

Frame Semantics as a framework for describing polysemy and syntactic structures of English and German motion verbs in contrastive computational lexicography

Hans C. Boas¹
ICSI/UC Berkeley

This paper addresses the question of how to account for verbal polysemy from a contrastive point of view. By examining the syntactic and semantic distribution of arguments of a selected number of English and German motion verbs, I intend to demonstrate the usefulness of Fillmore's (1982) Frame Semantics for describing verbal argument realization patterns across languages. In this connection it will be shown that frame-semantic descriptions offer a unified way of relating the full range of lexical units² that instantiate the same semantic concept. In addition to these theoretical considerations, practical applications of the frame-semantic approach to lexical organization are discussed.

1. Polysemy of English and German motion verbs

The data in (1) – (2) illustrate a small range of senses associated with the motion verbs *run* and *walk* expressed in terms of distinct syntactic argument realization patterns. In (1a), *run* is used in a Self-motion sense to describe a situation in which a Self-mover (*Julie*) arrives at a Goal (*the store*) as the result of her moving under her own power.³ In (1b), *run* is used in a Caused-motion sense to describe a situation in which an Agent (*Julie*) causes a Theme (*Pat*) to end up in a location, in this case a Goal (*off the street*).

- (1) a. Julie ran to the store.
b. Julie ran Pat off the street.
- (2) a. Rod walked to the door.
b. Rod walked Melissa to the door.

The semantics of *walk* in (2a) is similar to the semantics of *run* in (1a) in that it describes the motion of a Self-mover (*Rod*) towards a Goal (*the door*). Following the terminology developed by Johnson et al. (2001), I classify the usages of *run* and *walk* in (1a) and (2a) as Self-motion. *Walk* differs from *run* in two respects. First, the manner of motion expressed by *walk* is of a slower nature than that expressed by *run*.⁴ Second, the semantics of *walk* in (2b) differs from the semantics of *run* in (1b) in terms of contact between the two event participants and their relation to each other. That is, whereas *run* in (1b) incorporates a notion of force, (2b) does not. In contrast to the Caused-motion semantics attributed to *run* in (1b), the Cotheme semantics associated with the use of *walk* in (2b) implies that the two event participants (i.e., frame elements), *Rod* (the Self-mover) and *Melissa* (the Cotheme), started walking together from an unmentioned common Source along an unmentioned Path to their final destination, the Goal (*to the door*).

In German, the basic types of situations described by *run* and *walk* in (1a) and (2a) are typically expressed by *rennen* and *gehen*, respectively. (3a) illustrates that the basic Self-motion sense of *rennen* is the translation equivalent of the basic Self-motion sense of *run* in (1a). Note, however, that although the basic Self-motion sense of *run* shows considerable semantic and syntactic overlap with the basic Self-motion senses of *rennen*, there is no such overlap between *run* in (1b) and *rennen* in (3b).

- (3) a. Tina rannte zum Geschäft.
Tina ran to the store
'Tina ran to the store.'

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² A lexical unit is a word in one of its senses.

³ For the sake of clarity, names of frame elements (i.e., semantic roles) and semantic frames are capitalized.

⁴ The difference in speed between *run* and *walk* is classified by Levin (1993: 265) as a difference in manner of motion. This leads her to classify *run* and *walk* as "manner of motion verbs."

- b. *Tina rannte Enno von der Straße ab.
Tina ran Enno from the street off
- c. Tina drängte Enno (beim Rennen) von der Straße ab.
Tina pushed Enno (while running) from the street off
'Tina pushed Enno off the street (while running).'

A comparison between the Caused-motion sense associated with *run* in (1b) and the sentence in (3b) shows that German *rennen* is not conventionally associated with a Caused-motion sense. The phenomenon exemplified by the distribution of *run* and *rennen* in (1b) and (3b) is a case of what has been called “divergence” in recent work on machine translation (cf., e.g., Dorr (1990) and Heid (1994)). Divergences are cases in which different languages use different means to convey a given meaning. In the case of German *rennen*, this means that the translation equivalent of the Caused-motion sense associated with *run* in (1b) is expressed by a different type of verb in German, in this case *abdrängen* in (3c).

A careful comparison of the Caused-motion meaning of *run* in (1b) with the meaning conveyed by *abdrängen* in isolation in (3c) shows that the semantics of the two verbs do not exhibit an exact overlap. That is, *abdrängen* without further specifications does not encode the manner in which the Theme (i.e., *Enno* in (3c)) has been caused to move to its end location. Information about the manner in which the caused-motion activity took place must be supplied by a separate phrase *beim Rennen*.

The comparison between the sentences in (1) and (3) shows that English and German verbs may differ with respect to how the semantics of Caused-motion is lexicalized. Whereas English may supply its motion verbs with a specific syntactic frame to express Caused-motion semantics, German does not allow for such an option with *rennen*. The language provides a different type of verb to express Caused-motion and leaves open the option of specifying the particular manner in which it happened. Building on Talmy’s (1985) terminology from work on motion expressions, I refer to the type of realization of Caused-motion semantics exemplified by *run* in (1b) as construction-framed semantics. That is, the abstract semantic concept of Caused-motion in (1b) is lexicalized in terms of a construction specific syntactic frame occurring with the same verb as the basic sense, i.e., *run*. German *abdrängen* in (3c) is an example of what I refer to as verb-framed semantics. In this case, the caused-motion semantics is not lexicalized in terms of a specific syntactic frame occurring with the same lexical unit expressing the basic sense. Instead, it is a lexicalized concept inherent to the semantics of a different lexical unit, in this case *abdrängen*.⁵

Turning to the German translation equivalents of the two senses of *walk* in (2) above note that the use of *gehen* in (4a) exhibits the same basic Self-motion sense as *walk* in (2a). A comparison between (2a) and (4a) illustrates that in contrast to *walk* which is associated with a construction-framed Cotheme semantics, *gehen* does not exhibit this pattern. Instead, German forces the use of a different verb, namely *begleiten*, in (4c), to express the Cotheme semantics exhibited by *walk* in (2b).

- (4) a. Bernd ging zur Tür.
Bernd walked to the door
'Bernd walked to the door.'
- b. *Bernd ging Anna zur Tür.
Bernd walked Anna to the door
- c. Bernd begleitete Anna zur Tür.
Bernd accompanied Anna to the door
'Bernd accompanied Anna to the door.'

The difference in lexicalization patterns of Cotheme semantics in (2) and (4) shows parallel properties to the differences in lexicalization patterns of Caused-motion semantics observed above in (1) and (3). That is, whereas the Cotheme semantics is lexicalized in terms of a construction-framed semantics with *walk*, German chooses to lexicalize the translation equivalent in terms of a verb-framed semantics by employing the verb *begleiten* (cf. (4c)).

This section has shown that English and German motion verbs may differ with respect to how abstract semantic concepts are lexicalized. It has been shown that English and German motion verbs display different types of polysemy networks, i.e., they are not all associated with an equal amount of different semantic concepts. The following section addresses the issue of describing the similarities and differences exhibited by *run*, *walk*, *rennen*, and *gehen* with a set of devices that allows for cross-linguistic abstractions across different lexicalization patterns.

⁵ To be more precise, the Caused-motion semantics is already lexicalized in the German verb *drängen*. In this case, the separable prefix *ab* serves as a preverb responsible for specifying the path and goal of the caused-motion semantics.

2. The role of Frame Semantics in contrastive lexicography

Most traditional approaches to lexicographic descriptions regard the notion of headword as central to the organization of dictionaries and list the different senses associated with a headword in a lexical entry. For each of the individual senses associated with a headword, traditional dictionaries list information about its meaning, its usage, register, etc. (cf. Atkins 1995: 26). Whereas this approach to documenting polysemy of lexical units typically centers around a dictionary example for each sense of a word in order to exemplify the context in which it is used, here I explore an alternative type of lexical organization for bilingual polysemy structures of the type illustrated in (1)-(4) above. Adopting ideas from previous work on lexical organization (e.g., Fillmore & Atkins (1992), Heid (1994), Atkins (1995), and Fontenelle (2000)), I propose that the different senses of English and German motion verbs are related to each other in terms of frame semantic descriptions.

2.1 Frame Semantics

Charles Fillmore's (1982) Frame Semantics centers around the idea that in order to understand the meanings of words in a language one must first have knowledge of the semantic frames, or conceptual structures, that underlie their usage. Frames serve as a type of cognitive structuring device that provide the background knowledge and motivation for the existence of words in a language as well as how they are used in discourse.⁶ Fillmore's most often cited example of a frame is the commercial transaction frame which involves a scenario with different frame elements such as Buyer, Seller, Goods, and Money which participate in a commercial transaction. In this frame,

"one person acquires control or possession of something from a second person, by agreement, as a result of surrendering to that person a sum of money. The needed background requires an understanding of property ownership, a money economy, implicit contract, and a great deal more." (Fillmore & Atkins 1992: 78)

Lexical units belonging to this frame are verbs such as *buy*, *sell*, *spend*, or *charge*, nouns such as *price*, *goods*, or *money*, and adjectives such as *cheap* and *expensive*. While all of these lexical units belong to the same semantic frame (the commercial transaction frame), a specific choice of a lexical unit reveals a particular perspective from which the commercial transaction frame is viewed. Consider the following examples.

- (5) a. Miriam bought a book (from Collin) (for \$20).
 b. Collin sold a book (to Miriam) (for \$20).

Both sentences in (5) describe the same commercial transaction event but from different perspectives. Whereas (5a) views the transaction from the viewpoint of the buyer, (5b) views the transaction from the perspective of the seller. The main point is that the two verbs *buy* and *sell* both refer to the same underlying frame and evoke the same type of underlying knowledge about commercial transaction events. Note also, that the syntactic realization of the individual frame elements differs depending on the type of verb employed to describe the commercial transaction event. Whereas *buy* requires syntactic realization of the frame elements Buyer and Goods, the Seller and the Price do not have to be realized syntactically as is indicated by parentheses. *Sell* requires the Seller and the Goods to be realized at the syntactic level, but leaves the realization of the Buyer and the Price an option.

A complete frame semantic description of a lexical unit belonging to the commercial transaction frame includes not only information about the types of frame elements that make up the underlying frame, but also information about how these frame elements are realized at the syntactic level. For example, the lexical entry for the verb *buy* includes information about the fact that the frame element Buyer has to be realized as a NP in subject position, whereas the frame element Goods has to be realized as a NP in object position. The entry also records the fact that the frame elements Seller and Price may optionally occur in postverbal position.

Capturing semantic and syntactic information about lexical units in terms of frame semantic descriptions facilitates the creation of inventories of lexical units according to the types of frames to which they belong. This type of lexical organization differs from that of traditional dictionaries in that in a frame semantics dictionary the "concept of 'headword' becomes obsolete, for the whole frame is the definiendum," as Atkins (1995: 27) points out. Note also that the frame-semantic approach to dictionary organization has practical advantages for the everyday dictionary user. By switching the

⁶ For a detailed survey of the main concepts underlying Frame Semantics, see Petruck (1996).

definitional burden from the level of the individual sense listed under the category of a headword to a frame-semantic level, it becomes easier to understand the entire structured background of knowledge that underlies the usage of a word. Since the description of a semantic frame also includes a list of the words that evoke the frame, the dictionary user has access to the interrelationships that hold between the class of words belonging to a common semantic frame. This means that understanding the meaning of a single word based on a frame semantic description facilitates a more direct understanding of all of the words belonging to the same frame.⁷

The next section illustrates the advantages of a frame-semantic approach to lexical organization for describing the different polysemy structures of English and German motion verbs discussed above.

2.2 Describing contrastive polysemy structures

We are now in a position to contrast systematically the polysemy structures of English and German motion verbs on the basis of frame semantic principles. In our frame semantic treatment of the data in (1)-(4), there is one important feature that sets our approach apart from traditional approaches to bilingual lexicography. That is, our lexico-semantic descriptions do not refer to the notion of headword as the structuring element of our dictionary. This means that instead of referring to a specific sense of a headword only, the description of a lexical unit will be stated in terms of a frame as structuring device. By turning to this alternative level of lexical organization, it becomes possible to make higher order generalizations about meanings of words across different languages.

In order to tease apart the relationships that hold between the individual senses of the verbs surveyed in section 1, consider first the “basic” senses of English *run* and *walk*. As pointed out above, the usages in (1a) and (2a) are instances of Self-motion in which “a living being (the Self-mover) moves under its own power in a directed fashion.” (Johnson et al. (2001: 148)) Using the terminology of Johnson et al. (2001), we identify in (6) the frame elements belonging to the Self-motion frame as follows. The frame element Self-mover is a living being which moves under its own power (i.e., *Julie* in (6a) and *Rod* in (6b)). The frame element Goal gives information about where the Self-mover ends up as a result of its motion (i.e., *to the store* in (6a) and *to the door* in (6b)).⁸

- (6) a. Julie ran to the store.
b. Rod walked to the door.

Capturing the information about the distribution of frame elements of the self-motion frame as they are realized by *run* and *walk* in (6) results in partial sets of simplified frame-semantic descriptions as in (7).⁹

- (7) Partial frame-semantic descriptions of Self-motion senses of *run* and *walk*

- | | | |
|---------------------------------------|--------------|--------|
| a. <u>run</u> _{Self-Motion} | [Self-mover | Goal] |
| | NP | PP |
| b. <u>walk</u> _{Self-Motion} | [Self-mover | Goal] |
| | NP | PP |

The simplified partial frame-semantic descriptions in (7) identify each verb as belonging to the Self-motion frame and give information about the syntactic realization of the two frame elements Self-mover and Goal. Whereas Self-motion is realized as an NP, the Goal is realized as a PP with both verbs. Next, consider the corresponding German verbs *rennen* and *gehen* in (3a) and (4a), repeated in

⁷ By including sets of example sentences exemplifying the use of a word in context, the dictionary user also has access to information about the entire range of syntactic realization patterns of frame elements. In the Berkeley FrameNet database (for detailed descriptions, see Lowe et al. (1997), Baker et al. (1998), Fillmore & Atkins (1998), and Johnson et al. (2001)), each lexical entry includes corpus examples from the British National Corpus that have been annotated with semantic tags representing frame elements (see Gahl (1998)).

⁸ Besides Self-mover and Goal, this frame also includes the frame elements Source, Path, Manner, Distance, and Area. For more details, see Johnson et al. (2001: 148 – 150).

⁹ Note that in a full-fledged frame-semantic description of FrameNet, lexical entries include the entire range of corpus-attested syntactic patterns exhibited by a lexical unit, including information about how frame elements are realized by each syntactic pattern. They also include semantically annotated corpus sentences serving as examples (see Lowe et al. (1997), Baker et al. (1998), and [http://www.icsi.berkeley.edu/~framenet] for details).

(8), and their corresponding simplified partial frame-semantic descriptions in (9) identifying them as belonging to the Self-motion frame.

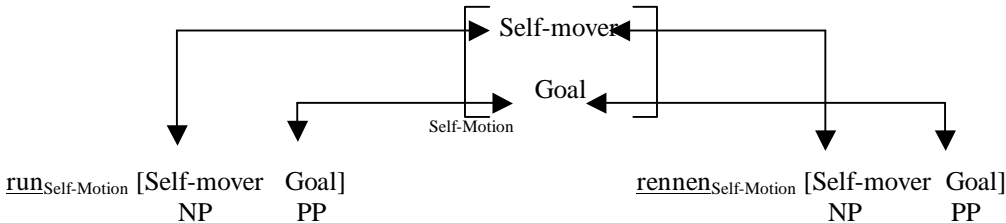
- (8) a. Tina rannte zum Geschäft.
- b. Bernd ging zur Tür.

(9) Partial frame-semantic descriptions of Self-motion senses of *rennen* and *gehen*

- a. rennen_{Self-Motion} [Self-mover Goal]
 NP PP
- b. gehen_{Self-Motion} [Self-mover Goal]
 NP PP

A comparison of the partial frame-semantic descriptions in (7) and (9) shows that all four verbs evoke the Self-motion frame and exhibit the same type of syntactic realization of the frame elements Self-mover and Goal. Taking our observations to a higher level of abstraction, we arrive at a generalization about how the frame elements belonging to the Self-motion frame are realized by the four verbs in the two languages as in (10).

(10) The Self-motion frame as a common structuring device for English and German



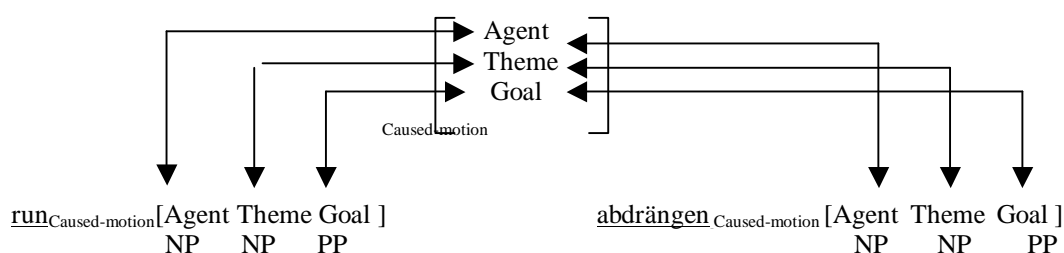
The top of the diagram in (10) contains a fragment of the Self-motion frame and illustrates how the individual English and German verbs instantiate the respective frame elements of that frame. The arrows connecting the verb’s individual frame semantic descriptions with the frame elements of the underlying Self-motion frame illustrate the mapping between the frame elements of the Self-motion frame and their syntactic realizations in the two languages. A comparison of the mapping properties between the frame elements of the Self-motion frames and *run* and *gehen* in (10) shows that the two verbs have identical mapping properties, i.e., they map the Self-mover as a preverbal NP and the Goal as a postverbal PP. Similar observations can be made for the mapping of frame elements between *walk* and *gehen* discussed in (7b) and (9b) above.

So far, it has been demonstrated how the frame elements of the Self-motion frame are realized in similar ways by *run*, *walk*, *gehen*, and *rennen*. The next section turns to a discussion of cases in which verbs from different languages exhibit different types of mapping of frame elements due to a difference in lexicalization patterns of semantic frames.

In section 1 it was shown that whereas *run* is associated both with a Self-motion and a Caused-motion frame, German *rennen* does not display a Caused-motion use parallel to that of *run*. Instead, German offers a verb-framed lexicalization of Caused-motion (i.e., *abdrängen*) to describe those types of situations that are expressed by the construction-framed Caused-motion sense of *run*. Adopting Johnson et al.’s (2001: 132) terminology to describe the Caused-motion frame, we can say that “an Agent causes a Theme to undergo directed motion” which may be “described with respect to a Source, Path and/or Goal.” The frame elements relevant for describing the Caused-motion senses of *run* and *abdrängen* include Agent, Theme, and Goal.¹⁰ The following diagram illustrates how these three frame elements are realized by the Caused-motion sense of *run* and the Caused-motion sense of *abdrängen*.

¹⁰ Other frame elements included in the Caused-motion frame are Source, Path, Distance, and Area (cf. Johnson et al. (2001: 131-133)).

(11) The Caused-motion frame as a common structuring device for English and German



- (12) a. Julie ran Pat off the street.
 b. Tina drängte Enno von der Straße ab.
 Tina pushed Enno from the street off
 ‘Tina ran Enno off the street.’

Note that the frame-semantic descriptions of the Caused-motion senses of *run* and *abdrängen* in (11) express similar types of scenarios as exemplified in (12). When comparing the similarities and differences between the two diagrams in (10) and (11), we see that the notion of semantic frame offers a convenient way of comparing and contrasting distributions of semantic concepts among different lexical units.¹¹ In particular, our frame-semantic descriptions give information about the use of *run* to express both Self-motion as well as Caused-motion, and the use of *gehen* only to express Self-motion.¹² The advantage of organizing a bilingual dictionary along frame-semantic concepts should be clear by now. For example, users of bilingual dictionaries requiring information about how to express a specific semantic concept in a different language, are offered multiple ways of gaining access to the information.

The first possibility includes looking up a specific word in the target language in order to see whether it may be used in the same pattern as the word in the source language. In the case of Caused-motion, the dictionary user might expect that because *run* and *rennen* are associated with similar Self-motion senses, the two verbs share a similar usage pattern when it comes to expressing Caused-motion. By looking up the caused-motion sense of *run*, the dictionary user would then get to a description of the Caused-motion frame and subsequently discover that there is no Caused-motion equivalent for *rennen* but that he must use *abdrängen*. In this case, a frame-semantic description underlying a diagram such as (11) allows the dictionary user to understand more easily the meaning of *abdrängen*, because it is described in terms of the same type of underlying structuring devices, namely the Caused-motion frame and its frame elements. Furthermore, by providing example sentences such as (12) which include information about how the given sense of a word is used in context, the dictionary user gains full access to usage examples from both languages.

The second way of accessing the desired information needed to express a given situation has to do with cases in which a dictionary user is not completely sure about what types of words to use in either language. Here, the frame semantic dictionary serves as a combination of dictionary and thesaurus. The user is able to consult the frame-dictionary and look up lists of descriptions of semantic frames including the types of words belonging to the frame. Based on the definition of frames and in combination with examples illustrating the use of the individual words belonging to the frame, the dictionary user can pick the word which best describes the situations in mind.

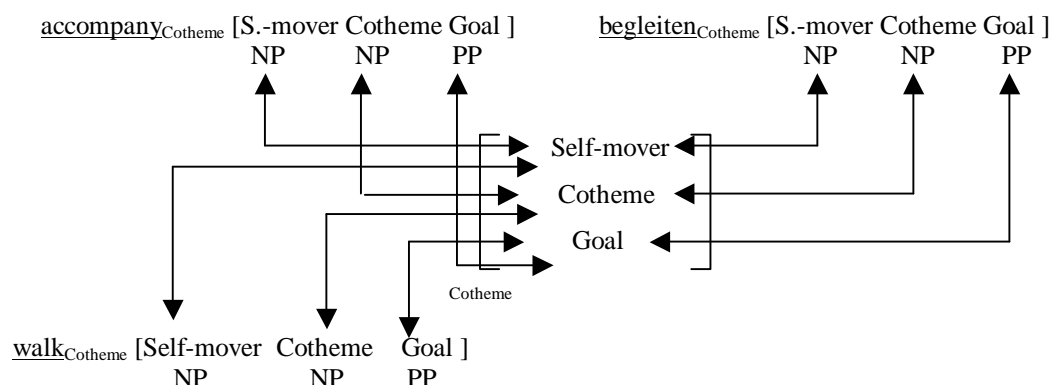
Take, for example, our comparison of *walk* and *gehen* in (2b) and (4b) above. We have seen that whereas *walk* is associated with a construction-framed Cotheme semantics, *gehen* is not. To be more precise, whereas *walk* is associated with a sense describing the motion of two distinct objects (Self-mover and Cotheme) moving towards a goal, *gehen* does not allow for such a construction-framed

¹¹ Note that *abdrängen* by itself does not characterize in detail the manner in which the Caused-motion is carried out. That is, it only lexicalizes the force dynamics of Caused-motion (pushing). In contrast, *run X off* does not only lexicalize the abstract force dynamic semantics of Caused-motion in terms of a syntactic frame, but it also gives information about the manner in which the Caused-motion activity is carried out.

¹² The proposals put forward in this paper are in contrast to many generative accounts of verbal polysemy such as Jackendoff (1972), Pustejovsky (1995), and Rappaport Hovav & Levin (1998). These accounts typically suggest that verb meanings should be split up into different verb class clusters and subsequently reduced to include only very minimal lexical semantic information. In order to arrive at multiple verb meanings, these accounts propose to employ different sets of generative mechanisms to ensure the generation of different verb senses and their related argument realization patterns from underspecified minimal lexical entries. With respect to the range of application of generative accounts of verb meaning, Weigand (1998: viii) points out that “the generative approach (...) reaches its limits in so far as the rule-governed mode-oriented approach, in principle, cannot tackle all the varieties and idiosyncrasies of language use and therefore remains restricted to a subset of examples.”

association with the semantics of the Cotheme frame. Instead, it calls for a different verb, *begleiten*, to express the same type of Cotheme semantics. This is illustrated by the following diagram.

- (13) The Motion-Cotheme frame as a common structuring device for English and German



- (14) a. Rod walked Melissa to the door.
 b. Rod accompanied Melissa to the door.
 c. Bernd begleitete Anna zur Tür.
 ‘Bernd accompanied Anna to the door.’

At its center, diagram (13) contains a partial set of frame elements from the Motion-Cotheme frame.¹³ The arrows linking the frame-descriptions of the individual verbs to the Motion-Cotheme frame indicate that each of the three verbs are associated with the semantics of the Motion-Cotheme frame, as well as how the frame elements are realized by each verb respectively.

Coming back to the problems that a dictionary user is faced with, we might consider a German speaker who wishes to describe a Motion-Cotheme scenario. By consulting the frame-index, the speaker looks up the Motion-cotheme frame description and sees two possibilities for expressing such a scenario in English. This is the point where example sentences exemplifying the usage of the respective words in the frame become crucial. For example, when choosing between the construction-framed lexicalization pattern of the Motion-Cotheme frame with *walk* or the verb-framed lexicalization pattern of the Motion-Cotheme frame with *accompany*, the dictionary user may want to emphasize the fact that the Motion-Cotheme scenario was carried out by means of walking. In this case, he chooses the construction-framed lexicalization of the Motion-Cotheme semantics with *walk* (cf. (14a)). In contrast, if the speaker chooses to remain silent about the manner of motion, he chooses the verb-framed lexicalization of the Motion-Cotheme semantics with *accompany* (cf. (14b)) which exhibits the same type of Motion-Cotheme lexicalization pattern as *begleiten* (i.e., verb-framed) (cf. (14c)).¹⁴

The third possibility of gaining access to information about how a specific concept is expressed in a language is by making reference to individual frame elements. For example, when the dictionary user is interested in expressing information about a person’s motion, he may look up the definition for the frame element Self-mover. Based on this definition, the dictionary user has automatic access to all semantic frames that include this frame element in their frame description. For the example frames discussed in this paper, this means that referring to Self-mover offers direct access to the lexical items belonging to the Self-motion (e.g., *run*, *walk*, *rennen*, and *gehen*), Caused-motion (e.g., *run*, *walk*, and *abdrängen*), and Cotheme-motion (e.g., *walk*, *accompany*, and *begleiten*) frames, among many others.

Offering multiple ways of accessing information about the distribution of lexical items in a bilingual dictionary demonstrates the usefulness of a frame-semantic approach for lexical organization. In contrast to traditional dictionaries employing the notions of headword and isolated examples to guide the dictionary user in finding the proper translation equivalent for a specific sense of a word, bilingual

¹³ The frame elements of this frame include Self-mover, Cotheme, Source, Path, Goal, Manner, Distance, and Area (cf. Johnson et al. (2001: 133–135).

¹⁴ Note that although all three verbs *walk*, *accompany*, and *begleiten* are all associated with Motion-Cotheme semantics, they describe the semantics of the Motion-Cotheme from different angles. That is, *accompany* and *begleiten* do not explicitly mention the manner of motion, whereas the Cotheme use of *walk* makes explicit reference to the manner of motion. According to Snell-Hornby’s (1983: 33-35) classification of verb descriptivity, verbs like *accompany* and *begleiten* exhibit a variable degree of descriptivity, whereas the Cotheme sense of *walk* exhibits a low degree of descriptivity. In this connection, see also Leisi’s (1975:77) discussion of “expressive verbs.”

dictionaries employing the notion of semantic frames facilitate the finding and understanding of lexical items because the common device for understanding meaning is the whole semantic frame.

Using semantic frames as structuring devices also facilitates the learning of polysemous structures since the types of polysemy exhibited by a word in the source language might not be mirrored by a similar polysemy network of the corresponding word in the target language.¹⁵ By constructing bilingual dictionaries along frame semantic guidelines and supplementing them with a large number of corpus examples exemplifying the various usages of a lexical item in context, it may become possible to circumvent a major problem for users of bilingual dictionaries pointed out by Snell-Hornby (1983: 215): “It is perhaps the stumbling-block of the conventional bilingual dictionary that it operates with words in isolation, yet functions according to the principle of working equivalence, whereby a context would be required.”

3. Practical applications for bilingual computational lexicography and educational tools

Employing frame-semantic principles for the construction of bilingual dictionaries requires effective means of representing vast amounts of lexical information. Rather than being confined to traditional representation tools such as printed materials, a dictionary design employing an electronic database architecture will facilitate the representation and looking up of lexical units, their frame semantic descriptions, and semantic relationships among frames (e.g., inheritance and blending (cf. Fillmore & Atkins (1998)). A basis for building such a bilingual electronic database incorporating the main ideas proposed in section 2 is the mono-lingual Berkeley FrameNet database for English.¹⁶ Without going into the details of its full architecture (see Lowe et al. (1997) and Baker et al. (1998) for details), I will briefly outline how some of its features may be incorporated into a computer-based bilingual frame-semantic database.¹⁷

At the center of such a database is the description of a frame, its frame elements, and the lexical units belonging to that frame. For each lexical unit of a language, a lexical entry contains a “traditional” definition combined with a frame semantic description with an exhaustive list of the semantic and syntactic combinatorial properties. In addition, the lexical entry includes annotated corpus examples exemplifying the syntactic valence patterns in which the frame elements occur. As mentioned above, the database user has the possibility to access information about translation equivalents of a lexical item in different ways. The first option consists of an alphabetic list of abstract frames that contains a description of each frame as well as its frame elements and the lexical units for both languages that participate in this frame. By clicking on a frame name, the user is informed of the frame description and may then proceed to gather information about individual English and German lexical items that are members of this frame.¹⁸

The second option of accessing information starts from an alphabetical list containing all lexical units (different lists for English and German). By clicking on a lexical unit, the user will see its lexical entry and may proceed from there either directly to the corresponding lexical unit(s) of the other language or to the full description of the semantic frame. At the level of semantic frames, the user is informed of all of the lexical units from both languages that participate in the frame and may choose the corresponding lexical item of the other language from there.

Under the third option, as outlined in section 2.2, the dictionary user may access information about lexical items and their translation equivalents by choosing a frame element from an alphabetical list of frame elements in order to gain access to an overview of all of the frames in which the frame element occurs. From this list, individual frame descriptions may be accessed for an overview of lexical items that instantiate this frame element.

The various ways of accessing frame-semantic descriptions of lexical items and their translation equivalents presented in this section constitute only a small set of options for representing lexical information in a bilingual frame-semantic database. The important point is that in a database that is as

¹⁵ See, for example, our discussion of *run* and *rennen* in section 1. There we have seen that *run* is associated with both a Self-motion sense as well as a Caused-motion sense. In contrast, *rennen* is only associated with a Self-motion sense.

¹⁶ See <http://www.icsi.berkeley.edu/~framenet>

¹⁷ For similar proposals, see Fontenelle (2000) on bilingual lexical data bases combining frame semantics and Meaning-Text Theory (Mel'cuk et al. (1984)). Heid (1994) presents an outline of the DELIS project which is aimed at developing lexicographic tools for corpus-based lexicography. Within this project, Frame Semantics is employed to develop semantic descriptions of lexicon fragments for English, French, Italian, Danish, and Dutch lexical items. The proposals put forward in this paper share many theoretical and practical considerations underlying the architecture of DELIS.

¹⁸ An example of this is the simplified representation in (13) to which the dictionary user would get after clicking on “Motion-Cotheme.” In addition to information regarding which lexical units belong to this frame, the database user may also have access to full-fledged frame-semantic descriptions of the individual lexical items by clicking on them.

flexible as the type outlined above, the possibilities for accessing different types of relevant information is manifold. Moreover, dealing with polysemous structures across languages is facilitated because semantic frames offer a convenient way of structuring polysemy in terms of a unified descriptive vocabulary.

Finally, consider the advantages a frame-semantic bilingual database can offer to the field of second language acquisition, especially with respect to educational tools needed for foreign language instruction. Traditional learning tools such as printed textbooks are limited in the size and scope of exercises they offer to students. Incorporating a bilingual frame-semantic database into electronic learning tools for foreign language pedagogy would not only offer students access to more efficient ways of learning vocabulary by being able to relate to a common structuring device, i.e., semantic frames. It would also give foreign language teachers the opportunity to design individual exercises for students incorporating different types of pedagogically relevant information from the database that are needed for specific learning tasks not covered by the standard learning software employed in the classroom. Lastly, with semantically annotated example sentences from corpora, students would be offered the opportunity of learning the vocabulary of a foreign language in context. Such an opportunity would allow students to increase their understanding of the usage patterns of the respective lexical items as opposed to simply learning vocabulary by memorizing lists consisting of only “words” and their translation equivalents.¹⁹

4. Summary

This paper has outlined the theoretical and practical advantages of adopting Fillmore’s Frame Semantics for the description of different types of polysemy networks in English and German.²⁰ By examining the syntactic and semantic distribution of arguments of a selected number of English and German motion verbs, this paper has shown how semantic frames can be employed as unified structuring devices for bilingual dictionaries and databases. By describing lexical units with respect to their underlying semantic frames, there is no need for the traditional notions of ‘headword’ or ‘basic sense’ as organizational devices for structuring the lexicon. Frame Semantics can thus be regarded as a true semantic metalanguage for both linguistic theory and applied lexicography, because it refers to scenarios typically shared by speakers of all languages.

5. References

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¹⁹ Since lexical entries contain semantically annotated corpus examples showing how a lexical item is used in context, a frame-semantic database would also greatly increase what Neubert (2000) calls the “five parameters of translational competence.” These include “(1) *language competence*, (2) *textual competence*, (3) *subject competence*, (4) *cultural competence*, and, last but not least, (5) *transfer competence*.” (Neubert (2000: 6))

²⁰ The full range of polysemy networks of English and German motion verbs is, of course, much larger. Creating inventories of the frame semantic descriptions of these verbs and comparing their different sense distributions is a task that is far beyond the limits of this paper. For an example of a detailed study discussing the polysemy networks of two related verbs, see Fillmore & Atkins (2000) for a comparison of English *crawl* and French *ramper*.

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