Distinctions in the linguistic encoding of motion: Evidence from a free naming task. In M. Vulchanova & E. van der Zee (Eds.), *Motion Encoding in Language and Space* (pp. 11–43). Oxford: Oxford University Press.
- Vulchanova, M., & van der Zee, E. (Eds.). (2013). *Motion encoding in language and space*. Oxford: Oxford University Press.
- Wagner, M. (2006). *The Geometries of Visual Space*. Mahwah, NJ: Lawrence Erlbaum.
- Waliński, J. T. (2005). Typologia korpusów oraz warsztat informatyczny lingwistyki korpusowej [Corpus typology and the computational workshop of corpus linguistics]. In B. Lewandowska-Tomaszczyk (Ed.), *Podstawy językoznawstwa korpusowego* (pp. 27–41). Łódź: Łódź University Press.
- Waliński, J. T. (2014a). Atemporality of Coextension Paths. In B. Lewandowska-Tomaszczyk & K. Kosecki (Eds.), *Time and Temporality in Language and Human Experience* (pp. 103–119). Frankfurt am Main: Peter Lang.
- Waliński, J. T. (2014b). *Complementarity of Space and Time in Distance Representations: A Cognitive Corpus-based Study, 2nd Ed.* Łódź: Łódź University Press.
- Waliński, J. T. (2015a). Application of conceptual conditions for translation of fictive motion. In P. Pietrzak & M. Deckert (Eds.), *Constructing Translation Competence* (pp. 75–89). Frankfurt am Main: Peter Lang.
- Waliński, J. T. (2015b). Instrumentality of fictive motion in coextension paths. *Kwartalnik Neofilologiczny*, 62(1), 87–103.
- Waliński, J. T. (2016a). Construal in approximations of caused-motion patterns. In D. Gonigroszek & A. Stanecka (Eds.), *Philological Studies: Interdisciplinary and Multidimensional Approaches* (pp. 67–83). Piotrków Trybunalski: Naukowe Wydawnictwo Piotrkowskie.
- Waliński, J. T. (2016b). How to *sneeze off papers from the desk* in Polish translation: Re-conceptualization and approximation at work. In Ł. Bogucki, B. Lewandowska-Tomaszczyk, & M. Thelen (Eds.), *Translation and Meaning. New Series, Vol. 2, Pt. 1* (pp. 85–105). Frankfurt am Main: Peter Lang.

- Waliński, J. T. (2017a). *Fictive motion expressions that encode the source and goal of motion in the British National Corpus* (PELCRA Research Report No. 01/JTW/2017). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.31640.44806>
- Waliński, J. T. (2017b). *Unbounded path verbs in fictive motion in the British National Corpus* (PELCRA Research Report No. 02/JTW/2017). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.21574.11843>
- Waliński, J. T. (2017c). *Relations of routing (cross and pass) in coextension paths in the British National Corpus* (PELCRA Research Report No. 03/JTW/2017). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.33318.16966>
- Waliński, J. T. (2017d). *Chase and accompany verbs in fictive motion expressions in the British National Corpus* (PELCRA Research Report No. 04/JTW/2017). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.29962.72649>
- Waliński, J. T. (2017e). *Deictic verbs of motion in coextension paths in the British National Corpus* (PELCRA Research Report No. 05/JTW/2017). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.36673.61284>
- Waliński, J. T. (2018a). *Verbs of rolling in coextension path expressions in the British National Corpus* (PELCRA Research Report No. 01/JTW/2018). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.30277.29925>
- Waliński, J. T. (2018b). *Verbs of walking in fictive motion in the British National Corpus* (PELCRA Research Report No. 02/JTW/2018). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.26921.85607>
- Waliński, J. T. (2018c). *Verbs of running in fictive motion expressions in the British National Corpus* (PELCRA Research Report No. 03/JTW/2018). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.33632.74242>
- Waliński, J. T. (2018d). *Fictive motion expressions including verbs of unsteady movement in the British National Corpus* (PELCRA Research Report No. 04/JTW/2018). Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.17694.38729>
- Waliński, J. T. (2018e). *Instrumental motion verbs in coextension path expressions in the British National Corpus* (PELCRA Research Report No. 05/JTW/2018) [Data first published in 2013 as COST TIMELY Research Report No. 06/2013]. Łódź: University of Łódź. <https://doi.org/10.13140/RG.2.2.32793.88169>
- Waliński, J. T., & Pezik, P. (2007). Web access interface to the PELCRA referential corpus of Polish. In J. T. Waliński, K. Kredens, & S. Goźdz-Roszkowski (Eds.), *Corpora and ICT in Language Studies* (pp. 65–86). Frankfurt am Main: Peter Lang.
- Wallentin, M., Østergaard, S., Lund, T. E., Østergaard, L., & Roepstorff, A. (2005). Concrete spatial language: See what I mean? *Brain and Language*, 92(3), 221–233. <https://doi.org/10.1016/j.bandl.2004.06.106>
- Walsh, V. (2003). A theory of magnitude: Common cortical metrics of time, space and quantity. *Trends in Cognitive Sciences*, 7(11), 483–488. <https://doi.org/10.1016/j.tics.2003.09.002>
- Warglien, M., Gärdenfors, P., & Westera, M. (2012). Event structure, conceptual spaces and the semantics of verbs. *Theoretical Linguistics*, 38(3–4). <https://doi.org/10.1515/tl-2012-0010>
- Wertheimer, M. (1912). Experimentelle Studien über das Sehen von Bewegung [Experimental Studies in the Perception of Movement]. *Zeitschrift Für Psychologie*, 61, 161–265.
- Wheeler, J. A., & Ford, K. W. (2010). *Geons, Black Holes, and Quantum Foam: A Life in Physics*. New York: W.W. Norton & Company.

- Whorf, B. L. (1939/1956a). The Relation of Habitual Thought and Behavior to Language [Written in 1939]. In J. B. Carroll (Ed.), *Language, Thought, and Reality: Selected Writings of Benjamin Lee Whorf* (pp. 134–159). Cambridge, MA: MIT Press.
- Whorf, B. L. (1940/1956b). Science and Linguistics [Written in 1940]. In J. B. Carroll (Ed.), *Language, Thought, and Reality: Selected Writings of Benjamin Lee Whorf* (pp. 207–219). Cambridge, MA: MIT Press.
- Wierzbicka, A. (1996). *Semantics: Primes and Universals*. Oxford: Oxford University Press.
- Wierzbicka, A. (2006). *English: Meaning and Culture*. Oxford: Oxford University Press.
- Wilkins, D. P., & Hill, D. (1995). When "go" means "come": Questioning the basicness of basic motion verbs. *Cognitive Linguistics*, 6(2–3), 209–260.  
<https://doi.org/10.1515/cogl.1995.6.2-3.209>
- Wilks, Y. (1975). Preference semantics. In E. L. Keenan (Ed.), *Formal semantics of Natural Language* (pp. 329–348). Cambridge: Cambridge University Press.  
<https://doi.org/10.1017/CBO9780511897696.022>
- Williams, J. M. (1976). Synaesthetic Adjectives: A Possible Law of Semantic Change. *Language*, 52(2), 461–478. <https://doi.org/10.2307/412571>
- Williams, R. F. (2004). *Making meaning from a clock: Material artifacts and conceptual blending in time-telling instruction*. (Ph.D. Dissertation). University of California, San Diego.
- Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review*, 9(4), 625–636. <https://doi.org/10.3758/BF03196322>
- Wilson, R. A., & Foglia, L. (2015). Embodied Cognition. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2015). Retrieved on 21.09.2017 from <https://plato.stanford.edu/entries/embodied-cognition/>
- Winter, B., & Bergen, B. K. (2012). Language comprehenders represent object distance both visually and auditorily. *Language and Cognition*, 4(01), 1–16.  
<https://doi.org/10.1515/langcog-2012-0001>
- Winterboer, A., Tenbrink, T., & Moratz, R. (2013). Spatial directionals for robot navigation. In M. Vulchanova & E. van der Zee (Eds.), *Motion Encoding in Language and Space* (pp. 84–101). Oxford: Oxford University Press.
- Wittgenstein, L. (1953/2009). *Philosophical Investigations, Rev. 4th Ed.* [*Philosophische Untersuchungen*, first published, posthumously, in 1953]. (G. E. M. Anscombe, P. M. S. Hacker, & J. Schulte, Trans.). Chichester: Wiley-Blackwell.
- Woelert, P. (2011). Human cognition, space, and the sedimentation of meaning. *Phenomenology and the Cognitive Sciences*, 10(1), 113–137.  
<https://doi.org/10.1007/s11097-010-9153-3>
- Wolff, P., & Holmes, K. J. (2011). Linguistic relativity. *Wiley Interdisciplinary Reviews: Cognitive Science*, 2(3), 253–265. <https://doi.org/10.1002/wcs.104>
- Wyhorska, E. (2014). Abstract vs concrete: Contrastive analysis of the conceptualization of stillness and motion in Polish and English. In K. Rudnicka-Szozda & A. Szwedek (Eds.), *Cognitive Linguistics in the Making* (pp. 349–360). Frankfurt am Main: Peter Lang.
- Wynne, M. (2008). Searching and concordancing. In A. Lüdeling & M. Kytö (Eds.), *Corpus Linguistics: An International Handbook, Vol. 1* (pp. 708–737). Berlin: Walter de Gruyter.
- Yang, J. (2014). The role of the right hemisphere in metaphor comprehension: A meta-analysis of functional magnetic resonance imaging studies. *Human Brain Mapping*, 35(1), 107–122. <https://doi.org/10.1002/hbm.22160>

- Yaxley, R. H., & Zwaan, R. A. (2007). Simulating visibility during language comprehension. *Cognition*, 105(1), 229–236. <https://doi.org/10.1016/j.cognition.2006.09.003>
- Yeh, W., & Barsalou, L. W. (2006). The Situated Nature of Concepts. *The American Journal of Psychology*, 119(3), 349. <https://doi.org/10.2307/20445349>
- Zacks, J. M., & Tversky, B. (2001). Event structure in perception and conception. *Psychological Bulletin*, 127(1), 3–21. <https://doi.org/10.1037/0033-2909.127.1.3>
- Zipf, G. K. (1949). *Human Behavior and the Principle of Least Effort*. New York: Addison-Wesley.
- Zlatev, J. (2007). Spatial Semantics. In D. Geeraerts & H. Cuyckens (Eds.), *The Oxford Handbook of Cognitive Linguistics* (pp. 318–350). Oxford: Oxford University Press.
- Zlatev, J. (2015). Cognitive Semiotics. In P. P. Trifonas (Ed.), *International Handbook of Semiotics* (pp. 1043–1067). Dordrecht: Springer. [https://doi.org/10.1007/978-94-017-9404-6\\_47](https://doi.org/10.1007/978-94-017-9404-6_47)
- Zlatev, J., Blomberg, J., & David, C. (2010). Translocation, language and the categorization of experience. In V. Evans & P. A. Chilton (Eds.), *Language, Cognition and Space: The State of the Art and New Directions* (pp. 389–418). London: Equinox.
- Zlatev, J., Blomberg, J., & Magnusson, U. (2012). Metaphor and subjective experience: A study of motion-emotion metaphors in English, Swedish, Bulgarian, and Thai. In A. Foolen, U. M. Lüdtke, T. P. Racine, & J. Zlatev (Eds.), *Moving Ourselves, Moving Others: Motion and emotion in intersubjectivity, consciousness and language*. (pp. 423–450). Amsterdam: John Benjamins.
- Zlatev, J., & Yangklang, P. (2004). A Third Way to Travel: The Place of Thai in Motion-Event Typology. In S. Strömqvist & L. T. Verhoeven (Eds.), *Relating Events in Narrative, Vol. 2: Typological and Contextual Perspectives* (pp. 159–190). Hillsdale, NJ: Lawrence Erlbaum.
- Zwaan, R. A. (2004). The immersed experiencer: Toward an embodied theory of language comprehension. In B. H. Ross (Ed.), *The psychology of learning and motivation, Vol. 44* (pp. 35–62). San Diego, CA: Academic Press.
- Zwaan, R. A. (2008). Time in Language, Situation Models, and Mental Simulations. In P. Indefrey & M. Gullberg (Eds.), *Time to Speak: Cognitive and Neural Prerequisites for Time in Language* (pp. 13–26). Oxford: Wiley-Blackwell.
- Zwaan, R. A., & Pecher, D. (2012). Revisiting Mental Simulation in Language Comprehension: Six Replication Attempts. *PLoS ONE*, 7(12), e51382. <https://doi.org/10.1371/journal.pone.0051382>
- Zwaan, R. A., & Radvansky, G. A. (1998). Situation models in language comprehension and memory. *Psychological Bulletin*, 123(2), 162–185. <https://doi.org/10.1037/0033-2909.123.2.162>
- Zwaan, R. A., Madden, C. J., Yaxley, R. H., & Aveyard, M. E. (2004). Moving words: Dynamic representations in language comprehension. *Cognitive Science*, 28(4), 611–619. <https://doi.org/10.1016/j.cogsci.2004.03.004>
- Zwaan, R. A., Stanfield, R. A., & Yaxley, R. H. (2002). Language Comprehenders Mentally Represent the Shapes of Objects. *Psychological Science*, 13(2), 168–171. <https://doi.org/10.1111/1467-9280.00430>
- Zwaan, R. A., & Taylor, L. J. (2006). Seeing, Acting, Understanding: Motor Resonance in Language Comprehension. *Journal of Experimental Psychology: General*, 135(1), 1–11. <https://doi.org/10.1037/0096-3445.135.1.1>

- Zwarts, J. (2003). Vectors across Spatial Domains: From Place to Size, Orientation, Shape, and Parts. In E. van der Zee & J. Slack (Eds.), *Representing Direction in Language and Space* (pp. 39–68). Oxford: Oxford University Press.
- Zwarts, J. (2004). Competition between word meanings: The polysemy of (a)round. In C. Meier & M. Weisgerber (Eds.), *Proceedings of sub8-Sinn und Bedeutung* (pp. 349–360). Konstanz: University of Konstanz Fachbereich Sprachwissenschaft.
- Zwarts, J. (2008). Aspects of a typology of direction. In S. D. Rothstein (Ed.), *Theoretical and Crosslinguistic Approaches to the Semantics of Aspect* (pp. 79–105). Amsterdam: John Benjamins.
- Zwarts, J. (2017). Spatial semantics: Modeling the meaning of prepositions. *Language and Linguistics Compass*, 11(5), e12241. <https://doi.org/10.1111/lnc3.12241>
- Zwarts, J., & Gärdenfors, P. (2016). Locative and Directional Prepositions in Conceptual Spaces: The Role of Polar Convexity. *Journal of Logic, Language and Information*, 25(1), 109–138. <https://doi.org/10.1007/s10849-015-9224-5>

### Works of fiction quoted in the text

- Chaucer, G. (1387/1997). *The Man of Law's Tale* [Written c. 1387]. In S. Kökbugur (Ed.), *The Canterbury Tales and Other Works by Geoffrey Chaucer*. Librarius. Available at: [www.librarius.com](http://www.librarius.com)
- Gervais, R. (Producer & Director), & Robinson, M. (Director). (2009). *The Invention of Lying* [Motion picture]. United States: Warner Bros.
- Shakespeare, W. (1603/1966). *Hamlet, Prince of Denmark* [First printed in 1603]. In W. J. Craig (Ed.), *The Complete Works of William Shakespeare*. London: Oxford University Press.
- Shakespeare, W. (1623/1966). *The Tragedy of Macbeth* [First printed in 1623]. In W. J. Craig (Ed.), *The Complete Works of William Shakespeare*. London: Oxford University Press.
- Tolkien, J. R. R. (1954/2012). *The Fellowship of the Ring*. New York: Del Rey.
- Tolkien, J. R. R. (1954/2012). *La comunidad del Anillo*. (Luis Domènech, Spanish Trans.). Mexico: Editorial Planeta Mexicana.

### Reference materials

- BNC. (2001). *The British National Corpus* [World Edition] Oxford: Oxford University Computing Services. Available from OUCS at: <http://www.natcorp.ox.ac.uk>
- Google Books Ngram Viewer*. (2013). Mountain View, CA: Google LLC. Available at: <https://books.google.com/ngrams/>
- Oxford English Dictionary, 2nd Edition, Version 4.0*. (2009). [CD-ROM]. Oxford: Oxford University Press.
- SlopeQ for the BNC*. (2017). A part-of-speech-sensitive search engine with support for proximity queries for the British National Corpus data. A general description of the SlopeQ query syntax can be found at: [http://pelcra.pl/docs/doku.php?id=slopeq\\_for\\_bnc](http://pelcra.pl/docs/doku.php?id=slopeq_for_bnc)
- VerbNet 3.2*. (2013). A class-based verb lexicon with mappings to other lexical resources. The unified verb index accessible from: <http://verbs.colorado.edu/verb-index/>
- WordNet Online Search 3.1*. (2010). A lexical database for English. Princeton: Princeton University. Available at: <http://wordnetweb.princeton.edu/perl/webwn>