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Semantic Frames for Foreign Language Education: Towards a German frame-based online dictionary

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ABSTRACT: This paper presents a pilot study on the usability of a novel on-line frame-based lexicon for foreign language education, G-FOL (German Frame-semantic Online Lexicon). It compares students using G-FOL with students not using G-FOL to determine whether there is any significant advantage for students using the frame-based approach to vocabulary acquisition. The results of our pilot study indicate across-the-board higher scores among those students using the G-FOL for vocabulary learning.

KEYWORDS: Frame Semantics, Foreign Language Education, Vocabulary Acquisition, German, On-line Lexicon.

Introduction

One of the great difficulties when learning a foreign language involves learning new words, concepts, and culturally appropriate norms (SNELL-HORNBY, 1983; NATION, 2001). Without proper words it is impossible to adequately express one's thoughts. Given the importance of knowing the right words it comes as a surprise that the methods for teaching vocabulary have not changed much over the past few decades even though the body of research on the subject has been continually growing (RICHARDS, 1976; KRASHEN, 1989; SCHMITT & MCCARTHY, 1997).

This paper presents a first report on the development of a novel on-line resource for vocabulary acquisition, the German Frame-semantic Online Lexicon (G-FOL), which has been under development at the University of Texas at Austin since 2011. Our goal is to show how using Frame Semantics for the development of a vocabulary learning resource can help students with structuring words and their meanings according to semantic frames, thereby more efficiently arriving at knowledge similar to that of native speakers. Section 1 briefly reviews previous research on pedagogical approaches to vocabulary acquisition. Section 2 offers a short overview of linguistic approaches to structuring the lexicon, most notably Frame Semantics (FILLMORE, 1982), which serves as the theoretical backbone of the G-FOL. Section 3 presents the architecture of the G-FOL and discusses some important differences in mapping word meanings from English to German based on semantic frames. Section 4 reports on the results of a preliminary classroom study seeking to investigate how first year German students using the G-FOL learn new vocabulary in comparison to a control group using traditional resources for vocabulary acquisition. The conclusion summarizes our findings and proposes a set of questions to be answered by future research.

1. Vocabulary acquisition: approaches and resources

Traditionally, research on second language (L2) learning proposed that learners could acquire L2 vocabulary items through rote memorization techniques without explicit teaching. This view is often grounded in the idea that L2 learners do not need to learn the definitions of

each new word, because meanings of L2 words could be deduced from the meanings of words in the surrounding context. If vocabulary was taught explicitly, it was often through memorization of lists of isolated vocabulary items, where words are either in alphabetical order or they are semantically related or thematically related (ZIMMERMAN, 1997; READ, 2004; CHADHA, 2007).[1] This approach, however, has a number of disadvantages at levels above basic proficiency, as pointed out by Folse (2007): First, vocabulary lists offer only limited information, which precludes L2 learners from fully knowing the meanings of words. Second, lists are typically short on important cultural knowledge relevant for using the words appropriately. Finally, learning new words from lists is a rather dull exercise without much structure to it.

More recent proposals suggest that vocabulary should be taught explicitly, to ensure that students have a base for the type of learning described above and that they are aware of subtle differences in meanings of related words.[2] Nation (2001) and others also criticized early teaching methods and suggested that vocabulary be taught through *rich instruction*, which recognizes that beyond the basic dictionary entry for a word's meaning, students should learn (a) meaning extensions, such as connotations and metaphor, (b) collocational and grammatical properties, and (c) lexical relations such as synonymy and antonymy. This type of instruction implicates that vocabulary lists, if used at all, must be highly structured, and that one-to-one glosses must be replaced with detailed meaning descriptions and examples of usage, including information about culturally appropriate usage of words (KRASHEN, 1989; STEELE, 1990; LAUFER, 1990; KRAMSCH, 1993).

To illustrate, consider Atzler's (2011) discussion of words and concepts that differ from language to language or culture to culture. Based on earlier work by Wierzbicka (1997), Atzler discusses the differences in personal relationships between cultures and how they are manifested linguistically in English (L1) and German (L2). She points out that such differences are often difficult to understand for foreign language learners because learners are often not "aware of the culture that is embedded within these lexical items" (2011, p. 3).

One of her prime examples is the meaning and use of the word *friend* among Americans as opposed to the (roughly) corresponding word *Freund* ('friend') by speakers of German. Whereas the English term covers a broad array of personal relationships – someone you know very well, someone you don't know that well, someone who you might have just met and that you consider to be friendly – German speakers tend to make more fine-grained distinctions based on the level of intimacy, friendship, and length of the relationship. Thus, Germans will typically use the word *Freund* ('friend') only for people they have known for a relatively long time and who they feel they can trust. German speakers typically only have a limited and clearly-defined group of people they would address as *Freund*. In contrast, the word *Bekannter* ('acquaintance') is used by German speakers for people that they know in some capacity, but not as well or as intimately as a *Freund*.[3] Based on this example as well as others, Atzler (2011, p. 4) concludes that "such differences (…) are difficult to tease out in list-based approaches to vocabulary teaching, and more culturally nuanced practices must be

[1] For an overview of differences in vocabulary teaching between the grammar translation method, the direct method, the audio-lingual method, and the communicative method, see Atzler (2011, p.28).

[2] For research on depth of vocabulary knowledge, see Nation (1990); for research on vocabulary learning strategies and acquisition, see Ijaz (1986) and Coady (1997); for research on L1 influence on L2 vocabulary, see Laufer (1990) and Swan (1997).

[3] While English also has a similar word *acquaintance*, it is much less commonly used than the word *friend*. In fact, *acquaintance* appears to have a rather neutral if not distancing or negative effect towards the person denoted by it.

explored and implemented." Next, consider what other types of knowledge about words are relevant besides definitional and cultural knowledge.

Nation (2001) proposes a tri-partite split of word knowledge into form, meaning, and usage as summarized by Atzler (2011, p. 13), and each of these aspects is involved with at least six specific types of knowledge speakers ought to know about the word (see Table 1). These factors of word behavior are distinguished between receptive and productive knowledge. For instance, given a vocabulary item, learners must have the receptive knowledge of how it sounds (when heard) and looks (when read), as well as productive knowledge of how it is pronounced and spelled. They must also possess semantic knowledge of the word, including what is included in the concept denoted by the word (for reception) and the range of entities/situations the concept may refer to (for production). Finally, learners must understand the linguistic and sociocultural situations in which a word is used, such as what types of other words occur with the item in question, in order to use the word in the proper grammatical and social contexts. Nation's summary emphasizes the vast range of information learners must obtain in order to produce and understand foreign vocabulary items correctly.

Form	spoken	R	What does the word sound like?
		P	How is the word pronounced?
	written	R	What does the word look like?
		P	How is the word written and spelled?
	word parts	R	What parts are recognizable in this word?
		P	What word parts are needed to express the meaning?
Meaning	form & meaning	R	What meaning does the word form signal?
		P	What word form can be used to express this meaning?
	concept & referents	R	What is included in the concept?
		P	What items can the concept refer to?
	associations	R	What other words does this word make us think of?
		P	What other words could we use instead of this one?
Use	grammatical function	R	In what patterns does the word occur?
		P	In what patterns must we use the word?
	collocations	R	What words or types of words occur with this word?
		P	What words or types of words must we use with this word?
	constraints on use	R	Where, when, and how often would we expect to meet this word?
	(register, frequency,...)	P	Where, when, and how often can we use this word?

Table 1: Components of Word Knowledge (ATZLER, 2011, p. 13)

While many newer textbooks have taken this recent research into account with enriched vocabulary sections and activities, vocabulary teaching remains at risk of being neglected in most current curricula. In our view, this results from a number of challenges, particularly the current emphasis on communicative competence and functionality over rich linguistic knowledge and accuracy. First, there are no clear guidelines as to exactly *how* teachers should apply the ideas of "rich" instruction. If one were to teach all of a word's components of meaning and usage explicitly, there would be little time for other activities. If rich instruction is applied, then it is often an isolated activity inserted randomly in between other unrelated content, and only involves the comparison of two to four lexical items. There is also little help for language instructors in the way of concrete activity templates for rich vocabulary instruction, and this is often just an explicit explanation of differences. Also, today's emphasis on communicative competency leaves teachers with little class time to explicitly teach the cultural knowledge that is encapsulated in a language's vocabulary (SCHMIDT, 1990). This means that most vocabulary learning is done as homework by the

student; however, such isolated learning often proves problematic when students are exposed to new word meanings that express concepts and cultural values different from L1 (see our example of *friend* and *Freund* above). Below, we will show that the vocabulary resources which students must often rely on to complete such at-home activities do not always/easily provide learners with the relevant semantic, grammatical, and pragmatic knowledge. This situation accentuates the need for an easily accessible resource, which readily provides students with more relevant information.

Another challenge for the rich instruction of vocabulary items involves the emphasis on functionality over accuracy in communicative approaches to language learning. Under such an approach, beginning students benefit more from rudimentary knowledge of a large number of vocabulary items and do not need to know all aspects of a word. This stance finds support in how people obtain their first language: only after repeated exposure to a word do speakers have rich knowledge of all the aspects described by Nation (2001). While we fully agree that a large non-rich vocabulary is necessary for communicative competence in beginning learners, we believe that rich presentation of vocabulary items, particularly those which exemplify cross-linguistic differences, should remain a goal of beginning language education. In particular, it is safe to assume that any college instructor agrees that students should possess an awareness of linguistic diversity (both grammatical and cultural). In the strict communicative approach without rich instruction, only those dedicated students who practice the language for years will benefit from full awareness of linguistic differences. However, in practice, the majority of students who enroll in beginning language courses (at least at large public universities) will not continue to work with the language after receiving their needed credits, and will not obtain this awareness (e.g. because they assume that words can be translated directly from English without regard for conceptual or cultural differences). As educators, it should be our goal to teach even the short-term students that words, concepts, and cultures differ greatly. Given this situation, we maintain that there is a place for accuracy in beginning language courses and a need for a resource, which guides students in the identification of important differences between English and other languages.

If students are not always offered sufficient information for acquiring the relevant information about a word's meaning, where should students then turn? Clearly, dictionaries often offer more detailed information about a word's usage and its multiple meanings. However, (mono- and bilingual) print dictionaries do not always offer adequate ways for learning all necessary aspects of a word's meaning and usage. First, they offer no particular organizational pattern except for the traditional alphabetic order. Second, traditional dictionaries often miss fine-grained differences in meaning, as demonstrated by Atkins' (2002) analysis of the entry of *to cook* in the original Collins-Robert English-French Dictionary (CREFD) (ATKINS & DUVAL, 1978), shown below.

cook […] **3** *vt* **(a)** *food* (faire) cuire. (*fig*) **to ~ sb's goose*** faire son affaire à qn, régler son compte à qn; **(b)** (*Brit**: *falsify*) *accounts*, *books* truquer, maquiller.

Figure 1: Partial entry for *cook* in the CREFD first edition

Atkins (2002) points out that the range of nouns occurring in a large corpus such as the British National Corpus is quite varied, including in order of frequency *meal*, *dinner*, *onion*, *supper*, *rice*, *pasta*, *breakfast*, *potato*, *lunch*, *chicken*, etc. The French equivalents *cuire* and *faire cuire* can only be used when the object in English denotes food items such as *onion*, *rice*, *pasta*, *potato*, and *chicken*. However, they cannot be used to translate *to cook* when its object is *meal*, *dinner*, *supper*, *breakfast*, *lunch*, etc., according to Atkins. Based on entries

such as that in Figure 1, Atkins argues that many bilingual dictionaries are in dire need of revisions, largely because they do not split up meanings of words according to their various senses and usage patterns.[4] Such shortcomings are problematic for L2 learners, especially when they are left to their own devices to determine the meanings and usage of words.

A third problem with traditional print dictionaries concerns coverage of primary and extended word senses. In their seminal paper, Fillmore & Atkins (2000) discuss, among other things, how well dictionaries compare with respect to coverage of senses. To this end, they review the coverage of the verb *to crawl* in the Collins English Dictionary (CED, 1991), the Cambridge International Dictionary of English (CIDE, 1995), the Collins-Cobuild Dictionary of English (COBUILD, 1995), the Longman Dictionary of Contemporary English (LDOCE, 1995), and the Oxford Advanced Learner's Dictionary (OALD, 1995). Fillmore & Atkins (2000, p. 92) point out that while there are some similarities in coverage, e.g. sense 2 in Figure 2 'of person: on hand and knees', there are also significant differences in which senses are identified and covered, and how dictionaries go about identifying primary senses and extended senses (represented by numbered definitions in dictionary entries and in Figure 2). In some cases (indicated by the '-x' notation), meanings may be discerned not overtly in the first definition, but rather in an example following that definition, according to Fillmore and Atkins. Of interest are also those senses dictionaries do not cover, indicated by '–' in Figure 2.

Definitions		CIDE	COBUILD	LDOCE	OALD
1	of person: dragging body	1	--	--	1a
2	of person: on hands and knees	1	1	1	1a
3	of baby: manner of motion	1 – x	1 – x	1 – x	1a – x
4	of traffic: move slowly	1 – x	3 – x	3	1b
5	of insects, crabs etc.	--	2	2	1a
6	of snakes, worms etc.	1 – x	--	--	--
7	of person: grovel, fawn	2	--	4	2
8	of place: be swarming with	3	4	5	PHRV
9	of skin etc.: creeping sensation	--	PHRASE	6	IDM

Figure 2: Comparative coverage of the verb *crawl* in four dictionaries (FILLMORE & ATKINS, 2000, p. 94)

Besides the difference in coverage of word senses, Fillmore and Atkins (2000, p. 95) show that a detailed corpus study of the distribution of *to crawl* in the British National Corpus reveals a number of sense distinctions that are not recognized by any of the dictionaries (see Figure 3 below). Examples found by the authors include instances where a type of non-human creature which may be said to crawl, is restricted by the dictionaries to insects and limbless invertebrates, and excluding cats, hedgehogs, and injured animals (e.g. *A cat can crawl through any hole it can get its head through* (2000, p. 95)). In addition, there are several different types of metaphorical usages where different entities such as hands, clouds, fog, and even darkness are crawling, according to Fillmore & Atkins (2000, p. 95) (*He watched the approaching fog crawling forward*). Finally, Fillmore & Atkins (2000, p. 98) found a number of senses not covered by any of the dictionaries, such as in "sentences in which *crawl* is used to describe the activity of examining something in great detail, with the intention of discovering errors or omissions" (*There are MPs who crawl over everything we do*).

An additional problem with the dictionaries examined by Fillmore and Atkins (2000, p. 99) concerns the coverage of combinatorial properties of the words they include, which is a rather crucial feature for learners of English as a foreign language. However, as with coverage

[4] See Atkins et al. (2003: 340) for a suggested revision of the original entry of *to cook*.

of word senses, the four dictionaries are rather inconsistent when it comes to documenting what a learner needs to know about the way the verb *crawl* combines with other words.

Non-traditional online dictionaries may offer more information than traditional print dictionaries, as they show some phrasal and grammatical properties. In addition, resources such as the LEO Online Dictionary (http://dict.leo.org) have forums, which bring out subtler aspects of word meaning. However, one must often be very determined and spend a lot of time to find the relevant information. An additional problem of online dictionaries is that one may search for a single English word and receive multiple L2 translation equivalents, leaving the user unaware which foreign word is most appropriate. For instance, on the LEO Online Dictionary, a search for English *steal* returned six German verbs. A search for German *stehlen* ('steal') returned nine English verbs. This discrepancy shows that there is a need for alternative resources providing information about the differences of closely related expressions.

Definitions		CIDE	COBUILD	LDOCE	OALD
1	of person: dragging body [usually + DIRECTION ADJUNCT]	x	--	--	Y
2	of person: on hands and knees [usually + DIRECTION ADJUNCT]	N	Y	Y	Y
3	of baby: manner of motion [never + DIRECTION ADJUNCT]	N	Y	x	Y
4	of traffic: move slowly [usually + DIRECTION ADJUNCT]	x	N	Y	Y
5	of insects, crabs etc. [+ DIRECTION ADJUNCT]	--	Y	Y	Y
6	of snakes, worms etc. [+ DIRECTION ADJUNCT]	x	--	--	--
7	of person: grovel, fawn [+ PP/to]	x	--	Y	Y
8	of place: be swarming with [in progressive tenses, + PP/with]	Y	Y	Y	Y

Figure 3: Grammatical information for the verb *crawl* in four dictionaries (FILLMORE & ATKINS, 2000, p. 99). 'Y': information explicitly encoded in entry; 'N': no mention of it; 'x': information is shown in an example sentence, but not specifically spelled out; '-': this use is not mentioned at all.

Our review of different resources for the teaching and learning of vocabulary has identified a number of important issues. First, students must understand several aspects of a word's form, meaning, and usage in order to comprehend and produce it accurately. Second, the teaching of vocabulary is at risk of being neglected in most foreign language instruction approaches. Most communicative-based syllabi do not allow students much in-class exposure to rich lexical meaning and differences from English, leaving students to learn words unguided through homework. We recognize that functionality does not require rich knowledge of vocabulary, but argue for the importance of exposing beginning language students to linguistic differences, which can often only proceed through explicit instruction. Third, traditional and online dictionaries are rather inconsistent when it comes to covering different senses of words as well as their usage patterns and information about how words combine with other words. The following section outlines the principles of Frame Semantics, which, when applied to the foreign language classroom (as we will in Section 3), can be employed to overcome the drawbacks of traditional methods for L2 vocabulary learning as discussed above.

2. Frame Semantics and (English) FrameNet

Fillmore's Frame Semantics is "a research program in empirical semantics and a descriptive framework for presenting the results of such research" (FILLMORE, 1982, p. 111).[5] This approach differs from other theories of lexical meaning in that it builds on common backgrounds of knowledge (semantic frames) against which the meanings of words are interpreted. A "frame is a cognitive structuring device, parts of which are indexed by words associated with it and used in the service of understanding" (PETRUCK, 1996, p. 2). The central ideas underlying Frame Semantics can be characterized as follows:

> A word's meaning can be understood only with reference to a structured background of experience, beliefs, or practices, constituting a kind of conceptual prerequisite for understanding the meaning. Speakers can be said to know the meaning of the word only by first understanding the background frames that motivate the concept that the word encodes. Within such an approach, words or word senses are not related to each other directly, word to word, but only by way of their links to common background frames and indications of the manner in which their meanings highlight particular elements of such frames. (FILLMORE & ATKINS, 1992, p. 76–77)[6]

To illustrate, consider the `Theft` frame, which involves several semantically related verbs such as *steal*, *snatch*, *shoplift*, *snitch*, *pinch*, *filch*, *purloin*, and *thieve*, among others. The `Theft` frame represents a scenario with different frame elements (FEs) that can be regarded as instances of broader semantic roles such as AGENT, UNDERGOER, INSTRUMENT, etc. Giving precise definitions for FEs is important because the entirety of FEs comprises the frame description, which in turn represents a schematic arrangement of the situation type that underlies the meanings of semantically related words as in the following examples.[7]

(1) a. Nikki stole the watch from Carolyn.
b. Guido swiped the disk from the table.
c. Jana nicked the book.

In (1a) – (1c), the `Theft` frame is evoked by the verbs *steal*, *swipe*, and *nick*. This frame represents a scenario with different core FEs such as GOODS (anything that can be taken away), PERPETRATOR (the person or other agent that takes the goods away), SOURCE (the initial location of the goods before they change location), and VICTIM (the person [or other sentient being or group] that owns the goods before they are taken away by the perpetrator). The frame description defines the relationships between FEs, in this case that a PERPETRATOR takes GOODS that belong to a VICTIM. For example, *stole* in (1a) is the target word that evokes the `Theft` frame. *Nikki* is the PERPETRATOR FE, *the watch* is the GOODS FE, and *from Carolyn* is the VICTIM FE. In (1b), *from the table* is the SOURCE FE, and in (1c) only the PERPETRATOR FE and the GOODS FE are realized. Interpreting the verbs in (1a) – (1c) as

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5 This section is based on Boas (2011, 2013).

6 For a more detailed review of the main principles of Frame Semantics, see Petruck (1996), Fillmore et al. (2003a), and Fillmore and Baker (2010). For differences between how the concept of frame is used in Frame Semantics and other linguistic frameworks, see Ziem (2008) and Busse (2012).

7 Names of semantic frames are in Courier font. Names of Frame Elements (FEs) are in small caps. Frame Elements differ from traditional universal semantic (or thematic) roles such as Agent or Patient in that they are specific to the frame in which they are used to describe participants in certain types of scenarios. "Tgt" stands for target word, which is the word that evokes the semantic frame.

belonging to the `Theft` frame requires an understanding of illegal activities, property ownership, taking things, and a great deal more.[8] Besides so-called core FEs there are other FEs that are peripheral from the perspective of the `Theft` frame such as MEANS (e.g. *by trickery*), TIME (e.g. *two days ago*), MANNER (e.g. *quietly*), or PLACE (e.g. *in the city*). These FEs do not belong to the set of core FEs of the `Theft` frame because they are also found among other frames of agentive action (see DUX, 2011a for details).

The FrameNet project (LOWE ET AL., 1997; BAKER ET AL., 1998; FILLMORE & BAKER, 2010; BAKER 2012) applies the principles of Frame Semantics to the description and analysis of the English lexicon, thereby creating a database of lexical entries for several thousand words taken from a variety of semantic domains. Based on corpus data, FrameNet identifies and describes semantic frames and analyzes the meanings of words by appealing directly to the frames that underlie their meanings. In addition, it studies the syntactic properties of words by asking how their semantic properties are given syntactic form (FILLMORE ET AL., 2003a, p. 235). Between 1997 and 2012, FrameNet defined close to 9,000 lexical units (LUs) (a word in one of its senses) in more than 1,000 frames.

The result of this workflow is an on-line dictionary of English that is structured in terms of semantic frames. Going to the FrameNet website (http://framenet.icsi.berkeley.edu), users can search – among other things – for entries of specific LUs, frame descriptions, and combinations thereof. Lexical entries in FrameNet offer a link to the definition of the frame evoked by a LU, including FE definitions, and example sentences exemplifying prototypical instances of FEs. In addition, FrameNet includes a list of all LUs evoking the same frame while also providing frame-specific information about various frame-to-frame relations, like the child-parent relation and sub-frame relation (FILLMORE ET AL., 2003a). Each FrameNet entry consist of three parts: The Frame Element Table, the Realization Table (how FEs are realized syntactically), and a table listing all valence patterns found with a LU, together with annotated corpus sentences.

Over the past ten years, several projects have begun to create FrameNets for other languages, including Spanish, Japanese, German, Swedish, Italian, and French (for an overview see BOAS, 2009; 2011). The unifying idea is to reuse semantic frames created on the basis of English to describe and structure the lexicons of other languages (BOAS, 2013). Although independent from pedagogical research, this cross-linguistic frame-semantic approach also emphasizes that individual words cannot be understood in isolation but depend on detailed structures of lexical organization which have been conventionalized within a linguistic community. Furthermore, individual LUs cut up the semantic space of a frame in different ways across languages, leading to mismatches in the meaning of translation equivalents and cognates. Take, for example, our discussion of German *Freund* (see Section 2), which is restricted to a small set of very close relationships, whereas English *friend* covers not only these close relationships but also a large number of less serious ones. Other differences may relate to pragmatic properties: while American English *steal* does not have a slang/informal counterpart (with extremely general meaning), German employs informal *klauen* in all semantic contexts of formal *stehlen* (DUX, 2011b). Such analyses point out the importance of cultural differences on vocabulary and the problems of one-to-one translation. However, Frame Semantics provides tools to systematize the description of these differences for lexicographic and pedagogical purposes.

[8] Other parts of speech can also evoke frames. For example, nouns such as *shoplifter*, *snatcher*, *stealer*, *thief*, and *pickpocket* or adjectives such as *light-fingered*, *thieving*, and *stolen* also evoke the same `Theft` frame as the verbs in (1).

While data from FrameNets for different languages have been used for a variety of purposes such as automatic semantic role labeling and inferencing, the creation of ontologies, annotation of grammatical constructions, full text annotation, text understanding, and metaphor analysis, relatively little research has been conducted on using FrameNet data for foreign language teaching (for exceptions, see HUANG, 2003; ATZLER, 2011 and HEPPIN & FRIBERG, 2012). In the following sections we first report on how we created a pilot version of G-FOL. Then, we show how G-FOL has been employed as a teaching resource for undergraduate students of German at the University of Texas at Austin. Finally, we present a pilot study examining whether students using the pilot version of G-FOL exhibit a significantly higher success rate with learning new vocabulary than those students who do not.

3. The German Frame-semantic Online Lexicon (G-FOL)

The first step in the construction of the G-FOL was to determine the design and layout of the website, which required us to decide what general types of information to include. Because the pilot website only covers a single frame, the site structure is relatively simple, consisting of three types of pages. The main page provides a brief description of the G-FOL and instructions on how it is used. From here, users follow a link to the Frame Description page, which provides basic information about the frame and a list of LUs evoking the frame. Users may click on any of the LUs to see the Lexical Entry page for that item. The content of the Frame Description and Lexical Entry pages are described in more detail later in this section.

Our second step was to select a pedagogically and linguistically appropriate frame to feature in the pilot website. We decided on the `Personal_relationships` frame because it is pedagogically attractive: nearly every introductory language textbook deals with the topic of personal relationships. Furthermore, personal relationships are relevant to all social groups and exhibit interesting cross-cultural differences, such as those mentioned in Section 1. Linguistically, there are a number of interesting mismatches between English and German lexical items which challenge learners and are not accounted for by traditional resources, as discussed in detail by Atzler (2011). In addition to lexical differences such as those regarding *friend* and *Freund*, there are important systematic differences in the syntactic realization of FEs. One such difference involves the English use of a light verb (e.g. *get*) with a past participle to refer to events such as getting engaged, married, or divorced, as in *He gets engaged*. In German, however, these acts are described using a full verb with the subject repeated as a reflexive pronoun, as in *Er verlobt sich* (‘He engages himself’).

Before adding content to the pilot website, we downloaded and installed the English FrameNet database from Berkeley (http://framenet.icsi.berkeley.edu) in order to link the German lexical items to their English counterparts in FrameNet. Next, we determined how to modify the content of FrameNet for average language learners. Because FrameNet was primarily developed for use by theoretical and computational linguists, a great deal of reformatting is necessary to make the G-FOL accessible to foreign language students. An obvious difference is that FrameNet is only for English, so one task involves the integration of information in both languages. Second, FrameNet does not provide the semantic details necessary for comparing expressions across languages. Here, the G-FOL provides explicit descriptions of meaning aspects for both entire frames and individual LUs. Third, FrameNet data is often quite technical and can be confusing for average language students. For instance, the valence tables document Frame Element Configurations using the term “NP.Ext” to refer to nominal subject arguments. While this is clear for most linguists, the G-FOL strives to

describe syntactic properties in a simplified manner, particularly through the use of clear example sentences. More detailed descriptions of how the G-FOL differs from FrameNet are discussed below.

Frame Element	Definition
Partner 1:	That partner in the Relationship who is realized as the subject of verbs in active form sentences, or of adjectives in predicative uses. […]
Partner 2:	That partner in the Relationship who is not expressed as the external argument.

Table 2: Definition of `Personal_relationship` Frame Elements in FrameNet (https://framenet2.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Personal_relationship)

The next phase in developing the lexicon involved the collection and creation of content about the `Personal_relationship` frame and the LUs evoking this frame. On the Frame Description page, the frame definition was copied verbatim from FrameNet. Because the FE descriptions on FrameNet were deemed too technical for most users, clearer FE definitions in simple English prose combined with more comprehensible examples were added for clarity.

Compare the FrameNet definitions for PARTNER_1 and PARTNER_2 in Table 2 with the G-FOL definitions and examples in Figure 4. We then created five simple example sentences, which demonstrated how the three FEs are realized in various types of sentences. Figure 4 shows a portion of the Frame Description page.

Personal Relationship

The words in this frame have to do with people and the personal Relationships they are or can be a part of. Some of the words denote people engaged in a particular kind of Relationship, others denote the Relationship, yet others the events bringing about or ending the Relationships. Many of the words presuppose an understanding of states and events that must have occurred before another event takes place or before a person can be classified in a certain way.

FRAME DESCRIPTION

Frame Elements

The frame elements are **Partner 1** , Partner 2 , and Partners.

Partner 1 is usually the subject of the sentence when the verb is "to be" (as in 1), or it is a noun that is equal to the "partner" word (as in 2 or 3).

Partner 2 is the other person in the relationship, usually described as "possessing" the friend/lover. It is realized with *von*-phrases (1), possessive pronouns (2), the subject of sentences with "haben," or it may be omitted.

1) **Der Mann** ist ein **Freund** von mir.

2) Das ist meine **Freundin**, **Anna**.

3) Ich habe einen **Freund**.

Figure 4: Frame Definition and FE Descriptions for the `Personal_relationship` frame (http://www.coerll.utexas.edu/mfn/personal_relationship)

The `Personal_relationship` frame in FrameNet is evoked by 56 LUs, a number we desired to decrease in the G-FOL so as to not overwhelm beginning foreign language students with infrequently used words. We decided to include only 30 of the most significant LUs, excluding words such as *betrothed, cohabitation,* and *paramour*. For each of

these LUs, we first established their closest German translation equivalent using bilingual dictionaries and corpus examples. If multiple equivalents exist, they are dealt with in one of two ways. If the German LU has two related English equivalents, it is displayed across from both of them (e.g. German *Bekannte* is displayed across from both *friend* and *acquaintance*). If the English equivalents display significant semantic differences, multiple entries for the German LU are provided. For instance, German *Freund(in)* is listed multiple times in order to reflect its translation as *friend*, *boyfriend,* and *girlfriend*. Some German LUs are listed in multiple grammatical forms to reflect that determiners and endings may vary depending on gender or definiteness, as with the equivalents of *spouse*. Figure 5 below shows a portion of the LU list for the `Personal_relationship` frame.

A variety of data was required to populate the Lexical Entry pages for each of the 30 German LUs. We consulted textbooks, corpora, native speakers, and discussion forums on bilingual dictionary websites such as LEO (http://dict.leo.org), to identify relevant semantic and grammatical differences between German and English LUs. These differences were explicated in simple English prose and exemplified through annotated sentences in German and English. Beyond the definition and comments, we also extracted three to five example sentences from the DWDS German corpus (http://dwds.de) for each LU entry which clearly and simply demonstrated how the given LU and associated FEs are combined in actual language use. Finally, we annotated these examples for LUs and FEs, marking the frame-evoking LU in bold and all occurring FEs in color-coding (green for PARTNER_1, pink for PARTNER_2, and purple for PARTNERS).[9] A list of the FEs occurring with the given LU was added automatically under "Frame Elements." A sample Lexical Entry page for *sich mit jemandem verloben* ('to get engaged to someone') is given in Figure 6.

German	English
das Paar	couple.n
der Bekannte (ein Bekannter) / die Bekannte	friend.n acquaintance.n
der Ehemann / die Ehefrau	spouse.n
der Freund	boyfriend.n
der Freund/die Freundin	friend.n
...	...
der Kumpel	buddy.n pal.n chum.n

Figure 5: List of German and English LUs for the `Personal_relationship` frame (http://www.coerll.utexas.edu/mfn/personal_relationship)

The G-FOL offers a number of features which overcome problems associated with traditional lexical resources and allows learners to discover more about the meaning and usage of German expressions. The Frame Description page helps learners identify the meaning components that tie the numerous LUs together via frames and their FEs, unlike textbooks where words are only associated by a single keyword such as "Dating." It also explicitly describes the participants (i.e. arguments) associated with the frame-evoking words and shows learners how they appear in actual sentences. The organization of expressions in

[9] In this article, PARTNER_1 is shaded dark gray, PARTNER_2 is shaded light gray, and PARTNERS is underlined.

the LU list avoids both the vagueness of one-word glosses and the complications from receiving numerous search returns.

sich (akk.) mit jdm. verloben

get engaged.v

While English uses the helping verb "get" with the word "engaged", German uses a reflexive construction "to engage oneself to someone". Note also that while in English, one gets engaged "to" a person, in German one gets engaged "with" a person.

German:	**Ich** verlobe **mich** mit ihm.
Literal Translation:	**I** engage **myself** with him
English:	**I** get engaged to him

FRAME ELEMENTS:

Partner_1 Partner_2

CORPUS EXAMPLES:

1. Als **er sich verlobt** hatte, ist er zu verschiedenen Damen aus der Gesellschaft gegangen,	1. When **he** got **engaged**, he went to different ladies from the society.
2. **Er** verlobte **sich** mit ihr gegen den Willen ihrer Eltern.	2 **He** got **engaged** to her against the will of her parents

Figure 6: Lexical Entry page for *sich verloben* (‘get engaged’)

Many German LUs are listed with multiple English equivalents, showing that a single German word corresponds to multiple English words (cf. *Kumpel* in Figure 5). Conversely, users are not overwhelmed with too many translation choices, because the frame-semantic approach separates words with multiple senses into different frames. For instance, equivalents for *single* include only those pertaining to personal relationships, because the word’s other senses (e.g. ‘only one,’ ‘baseball hit’) do not evoke the `Personal_relationship` frame. The Lexical Entry pages also contain significantly more information than traditional entries, including semantic and pragmatic information provided through the comments and grammatical information in the annotated corpus sentences.

4. Pilot Study to test the efficacy of G-FOL

4.1. Description of Pilot Study

In the fall semester of 2011, we conducted a pilot study to test whether the G-FOL provides more of the relevant information about vocabulary items in the `Personal_relationship` frame than existing resources used by students of German, such as textbooks and dictionaries. In particular, we wanted to know whether students who use the G-FOL are more aware of important cultural and grammatical differences between translation equivalents than those who do not. To test this, two groups of students completed a worksheet testing knowledge of the meaning and grammar of ten LUs evoking the `Personal_relationship` frame. We hypothesized that the group using G-FOL would score higher on the worksheet than those without access to it, thereby suggesting that the G-FOL is useful resource for language learners.

Twenty students in two different second-semester German classes at the University of Texas at Austin participated in the study. The test group consisted of nine students in a class taught by one of the authors (Dux). This group had access to the G-FOL and received a thirty

minute long in-class introduction to Frame Semantics and the G-FOL two days prior to testing. This introduction to Frame Semantics did not mention vocabulary from the personal relationship domain. The control group contained 11 students from a different class. This group did not use the G-FOL, but was allowed access to any other resources such as print and online dictionaries. The worksheet was administered before beginning the unit on personal relationships to ensure that students did not have prior knowledge of the tested vocabulary. The students were given five days to complete the worksheet as homework.

The written worksheets, listed in Appendix A, consist of five sections. Part A asks students to identify English translation equivalents and describe relevant semantic and pragmatic features about six lexical items. Part B requires them to describe appropriate real-world contexts and situations for five of the six items from Part A. For part C, students must describe grammatical differences between a set of four German expressions and their English equivalents. In Part D, they create their own German sentences with these same four expressions, in order to test their knowledge of the grammatical properties associated with them. Finally, part E asks students for feedback on the assignment and sources used (for the control group) or on the G-FOL resource (for the test group).

The German vocabulary items tested in Parts A and B exhibited semantic and pragmatic differences from English, while the expressions tested in Parts C and D displayed syntactic differences. Parts A and C of the worksheet tested meta-linguistic awareness of differences between German and English, asking students to describe said differences in English prose. Parts B and D were more practically-oriented, asking students to describe appropriate situations (Part B) or create appropriate sentences (Part D) to demonstrate their awareness of these differences. Appendix A contains all questions used in the survey, and Appendix B describes the relevant information for correct answers in each of the sections.

4.2. Summary of Results

Each response on the worksheet was given a score of zero, one, or two points. A score of zero was assigned if students did not address any of the relevant information, particularly if they stated that the expressions were not different in English and German. Students received one point if they showed some awareness of the differences but did not sufficiently address the relevant information given in Appendix B or if they only acknowledged differences that were deemed irrelevant. Two points were awarded if a majority of the relevant information was addressed. Unanswered questions were simply discarded and did not count against the participant's score.

Table 3 shows the average scores for the two groups and the percentage of difference between them. Due to space limitations and the small sample size, scores are calculated as total percentages for each activity type. The data show that the G-FOL group outperformed the control group in each of the four worksheet parts. The overall average percentage was significantly higher for the G-FOL group (67%) than for the control group (39%). The highest discrepancy between groups is in the description of semantic/pragmatic differences between German and English expressions (Part A), where the G-FOL group scored 80% and the control group scored 38% on average. It must be noted that the G-FOL group did not outperform the control group as significantly on the practical activities (B, D) as on the meta-linguistic activities (A, C). However, the overall results confirm our hypothesis that students using the G-FOL are more aware of the differences in grammar and meaning between German and English expressions of personal relationships.

	G-FOL	Control	% Diff
A. Semantic Description	80%	38%	42
B. Situational Use	76%	52%	24
C. Grammatical Differences	58%	30%	28
D. Correct Usage	56%	41%	15
OVERALL	**67%**	**39%**	**28%**

Table 3: Overall results for each group based on category

4.3. Limitations of Pilot Study

Although the results of our pilot study indicate across-the-board higher scores among those students using the G-FOL for vocabulary learning, we recognize that further broad-scale testing is needed. More specifically, our pilot study calls for further studies that address some of the issues pointed out above: First, the small sample size makes it difficult to arrive at any solid conclusions, so future testing should use significantly more participants. The small range of vocabulary items and activity types also makes the results less convincing: future research should test more items using a wider variety of activities. Another major challenge is that the two groups were from different classrooms with different teachers, and individual teaching styles may have influenced the results. Finally, we did not control for previous knowledge of the tested vocabulary, as some participants may have been familiar with the nuances of personal relationship vocabulary prior to testing, nor did we control for time on task, but allowed students several days to complete the activity at home. Future testing must rectify these issues before solid conclusions can be made regarding the efficacy of the G-FOL as a language-learning tool.

Conclusions

This paper described the development of an online tool for vocabulary learning and it presented a pilot study testing the efficacy of this new, the G-FOL. After highlighting a number of problems with traditional vocabulary learning resources in the foreign language classroom, we presented the basic principles of Frame Semantics as developed by Fillmore (1982) and its practical implementation in the FrameNet database for English. We then discussed how we employed the English FrameNet database as a basis for the novel on-line G-FOL. Next, we summarized the work-flow that incorporates English FrameNet entries and their German counterparts in the personal relationship frame. We showed how corpus examples are used to highlight syntactic, semantic, and pragmatic differences between English and German LUs evoking the same semantic frame. Additionally, we discussed the role of explicit grammar notes for each frame and annotated sentences in both languages side-by-side. Finally, we reported on the results of a pilot study testing the efficacy of the G-FOL for vocabulary learning. Our overall results confirm our hypothesis that students using the G-FOL are more aware of the differences in grammar and meaning between German and English expressions of personal relationships than those students who do not use the G-FOL.

Clearly, this pilot study needs to be extended in a number of ways. First, we need to test our results against vocabulary from a variety of other semantic frames, such as education, grooming, and others occurring in introductory language courses. Second, the role of general syntactic patterns is unclear so far: while some syntactic patterns occur with many LUs evoking the same frame, others appear to be specific to particular LUs. We think that finding

proper generalizations about syntactic similarities and differences will also help students acquire vocabulary more efficiently. Third, we have not addressed the incremental nature of language learning or the overall assessment of vocabulary (see ATZLER 2011, p. 16 and 38). In this context we will also need to determine why our results differ from a similar study by Atzler (2011), which did not find any statistical difference between learners using Frame Semantics and those using more traditional methods. These crucial issues need to be investigated in the future in order to be able to properly evaluate the usefulness of online resources such as the G-FOL.

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APPENDIX A – Worksheet Questions

Questions for G-FOL Group

A) Look at the descriptions for the following German words. Describe in your own words how they are similar or different to equivalent English words.

1) *Junggeselle*:
2) *ledig* and *Single*:
3) *Freund(in), Freund(in)* and *Bekannte(r)*:

B) Come up with situations where you would use:

4) each of the two words in (2):
5) each of the words in (3):

C) How do the following expressions differ from English in regards to their grammar? Are each of them easily translatable (word-for-word)? Why or why not?

6) *befreundet sein*:
7) *verknallt:*
8) *sich trennen*:
9) *sich verloben*:

D) Make your own sentences using the expressions in (6) to (9).

10)
11)
12)
13)

E) Please answer the following questions:

(For G-FOL group)

14) How does this mini-dictionary compare with others you have been using, such as LEO, dict.cc or paper dictionaries?
15) Would you like to see more semantic domains in this type of dictionary?
16) What type of information was particularly useful? What was unnecessary?
17) How could a tool like this be used in other ways to make learning more effective?

(For Control Group)
14) How difficult was this activity?
15) What resources did you use to complete this activity? (dictionaries, internet resources, native speakers)
16) What resources were most helpful for you? Or what types of resources would have made the activity easier?

APPENDIX B – Semantic/Grammatical Features of Expressions Tested

German Expression(s)	English	Semantic and Pragmatic differences between German and English
Junggeselle	'bachelor'	*Junggeselle* is fairly antiquated, and often lacks the positive connotations of freedom and care-freeness associated with English 'bachelor'
ledig – Single	'single' 'unwed'	*Ledig* is often translated as single, but applies only in formal contexts. It is often found in questionnaires. When speaking informally, one would say they are a *Single* (borrowed from English). *Single* only functions as a noun in German, not as an adjective.
Freund	'friend' 'boy-/girlfriend'	German *Freund(in)* is ambiguous between non-romantic friend (*ein Freund*) and romantic partner (*mein/sein/ihr Freund*). It is often disambiguated through context and through grammatical features.
Freund - Bekannte	'friend' 'acquaintaince'	Although these two terms translate directly between languages, there is a difference between their range of uses. German *Freund* is more restricted than English 'friend', as it is reserved for one's closest friends. Accordingly, *Bekannte* is used more frequently than English 'acquaintance'.

Table 1: Relevant information for parts A and B.

German Expression(s)	English	Grammatical differences between German and English
befreundet sein	'to be befriended'	The English verb 'befriend' is a transitive verb and only refers to entering into a friendship. *Befreundet* is an adjective meaning 'befriended' but it is the closest equivalent to English 'be friends with,' which requires a noun.
verknallt	~'crush'	For English 'have a crush on s.o.', German uses an adjective phrase and a different preposition: *~to be verknallt in s.o.*
sich trennen	'to separate/divorce'	English can use a simple transitive ('he divorced her') or a light verb construction ('they got divorced'), but German requires a reflexive construction ('er trennte sich von ihr' or 'sie haben sich getrennt.'
sich verloben	'to get engaged'	As above, German uses a reflexive pattern ('sie verlobte sich mit ihm') while English uses a light verb ('she got engaged to him'). Also, German introduces the Partner_2 argument with a *mit* ('with') prepositional phrase, while English uses *to*.

Table 2: Relevant information for parts C and D.

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