4 Language and cognition: The view from cognitive linguistics

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Cognitive linguistics is a modern school of linguistic thought and practice, concerned with investigating the relationship between human language, the mind, and socio-physical experience. For comprehensive and detailed overviews of cognitive linguistics see Evans and Green (2006), which is suitable for the neophyte, or the more voluminous Geeraerts and Cuyckens (2007). For collections of fundamental readings see Evans, Bergen, and Zinken (2007) and Geerearts (2006). For a glossary covering many of the technical terms of cognitive linguistics see Evans (2007).

Cognitive linguistics has its origins in scholarship which emerged in the 1970s, conducted by a small number of researchers. These include Charles Fillmore (e.g., 1975), George Lakoff (e.g., 1977; Lakoff & Thompson, 1975), Ronald Langacker (e.g., 1978) and Leonard Talmy (e.g., 1975, 1978). This research arose out of dissatisfaction with formal approaches, then dominant in the disciplines of linguistics and philosophy. While its origins were, in part, philosophical in nature, as is evident in the landmark 1980 publication, *Metaphors we Live by*, by Lakoff and Johnson, cognitive linguistics has always been strongly influenced by theories and findings from the other cognitive sciences as they emerged during the 1960s and 1970s, particularly cognitive psychology, and more recently by the brain sciences, especially the interdisciplinary perspective known as cognitive neuroscience. In recent years, cognitive linguistic theories have become sufficiently sophisticated and detailed to begin making predictions that are testable using a broad range of converging methods from the cognitive and brain sciences. González-Márquez, Mittelberg, Coulson, and Spivey (2006), for instance, provide a review of some of the methodologies currently deployed in cognitive linguistics.

Perhaps what is most distinctive about cognitive linguistics is that it is not a single articulated theoretical perspective or methodological toolkit. Nor is it subject to the *ex cathedra* pronouncements of a single theoretical authority. Rather, cognitive linguistics constitutes an enterprise characterized by a number of core commitments and guiding assumptions. It constitutes a loose confederation of theoretical perspectives united by these shared commitments and guiding assumptions. The worldview that

emerges has resonated with increasingly large numbers of researchers such that the rise and take-up of cognitive linguistics, particularly since the 1990s when it began to become increasingly institutionalized with the development of the International Cognitive Linguistics Association (ICLA), has been rapid and inexorable. At the time of publication, cognitive linguistics is arguably the most rapidly growing school of thought and practice within linguistics. It exerts an increasing influence on many subdisciplines of language science, as well as a number of cognate disciplines in the cognitive, brain, and social sciences, as well as the humanities.

Cognitive linguists have typically adopted a number of distinct (although complementary) foci. Some have been exercised by the study of language structure and organization. This constitutes a subbranch of cognitive linguistics sometimes referred to as 'cognitive approaches to grammar'. Notable exemplars include Croft (2002), Goldberg (1995, 2006), Lakoff (1987, case study 3), Langacker (e.g., 1987, 1991a, 1991b, 1999, 2008), and Talmy (e.g., 2000). Others have employed language as a means of studying aspects of conceptual organization and structure. The study of aspects of the mind, such as knowledge representation and meaning construction, employing language as a lens for doing so, is sometimes referred to as *cognitive semantics* Exemplars include Fauconnier (1985/1994, 1997), Fauconnier and Turner (2002), and Lakoff and Johnson (1980, 1999). A further subbranch relates to the study of word meanings, sometimes referred to as *cognitive lexical semantics*. Notable exemplars include Evans (2004), Geeraerts (1997) and Tyler and Evans (2003). Some scholars have attempted to integrate the study of all three areas. A recent example is Evans (2009).

The main purpose of this chapter is to survey the theoretical position and main findings of cognitive linguistics as it bears on the relationship between language and cognition. The chapter is organized as follows. In the next section I provide an overview of the two primary commitments of cognitive linguistics, its axiomatic base. Then I consider the five theses of cognitive linguistics: its postulates. It is subscription to these that gives a particular theoretical architecture or approach its distinctive cognitive linguistic character. The next section considers the distinctive cognitive linguistic worldview that emerges, and the subsequent section considers some of the models of language that have emerged within cognitive linguistics. I also consider the way in which these models reflect the underlying commitments and theses of the cognitive linguistics enterprise. Then I examine the way in which cognitive linguistics theories have additionally been employed to investigate aspects of conceptual structure and organization. The next section reviews cognitive linguistic theories of how language interfaces with non-linguistic aspects of mental representation in order to model linguistically mediated meaning construction. The chapter concludes by briefly considering what cognitive linguistics might offer the researcher in bilingual cognition.

THE TWO PRIMARY COMMITMENTS OF COGNITIVE LINGUISTICS

Cognitive linguistics is distinct from other movements in linguistics, both formalist and functionalist, in two respects. First, it takes seriously the cognitive underpinnings of language, the so-called Cognitive Commitment (Lakoff, 1990). Cognitive linguists attempt to describe and model language in the light of convergent evidence from other cognitive and brain sciences. Second, cognitive linguists subscribe to a generalization commitment: a commitment to describing the nature and principles that constitute linguistic knowledge as an outcome of general cognitive abilities (see Lakoff, 1990)—rather than viewing language as constituting, for instance, a wholly distinct encapsulated module of mind. In this section I briefly elaborate on these two commitments which lie at the heart of the cognitive linguistics enterprise.

The Cognitive Commitment

The hallmark of cognitive linguistics is the Cognitive Commitment (Lakoff, 1990). This represents a commitment to providing a characterisation of language that accords with what is known about the mind and brain from other disciplines. It is this commitment that makes cognitive linguistics cognitive, and thus an approach which is fundamentally interdisciplinary in nature.

The Cognitive Commitment represents the view that principles of linguistic structure should reflect what is known about human cognition from the other cognitive and brain sciences, particularly psychology, artificial intelligence, cognitive neuroscience, and philosophy. In other words, the Cognitive Commitment asserts that the models of language and linguistic organization proposed should reflect what is known about the human mind, rather than purely aesthetic dictates such as the use of particular kinds of formalisms or economy of representation (Croft, 1998).

The Cognitive Commitment has a number of concrete ramifications. First, linguistic theories cannot include structures or processes that violate what is known about human cognition. For example, if sequential derivation of syntactic structures violates time constraints provided by actual human language processing, then it must be jettisoned. Second, models that employ established cognitive properties to explain language phenomena are more parsimonious than those that are built from a priori simplicity metrics (such as Chomskyan elegance). For instance, given the amount of progress cognitive scientists have made in the study of categorization, a theory that employs the same mechanisms that are implicated in categorization in other cognitive domains in order to model linguistic structure is simpler than one that hypothesizes a separate system. Finally, the cognitive linguistic researcher is charged with establishing

convergent evidence for the cognitive reality of components of any model proposed—whether or not this research is conducted by the cognitive linguist (Gibbs, 2006).

The generalization commitment

The generalization commitment (Lakoff, 1990) represents a dedication to characterising general principles that apply to all aspects of human language. This goal reflects the standard commitment in science to seek the broadest generalizations possible. In contrast, some approaches to the study of language often separate what is sometimes termed the 'language faculty' into distinct areas such as phonology (sound), semantics (word and sentence meaning), pragmatics (meaning in discourse context), morphology (word structure), syntax (sentence structure), and so on. As a consequence, there is often little basis for generalization across these aspects of language, or for study of their interrelations.

Generative linguistics, for instance, attempts to model language by positing explicit algorithmic procedures operating on theoretical primitives in order to generate all the possible grammatical sentences of a given language. This approach has attempted precise formulations by adopting formalisms originally inspired by artificial intelligence, mathematics, and logic, as represented in the work of Noam Chomsky (e.g., 1965, 1981, 1995). In somewhat related fashion, formalisms deriving from these disciplines inform, even more explicitly, the tradition known as formal semantics, inspired by philosopher of language Richard Montague (1970, 1973; see Cann, 1993 for a review).

Within the generative grammar tradition it is often assumed that areas such as phonology, semantics, and syntax concern significantly different kinds of structuring principles operating over different kinds of primitives. For instance, the syntax concerns a particular kind of knowledge that is hypothesised to be specialised for arranging words into well-formed sentences, whereas a phonology subsystem is specialised for arranging sounds into patterns (e.g., CV structure) permitted by the rules of a given language, and by human language in general. This modular view of mind reinforces the idea that modern linguistics is justified in separating the study of language into distinct subdisciplines, not only on grounds of practicality, but also because the types of knowledge that make up language are wholly distinct and, in terms of their primitives and organizational principles, incommensurable.

While cognitive linguists acknowledge that it may often be useful to treat areas such as syntax, semantics, and phonology as being notionally distinct, cognitive linguists do not start with the assumption that the 'subsystems' of language are organized in significantly divergent ways. Hence, the generalization commitment represents a commitment to openly investigating how the various aspects of linguistic knowledge emerge

from a common set of human cognitive abilities upon which they draw, rather than assuming that they are produced in an encapsulated module of the mind, consisting of distinct knowledge types, or subsystems.

The generalization commitment has concrete consequences for studies of language. First, cognitive linguistic studies focus on what is common among aspects of language, seeking to re-use successful methods and explanations across these aspects. For instance, just as word meaning displays prototype effects—there are better and worse examples of referents of given words, related in particular ways (see Lakoff, 1987)—so various studies have applied the same principles to the organization of morphology (e.g., Taylor, 2003), syntax (e.g., Goldberg, 1995, 2006), and phonology (e.g., Jaeger & Ohala, 1984). Generalizing successful accounts over distinct domains of language isn't just good scientific practice, this is also the way biology works; reusing existing structures for new purposes, both on evolutionary and developmental timescales.

THE FIVE THESES OF COGNITIVE LINGUISTICS

In addition to the two primary commitments of cognitive linguistics, the enterprise also features a number of guiding assumptions: its postulates or theses. There are at least five distinctive theses that make up the cognitive linguistics perspective. These are:

1 the thesis of embodied cognition,
2 the thesis of encyclopedic semantics,
3 the symbolic thesis,
4 the thesis that meaning is conceptualization, and
5 the usage-based thesis.

Together with the two primary commitments, these theses give rise to a distinctive worldview, which I elaborate on below.

The thesis of embodied cognition

The thesis consists of two related parts. The first part holds that the nature of reality is not objectively given, but is a function of our species-specific and individual embodiment—this is the subthesis of 'embodied experience' (see Lakoff, 1987; Lakoff & Johnson, 1980, 1999; Tyler & Evans, 2003). Second, our mental representation of reality is grounded in our embodied mental states: mental states captured from our embodied experience—this is the subthesis of 'grounded cognition' (see Barsalou, 2008; Evans, 2009; Gallese & Lakoff, 2005).

The subthesis of embodied experience maintains that due to the nature of our bodies, including our neuro-anatomical architecture, we have a

species-specific view of the world. In other words, our construal of 'reality' is mediated, in large measure, by the nature of our embodiment. One example of the way in which embodiment affects the nature of experience is in the realm of color. While the human visual system has three kinds of photoreceptors (i.e., color channels), other organisms often have a different number (Varela, Thompson, & Rosch, 1991). For instance, the visual system of squirrels, rabbits, and possibly cats, makes use of two color channels, while other organisms, including goldfish and pigeons, have four color channels. Having a different range of color channels affects our experience of color in terms of the range of colors accessible to us along the color spectrum. Some organisms can see in the infrared range, such as rattlesnakes which hunt prey at night and can visually detect the heat given off by other organisms. Humans are unable to see in this range. The nature of our visual apparatus—one aspect of our embodiment—determines the nature and range of our visual experience.

A further consequence of the subthesis of embodied experience is that as individual embodiment within a species varies, so too will embodied experience across individual members of the same species. There is now empirical support for the position that humans have distinctive embodied experience due to individual variables such as handedness. That is, whether one is left- or right-handed influences the way in which one experiences reality (Casasanto, 2009).

The fact that our experience is embodied—that is, structured in part by the nature of the bodies we have and by our neurological organization—has consequences for cognition: the subthesis of grounded cognition. In other words, the concepts we have access to, and the nature of the 'reality' we think and talk about, are grounded in the multimodal representations that emerge from our embodied experience. More precisely, concepts constitute re-activations of brain states that are recorded during embodied experience. Such re-activations are technically referred to as 'simulations'. (I give an example below, relating to the word *red*, which illustrates this notion.) These simulations are grounded in multimodal brain states which arise from our action and interaction with our socio-physical environment. Such experiences include sensory-motor and proprioceptive experience, as well as states that arise from our subjective experience of our internal (bodily) environment, including our visceral sense, as well as experiences relating to mental evaluations and states and other subjective experiences, including emotions and affect more generally, and experiences relating to temporal experience. From the grounded cognition perspective, the human mind bears the imprint of embodied experience. The embodied experience and grounded cognition perspectives together make up the thesis of embodied cognition.

The thesis of encyclopedic semantics

The thesis of encyclopedic semantics is also made up of two parts. First, it holds that semantic representations in the linguistic system, what is often referred to as *semantic structure*, relate to—or interface with—representations in the conceptual system. The precise details as to the nature of the relationship can, and indeed do, vary however, across specific cognitive linguistic theories. For instance, Langacker (e.g., 1987) equates semantic structure with conceptual structure, whereas Evans (2009) maintains that semantic structure and conceptual structure constitute two distinct representational formats, with semantic structure facilitating access to (some aspects of) conceptual structure. It is worth noting that the 'representational' view associated with the thesis of encyclopaedic semantics is directly at odds with the 'denotational' perspective, what cognitive linguists sometimes refer to as 'objectivist semantics', as exemplified by some formal (i.e., truth-conditional) approaches to semantics.

The second part of the thesis relates to the view that conceptual structure, to which semantic structure relates, constitutes a vast network of structured knowledge, a semantic potential (Evans, 2009) which is hence encyclopedia-like in nature and in scope.

By way of illustration, consider the lexical item *red*. The precise meaning arising from any given instance of use of the lexical item *red* is a function of the range of perceptual hues associated with our encyclopedic set of mental representations for red, as constrained by the utterance context in which red is embedded. For instance, consider the following examples:

(1) The school teacher scrawled in red ink all over the pupil's exercise book.
(2) The red squirrel is almost extinct in the British Isles.

In each of these examples, a distinct re-activation of perceptual experience, a simulation, is prompted for. In the example in (1) the perceptual simulation relates to a vivid red, while in (2) the utterance prompts for a brown/dun hue of red. In other words, the meaning of the lexical item *red* arises from an interaction between linguistic and conceptual representations, such that the most relevant conceptual knowledge is activated upon each instance of use. Examples such as those in (1) and (2) suggest that word meaning does not arise by unpacking a purely linguistic representation. Rather, it involves access to a potentially vast body of encyclopedic knowledge. A simulation, then, is a re-activation of part of this non-linguistic encyclopedic knowledge.

A consequence of this is that each individual instance of word use potentially leads to a distinct interpretation. For instance, *fast* means something quite different in *fast car*, *fast driver*, and *fast lane of the motorway*. This follows as any instance of use constitutes a distinct usage

event that may activate a different part of the encyclopedic knowledge potential to which a lexical item facilitates access.

The symbolic thesis

The symbolic thesis holds that the fundamental unit of grammar is a form–meaning pairing, or *symbolic unit*. The symbolic unit is variously termed a 'symbolic assembly' in Langacker's cognitive grammar, or a 'construction' in construction grammar approaches (e.g., Goldberg's cognitive construction grammar, 1995, 2006). Symbolic units run the full gamut from the fully lexical to the wholly schematic. For instance, examples of symbolic units include morphemes (for example, *dis-* as in *distasteful*), whole words (for example, *cat*, *run*, *tomorrow*), idiomatic expressions such as *He kicked the bucket*, and sentence-level constructions such as the ditransitive (or double object) construction, as exemplified by the expression: *John baked Sally a cake* (see Goldberg, 1995). Some examples of symbolic units are given in Table 4.1.

More precisely, the symbolic thesis holds that the mental grammar consists of a form, a semantic unit, and symbolic correspondence that relates the two. This is captured in Figure 4.1. In other words, the symbolic thesis holds that our mental grammar comprises units which consist of pairings of form and meaning.

One consequence of the symbolic thesis is that units that do not consist of pairings of form and meaning, such as the abstract rules posited in the generative tradition, are excluded from a language user's mental grammar. Langacker (1987) for instance, posits a *content requirement*, a principle that asserts that units of grammar must involve actual content: units of semantic structure and phonological form (even if phonologically schematic) that are linked by a symbolic correspondence.

Table 4.1 Examples of symbolic units

Type of symbolic unit	*Traditional name*	*Example*
Complex and (mostly) schematic	Syntax	NP *be*-TENSE VERB- *en by* NP/[ACTION FROM PERSPECTIVE OF PATIENT]
Complex and (mostly) specific	Idiom	*pull*-TENSE NP'S *leg*/[TO TEASE AS A JOKE]
Complex but bound	Morphology	NOUN-*s*/[MORE THAN ONE OF SOMETHING], VERB-TENSE/[TIME REFERENCE WITH RESPECT TO CODING TIME]
Atomic and schematic	Word classes	NOUN/[THING], VERB/[TEMPORALLY GROUNDED RELATION]
Atomic and specific	Lexical items	*The*/[THE], *jumper*/[JUMPER]

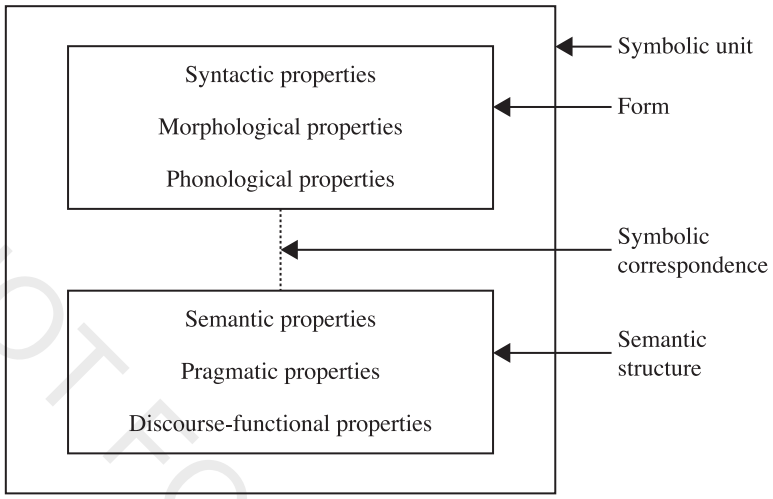

Figure 4.1 A symbolic unit.

The adoption of the symbolic thesis has a number of important consequences for a model of grammar. Because the basic unit is the symbolic unit, meaning achieves central status in cognitive linguistic approaches to grammar. This follows as the basic grammatical unit is a symbolic unit: form cannot be studied independently of meaning.

The second consequence is that as there is not a principled distinction between the study of semantics and syntax—the study of grammar is the study of the full range of units that make up a language, from the lexical to the grammatical. Cognitive linguists posit a 'lexicon–grammar continuum' (Croft, 2002; Langacker, 1987) to capture this perspective. While the grammar of a language is made of symbolic units, symbolic units exhibit qualitative differences in terms of their schematicity. At one extreme are symbolic units which are highly specified in terms of their lexical form, and in terms of the richness of their semantic content. Such symbolic units, such as words, lie at the 'lexical' end of the lexicon–grammar continuum. At the other end lie highly schematic symbolic units, schematic both in terms of phonological and semantic content. An example of a symbolic unit of this kind is the sentence-level ditransitive construction studied by Goldberg (e.g., 1995) and discussed in more detail below. Lexically unfilled sentence-level syntactic templates such as the ditransitive construction are held to have a schematic form and schematic meaning conventionally associated with them as exemplified in (3):

(3) a. Form: SUBJ VERB NP1 NP2
b. Meaning: X CAUSES Y TO RECEIVE Z

Symbolic units of this sort lie at the 'grammatical' end-point of the lexicon–grammar continuum. While fully 'lexical' and 'grammatical' symbolic units differ in qualitative terms, they are the same in principle, being symbolic in nature, in the sense described. Moreover, examples such as these are extreme exemplars. A range of symbolic units exist in all languages which occupy various points along the continuum that are less extreme.

A third consequence is that symbolic units can be related to one another, both in terms of similarity of form and semantic relatedness. One manifestation of such relationships is in terms of relative schematicity or specificity, such that one symbolic unit can be a more (or less) specific instantiation of another. Cognitive linguists model the relationships between symbolic units in terms of a network, arranged hierarchically relating to levels of schematicity. This is an issue I return to below when I discuss the usage-based thesis.

Finally, constituency structure—and hence the combinatorial nature of language—is a function of symbolic units becoming integrated or fused in order to create larger grammatical units, with different theorists proposing slightly different mechanisms for how this arises. For instance, Langacker (e.g., 1987) holds that constituency structure emerges from what he terms 'conceptually dependent (or relational) predications', such as verbs, encoding a schematic slot, termed an 'elaboration site'. The elaboration site is filled by 'conceptually autonomous (or nominal) predications', such as nouns. In contrast, Goldberg (e.g., 1995), in her theory of cognitive construction grammar, argues that integration is due to a fusion process that takes place between verb-level slots, what she terms 'participant roles', and sentence-level 'argument roles', discussed further below (see Evans, 2009, for further discussion of these issues).

The thesis that meaning is conceptualization

Language understanding involves the interaction between semantic structure and conceptual structure, as mediated by various linguistic and conceptual mechanisms and processes. In other words, linguistically mediated meaning construction doesn't simply involve compositionality, in the Fregean sense, whereby words encode meanings which are integrated in monotonic fashion such that the meaning of the whole arises from the sum of the parts (see Evans, 2006, 2009 for critical discussion of this notion of compositionality). Cognitive linguists subscribe to the position that linguistically mediated meaning involves conceptualiization—which is to say, higher-order cognitive processing some, or much, of which is non-linguistic in nature. In other words, the thesis that meaning is conceptualization holds that the way in which symbolic units are combined during language understanding gives rise to a unit of meaning which is non-linguistic in nature—the notion of a simulation introduced above—and relies, in part, on non-linguistic processes of integration.

There are two notable approaches to meaning construction that have been developed within cognitive linguistics. The first is concerned with the sorts of mechanisms central to meaning construction that are fundamentally non-linguistic in nature. Meaning construction processes of this kind have been referred to as 'backstage cognition' (Fauconnier, 1985/1994, 1997). There are two distinct, but closely related, theories of backstage cognition: mental spaces theory, developed in two monographs by Gilles Fauconnier (1985/1994, 1997), and conceptual blending theory, developed by Gilles Fauconnier and Mark Turner (2002), both of which are explicated later in the chapter. Mental spaces theory is concerned with the nature and creation of 'mental spaces', small packets of conceptual structure built as we think and talk. Conceptual blending theory is concerned with the integrative mechanisms and networks that operate over collections of mental spaces in order to produce emergent aspects of meaning—meaning that is in some sense novel.

A more recent approach is LCCM theory (Evans, 2006, 2009), named after the two central constructs in the theory: the 'lexical concept' and the 'cognitive model'. LCCM theory is concerned with the role of linguistic cues and linguistic processes in meaning construction (lexical concepts), and the way in which these lexical concepts facilitate access to non-linguistic knowledge (cognitive models) in the process of language understanding. Accordingly, as the emphasis is on the nature and the role of linguistic prompts in meaning construction, LCCM theory represents an attempt to provide a 'front-stage approach' to the cognitive mechanisms, and specifically the role of language, in meaning construction. LCCM theory is discussed in slightly more detail below.

The usage-based thesis

The final thesis to be discussed is the usage-based thesis. This holds that the mental grammar of the language user is formed by the abstraction of symbolic units from situated instances of language use: utterances—specific usage events involving symbolic units for purposes of signalling local and contextually relevant communicative intentions. An important consequence of adopting the usage-based thesis is that there is no principled distinction between knowledge of language, and use of language (competence and performance, in generative grammar terms), since knowledge emerges from use. From this perspective, knowledge of language *is* knowledge of how language is used.

The symbolic units that come to be stored in the mind of the language user emerge through processes of 'abstraction' and 'schematization' (Langacker, 2000), based on 'pattern recognition' and 'intention reading' abilities (Tomasello, 1999, 2003). Symbolic units thus constitute what might be thought of as 'mental routines' (Langacker, 1987), consisting, as we have seen, of conventional pairings of form and meaning.

One of the consequences of the usage-based thesis is that symbolic units exhibit degrees of 'entrenchment'—the degree to which a symbolic unit is established as a cognitive routine in the mind of the language user. If the language system is a function of language use, then it follows that the relative frequency with which particular words or other kinds of symbolic units are encountered by the speaker will affect the nature of the grammar. That is, symbolic units that are more frequently encountered become more entrenched. Accordingly, the most entrenched symbolic units tend to shape the language system in terms of patterns of use, at the expense of less-frequent and thus less-well-entrenched words or constructions. Hence, the mental grammar, while deriving from language use, also influences language use.

A further consequence of the usage-based thesis is that by virtue of the mental grammar reflecting symbolic units that exist in language use, and employing cognitive abilities such as abstraction in order to extract them from usage, the language system exhibits redundancy. That is, redundancy is to be expected in the mental grammar.

As noted earlier, symbolic units are modelled in terms of a network. Redundancy between symbolic units is captured in terms of a hierarchical arrangement of *schema–instance* relations holding between more schematic and more specific symbolic units. By way of illustration, Figure 4.2 captures the schema–instance relationships that hold between the more abstract [P [NP]] symbolic unit and the more specific instances of this abstract schema, such as [*to me*]. The usage-based thesis predicts that as [P [NP]] is a feature of many (more specific) instances of use, it becomes entrenched in long-term memory along with its more specific instantiations. Moreover, the schema ([P [NP]]) and its instances (e.g., [*to me*]), are stored in related fashion, as illustrated in Figure 4.2.

THE COGNITIVE LINGUISTICS WORLDVIEW

The primary commitments and theses of cognitive linguistics give rise to a specific and distinctive worldview, which has a number of dimensions. Collectively, these give rise to a distinctive cognitive linguistic perspective on (i) the nature of language, (ii) its interaction with non-linguistic aspects of cognition, and (iii) the nature of the human mind. In this section I

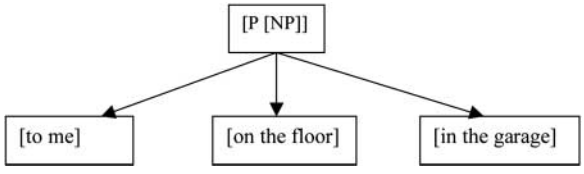

Figure 4.2 Schema–instance relationships.

identify five dimensions of the cognitive linguistics worldview and briefly elaborate on these:

- Language reflects the embodied nature of conceptual organization.
- Language is a lens for studying conceptual organization.
- Language provides a mechanism for construal.
- Language can influence aspects of non-linguistic cognition.
- Humans have a common conceptualizing capacity.

Language reflects conceptual organization

Following the thesis of embodied cognition, cognitive linguists view language as reflecting the embodied nature of conceptual structure and organization. Hence, cognitive linguists study language by taking seriously the way language manifests embodied conceptual structure.

An outstanding example of this is the study of 'conceptual metaphor' (e.g., Lakoff & Johnson, 1980, 1999; Lakoff & Turner, 1989). For instance, we use language relating to more abstract domains such as time, in terms of space, as exemplified by the example in (4), or states in terms of locations exemplified in (5), precisely because at the level of conceptual structure time is systematically structured in terms of conceptual structure recruited from the domain of space, and states are structured in terms of locations in space. I consider the issue of conceptual metaphor in more detail later on.

(4) Christmas is *approaching*.
(5) She is *in* love.

Language is a lens on the mind

Second, language serves as a lens for studying aspects of the mind. It does so precisely because it reflects organizational principles of embodied cognition. For instance, by studying metaphorical patterns in language, the cognitive linguist is able to discern patterns in the nature and organization of conceptual structure. Conceptual metaphors, qua cross-domain mappings—mappings that relate distinct conceptual domains—are evidenced by virtue of examining distinctive and productive patterns in language in order to uncover their existence.

Of course, in keeping with the Cognitive Commitment, linguistic evidence for conceptual structure must be supplemented with *converging evidence* from the other cognitive sciences. Evidence supporting some of the main claims made by conceptual metaphor theory, for instance with respect to time-as-space metaphors, has emerged on the basis of gestural studies (Núñez & Sweetser, 2006), and behavioral experiments (e.g., Boroditsky, 2000; Casasanto & Boroditsky, 2008; Gentner, Imai, & Boroditsky, 2002).

Language provides a mechanism for construal

Third, as language is constituted of a language-specific inventory of symbolic units, following the symbolic thesis, any given language provides a means of viewing the same state, situation, or event from the range of perspectives that are conventionally available to the language user, given the language-specific symbolic resources available. In other words, a language provides the language user with resources for viewing the same scene in multiple, and hence alternative, ways. This constitutes a mechanism for 'construal'. Construal is a technical term for the facility whereby the same situation can be linguistically encoded in multiple ways. For example, someone who is not easily parted from his or her money could be either described as *stingy* or as *thrifty*. In keeping with the thesis of encyclopedic semantics, each of these words is understood with respect to a different background frame or cognitive model, which provides a distinct set of evaluations. While *stingy* represents a negative assessment against an evaluative frame of giving and sharing, *thrifty* relates to a frame of careful management of resources (husbandry), against which it represents a positive assessment. Hence, lexical choice provides a different way of framing ostensibly the same situation, giving rise to a different construal.

Indeed, any given language, by virtue of containing a language-specific set of symbolic units, thereby provides a ready-made language-specific repertoire for construing human experience and the world in, necessarily, different ways. One reason for this is because different languages often encode culture-specific ideas and hence perspectives. For instance, the Korean word *nunchi*, which might be translated as 'eye-measure' in English, provides a conventionalized means of encoding the idea that a host evaluates whether a guest requires further food or drink in order to avoid the guest being embarrassed by having to request it.

Of course, languages provide conventional means of alternate construals even when two similar ideas are both conveyed in two different languages. For instance, both English and French—related genetically and by area—have conventional means of expressing the notion of containment: the preposition *in* for English and *dans* for French. Yet the scene depicted by Figure 4.3, involving a woman walking in the rain, is conventionally construed, in English, as exhibiting a 'containment' relationship as evidenced by (6), but in French as exhibiting an 'under' relationship, as encoded by the French preposition *sous*, evidenced in (7).

(6) The woman is walking in the rain.
(7) *La femme marche sous la pluie*.
The woman walks under the rain.
'The woman is walking in the rain'

What is remarkable about these examples is how they illustrate the way in

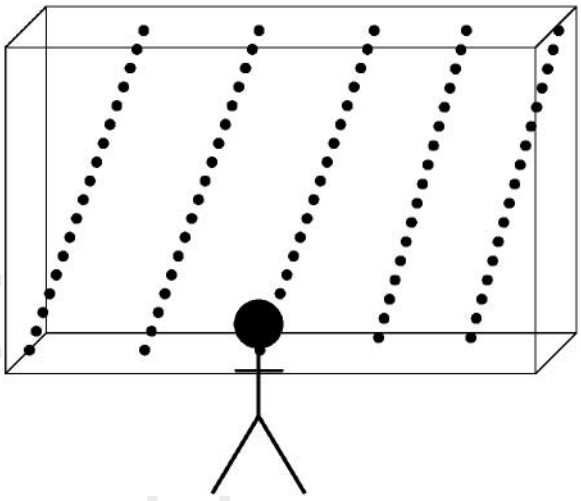

Figure 4.3 The woman walks in the rain.

which two relatively closely related languages conventionally construe a similar, everyday experience in what amounts to quite different ways.

Language influences non-linguistic cognition

The discussion of the English and French utterances in (6) and (7) also helps illustrate the fourth dimension of the cognitive linguistics worldview. As language provides a means of construing reality in alternate ways, and moreover remains connected to conceptual representation, it has a transformative function: It can influence aspects of non-linguistic cognition. That is, language doesn't merely reflect conceptual representation; it can influence and affect it. For instance, as French and English each have conventionalized alternative ways of encoding a particular spatial scene, this leads to what Slobin (e.g., 2003) has labelled differences in 'thinking for speaking': Users of any given language must pay attention to particular aspects of their experienced reality, at the expense of others, in order to package their thoughts for purposes of linguistic communication.

Cognitive linguists hold that this language-specific 'packaging' has profound consequences on non-linguistic cognition. That is, language influences how we categorize aspects of our socio-physical environment, and how we think about reality, independently of language. For example, in experimental work, Lera Boroditsky (2001; Boroditsky, Schmidt, & Phillips, 2003) has found that different ways of construing both time and gender in language influence performance of non-linguistic activities. This view is of course part of a resurgence in work by linguists of various theoretical stripes who are increasingly vocal in advocating a neo-Whorfian

perspective on the relationship between language and non-linguistic cognition. Notable exemplars include the work of Stephen Levinson (e.g., 2003) on space, and Athanasopolous (e.g., Thierry, Athanasopoulos, Wiggett, Dering, & Kuipers, 2009) on color perception.

A simple illustration of the way in which language can influence thought comes from an experiment described by Gentner and Gentner (1982), in which they trained different English-speaking participants in 'analogical models' of electricity. An analogical model relies on a relatively well-known scenario or system for understanding a less-well-known system, where the parts and relations of the well-known system stand in a similar relation to those in the less-well-known system, here electricity. Through analogy, participants can reason about electricity using the well-known model.

In the experiment, one group was taught that electricity can be represented as a teeming crowd of people, while another group was taught that electricity can be represented as water flowing through a pipe, as in a hydraulic system. The mappings between these two analogical models and an electrical circuit are summarized in Tables 4.2 and 4.3.

Importantly, each analogical model correctly predicted different aspects of the behavior of an electrical circuit, but was no help with other aspects. For example, a circuit with batteries connected serially will produce more current than a circuit with batteries in parallel. This is predicted by the analogy based on the hydraulic system, where serial pumps one after the

Table 4.2 Hydraulic system model

Hydraulic system	*Electric circuit*
Pipe	Wire
Pump	Battery
Narrow pipe	Resistor
Water pressure	Voltage
Narrowness of pipe	Resistance
Flow rate of water	Current

Based on Gentner & Gentner 1982, p. 110.

Table 4.3 Moving crowd model

Moving crowd	*Electric circuit*
Course/passageway	Wire
Crowd	Battery
People	Resistor
Pushing of people	Voltage
Gates	Resistance
Passage rate of people	Current

Based on Gentner & Gentner, 1982, p. 120.

other will produce a greater flow rate of water. In the moving crowd model, where the battery corresponds simply to the crowd, it is difficult to think of a meaningful contrast between a serial and a parallel connection.

Serial resistors in an electrical circuit reduce current, while parallel resistors increase it. The moving crowd model is better at predicting this aspect of the behavior of electricity, where resistance is modeled in terms of gates. Parallel gates allow more people through, while serial gates allow fewer people through.

Gentner and Gentner (1982) hypothesized that if participants used different analogical models to reason about the circuit, then each group should produce dramatically divergent results, which is exactly what they found. Participants who were trained in the hydraulic system model were better at correctly predicting the effect of serial versus parallel batteries on current, while those who were familiar with the moving crowd model were better at predicting the effect of serial versus parallel resistors on current.

This study reveals that different 'choices' of language for representing concepts can indeed affect non-linguistic thought, such as reasoning and problem solving.

A common human conceptualizing capacity

Of course, one of the charges that has been levelled at those who subscribe to a (neo) Whorfian perspective is that this entails that language determines how the world is viewed and categorised. If this view were correct, language would effectively provide a straitjacket, resulting in wholly distinct ways of conceptualization across languages and language users, which would be insurmountable.

However, the cognitive linguistics worldview treats language as but one of the mechanisms whereby humans construct their perceptual, cognitive, and socio-cultural reality. Cognitively modern humans have a common conceptualizing capacity: we share with our conspecifics a similar range of cognitive mechanisms and processes that provide us with multiple ways of construing reality. Language is but one modality, and hence but one way in which we interact with and learn about our environment, our socio-cultural reality, others around us, and ourselves. Cognitive linguists fully recognize that there are myriad ways in which humans experience their environment, including sense-perceptory experience, proprioception, and subjective experiences including affect, the visceral sense, and diverse cognitive evaluations and states. All of these experiences provide a rich basis for a multiplicity of mental representations, providing often complementary and even competing 'views' of reality. From the perspective of cognitive linguistics, semantic structure encoded by language can influence our conceptualizations, and other outputs of cognitive function, such as categorisation, for instance. However, language does not determine them.

MODELLING LANGUAGE: LANGUAGE AS REFLECTING COGNITION

In this section I examine the way language has been modelled by cognitive linguists in order to exemplify the various commitments, theses, and worldview of cognitive linguistics. I focus on three distinct but related proposals:

- The lexical and grammatical systems approach (Leonard Talmy)
- Cognitive grammar (Ronald Langacker)
- Cognitive construction grammar (Adele Goldberg)

In particular, I show that, in slightly different ways, each of these three approaches reveals how linguistic structure and organization reflects and interacts with aspects of cognition.

The interplay between language and conceptual structure

In this section I consider the nature of the conceptual structure which gets encoded in language. I do so by considering the lexical and grammatical systems approach of Talmy (e.g., 2000). Talmy suggests that language serves to encode and externalize an experiential complex, which he refers to as the 'cognitive representation' (CR). The CR might relate to an objectively verifiable state, concerning some aspect of the world, as in the expression in (8), or it might relate to a cognitive or affective state, such as the expression of unrequited love in (9):

(8) It is raining in London.
(9) John is desperate for Susan's love but she hasn't even noticed him.

Talmy holds that language expresses the CR of the language user by means of two distinct subsystems: language is made up of two systems, each of which brings equally important but very different dimensions to the scene that they jointly prompt for. These systems are the 'conceptual structuring (or "grammatical") system' and the 'conceptual content (or "lexical") system'. While the grammatical or conceptual structuring system, as its name suggests, provides the structure, skeleton, or 'scaffolding' for a given scene, the lexical or content system provides the majority of rich substantive detail. It follows from this view that the meaning associated with the grammatical system is highly schematic in nature, while the meaning associated with the lexical system is rich and highly detailed. This distinction is captured in Figure 4.4.

The bifurcation in content externalized by language relates, Talmy contends, to a well-known distinction in the phonological forms that make up the symbolic units of a given language. Open-class forms encode rich

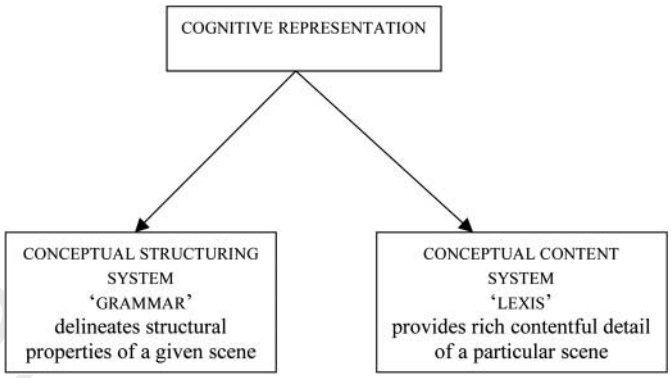

Figure 4.4 The bifurcation in content encoded by the grammatical and lexical systems.

aspects of conceptual content, while closed-class forms encode the more schematic or structural aspects of conceptual content. In other words, closed-class forms relate to the schematic meanings encoded by the grammatical system while open-class forms encode the rich meanings associated with the lexical system. To illustrate, consider (10), in which closed-class forms are highlighted in bold while the open-class forms appear in italics:

(10) **A** *waiter serv***ed the** *customer***s.**

The lexical system, encoded by open-class forms, relates to things, people, places, events, properties of things, and so on. The grammatical system, encoded by closed-class forms, relates to content having to do with topological aspects of space, time, and number, whether a piece of information is old or new, and whether the speaker is providing information or requesting information, and so on.

In addition to closed-class forms that have an overt phonetic realization —those marked in bold face in (10)—closed-class forms can also be phonetically abstract. A central claim made by Talmy, in keeping with the symbolic thesis, is that even abstract closed-class forms encode (schematic) content. Examples of such forms include lexical classes: e.g., noun, verb; lexical subclasses: e.g., count noun, mass noun; grammatical relations: e.g., subject, object; declarative versus integrative forms, active voice versus passive voice, and clause-level symbolic units such as the ditransitive construction, and so forth.

Tables 4.4 and 4.5 present a Talmy-style analysis for the example in (10) in order to illustrate the distinction in terms of schematic versus rich content encoded by closed-class versus open-class forms.

While the contribution of both the lexical and grammatical systems is essential to encoding the CR, in his research Talmy primarily focuses on

Table 4.4 Schematic content encoded by closed-class forms

Closed-class vehicles	*Schematic semantic content*
A	Introduces a referent which the hearer is held to be unable to readily identify (from context or preceding discourse)
A	Designates a unitary instantiation of the referent
The	Introduces a referent which the hearer is held to be able to readily identify (from context or preceding discourse)
-s	Designates multiple instantiations of a referent
-er	Designates performer of a particular action or activity
lexical class: verb (for *serve*)	Designates entity as an event (as one possibility)
Lexical class: noun (for *waiter*/*customer*)	Designates entity as an object (as one possibility)
Grammatical relation: subject (for *waiter*)	Designates entity as being the primary or focal entity in a designated relationship
Grammatical relation: object (for *customers*)	Designates entity as less important or secondary entity in a designated relationship
Active voice (through verb form)	Designates point of view being situated at the agent
Declarative word order	Speaker knows the situation to be true and asserts it to the hearer

Table 4.5 Rich content encoded by open-class forms

Open-class vehicles	*Rich semantic content*
Waiter	Person with a particular function, and sometimes appearance, who works in a particular setting
Serve	Particular mode of activity involving two or more people and, typically, an entity with which one of the participants is provided by the other
Customer	Person who is provided with a particular object or service (of various sorts) in exchange for, typically, money

the nature of the conceptual content that gets encoded by the grammatical system. He does this for at least two reasons. First, as the content encoded by the grammatical system is structural and hence schematic in nature, it provides a set of schematic semantic content which is potentially finite

in nature. In terms of practicality then, the content associated with the grammatical system can, in principle, be fully described. As the lexical system relates to rich content, it is less clear that the range of meanings encoded are finite. Hence, they are not susceptible to a complete description. On grounds of practicality then, it makes sense to target the schematic content associated with the grammatical system.

Second, as the schematic content encoded by closed-class forms is finite, it provides an inventory of meanings upon which all languages are likely to draw. Indeed, even for prepositions, which have a large number of distinct senses associated with them, we cannot create new meanings as effortlessly as new meanings can be created for open-class forms such as nouns. There are constraints that apply to the range of meanings that are and can be associated with closed-class forms such as prepositions (see Tyler & Evans, 2001). This is due to the nature and quality of the meaning encoded by closed-class forms (see Evans, 2009). As such, the study of the nature of the schematic meanings encoded by the grammatical system is likely to reveal details as to which aspects of conceptual content are foundational in terms of facilitating a structuring function cross-linguistically.

Talmy proposes that the grammatical system is arranged in terms of a limited number of large-scale 'schematic systems' (Talmy, 2000). These provide the basic organization of the CR, upon which the rich content encoded by open-class elements can be organized and supported. Various schematic systems collaborate to structure a scene that is expressed via language. Each schematic system contributes different structural aspects of the scene, resulting in the overall delineation of the scene's skeletal framework. In his work, Talmy has primarily elucidated four schematic systems, although he acknowledges there are likely to be others. These are given in Figure 4.5.

Schematic systems can be further divided into 'schematic categories'. By way of illustration, I elucidate one schematic category from one schematic system: The configurational system. This schematic system structures the temporal and spatial properties associated with an experiential complex, such as the division of a given scene into parts and participants. Consider the schematic category which Talmy identifies as 'degree of extension'. 'Degree of extension' relates to the degree to which matter (space) or action (time) are extended. The schematic category 'degree of extension' has three values: a point, a bounded extent, or an unbounded extent.

To make this clear, consider the examples in (11) to (13). These employ closed-class elements in order to specify the degree of extension involved.

(11) Point *at* + $NP_{point\text{-}of\text{-}time}$
The train passed through at [noon]

(12) Bounded extent *in* + $NP_{extent\text{-}of\text{-}time}$
She went through the training circuit in [five minutes flat]

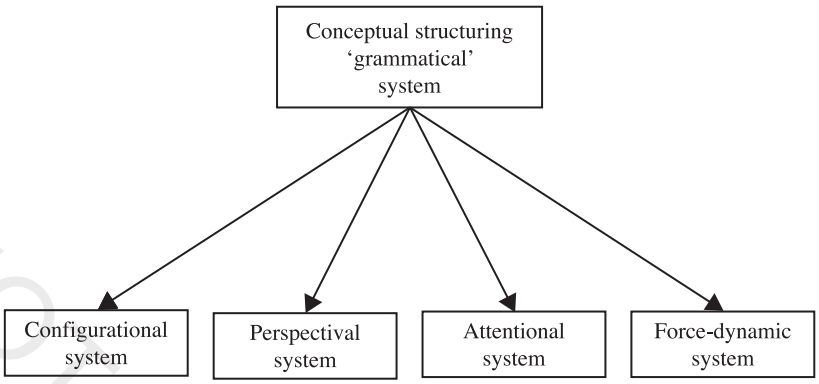

Figure 4.5 The schematic systems identified by Talmy.

(13) Unbounded extent '*keep -ing*' + '*-er and -er*'
The plane kept going higher and higher

As these examples illustrate, some closed-class elements encode a particular degree of extension. For instance, in (11) the preposition *at*, together with an NP that encodes a temporal point, encodes a point-like degree of extension. The NP does not achieve this meaning by itself: If we substitute a different preposition for instance, a construction containing the same NP *noon* can encode a bounded extent (e.g., *The train arrives between noon and 1 pm*). The punctual nature of the temporal experience in example (11) forms part of the grammatical system, and is conveyed in this example by closed-class forms. The nature of the punctual event—that is, the passage of a train through a station rather than, say, the flight of a flock of birds overhead—relates to content drawn from the lexical system, e.g., the selection of the form *train* versus *birds*.

In the example in (12), the preposition *in*, together with an NP that encodes a bounded extent encodes a bounded degree of extension. In (13) the closed-class elements *keep -ing + -er and -er* encode an unbounded degree of extension. This closed-class construction provides a grammatical 'skeleton' specialized for encoding a particular value within the schematic category 'degree of extension'. The lexical system can add dramatically different content meaning to this frame (e.g., *keep singing louder and louder*; *keep swimming faster and faster*; *keep getting weaker and weaker*), but the schematic meaning contributed by the structuring system remains constant —in all these examples, time has an unbounded degree of extension.

The interplay between language and cognitive mechanisms

In this section I briefly consider the way in which cognitive linguistics views language structure and organization as an outcome of generalized

conceptual mechanisms. In so doing, I draw on the seminal work of Langacker (1987, 1991a, 1991b, 1999, 2008), as exemplified in his theory of cognitive grammar.

In his work, Langacker has developed a model of language which treats linguistic structure and organization as reflecting general cognitive organizational principles. In particular, mechanisms relating to cognitive aspects of attention are claimed to underpin the organization of linguistic structure. Langacker defines attention as being 'intrinsically associated with the intensity or energy level of cognitive processes, which translates experientially into greater prominence or salience' (1987, p. 115). I briefly consider two theoretical constructs posited in cognitive grammar which are held to be central to attention in general and which also show up in linguistic organization. These are the notions of 'profile–base organization' and 'trajector–landmark organization'.

Profile–base organization

Profile–base organization has to do with the semantic pole of a symbolic unit. It assumes that word meaning, for instance, involves focusing attentional resources on one aspect of a particular structure, such that a particular facet is highlighted or profiled. For instance, consider the symbolic unit *hypotenuse*, employed by Langacker to make this idea clear. This lexical item designates a substructure—the longest side in a right-angled triangle—but does so with respect to a larger structure—the right-angled triangle, as illustrated in Figure 4.6.

In Figure 4.6 the longest side, labelled A, is the subpart of the larger structure designated, and thus constitutes the profile. The entire triangle, involving sides A-B-C constitutes the base, the entity with respect to which the profile receives special prominence. Profile–base organization is thus a feature of linguistic semantics, but it reflects a deeper cognitive impulse, namely the selection of a particular substructure for attentional prominence against some larger structure.

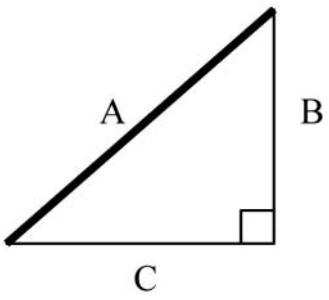

Figure 4.6 Profile–base organization for *hypotenuse*.

Trajector–landmark organization

The second theoretical construct, trajector–landmark organization, is motivated by a related attentional phenomenon concerning the relative prominence assigned to entities involved in a relationship of some sort. For instance, in events involving energy transfer, what Langacker refers to as an 'action chain' (e.g., *John started the ball rolling*) one participant typically transfers energy to another entity, thereby affecting it. As such, the affecting participant is more salient.

Langacker maintains that the assignment of relative prominence to entities at the perceptual and cognitive levels is also a fundamental design feature of language. Indeed, he claims that it shows up at the level of the word, phrase, and clause, and is therefore fundamental for constituency, and hence the ability of symbolic units to be combined with one another in order to form larger units. To illustrate this idea, consider the distinction between the following two utterances:

(14) John ate all the pizza.
(15) All the pizza was eaten by John.

These utterances relate to an action chain in which some activity, namely eating, is performed by John on the pizza so that there is no pizza left. Yet each utterance assigns differential relative prominence to the participants in this action chain, namely *John* and *pizza*. In English, and in language in general, the first participant slot in an utterance, commonly referred to as the subject position, is reserved for participants that are most prominent. The participant in a profiled relationship that receives greatest prominence, what Langacker terms *focal prominence*, is referred to as the *trajector* (TR). The participant that receives lesser prominence, referred to as secondary prominence, is termed the *landmark* (LM). The distinction, then, in the utterances above is that in (14) *John* corresponds to the TR and *pizza* to the LM, while in (15) *pizza* corresponds to the TR and *John* to the LM. This distinction is captured by Figure 4.7. The distinction between TR and LM approximates the more traditional distinction between subject and object. The advantage is that it provides a conceptual basis for the distinction.

The diagrams in Figure 4.7 reveal the following. While the transfer of energy is still the same across the two utterances, as indicated by the direction of the arrows, the participants are assigned differential prominence across the two utterances. Put another way, the active and passive constructions, as exemplified by the two utterances, in fact encode a distinction in terms of the focal prominence associated with the two participants involved in the relationship being conveyed. This distinction, which is central to the way language encodes the relationship between agents and patients, in fact reflects a more general cognitive mechanism:

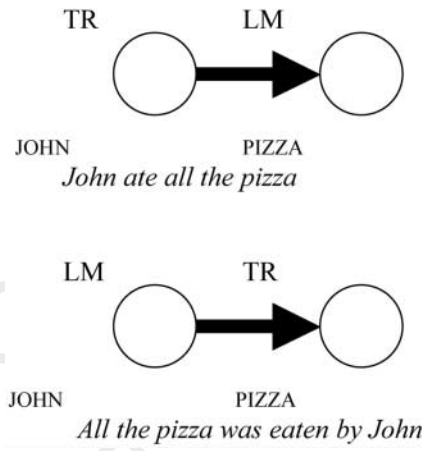

Figure 4.7 The distinction between TR–LM alignment across agent–patient reversal.

distinguishing between the relative prominence paid and assigned to participants in an action chain.

The interplay between language and cognitive mechanisms

In this section I consider the way in which cognitive linguistics views language organization as reflecting embodied experience, in the sense defined above. I do so by considering the theory of cognitive construction grammar developed in the work of Adele Goldberg (e.g., 1995, 2006).

In her work, Goldberg has studied sentence-level symbolic units, what she refers to as constructions. In keeping with the symbolic thesis, Goldberg claims that sentences are themselves motivated by sentence-level symbolic units, consisting of a schematic meaning and a schematic form. For instance, consider the following example:

(16) John gave Mary the flowers.

Goldberg argues that a sentence such as (16) is motivated by the ditransitive construction. This is essentially a symbolic unit that has the schematic meaning: X CAUSES Y TO RECEIVE Z, and the form: Subj Verb NP1 NP2. As with many other symbolic units associated with the grammatical system (in the sense of Talmy), the distransitive construction is phonetically implicit. That is, its form consists of a syntactic template which is not lexically filled, but which stipulates the nature and range of the lexical constituents that can be fused with it (see Goldberg, 1995, for discussion and evidence for positing sentence-level constructions; see also Goldberg, 2006, and Evans, 2009).

A crucial question for Goldberg concerns what motivates the semantics and the form of such sentence-level constructions. That is, what motivates such constructions to emerge in the first place? In keeping with the thesis of embodied cognition, she posits what she terms the 'scene encoding hypothesis'. According to this hypothesis, sentence-level constructions emerge from humanly relevant scenes that are highly recurrent and salient in nature. For instance, on many occasions each day we experience acts of transfer. Such acts involve three participants: The agent who effects the transfer, the recipient of the act of the transfer, and the entity transferred. In addition, such acts involve a means of transfer. Goldberg holds that the sentence-level construction is motivated by the human need to communicate about this highly salient scene. Indeed, the semantics and the form associated with this construction are uniquely tailored to encoding such humanly relevant scenes. In this way, grammatical organization, Goldberg suggests, reflects fundamental aspects of human embodied experience.

The construction grammar perspective has also been applied cross-linguistically in the work of William Croft (e.g., 2002). Indeed, based on a wide range of typologically diverse languages, Croft argues that construction grammar provides the most appropriate means of modeling languages from a typological perspective.

MODELLING CONCEPTUAL STRUCTURE: LANGUAGE AS LENS

The human conceptual system is not open to direct investigation. Nevertheless, cognitive linguists maintain that the properties of language allow us to reconstruct the properties of the conceptual system, and to build a model of that system. The logic of this claim is as follows. As language structure and organization, as revealed in the previous section, reflect various known aspects of cognitive structure, by studying language, which is observable, we thereby gain insight into the nature of the conceptual system. The subbranch of cognitive linguistics concerned with employing language as a lens, in order to study otherwise hidden aspects of conceptual structure, is often referred to as cognitive semantics.

One of the earliest, and perhaps best-known, cognitive semantic theories is conceptual metaphor theory, developed by Lakoff and Johnson (1980, 1999). The central insight of this approach is that figurative patterns in language reflect underlying, highly stable associations, known as *mappings*, which hold between domains in the conceptual system. Sets of mappings holding between two distinct conceptual domains are referred to as conceptual metaphors, which is what gives the theory its name. For instance, one particularly common way in which we talk and think about a love relationship is in terms of journeys. To illustrate, consider the

following everyday expressions, drawn from Lakoff and Johnson (1980), which we might use to describe aspects of a love relationship:

(17) a. Look *how far* we've *come*.
b. We're at *a crossroads*.
c. We'll just have to *go our separate ways*.
d. We can't *turn back* now.
e. I don't think this relationship is *going anywhere*.
f. This relationship is *a dead-end street*.
g. Our marriage is *on the rocks*.
h. This relationship *is foundering*.

According to Lakoff and Johnson, utterances such as these are motivated by an entrenched pattern in our conceptual system: A conceptual metaphor. The conceptual metaphor can be stated as LOVE IS A JOURNEY. This conceptual metaphor is made up of a fixed set of established mappings which structure concepts that are located in the more abstract domain of LOVE, in terms of concepts belonging to the more concrete domain of JOURNEY. For instance, in the domain of LOVE we have concepts for lovers, the love relationship, events that take place in the love relationship, difficulties that take place in the relationship, progress we make in resolving these difficulties, and in developing the relationship, choices about what to do in the relationship, such as moving in together, whether to split up, and so on, and the shared and separate goals we might have for ourselves in the relationship, and for the relationship itself. Similarly, we represent a range of concepts relating to the domain of JOURNEYS. These include concepts for the travellers, the vehicle used for the journey, plane, train, or automobile, the distance covered, obstacles encountered, such as traffic jams, that lead to delays and hence impediments to the progress of the journey, our decisions about the direction and the route to be taken, and our knowledge about destinations.

The conceptual metaphor, LOVE IS A JOURNEY, provides a means of systematically mapping these knowledge slots from the domain of JOURNEY onto corresponding slots in the domain of LOVE. This means that slots in the LOVE domain are structured *in terms of* knowledge from the domain of JOURNEY. For instance, the lovers in the domain of LOVE are structured in terms of travellers such that we understand lovers in terms of travellers. Similarly, the love relationship itself is structured in terms of the vehicle used on the journey. For this reason we can talk about marriage *foundering*, *being on the rocks*, or *stuck in a rut* and understand expressions such as these as relating, not literally to a journey, but rather to two people in a long-term love relationship that is troubled in some way. In other words, we must have knowledge of the sort specified by the conceptual metaphor stored in our heads if we are to be able to understand these English expressions: to understand lovers in terms of travellers, and the relationship in

terms of the vehicles, and so on. The linguistic expressions provide compelling evidence for the conceptual metaphors. The mappings implicated by the linguistic evidence are given in Table 4.6.

In essence, the claim at the heart of conceptual metaphor theory is that the mappings, which lie at the level of conceptual structure, are revealed by evidence from language, as exemplified by the sentences in (17) for instance. Language can thus be employed as a key methodological tool for revealing conceptual patterns that underlie language use.

MEANING CONSTRUCTION: THE INTERACTION BETWEEN LANGUAGE AND COGNITION

In this section I consider the way in which cognitive linguistics has modelled the contribution of language to meaning construction. The essential insight is that language provides relatively impoverished prompts for the construction of meaning. These linguistic prompts interface with non-linguistic conceptual mechanisms specialized for the construction of meaning, and with non-linguistic knowledge representation. In other words, cognitive linguists take the view that meaning construction involves an interaction between language on the one hand, and cognitive mechanisms and representations on the other.

In the remainder of this section I explore two distinct, albeit related, cognitive semantic approaches to meaning construction. The first approach relates to what I earlier referred to as the backstage cognition perspective, associated with the scholarship of Gilles Fauconnier, and Mark Turner. Fauconnier (1985/1994, 1997), and Fauconnier and Turner (2002) have shown that much of the complexity and some of the most interesting aspects of meaning construction involving language occur

Table 4.6 Mappings for LOVE IS A JOURNEY

Source domain: *JOURNEY*	*Mappings*	*Target domain:* *LOVE*
TRAVELLERS	→	LOVERS
VEHICLE	→	LOVE RELATIONSHIP
JOURNEY	→	EVENTS IN THE RELATIONSHIP
DISTANCE COVERED	→	PROGRESS MADE
OBSTACLES ENCOUNTERED	→	DIFFICULTIES EXPERIENCED
DECISIONS ABOUT DIRECTION	→	CHOICES ABOUT WHAT TO DO
DESTINATION OF THE JOURNEY	→	GOALS OF THE RELATIONSHIP

behind the scenes. That is, meaning construction predominantly involves a battery of conceptual mechanisms that serve to integrate hugely complex assemblies of knowledge. Accordingly, language provides relatively impoverished prompts which are hence but the tip of the iceberg.

A related, and more recent approach, developed by V. Evans (e.g., 2006, 2009) takes what I have referred to as the front-stage cognition perspective. While this approach also assumes that language provides relatively impoverished prompts for backstage processes of meaning construction, Evans maintains that there is nevertheless significant complexity associated with these linguistic prompts. Evans proceeds by studying the nature of this complexity and the way in which linguistic prompts interface with 'backstage' aspects of knowledge representation inhering in the conceptual system.

Mental spaces and conceptual integration

The backstage cognition perspective involves two distinct, although closely related, theoretical proposals. The first, mental spaces theory, was developed in two book-length treatments by Gilles Fauconnier (1985/1994, 1997). The second, which builds on mental spaces theory is termed conceptual integration theory, and develops the mechanisms referred to as 'blending'. This latter theory, and the mechanism of blending, is developed in a (2002) book-length treatment by the architects of the theory: Gilles Fauconnier and Mark Turner.

The backstage cognition perspective holds that, when we think and talk, humans assemble what are referred to as mental spaces, briefly introduced earlier. These are 'packets' of conceptual material, assembled 'on the fly' for local purposes of language understanding and conceptual processing. Moreover, material from these mental spaces qua conceptual packets, can be selectively projected in order to form a hybrid mental space drawn from a number of so-called input mental spaces. This hybrid mental space is referred to as a 'blended space', also known as a 'blend'.

In order to briefly illustrate the process of mental space formation and blending consider the following joke:

(18) Q. What do you get if you cross a kangaroo with an elephant?
A. Holes all over Australia!

The backstage cognition perspective holds that in order to understand and hence 'get' the joke, we have to perform conceptual integration across mental spaces and thus construct a blend. While we have complex bodies of knowledge available to us concerning elephants and kangaroos, including their size, means of locomotion, and their geographical region of abode, all of which gets diffusely activated by the question, the punch-line prompts us to selectively project only specific aspects of our knowledge

relating to elephants and kangaroos, in order to build a blended space. In the blend we integrate information relating to the abode and manner of locomotion associated with kangaroos, with the size of elephants. The hybrid organism we come up with, that exists only in the blend, which is to say 'in' our heads, has the size of an elephant, lives in Australia, and gets about by hopping. Such an organism would surely leave holes all over Australia. The joke is possible (and possibly funny) only because the operation of blending is a fundamental aspect of how we think. Moreover, blending is revealed by language use; linguistically mediated meaning construction relies upon it.

In essence, then, the backstage cognition perspective is concerned with the mechanisms of mental space construction and blending, processes that are primarily conceptual in nature.

LCCM theory

The front-stage cognition perspective developed in Evans (2006, 2009) is embodied in the theory of lexical concepts and cognitive models (LCCM theory). LCCM theory was developed in order to account for variation in word meanings across contexts of use, although it has been applied to a wider range of linguistic semantic phenomena including metaphor and metonymy.

The main premise of the theory is that there is a distinction in the nature of the semantic representations that populate the linguistic and conceptual systems. The semantic representational format of the linguistic system is modeled in terms of the theoretical construct of the lexical concept, while the semantic representational format of the conceptual system is modeled in terms of the construct of the cognitive model—notions that give LCCM theory its name. A cognitive model is a composite multimodal knowledge structure grounded in the range of experience types processed by the brain, including sensory-motor experience, proprioception, and subjective experience. In contrast, a lexical concept—the semantic pole of a symbolic unit—consists of a bundle of different types of schematic knowledge encoded in a format that can be directly represented in the time-pressured auditory-manual medium that is manifested by the world's spoken and signed natural languages.

In LCCM theory, although linguistic representations are schematic in nature they nevertheless exhibit significant complexity. For instance, lexical concepts encode what are referred to as 'parameters': digitized dimensions abstracted from across rich perceptual experience. Building on insights developed by Talmy (e.g., 2000), Evans claims that one aspect of the schematic nature of content encoded by lexical concepts is that they provide topological rather than Euclidean reference. That is, linguistic content encodes schematic aspects of sensory-motor, proprioceptive, and subjective experience, while conceptual content, to which

open-class lexical concepts facilitate access, relates to precise, metric distinctions.

To illustrate consider the closed-class lexical concepts associated with the demonstrative forms *this* and *that*. These lexical concepts encode a distinction between an entity construed as proximal to the speaker, glossed as [THIS], versus an entity construed as distal, glossed as [THAT]. Consider (19):

(19) Sit on this chair not that one!

In this utterance, the chair that the addressee is being asked to sit on is the one closer to the speaker: 'this chair' as opposed to 'that one'. Nevertheless, the distinction between [THIS] versus [THAT] does not rely on precise metric details such as the exact distance from the speaker, in terms of metres, centimetres, and millimetres. After all, it is immaterial how far the chairs are from the speaker (within reason), as long as one is closer to the speaker than the other. In other words, closed-class lexical concepts are 'magnitude neutral', where magnitude has to do with metric properties relating to distance. This is what it means to say that closed-class lexical concepts provide topological reference. In contrast, the open-class lexical concepts facilitate access to conceptual content, and hence can be employed to express metric details of distance giving rise to Euclidean reference, as illustrated by (20):

(20) Sit on the chair 2.54 metres away from me!

The expression '2.54 metres' involves open-class lexical concepts rather than closed-class lexical concepts, and serves to evoke the chair precisely.

One of the distinctive aspects of LCCM theory is that it proposes specific mechanisms that facilitate the interaction of linguistic and conceptual representations belonging to two distinct representational systems in service of meaning construction. While I do not present an overview of the compositional mechanisms involved here (for that see Evans, 2009), I present below an informal illustration of the way in which lexical concepts interface with cognitive models in providing an utterance-level simulation.

Consider the following four utterances:

(21) a. France is a country of outstanding natural beauty.
b. France is one of the leading nations in the European Union.
c. France beat New Zealand in the 2007 Rugby World Cup.
d. France voted against the EU constitution in the 2005 referendum.

In each of these examples the semantic contribution associated with the form *France* is slightly distinct. That is, the semantic contribution provided by *France* varies across these distinct utterances. The key insight of LCCM

theory is that the reason for this variation is due to differential activation of non-linguistic knowledge structures, the cognitive models, to which the lexical concept associated with *France* affords access. The linguistic and non-linguistic processes that give rise to this differential activation, which relate, in part, to the differences in the four linguistic contexts in which *France* is embedded, are highly complex. LCCM theory represents a programmatic attempt to identify the sorts of mechanisms involved in this activation process.

The meaning associated with *France* in each of these examples concerns France as a geographical landmass in (21a), France as a political entity, a nation state, in (21b), the 15 players who make up the French Rugby team in (21c), and in (21d) that proportion of the French electorate who voted *non* when presented, in a 2005 referendum, with the proposal to endorse a constitution for the European Union.

In order to provide these distinct interpretations, LCCM posits that the lexical concept glossed as [FRANCE], facilitates access to a wide range of cognitive models, its 'cognitive model profile'. This, in informal terms, provides a semantic potential, part of which can be activated by a given linguistic (or extra-linguistic context). In each of the examples in (21), the different reading for France arises precisely because a different aspect of the cognitive model profile accessed via the lexical concept [FRANCE] is activated. Put another way, the lexical concept [FRANCE] provides an 'access site' for a cognitive model profile that, at the very least, includes the cognitive models indicated in Figure 4.8.

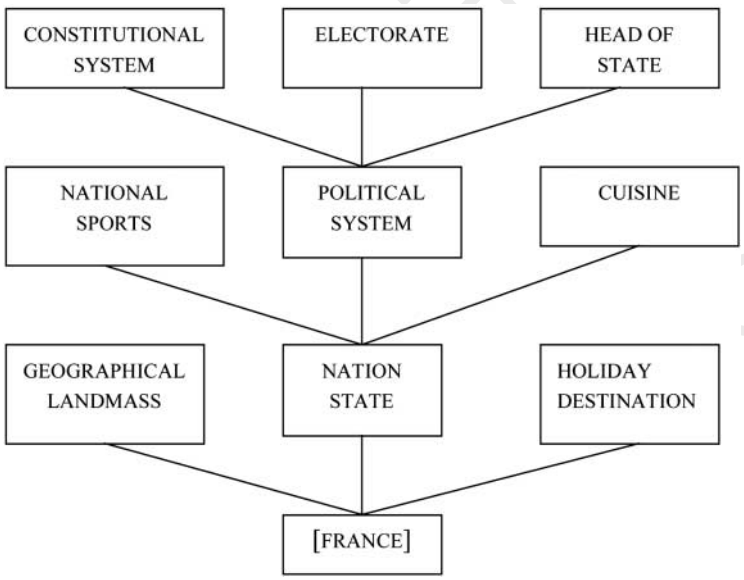

Figure 4.8 Partial cognitive model profile for [FRANCE].

Figure 4.8 captures the sort of knowledge that language users must have access to when speaking and thinking about France. In Figure 4.8 the lexical concept [FRANCE] provides access to a potentially large number of cognitive models. As each cognitive model consists of a complex and structured body of knowledge which provides access to other sorts of knowledge, LCCM theory distinguishes between cognitive models which are directly accessed via the lexical concept—'primary cognitive models'—and those cognitive models which form substructures of those that are directly accessed—'secondary cognitive models'. These secondary cognitive models are indirectly accessed via the lexical concept.

The lexical concept [FRANCE] affords access to a number of primary cognitive models. These include: GEOGRAPHICAL LANDMASS, NATION STATE, and HOLIDAY DESTINATION. Each of these cognitive models provides access to further cognitive models. In Figure 4.8 a flavor of this is given by virtue of the various secondary cognitive models which are accessed via the NATION STATE cognitive model. These include NATIONAL SPORTS, POLITICAL SYSTEM, and CUISINE. For instance we may know that, in France, the French engage in national sports of particular types, such as football, rugby, athletics, and so on, rather than others: the French don't typically engage in American football, ice hockey, cricket, and so on. We may also know that as a sporting nation they take part in international sports competitions of various kinds, including the FIFA football world cup, the Six Nations rugby competition, the rugby world cup, the Olympics, and so on. That is, we may have access to a large body of knowledge concerning the sorts of sports French people engage in. We may also have some knowledge of the funding structures and social and economic conditions and constraints that apply to these sports in France, France's international standing with respect to these particular sports, and further knowledge about the sports themselves including the rules that govern their practice, and so on. This knowledge is derived from a large number of sources including direct experience and through cultural transmission.

With respect to the secondary cognitive model of POLITICAL SYSTEM, Figure 4.8 illustrates a sample of further secondary cognitive models which are accessed via this cognitive model. In other words, each secondary cognitive model has further (secondary) cognitive models to which it provides access. For instance, (FRENCH) ELECTORATE is a cognitive model accessed via the cognitive model (FRENCH) POLITICAL SYSTEM. In turn the cognitive model (FRENCH) POLITICAL SYSTEM is accessed via the cognitive model NATION STATE. Accordingly, NATION STATE is a primary cognitive model while ELECTORATE and POLITICAL SYSTEM are secondary cognitive models.

In view of all this, LCCM theory accounts for differential interpretations associated with *France* in (21) as follows. In (21a) the interpretation associated with the form *France*, which relates to a particular geographical region, derives from activation of the GEOGRAPHICAL LANDMASS cognitive

model. That is, individual language users have knowledge relating to the physical aspects of France, including its terrain and its geographical location. In this example, the utterance context serves to activate this part of the cognitive model profile accessed by the lexical concept [FRANCE]. In the second example, the utterance context serves to activate a different part of the cognitive model profile to which the lexical concept [FRANCE] affords access. In this example, the reading for *France* relates to the cognitive model of France as a political entity. This is due to activation of the NATION STATE cognitive model. In example (21c) the use of *France* relates to the group of 15 French individuals who play as a team and thereby represent the French nation on the rugby field. Hence, it is the NATIONAL SPORTS cognitive model which is activated. In the example in (21d) the form *France* relates not to a geographical landmass, nor a political entity, a nation state, nor to a group of 15 rugby players who happen to be representing the entire population of France. Rather, it relates to that portion of the French electorate that voted against ratification of the EU constitution in a referendum held in 2005. Accordingly, what is activated here is the ELECTORATE cognitive model.

In essence, LCCM theory treats semantic variation in word meaning as a function of interaction between linguistic and conceptual content. The distinctive semantic contribution of a particular word in any given context of use results from the differential activation of the encyclopedic multimodal knowledge structures to which words facilitate access.

CONCLUSION: IMPLICATIONS FOR RESEARCH ON BILINGUAL COGNITION

Research conducted by scholars investigating bilingualism has, among other things, been concerned with modeling how the bilingual mind stores and processes distinct linguistic systems and the way in which the distinct linguistic systems interface with conceptual structure. For instance, one issue concerns whether bilingual cognition deploys a single unified set of conceptual representations, or whether two distinct linguistic systems require distinct sets of conceptual structures. A related issue concerns distinctions that may (or may not) arise in the mind of the bilingual versus the monolingual speaker. That is, does representing more than one linguistic system in the mind have consequences for other aspects of cognitive function and processing?

While cognitive linguistics has not directly explored such issues, the cognitive linguistics enterprise proffers researchers on bilingual cognition fresh perspectives and, perhaps importantly, a rich set of cognitively realistic analytical frameworks with which to better address some of the key issues in bilingual cognition research. In particular, cognitive linguistics provides the bilingual researcher with theories of language structure,

conceptual structure, and the relationship between the two that take seriously psychological plausibility, and hence are more cognitively realistic than many previous models of language structure and processing. Moreover, cognitive linguistics specifies and clarifies the relationship between language and conceptual structure in terms of the relative contribution of each. Accordingly, it sheds light on how language and non-linguistic cognition interface, in terms of both meaning construction and linguistically mediated communication. As such, cognitive linguistics provides a rich and diverse set of findings, theoretical frameworks, and methodologies which can potentially serve the bilingual researcher in investigating a number of the key empirical concerns that are central to a better understanding of bilingual cognition.

There are at least three specific areas of research in bilingual cognition for which recent research in cognitive linguistics is likely to have implications. These are the following:

1 the nature of linguistic representation in the bilingual mind,
2 the nature of conceptual structure in the bilingual mind, and
3 the influence of different linguistic codes on cognitive structure and function in the bilingual mind

In terms of the first issue, bilingualism researchers are 'generally agreed now that the languages of the bilingual child are represented [in the mind] in underlyingly different ways.' (Genesee, 2001, p. 158). They develop as autonomous systems. The recent models of linguistic organization that emerge from cognitive linguistics developed by scholars such as Langacker, Goldberg, and others reveal why this must be so. A language consists of a vast inventory of constructions, language-specific form–meaning pairings. Moreover, infants do not come with an inbuilt prespecification for language in the Chomskyan sense. Rather, language acquisition is a dynamic usage-based process, which is constructed in an item-based way. To be sure, humans have impressive schematization and abstraction skills, and this facilitates the development of rules, of a grammar. But the rules of grammar emerge from use rather than being prewired in the first place (Langacker, 2008; Tomasello, 2003, 2008). This constructional usage-based view provides a fresh perspective for scrutinizing the findings arising from research on language organization and development in the bilingual mind. Moreover, as the acquisition of constructions is usage based, this may go some way to shedding light on the well-known finding that bilingual children are adept at using expressions from both their L1 and L2 in language-specific ways and contexts, and, moreover, address their carer in the appropriate language from early in infancy (see Baker, 2006, for review).

In terms of the second issue, the nature of conceptual structure in the bilingual mind, it has often been observed that bilinguals are adept at

'translating' ideas between languages. An influential account relates to the work of Cummins (e.g., 1981) who advocates a common underlying proficiency model for the bilingual L1 and L2. Recent work on the nature of conceptual structure in cognitive linguistics and the way it interfaces with linguistic representation provides a fresh perspective on this particular issue. Some aspects of knowledge representation are likely to be universal (or at least nearly universal), such as primary metaphors (Grady, 1997; Lakoff & Johnson, 1999), while others are likely to be culture specific. The nature and organization of the meaning construction processes that draw upon conceptual structure, such as the mechanisms of conceptual integration (Fauconnier & Turner, 2002) are likely to be universal. In contrast, the way in which specific languages interface with conceptual structure is likely to be language specific (Evans, 2009). Hence, some aspects of conceptual structure and conceptualization in the bilingual mind may underpin both L1 and L2 while other aspects may be specific to the requirements of each language. In any case, this is an area of investigation which is likely to be enriched by an awareness of ideas from cognitive linguistics.

Finally, the worldview provided by cognitive linguistics bears on the issue of the nature of the influence exerted by language on non-linguistic cognition. This is an issue that is particularly relevant for research in bilingual cognition as, if language does indeed influence non-linguistic aspects of conceptual structure and function, then it remains to be established what the influence is in the case of the bilingual mind where there are two languages at play. Cognitive linguists contend both that language provides a mechanism for construal, and that language can influence aspects of non-linguistic cognition. The various findings provided by cognitive linguists will insightfully inform ongoing and future research in bilingual cognition.

REFERENCES

Baker, C. (2006). *Foundations of bilingual education and bilingualism*. Bristol, UK: Multilingual Matters.

Barsalou, L. (2008). Grounded cognition. *Annual Review of Psychology, 59,* 617–645.

Boroditsky, L. (2000). Metaphoric structuring: Understanding time through spatial metaphors. *Cognition, 75*(1), 1–28.

Boroditsky, L. (2001). Does language shape thought? English and Mandarin speakers' conceptions of time. *Cognitive Psychology, 43*(1), 1–22.

Boroditsky, L., Schmidt, L., & Phillips, W. (2003). Sex, syntax, and semantics. In D. Gentner & S. Goldin-Meadow (Eds.), *Language in mind: Advances in the study of language and cognition* (pp. 61–79). Cambridge, MA: MIT Press.

Cann, R. (1993). *Formal semantics*. Cambridge, UK: Cambridge University Press.

Casasanto, D. (2009). Embodiment of abstract concepts: Good and bad in

right- and left-handers. *Journal of Experimental Psychology: General, 138*(3), 351–367.
Casasanto, D., & Boroditsky, L. (2008). Time in the mind: Using space to think about time. *Cognition, 106,* 579–593.
Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
Chomsky, N. (1981). *Lectures on government and binding*. Dordrecht: Foris.
Chomsky, N. (1995). *The minimalist program*. Cambridge, MA: MIT Press.
Croft, W. (1998). Mental representations. *Cognitive Linguistics, 9*(2), 151–174.
Croft, W. (2002). *Radical construction grammar: Syntactic theory in typological perspective*. Oxford, UK: Oxford University Press.
Cummins, J. (1981). The role of primary language development in promoting educational success for language minority students. In California State Department of Education (Ed.), *Schooling and language minority students: A theoretical framework* (pp. 3–49). Los Angeles: Evaluation, Dissemination and Assessment Center California State University.
Evans, V. (2004). *The structure of time. Language, meaning and temporal cognition*. Amsterdam: John Benjamins.
Evans, V. (2006). Lexical concepts, cognitive models and meaning-construction. *Cognitive Linguistics, 17*(4), 491–534.
Evans, V. (2007). *A glossary of cognitive linguistics*. Edinburgh, UK: Edinburgh University Press.
Evans, V. (2009). *How words mean*. Oxford, UK: Oxford University Press.
Evans, V., Bergen, B. K., & Zinken, J. (2007). *The cognitive linguistics reader*. London: Equinox.
Evans, V., & Green, M. (2006). *Cognitive linguistics: An introduction*. Edinburgh, UK: Edinburgh University Press.
Fauconnier, G. (1985/1994). *Mental spaces*. Cambridge, UK: Cambridge University Press.
Fauconnier, G. (1997). *Mappings in thought and language*. Cambridge, UK: Cambridge University Press.
Fauconnier, G., & Turner, M. (2002). *The way we think: Conceptual blending and the mind's hidden complexities*. New York: Basic Books.
Fillmore, C. (1975). An alternative to checklist theories of meaning. *Proceedings of the First Annual Meeting of the Berkeley Linguistics Society, 1,* 123–131.
Gallese, V., & Lakoff, G. 2005. The brain's concepts: The role of the sensory-motor system in reason and language. *Cognitive Neuropsychology, 22,* 455–479.
Geeraerts, D. (1997). *Diachronic prototype semantics*. Oxford, UK: Oxford University Press.
Geeraerts, D. (2006). *Cognitive linguistics: Basic readings*. Berlin: Mouton de Gruyter.
Geeraerts, D., & Cuyckens, H. (2007). *The Oxford handbook of cognitive linguistics*. Oxford, UK: Oxford University Press.
Genesee, F. (2001). Bilingual first language acquisition: Exploring the limits of the language faculty. *Annual Review of Applied Linguistics, 21,* 153–168
Gentner, D., & Gentner, D. R. (1982). Flowing waters or teeming crowds: Mental models of electricity. In D. Gentner & A. Stevens (Eds.), *Mental models* (pp. 99–129). Hillsdale, NJ: Lawrence Erlbaum Associates Inc.
Gentner, D., Imai, M., & Boroditsky, L. (2002). As time goes by: Evidence for two

systems in processing space time metaphors. *Language and Cognitive Processes, 17*(5), 537–565.

Gibbs, R. W. (2006). Why cognitive linguists should care more about empirical evidence. In M. González-Márquez, I. Mittelberg, S. Coulson, & M. J. Spivey (Eds.) *Empirical methods in cognitive linguistics* (pp. 2–18). Amsterdam: John Benjamins.

Goldberg, A. (1995). *Constructions: A construction grammar approach to argument structure*. Chicago: Chicago University Press.

Goldberg, A. (2006). *Constructions at work: The nature of generalization in language*. Oxford, UK: Oxford University Press.

González-Márquez, M., Mittelberg, I., Coulson, S., & Spivey, M. J. (Eds.). (2006). *Empirical methods in cognitive linguistics*. Amsterdam: John Benjamins.

Grady, J. (1997). *Foundations of meaning*. Unpublished doctoral thesis, Linguistics Department, U.C., Berkeley.

Jaeger, J., & Ohala, J. (1984). On the structure of phonetic categories. *Proceedings of the 10th Annual Meeting of the Berkeley Linguistics Society* (pp. 15–26). Berkeley, CA: Berkeley Linguistics Society.

Lakoff, G. (1977). Linguistic gestalts. *Papers from the 13th Regional Meeting of the Chicago Linguistics Society, 13,* 236–287.

Lakoff, G. (1987). *Women, fire and dangerous things: What categories reveal about the mind*. Chicago: University of Chicago Press.

Lakoff, G. (1990). The invariance hypothesis: Is abstract reason based on image-schemas? *Cognitive Linguistics, 1*(1), 39–74.

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 for western thought*. New York: Basic Books.

Lakoff, G., & Thompson, H. (1975). Introduction to cognitive grammar. *Proceedings of the 1st Annual Meeting of the Berkeley Linguistics Society* (pp. 295–313). Berkeley, CA: Berkeley Linguistics Society.

Lakoff, G., & Turner, M. (1989). *More than cool reason: A field guide to poetic metaphor*. Chicago, IL: University of Chicago Press.

Langacker, R. (1978). The form and meaning of the English auxiliary. *Language, 54,* 853–882.

Langacker, R. (1987). *Foundations of cognitive grammar, Volume I*. Stanford, CA: Stanford University Press.

Langacker, R. (1991a). *Foundations of cognitive grammar, Volume II*. Stanford, CA: Stanford University Press.

Langacker, R. (1991b). *Concept, image, symbol: The cognitive basis of grammar* (2nd ed.) Berlin: Mouton de Gruyter.

Langacker, R. (1999). *Grammar and conceptualization*. Berlin: Mouton de Gruyter.

Langacker, R. (2000). A dynamic usage-based model. In M. Barlow & S. Kemmer (Eds.), *Usage-based models of language*. Stanford, CA: CSLI Publications.

Langacker, R. (2008). *Cognitive grammar: A basic introduction*. Oxford, UK: Oxford University Press.

Levinson, S. (2003). *Space in language and cognition*. Cambridge, UK: Cambridge University Press.

Montague, R. (1970). Universal grammar. *Theoria, 36,* 373–398.

Montague, R. (1973). The proper treatment of quantification in ordinary English.

In K. Hintikka, E. Moravcsik, & P. Suppes (Eds.), *Approaches to natural language* (pp. 221–242). Dordrecht: Reidel.

Núñez, R., & Sweetser, E. (2006). With the future behind them: Convergent evidence from Aymara language and gesture in the crosslinguistic comparison of spatial construals of time. *Cognitive Science, 30*(3), 401–450.

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 investigation of language and thought* (pp. 157–191). Cambridge, MA: MIT Press.

Talmy, L. (1975). Semantics and syntax of motion. In J. P. Kimball (Ed.), *Syntax and semantics 4* (pp. 181–238). New York: Academic Press.

Talmy, L. (1978). Figure and ground in complex sentences. In J. Greenberg, C. Ferguson, & J. Moravcsik (Eds.), *Universals of human language, Volume 4* (pp. 221–242). Stanford, CA: Stanford University Press.

Talmy, L. (2000). *Toward a cognitive semantics*. Cambridge, MA: MIT Press.

Taylor, J. (2003). *Linguistic categorization* (3rd ed.). Oxford, UK: Oxford University Press.

Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard University Press.

Tomasello, M. (2003). *Constructing a language*. Cambridge, MA: Harvard University Press.

Tomasello, M. (2008). *Origins of human communication*. Cambridge, MA: MIT Press.

Thierry, G., Athanasopoulos, P., Wiggett, A., Dering, B., & Kuipers, J-R. (2009). Unconscious effects of language-specific terminology on preattentive color perception. *Proceedings of the National Academy of Sciences of the USA*, 106/11, 4567–4570.

Tyler, A., & Evans, V. (2001). Reconsidering prepositional polysemy networks. *Language, 77*(4), 724–765.

Tyler, A., & Evans, V. (2003). *The semantics of English prepositions: Spatial scenes, embodied meaning and cognition*. Cambridge, UK: Cambridge University Press.

Varela, F., Thompson, E., & Rosch, E. (1991). *The embodied mind*. Cambridge, MA: MIT Press.