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# Semantic frames as an empirical metalanguage for linguistic analysis

**Abstract:** This paper discusses the status and role of metalanguage in linguistics by providing a brief overview of different types of metalanguages developed for different purposes. The main part of the paper offers an analysis and comparison of two different types of metalanguages, namely Wierzbicka's Natural Semantic Metalanguage and Fillmore's semantic frames as they are implemented in the *FrameNet* database. The comparison of the two approaches discusses the "building blocks" employed for recognizing, describing, and analyzing meaning and it highlights some important differences in methodology such as the use of empirical corpus data, reproducibility, and falsifiability.

**Keywords:** lexical semantics, metalanguage, natural semantic metalanguage, frame semantics, *FrameNet*

**Schlagwörter:** lexikalische Semantik, Metasprache, Natural Semantic Metalanguage (NSM), Frame-Semantik, *FrameNet*

## 1 Introduction

Semantic metalanguages aim to offer systematic and transparent ways for describing meanings by breaking complex ideas into simpler components.[1] They are important, because ideally they allow, among other things, for the standardization of how meanings are analyzed and discussed, they allow for cross-linguistic comparisons of meaning, they may help with uncovering universal patterns in human language, and they provide a tool for translation, cultural analysis, and language teaching (cf. van Leeuwen 2004).[2] One of the most well-known types of semantic metalanguages are the words in definitions found in dictionaries, since lexicographers often use simplified language or paraphrases to provide clear and concise definitions of words for general

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2 For a comparison of different definitions of the term "metalanguage", see Berry (2005: 5).

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understanding. An example of a simplified paraphrase explaining the meaning of a word in a dictionary is the definition 'A man who is not married' for the word *bachelor*.[3]

The goal of this paper is to show how the concept of semantic frames developed by Charles Fillmore (1982) in his theory of Frame Semantics can be employed as a metalanguage for systematic analysis of meaning, form, and function. More specifically, I argue below that the application of semantic frames to the analysis of the lexicon of English (and later to those of other languages) in the context of the Berkeley *FrameNet* project exhibits all the hallmarks of a semantic metalanguage. In this context, I propose that the workflow underlying the *FrameNet* project, is to a very large degree empirically based, because its results, the lexical database resulting from that workflow, can be verified (and, if need be, falsified) based on new empirical data.

The remainder of this paper is structured as follows. In Section 2 I first provide a very brief overview of the concept of metalanguage in the history of linguistics (and related fields). Then, I discuss Wierzbicka's theory of Natural Semantic Metalanguage (NSM) to show how an approach that is explicitly labeled as a semantic metalanguage operates. In Section 3, I first introduce Fillmore's (1982) theory of Frame Semantics. Then, I show how Frame Semantics has been applied to the description and analysis of the English lexicon in the context of the Berkeley *FrameNet* project (Baker et al. 1998, Fillmore et al. 2003, Ruppenhofer et al. 2017, Boas et al. 2024). More specifically, I argue that the semantic frames derived on the basis of a relatively complex workflow combining linguistic intuition with corpus evidence constitute a type of semantic metalanguage that differs from Wierzbicka's NSM in a number of methodological and empirical points. Section 4 summarizes the results of the paper.

# 2 Different metalanguages for describing meaning

## 2.1 A (very) brief overview

Metalanguages have come a long way from classical Greece and Rome until today. While Plato's *Cratylus* explored the relationship between words and their meanings, suggesting that language could be examined critically, Aristotle's *On Interpretation* formalized ideas about propositions, nouns, and verbs, marking the first step toward metalanguage as a tool for analysis. Ancient grammarians in India, such as Panini (see his *Ashtadhyayi* in the 4th century BCE), and Greece used a form of metalanguage – technical terms and symbols – to describe language structures. The Early Modern Period saw the emergence of symbolic logic during the 17th and 18th centuries. For example, Leibniz sought a universal symbolic language (*characteristica universalis*) that

**3** See Hanks (1987) and Sinclair (1991) on the distinction between "traditional" lexicographese and the more user-friendly metalanguage of Cobuild publications, in particular the Collins-Cobuild dictionaries.

represented a foundation for metalanguage. Subsequently, philosophers and linguists began to separate object language (language being described) from a so-called metalanguage (language used to describe it).

During the course of the 20th century, formal logic, semiotics, and structural linguistics all saw major developments in metalanguage(s). Bertrand Russell and Gottlob Frege developed formal logical systems, using metalanguage to describe the truth conditions of sentences. Ludwig Wittgenstein's (1921) *Tractatus Logico-Philosophicus* emphasized the distinction between language and metalanguage. During the 1930s, Alfred Tarski revolutionized the concept of metalanguage by formalizing the idea of object language and metalanguage. One way of achieving this goal was to define "truth" in language by introducing a metalanguage to define truth in an object language without leading to contradictions. For example, a metalanguage statement such as "*Snow is white* is true if and only if snow is white" explains the truth of the sentence in a way that avoids ambiguity. His formalization became foundational in formal semantics and logic approaches that sought to analyze the logical form of sentences and their truth conditions (cf. Heim/Kratzer 1998). For example, the predicate logic analysis of the sentence *All humans are mortal* consists of a metalanguage representation in formal logic that looks as follows: ∀x (Human(x) → Mortal(x)), where ∀ = "For all" and → = "implies". In short, in predicate logic, the metalanguage uses formal symbols and logical operators (e.g., ∧ for "and", ¬ for "not") to describe relationships between meanings and to express what is considered by some the logical structure of natural language sentences.

In the early 20th century, Ferdinand de Saussure proposed that language itself should be regarded as a system of signs that, in themselves, are only indirectly associated with real-life phenomena. Saussure's concept of the "arbitrariness" of the linguistic sign lays the foundation for the idea that language can take as its "object" not only material objects but abstractions, and "language" itself as one of these. In Saussure's view, there is a distinction between the signifier (word form) and the signified (concept). In many ways, this distinction pretty much laid the foundation for discussing language "about itself" for decades afterwards. To this end, Coupland/Jaworski (2004: 17) point out that "[a]n interest in metalanguage (...) as a recursive quality, or an in-built self-referential potential of linguistic systems, then surfaces in many of the formative movements of early linguistics – the Prague School, American and European Structuralism, Russian Formalism, and others." More specifically, many linguists during the second half of the 20th century commented in one way or another on the importance of metalanguage for linguistic description and analysis, including Hockett (1958), Hjelmslev (1972), Chomsky (1965), Weinreich (1966), Lyons (1977), Halliday (1978), Lucy (1992), and Gumperz/Levinson (1996).

Starting in the 1960s, researchers aimed to capture various types of meanings by developing different types of metalanguages. The goal of these efforts was to develop a system used to describe and analyze the meanings of words, phrases, or sentences in a given natural language. The key idea is that a semantic metalanguage provides a framework for explaining meanings in a clear, precise, and consistent way, often using

simplified vocabulary or symbols to explain complex meanings. In other words, a semantic metalanguage breaks meanings down into basic components, showing how complex concepts can be paraphrased using more fundamental elements.

A prominent semantic metalanguage approach developed during the 1970s is Montague Grammar, which employs a formal, logic-based metalanguage to describe the semantics of natural language sentences by integrating syntax and semantics using tools from formal logic (cf. Partee 1976). For example, a sentence like *John runs* can be analyzed in Montague Grammar using a metalanguage that represents it as a function and argument as in '*run (john)*'. This metalanguage representation is supposed to identify the predicate (*run*) and the argument (*john*).

However, while Montague Grammar significantly advanced formal semantics, it also has several limitations. First, since it relies heavily on formal logic, lambda calculus, and type theory it makes the framework difficult to understand and apply for linguists or researchers who lack training in formal logic or mathematics (cf. Bach 1989). Second, Montague Grammar's overemphasis on formalism stands in the way of accounting for natural language variability. In other words, Montague Grammar's strict formalism can lead to overly rigid or abstract representations that do not align well with the inherently flexible, ambiguous, and context-dependent nature of natural languages (cf. Dowty et al. 1981, Heim/Kratzer 1998).

In addition, because of its focus on syntax and semantics, Montague Grammar largely ignores pragmatics, i.e. how context, speaker intention, and conversational implicature influence meaning in different types of contexts (cf. Levinson 2000). Third, Montague Grammar offers only a limited account of lexical semantics because it assumes a close correspondence between words and their meanings, often treating words as fixed logical symbols. As such, this approach struggles with the rich, context-sensitive nature of lexical meaning, such as polysemy and metaphor. Fourth, Montague Grammar does not pay much attention to the integration of cognitive and psychological aspects of real-world language use, because it prioritizes abstract, logical models of meaning over how humans actually process and use language cognitively. In other words, it does not account for how meaning is grounded in human experiences, perception, or embodiment (as emphasized in cognitive semantics). However, psycholinguistic evidence suggests that people do not mentally compute complex logical formulas when understanding sentences (cf. Jackendoff 2002).

Montague Grammar, as well as the other approaches briefly mentioned above, use abstract notation systems consisting of symbols and terms that are not easily accessible to non-specialists. In contrast, natural metalanguages do not typically rely on such abstract symbols and terms. Instead, they use natural language to talk about language. Lyons (1995: 7) characterizes natural metalanguages as follows:

> Now it is a commonplace of philosophical semantics that natural languages (in contrast with many non-natural, or artificial, formal languages) contain their own metalanguage: they may be used to

> describe not only other languages (and language in general), but also themselves. The property by virtue of which a language may be used to refer to itself (in whole or in part) I will call reflexivity.

In the following sub-section, we will turn our attention to one particular natural metalanguage, namely Wierzbicka's NSM. Based on a summary of its main characteristics, I will point out a number of issues with this approach before turning to a different type of natural metalanguage in Section 3, namely the metalanguage employed by Frame Semantics and *FrameNet*.

## 2.2 Natural Semantic Metalanguage (NSM)

During the 1970s, Anna Wierzbicka proposed a novel approach to linguistic meaning by first observing that many formal approaches to meaning such as Montague Grammar did not capture how humans actually express meaning across languages and cultures. This observation served as the basis for what would later become known as NSM, an approach based on the hypothesis that all natural languages are based on a finite set of semantic universals – concepts that are so fundamental that they cannot be further simplified (cf. Wierzbicka 1972). The idea was to identify these basic concepts (primitives) and create a metalanguage based on them that could describe meaning across all languages (cf. Goddard 2010).

In a first step, Wierzbicka (1972) proposed a set of so-called semantic primitives, i.e. words or concepts that she claimed are irreducible and universal across languages. For example, she identified words like *I*, *you*, *someone*, *something*, *good*, *bad*, *think*, *say*, and *know* as universal concepts. According to Wierzbicka, these words were chosen based on their occurrence in a wide variety of unrelated languages. Wierzbicka's proposal to use these minimal, universal words allowed linguists to define and describe more complex meanings in any natural language, which was a radical shift away from earlier semantic theories that often relied on complex or culture-specific concepts. During the 1980s, Wierzbicka worked on refining the list of semantic primitives and applying them to a broader range of languages such as English, Russian, Polish, Japanese, Ewe, and Warlpiri to test whether her primitives could be regarded as universal (Wierzbicka 1980). Furthermore, Wierzbicka and her colleagues started developing so-called "explications", i.e. paraphrases of complex meanings using only semantic primitives. The explications were designed to provide for a clear, culture-free way of explaining words and concepts.

During the 1990s, Wierzbicka and her colleagues, especially Cliff Goddard, further refined the list of semantic primitives, adding words that had been overlooked earlier and dropping others that failed cross-linguistic tests (cf. Goddard/Wierzbicka 1994). This resulted in a list of approximately 60–70 universal concepts and it provided a way to compare languages without imposing culture-specific frameworks, according to

Wierzbicka (1996). Since the early 2000s, the NSM metalanguage has been slightly revised, resulting in about 65 universal concepts.

The NSM approach "is a decompositional system of meaning representation based on empirically established universal semantic primes, i.e., simple indefinable meanings which appear to be present as identifiable word-meanings in all languages." (Goddard 2008a: 1) According to Goddard, the NSM is different from the other types of semantic metalanguages discussed above, since (1) it avoids cultural bias by using universal semantic primes (universal applicability), (2) it respects the meanings of words and concepts as understood in their cultural contexts (cultural sensitivity), and (3) it provides a simple, clear, and cross-linguistic tool for analyzing meaning (practicality). According to Goddard (2008a: 1), the words and grammar of the metalanguage can be thought of as a highly disciplined and standardized subset of natural language: a small subset of word-meanings (63 in number (...)), together with a subset of their associated properties."[4]

According to Wierzbicka (1996), semantic primes are those meanings in any language that cannot be paraphrased in simpler terms.[5] On this view, exponents of semantic primes are lexical units, i.e. pairings of a single sense with a lexical form.[6] Goddard (2018: 318) presents a list of 65 primes, including different types of Substantives (*I*, *you*, *someone*, *something*), Actions (*do*, *happen*, *move*), Qualities (*big*, *small*, *good*, *bad*), Mental Predicates (*think*, *know*, *feel*, *want*), Speech (*say*, *words*, *true*), Time and Space (*when*, *where*, *here*, *now*), and Logical Concepts (*if*, *not*, *because*). Besides English, comparable lists of semantic primes for about 30 other languages have been compiled (Goddard 2018: 317). The availability of counterparts of semantic primes, i.e. a simple cross-translatable metalanguage, across various languages makes it possible to show how lexical units that share a given primitive meaning can be matched across languages. Goddard (2008a: 5) points out that when "exponents of a given prime have different polysemic extensions (as they frequently do), there is a match-up between lexical units, but not between whole lexemes." To illustrate how words can be explicated directly in terms of universal semantic primes, consider the verb *to think* as in the following example.

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**4** This paper focuses primarily on a discussion of semantic primes and their use for explications of word meanings. NSM also encompasses grammatical semantics, ethnopragmatics, and cultural scripts. See Goddard (2010) for more details.

**5** For a discussion of how primes can be discovered, see Goddard (2010: 463).

**6** According to Goddard (2008a: 12), universal semantic primes "have an inherent grammar – a 'conceptual grammar' – which is the same in all languages; that is, each semantic prime has certain combinatorial properties (cf. Goddard/Wierzbicka 2002: 41–85) by virtue of the particular concept it represents. The formal realisations (marking patterns, word order, constituent structure, etc.) may differ from language to language without these underlying combinatorial properties being disturbed. Because their inherent syntactic properties are manifested in all languages, semantic primes bring with them a substantial slab of universal syntax: the syntactic properties of semantic primes are literally universals of syntax."

(1) X thinks about Y
- X knows something about Y.
- Because of this, something happens in X's mind.
- When this happens, X feels something.

The NSM explication in (1) is a semantic predicate, a combination of semantic primes that describes relationships or actions involving other elements. While semantic predicates are not universal in themselves, they are composed of universal semantic primes and are used to help describe complex meanings by showing how semantic primes interact and relate to each other. According to Goddard (2008a), explications such as in (1) avoid culture-specific or language-specific terms and use only NSM primes such as *think*, *about*, and *something* to create a universal meaning representation of "thinking". The first part of the explication "X knows something about Y" captures the fact that thinking presupposes some knowledge or awareness of the subject (Y). The second part "Something happens in X's mind" represents the fact that thinking involves mental activity, which is a process that happens internally. The third part, "When this happens, X feels something" represents the fact that thinking is often accompanied by emotions, or it causes a cognitive or emotional response. Note that the explication in (1) provides only one specific valence pattern associated with *to think*. However, as Goddard (2008a: 14) points out, every "NSM predicate has a set of valency options [...] which are seldom recognized in mainstream grammars and which may have no standard labels." Goddard goes on to point out that

> [the] semantic prime THINK universally allows a "cognitive topic" valency option such that one can say, in all languages, the semantic equivalent of a sentence like 'I was thinking about this someone (person) (this thing, this place, etc.)'. (Goddard (2018a: 14)

Goddard (2008: 14) notes that THINK also has additional complement options by pointing to the "full valency array for THINK" in (2), where the "third and fourth frames show sentential complement options: ways in which an expression analogous to a full sentence can be embedded inside the scope of THINK."[7]

7 In related work, Goddard/Karlsson (2008: 238) discuss two specific uses of *think*: "We have also identified and explicated two English-specific uses of *think*, namely, the generic or 'opinion' frame (as in *She thinks that* – –) and the conversational formula *I think*, which have no exact equivalents in Swedish. [...] it seems clear now that the propositional complement construction, i.e., the think *that* frame, is possible only in relation to a temporally grounded concrete thought."

(2) a. someone THINKS about someone/something [topic of cognition]
b. someone THINKS something (good/bad) about someone/something [topic + complement]
c. someone THINKS like this: " – – " [quasi-quotational thought]
d. (at this time) someone THINKS that [ —— ]$_S$ [propositional complement][8]

(Goddard 2008a: 14)

The NSM approach has a number of advantages over other approaches to meaning in that it offers a metalanguage that uses natural language. As such, it is intended to be accessible and easy to understand. To this end, Goddard (2008a: 2) comments on "the consistency or stability of its notation, in particular, the use of reductive paraphrases." In his view, "[t]his stands in sharp contrast to the situation in linguistics at large." In addition, according to Wierzbicka (1996), the primes used in NSM definitions ensure simple, clear, and culturally neutral definitions, and they provide a non-ethnocentric and non-circular way of analyzing meaning across different languages and cultures. As such, Wierzbicka's NSM has all the features of a semantic metalanguage: (1) It operates above the language being described and it serves as a system for defining meanings and relationships between words. (2) It uses simpler concepts or terms to explain complex meanings. (3) It breaks meanings down into basic components, showing how complex concepts can be paraphrased using more fundamental elements. (4) It can be applied to analyze and explain meanings in different natural languages.

At the same time, however, there are a few issues with the NSM approach. First, the claim of NSM to be universally applicable across all languages needs to be taken with a grain of salt. Just because the NSM approach has been shown to work for selected portions of the lexicons (as well as syntax and pragmatics) of several dozen typologically diverse languages does not automatically mean that it is universally applicable (cf. Levinson 2000). In my view, the jury is still out on the universal applicability of NSM, because we do not yet have full descriptions let alone analyses of all of the world's languages. In other words, the sheer diversity of the world's languages and cultural contexts makes comprehensive validation difficult (see also Lucy 1992 and Evans/Levinson 2009). In addition, as Croft (2001) argues, it appears as if languages and their

**8** Goddard (2008b: 72) observes the special status of propositional complements: "An outstanding property of a small number of primes – KNOW, THINK, WANT – is the possibility of taking a clausal ('propositional') complement. For example, one can KNOW THAT someone did something, something happened, etc., or THINK THAT someone did something, something happened, etc." These clausal complements, however, do not cover variants with a *that*-clause (the most frequently occurring one) is mentioned, but not the non-finite (e.g. *I knew him to be loyal to me*) and verbless (e.g. *I have never known him sick*) variants. Related lower-level configurations such as *Consider yourself warned* or cases of semantic shift from cognition to volition (e.g., *He thought to break her heart*) are also not mentioned by Goddard. Thanks to Francisco Gonzálvez-García for this important observation.

categories and constructions need to be described and analyzed separately, using only language-internal features and descriptions. This bottom-up approach requires separate analyses of languages before arriving at any specific claims about the possible universal status of categories, features, or linguistic units. Thus, more cross-linguistic research is needed to validate the universality of the proposed semantic primes.

Another issue with the NSM appears to be its heavy reliance on linguistic intuition without paying too much attention to corpus evidence.[9] Research in usage-based linguistics over the past two decades (see, e.g., Barlow/Kemmer 2000, Sampson 2001, Bybee 2023) has shown that it is important to account for actual language use in context. In this view, "an ideal usage-based analysis is one that emerges from observation of such bodies of usage data, called corpora" (Kemmer/Barlow 2000: xv). In other words, despite aiming for objectivity, creating explications typically involves subjective interpretations and different NSM researchers might propose different explications for the same word, leading to potential disagreements. A related problem is that the process of choosing and combining primes can be influenced by the analyst's own linguistic and cultural background and that some primes like *think* and *feel* may not have clear counterparts in some languages (cf. Levinson 2000). Note, though, that even though NSM research may not have fully incorporated a usage-based approach to linguistic analysis, it is still compatible with it.

A third issue with NSM is empirical, namely that there are some languages that do not have clear lexical equivalents for certain primes. For example, the Pirahã language, spoken in the Brazilian Amazon, is often cited as lacking words for certain presumed universal primes, such as numbers and quantifiers (*many*, *few*), or even temporal expressions (*before*, *after*). According to Everett (2005), Pirahã speakers use approximate quantifiers (*some*, *a lot*), but there is no evidence of discrete words for specific primes such as *one*, *two*, *many* (see also Nevins et al. 2009). A related issue is the finite number of semantic primes (currently around 65), which might not cover all meanings in all languages. Certain complex or abstract concepts such as emotions and cultural practices might require more nuanced primes or extensions to be fully explicated.[10] In other words, if one needed a new prime for every new culture-specific word or concept to explicate it, then this would mean that one of the main goals of NSM, i.e. to come up with a relatively limited set of universal semantic primes, does not work.

**9** A related issue is the coverage of NSM explications. Most NSM research focuses on a select number of words from specific lexical domains instead of covering a broader range of semantically related words, similar to the methodology pursued by Levin (1993) or the *FrameNet* approach (Fillmore/Baker 2010). If the sampling is not comprehensive enough in NSM, it is not clear how the set of proposed semantic primes is in itself sufficient enough to also handle semantically related words. I thank Francisco Gonzálvez-García for this important observation.

**10** See Levinson (2003), Haspelmath (2010), and Henrich et al. (2010) for observations on different concepts in a variety of different languages.

This problem is reminiscent of the issues faced by Fillmore's (1968) *Case Grammar*, which aimed to identify a limited number of universal deep cases (which later became known as semantic roles, see also Gruber 1965) to describe how meanings of verbs are realized syntactically. During the 1970s, several researchers applied Fillmore's (1968) proposals to different phenomena and languages (see Busse 2012 for an overview). It turned out that Fillmore's original ideas were problematic because there are no systematic tests for determining abstract semantic roles. Similarly, it was shown that it is difficult to determine the exact grain size of semantic roles, which in turn makes it difficult to distinguish between different types of semantic roles (see Levin/Rappaport Hovav 2005 and Boas/Dux 2017 for discussion). Despite its tremendous initial success, Fillmore and most other researchers eventually abandoned the original concept of semantic roles (for an exception, see Ágel/Höllein 2021, for discussion, Boas/Ziem 2022).

A fourth issue concerns the granularity of semantic primes and how they are used to represent meanings of different words that are closely related in meaning. Consider, for example, the two verbs *jog* and *stroll*. According to Al-Hammadi/Yagi (2024), the NSM explications for these two verbs can be represented as follows:

(3) Strolling:
- Someone X goes somewhere.
- X does something with X'S legs.
- This is slow.
- X does this because X wants to do this.
- X feels something good.

(4) Jogging:
- Someone X goes somewhere.
- X does something with X's legs.
- This is fast(er).
- X does this because X wants to do this.
- X does this because X wants to be healthy.

Both NSM explications cover the similarities in meaning, namely by characterizing the self-motion as "SOMEONE X GOES SOMEWHERE; X DOES SOMETHING WITH X'S LEGS" and that "X DOES THIS BECAUSE X WANTS TO DO THIS." The difference between the two verbs is that *stroll* involves a slower speed and that the activity of strolling results in that person feeling something good, while *jog* involves a fast(er) speed and the jogger supposedly wanting to be healthy. While the two NSM explications cover the similarities

and differences between these two verbs, they are also missing a number of important aspects of meaning.[11]

First, it is not clear why "X FEELS SOMETHING GOOD" only occurs in the explication of *stroll*, but not *jog*. Many people like to jog to relieve stress (e.g. *After a stressful day at work, Sarah laces up her running shoes and jogs through the park to clear her mind and release built-up tension*), to feel a sense of accomplishment (e.g. *Lisa loves the sense of accomplishment she feels after finishing her jog, knowing she's done something good for her body and mind*), to sleep better (e.g. *After jogging for five miles in the afternoon, Kim slept a lot better than the night before*), and to find time for reflection (e.g. *The rhythmic sound of her footsteps and the fresh air during her jog help Emily feel calmer and more grounded*). In other words, the activity of jogging also leads to the person jogging feeling something good.

Furthermore, it is not apparent why "X DOES THIS BECAUSE X WANTS TO BE HEALTHY" is only a part of the explication of *jog*, but not *stroll*, since strolling has several health benefits, even though it might not be as intense as jogging or brisk walking. For example, strolling has a number of physical health benefits such as improving circulation (e.g. *After sitting at her desk all day, Maria takes a stroll around the block to get her blood flowing and stretch her legs*), boosting mobility (e.g. *Joe makes it a habit to stroll around the garden every morning to keep his joints flexible and reduce stiffness*), burning calories (e.g. *Even though it's a slow-paced walk, Kim enjoys his daily evening stroll to burn a few extra calories after dinner*), supporting digestive health (e.g. *Strolling around the neighborhood after lunch helps Marc feel less bloated and aids his digestion*), and reduction of blood sugar levels (e.g. *Doctors recommended that Harold take a 10-minute stroll after meals to help manage his blood sugar levels*). In addition, strolling has different mental health benefits, including reducing stress (e.g. *Suzie finds that a leisurely stroll by the lake helps her unwind after a busy day at work*), improving mood (e.g. *Whenever he feels down, Sascha takes a stroll through the park, and the fresh air instantly lifts his spirits*), and enhancing creativity (e.g. *Strolling through the quiet streets of her neighborhood gave Nicole the mental clarity to solve a tricky problem at work*).[12] Another problem with the explication in (4) is that HEALTHY might mean different things to different people, and its meaning might shift over time. *Healthy* used to be about not being overweight. Today it is all about having enough muscle strength. In some years' time, it might all have to do with certain brain wave patterns one exhibits in a state of rest, for all we know. Or with how fast one's cells regenerate.[13]

**11** The same observation can be made about NSM coverage of members of other classes of verbs, including verbs of cognition (e.g. *know*, *think*, *believe*, *consider*) and verbs of saying (e.g. *announce*, *declare*, *state*, *say*).

**12** Note, too, that wanting to be healthy is not a necessary component of jogging: *He jogged over to some nearby picnic tables and searched their underbellies, but found nothing.*

**13** Thanks to Bert Cappelle for this important insight.

Second, both explications make reference to some type of speed, i.e. slow vs. fast(er), but it is not clear how these two concepts can be explicated further using the current set of 65 semantic primes.[14] Put differently, the concept of speed (and the words evoking it, such as slow or fast(er)) involves a number of interrelated concepts that a speaker needs to know in order to know how to understand the concept. This involves knowledge of the concepts of motion, distance, and time, and it involves knowledge of a scale on which words that express speed appear in a particular order (e.g., *slowest*, *slow*, *slower*, *normal*, *fast*, *faster*, *fastest*). At present, it is not clear how these interrelated concepts expressed by the NSM explications above can be broken down further with the current inventory of semantic primes. A related problem is the use of certain concepts such as *slow* or *fast* in the explications, since these are vague and often context-dependent (and perhaps even subjective).

Third, certain NSM explications might turn out to be too coarse-grained, because they are not structurally set up to capture the many fine meaning nuances of different words that are closely related in meaning.[15] Besides *jog* and *stroll*, consider other self motion verbs such as *amble*, *barge*, bustle, *crawl*, *dance*, *frolic*, *hitchhike*, *limp*, *lurch*, *march*, *meander*, *rush*, *shuffle*, *skip*, *sleepwalk*, *sneak*, *stagger*, *step*, *stumble*, *swagger*, *tiptoe*, *trudge*, *waddle*, *wade*, and *wriggle*. These verbs differ from each other not only with respect to speed, but also with respect to the nature of the surface on which the motion takes place, the type(s) of movement of limbs, the body posture of the person moving, the mental and/or physical state of the person moving, the direction of movement, and the types of possible obstacles involved that might hinder the motion. Note, too, that if each of these verbs needed to be distinguished from all of the others in the list, then the explications would have to become quite long. For more details on the subtle differences in meaning of English motion verbs, see, e.g. Snell-Hornby (1983) and Boas (2006).

In summary, while NSM provides a valuable tool for semantic analysis, the difficulties discussed above highlight significant differences between languages and concepts and the need for ongoing refinement and critical evaluation of NSM as a metalanguage for semantic analysis. In the following sections, we turn to a discussion of an alternative theory of meaning that employs semantic frames as a metalanguage for linguistic analysis. I first review some of the main claims of the theory of Frame Semantics (Fillmore 1982), then I discuss the practical implementation of Frame Semantics in a corpus-based lexicography project called *FrameNet* (Fillmore et al. 2003) that seeks to account for different types of meaning using semantic frames. Finally, I argue that semantic frames, together with their so-called frame elements (situation-specific semantic roles), should

**14** For a current list of NSM primes, see https://en.wikipedia.org/wiki/Natural_semantic_metalanguage.
**15** A related issue is the question of how semantic primes and explications can be employed to account for grammatical meaning similar to the way that semantic frames can be used to account for constructional meanings in Construction Grammar (cf. Boas 2025).

be regarded as a type of semantic metalanguage that overcomes many of the issues of Wierzbicka's NSM.

# 3 Combining meaning, form, and function

## 3.1 Frame Semantics

Fillmore's (1982) theory of Frame Semantics offers rich and detailed examples of how cultural and world knowledge motivates and is embedded in linguistic expressions. One of the main differences from his 1968 Case Grammar is that it does not rely on a limited set of semantic roles to account for word meanings (cf. Fillmore 2003). Instead, it relies on a potentially very large inventory of so-called frame elements that make up semantic frames (conceptual structures evoked by words that provide context for elements of interpretation) to cover the multitude of different types of linguistic meanings.[16] The main ideas of Frame Semantics are summarized in the following quote:

> 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. (Fillmore/Atkins 1992: 76–77)

One of Fillmore's examples showing the important role played by semantic frames is the sentence *We never open our presents until morning*. The words in this sentence individually evoke specific semantic frames (conceptual structures), e.g. *open* evokes the `Closure` frame, in which an Agent manipulates a Fastener to open or close a Containing Object, while *morning* evokes the `Calendric unit` frame that serves to structure different parts of the calendric cycle, both man-made and natural.[17] Fillmore points out that while each of the words have their own meanings, the sentence as a whole evokes the `Christmas` frame by describing a situation that captures relevant facts of Christmas practice, even though no word in it is specific to Christmas (cf. Gawron 2019: 60).[18]

Based on such observations, Fillmore proposes that one should characterize word meanings in terms of experience-based schematizations of events and objects in the speaker's world. Depending on the situation and the context, different types of references to extrinsic knowledge that are structured in terms of semantic frames are needed. Frames are used to capture different types of knowledge of various sorts and

**16** For details on Frame Semantics, see Petruck (1996), Busse (2012), and Gawron (2019).

**17** Frame names appear in Courier New font.

**18** Note that this requires knowledge of the various beliefs and customs around Christmas. Someone not familiar with the beliefs and customs will most likely not arrive at the Christmas interpretation of this sentence.

levels of complexities, such as the following: (1) events, such as `Revenge` (evoked by words such as *to avenge*, *vengeful*, *revenger*), `Giving birth` (evoked by words such as *to birth*, *to bear),* and `Complaining` (evoked by words such as *to bitch*, *to gripe*, and *to whine*); (2) relations, such as `Personal_Relationships` (evoked by words such as *to date*, *marital*, *romance*, and *wife*); (3) entities, such as `Gizmo` (evoked by words such as *apparatus*, *gear*, and *utensil*), (4) scales, such as `Temperature` (evoked by words such as *lukewarm* and *cold*), (5) states, such as `Being located` (evoked by words such as to *find*, *located*, and *whereabouts*), as well as person and spatial deixis.

During the 1990s, research in Frame Semantics began to focus on lexicographic and grammatical questions surrounding the syntactic realization of participants (a.k.a. frame elements). Fillmore/Atkins' (1992) pioneering study presents a detailed investigation of how the concept of 'risk' is realized linguistically by (a) identifying all participants in the risk scenario, (b) documenting how participants are formally realized in concrete linguistic expressions, and finally (c) summarizing the various ways in which the concept can be realized syntactically. In a follow-up study, Atkins (1994) argues that many definitions in traditional dictionaries are not appropriate, because they do not explain differences among near-synonyms such as *glimpse*, *spy*, *behold*, and *see*. Based on her observations, Atkins (1994) proposes a new corpus-based approach of lexicographic analysis that offers a more nuanced and systematic differentiation of the meanings of various semantically close verbs of seeing. Studies such as Fillmore/Atkins (1992), Atkins (1994), and Fillmore/Atkins (1994) laid the basis for the practical application of Frame Semantics to lexicography, as the following subsection shows.

## 3.2 *FrameNet* (FN)

In 1997, Fillmore founded the FN project at the International Computer Science Institute in Berkeley, California, with financial support from the National Science Foundation. The main goal of the FN project is to compile a lexicographic database by applying semantic frames to the structure and documentation of the English lexicon. The FN database (https://framenet.icsi.berkeley.edu/) offers rich frame semantic knowledge about the core vocabulary of English based on manually annotated corpus data, including valence description for each item analyzed (cf. Fillmore et al. 2003, Fillmore/Baker 2010). FN, which is freely available for academic research, currently contains about 1,200 frame definitions (including definitions of their respective FEs), together with lexical entries for more than 13,100 LUs evoking frames, more than 200,000 annotated corpus examples, and nearly 1,800 frame-to-frame relations illustrating how semantic frames are connected to each other via a frame hierarchy. The workflow underlying the creation of the contents in the FN database consists of three related stages.

First, a group of FN lexicographers proposes new semantic frames and lexical units (LUs) that evoke them.[19] When defining the boundaries of frames, FN lexicographers make sure that all LUs evoke the same type of event and share the same inventory and configuration of FEs (cf. Ruppenhofer et al. 2013). This process typically begins with finding a specific sense of a word that represents the prototypical meaning of that word and the frame more generally. For example, *to comply* expresses the prototypical meaning of the `Compliance` frame (see below). FN lexicographers formulate a first draft of a frame description by comparing the definitions of prototypical LUs in different dictionaries. Then, they discuss these definitions and compare them with their own intuitions. During this first stage, FN lexicographers also work closely with electronic corpora to study the different contexts in which the relevant LUs appear (cf. Fillmore/Atkins 1998, Atkins et al. 2003, Ruppenhofer et al. 2013). This three-part investigative process consisting of existing dictionary definitions, linguistic intuition, and corpus evidence helps FN lexicographers to arrive at a clearer (initial) definition of semantic frames and their frame elements.

This process also forms the basis for discussions about defining the boundaries of frames and identifying the different LUs that evoke them (cf. Johnson/Petruck 2003, Petruck et al. 2004, Boas 2005b). In the case of the `Compliance` frame, FN lexicographers identified other verbal LUs besides *comply* that evoke the same frame, such as *conform*, *follow*, and *observe*, as well as nouns such as *compliance*, *conformity*, and *observance*, and adjectives such as *compliant*, *obedient*, and *observant*. Figure 1 shows the FN definition of the Compliance frame.

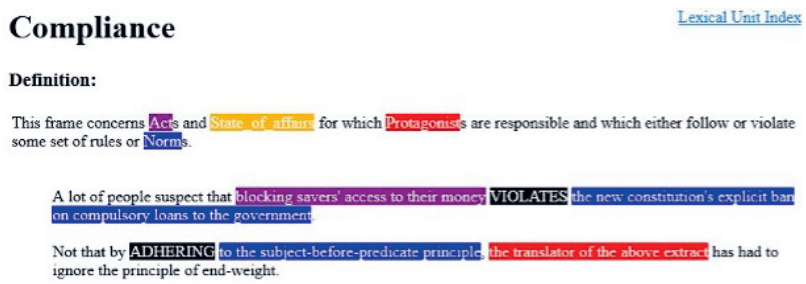



**Fig. 1:** First part of the FrameNet Definition of the Compliance frame[20]

Frame definitions in FN consist of multiple parts. The first part, as in Figure 1, provides a prose definition of the situation described by the LUs evoking the frame. The FEs,

19 A LU is a word in one of its senses. In FN, each sense of a word is a lexical unit and evokes a separate semantic frame.

20 See https://framenet.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Being_located.

situation-specific semantic roles, are color coded and defined in the second part of the frame definition. For example, the core FEs of the Compliance frame are Act (This FE identifies the Act that is judged to be in our out of compliance with the Norms), Norm (This FE identifies the rules of Norms that ought to guide a person's behavior), Protagonist (The Protagonist's behavior is in or out of compliance with norms), and State of Affairs (A State of Affairs may violate a law or rule).[21] The frame description in Figure 1 also includes two sentences exemplifying the Compliance frame. In these sentences, the frame-evoking LUs (*violate*, *adhere*) are marked in black, while the FEs of the Compliance frame appear in color.

The second stage in the FN workflow involves a second group of FN researchers, who annotate example sentences that were automatically extracted for each target LU from electronic corpora such as the British National Corpus and the American National Corpus. These annotators use a specific software, the co-called FN Desktop, to manually annotate about 10-20 example sentences per LU, depending on the LU's frequency in the corpus. Using the FN Desktop, annotators manually apply FE labels showing which parts of the sentence fill which FE role, labels for their phrase type(s) (PTs) and grammatical functions (GFs) vis-a-vis the target LU are added automatically (for details, see Fillmore et al. 2003, Boas 2017a, Ruppenhofer et al. 2017, Boas et al. 2024).[22] Table 1 provides an example annotation of one particular valence configuration of *to comply* in the Compliance frame.[23]

**Tab. 1:** Excerpt of one specific FE configuration from the valence table of the lexical entry of to comply in the Compliance frame[24]

| | Kim | complies | 100 percent | with the rules |
|---|---|---|---|---|
| FE | Protagonist | | Degree | NORM |
| PT | NP | | AVP | PP[with] |
| GF | Ext | | Dep | Dep |

**21** So-called core FEs are those types of FEs that uniquely define a frame, e.g. Act and Norm in the Compliance frame. Non-core FEs are peripheral FEs used to describe aspects of events more generally, such as Time, Manner, and Place (see Ruppenhofer et al. 2016). In contrast, extra-thematic FEs do not conceptually belong to the frame per se, but they situate an event against the backdrop of another state of affairs. For example, in *Sue baked the cookies for me*, the PP *for me* is an extra-thematic Recipient FE that is not an important part of a situation in which some edible entity is created (see Boas 2017b).

**22** The automatically generated information for PT and GF can be corrected manually if necessary.

**23** See Fillmore (2003) on how the concept of "valence" is implemented in FN.

**24** https://framenet.icsi.berkeley.edu/fnReports/data/lu/lu2332.xml?mode=lexentry.

The goal of annotating example sentences for each LU evoking a frame is to arrive at an annotation set for every possible combination of FE, PT, and GF. When annotating example sentences, annotators first have to read and understand the frame description devised by the first group of FN lexicographers, including the definitions of the various FEs. When reading through the extracted corpus example sentences, the annotators have to identify those constituents that represent specific FEs of the semantic frame under consideration and annotate them accordingly with the labels of those FEs that were defined by the first group of lexicographers. In most cases, this manual annotation process works very well. However, the annotation process is not always straightforward and linear. On a regular basis, annotators encounter extracted corpus example sentences that do not fit nicely into the frame descriptions provided by the first group of FN lexicographers. In many cases, these example sentences are instances of a different LU (evoking a different semantic frame) of the same word. Annotators then simply pick different sentences for annotation.

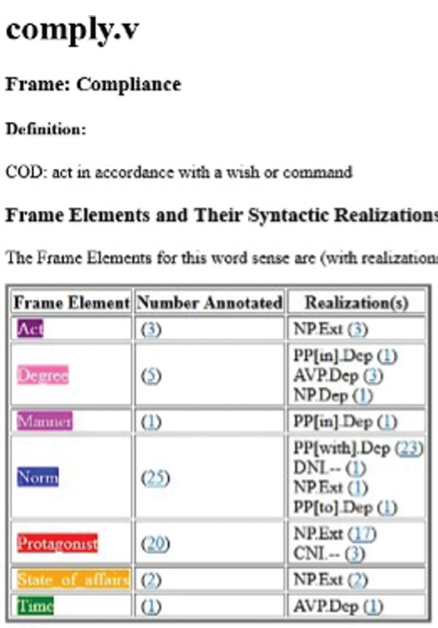
If, however, this problem re-occurs repeatedly and the annotators do not find any good example sentences among the extracted corpus examples, then they call a meeting with the first FN group of lexicographers to discuss these difficulties. The goal of the discussions between FN lexicographers (the first group in the workflow) and FN annotators (the second group in the workflow) is to determine possible issues causing the problems with annotating the difficult corpus examples under discussion and to resolve these issues. In many cases, the problems encountered by annotators are due to unclear boundaries of individual semantic frames. In other cases, the problems are caused by imprecise definitions of FEs of frames. Sometimes, it turns out that a specific LU has been misidentified by the first group as evoking a particular semantic frame (see, e.g., Petruck et al. 2004).

Usually, all three types of issues are caused by the output of the workflow by the first group of FN lexicographers. Then, the FN lexicographers engage in a discussion with the FN annotators to re-determine the boundaries of individual frames, or to re-define specific FEs of a frame, or to re-assign example sentences illustrating a particular use of a LU in a specific context to a different semantic frame. This process of reformulating frames is parallel to the more general process of reframing (cf. Petruck et al. 2004), in which the new analysis of a frame needs to be redone because the specific existing frame in question is too close to or overlaps with a new frame under development.[25] This process typically results in (1) more fine-grained definitions of FEs re-drawing the boundaries of existing semantic frames vis-a-vis other newer frames on which the FN lexicographers work, (2) re-defined frame descriptions (often coupled with an analysis and definition of a new semantic frame that is closely related to the original

25 See Petruck et al.'s (2004) discussion of how the original `Noise` frame is reframed by the FN lexicographers, resulting in two separate but related frames, namely `Make_noise`, `Cause_to_make_noise`, `Sound_movement`, and `Sounds`.

frame under reconsideration), or (3) re-assignment of automatically extracted corpus examples sentences to a different frame (or deleting it altogether because it does not illustrate use of a particular LU vis-a-vis a specific frame).

After FN annotators complete manual annotation of extracted corpus sentences with FE annotations, lexical entries are produced automatically for each LU in a frame during the third and final stage of the FN workflow. Each lexical entry of an LU includes a brief definition of the LU together with the frame it evokes and how each individual FE is realized syntactically in the annotated corpus sentences, see Figure 2 for the first part of the lexical entry report of *comply* in the `Compliance` frame.



## comply.v

**Frame: Compliance**

**Definition:**

COD: act in accordance with a wish or command

**Frame Elements and Their Syntactic Realizations**

The Frame Elements for this word sense are (with realizations):

| Frame Element | Number Annotated | Realization(s) |
|---|---|---|
| Act | (3) | NP.Ext (3) |
| Degree | (5) | PP[in].Dep (1)<br>AVP.Dep (3)<br>NP.Dep (1) |
| Manner | (1) | PP[in].Dep (1) |
| Norm | (25) | PP[with].Dep (23)<br>DNI.-- (1)<br>NP.Ext (1)<br>PP[to].Dep (1) |
| Protagonist | (20) | NP.Ext (17)<br>CNI.-- (3) |
| State_of_affairs | (2) | NP.Ext (2) |
| Time | (1) | AVP.Dep (1) |

**Figure 2:** First part of the FN lexical entry of *comply* in the `Compliance` frame.

The second part of a lexical entry provides detailed valence tables providing exhaustive information about every attested combinatorial possibility of FEs and their syntactic realizations (PT and GF), so-called FE configurations (cf. Fillmore et al. 2003, Boas 2005b, Ruppenhofer et al. 2016). See Figure 3 for the second part of the lexical entry of *comply* in the Compliance frame.[26]

**26** Note that the concept of "realization" used by FN covers cases in which FEs are not overtly realized at all but instead "null instantiated" (indefinite null instantiation (INI), definite null instantiation (DNI),

**Valence Patterns:**

These frame elements occur in the following syntactic patterns:

| Number Annotated | Patterns | | |
|---|---|---|---|
| 1 TOTAL | Act | Degree | Norm |
| (1) | NP Ext | PP[in] Dep | PP[with] Dep |
| 2 TOTAL | Act | Norm | |
| (2) | NP Ext | PP[with] Dep | |
| 4 TOTAL | Degree | Norm | Protagonist |
| (3) | AVP Dep | PP[with] Dep | NP Ext |
| (1) | NP Dep | PP[with] Dep | NP Ext |
| 1 TOTAL | Manner | Norm | Protagonist |
| (1) | PP[in] Dep | PP[with] Dep | NP Ext |

**Figure 3:** Excerpt from the second part of the FN lexical entry of *to comply* in the Compliance frame.

For each LU in the FN database there is also an annotation report that presents the results of the manual annotation process by the FN annotators. These annotation reports illustrate how the relevant frame-evoking target LUs occur in different contexts. These reports form the basis of the detailed valence tables in the lexical entries of each LU as in Figure 3. FN users typically access information about LUs by directly searching for them on the FN website. Alternatively, they can search for LUs via an alphabetized index of LUs or via an alphabetized index of names of semantic frames. Another option for accessing FN data is via the FrameGrapher visualization tool,[27] which allows users to interactively explore the topology of relations that exist in a set of related frames. For additional ways of accessing FN data, see Fillmore & Baker (2010), Ruppenhofer et al. (2013) and Boas et al. (2024). With this brief overview of Frame Semantics and FN, we now turn to a discussion of how semantic frames function as a metalanguage and we compare Fillmore's application of Frame Semantics in FN with Wierzbicka's Natural Semantic Metalanguage.

and construction al null instantiation (CNI)). See Fillmore (1986), Ruppenhofer et al. (2013), and Boas (2017b) for details.

27 https://framenet.icsi.berkeley.edu/FrameGrapher.

## 3.3 Comparing semantic frames as a metalanguage with NSM

Wierzbicka's NSM and Fillmore's Frame Semantics (as applied to FN) both aim to capture meaning, but they approach it from different angles and with different tools. In the remainder of this subsection, I compare and contrast these two approaches, arguing that Frame Semantics (as applied to FN) offers a number of methodological and empirical advantages.

One key difference between the two approaches is that Wierzbicka explicitly labels her framework as a "natural semantic metalanguage", while Fillmore makes no explicit claims about semantic frames per se being a natural metalanguage. Another key difference is the level of granularity of semantic description and analysis. While NSM aims to define individual word meanings in terms of universal primes (see Section 2.2 above), FS offers different levels of abstraction of meaning descriptions. At the lowest level we find the prose definition of each LU in its lexical entry. At a more abstract level, meanings in FN are captured and defined via semantic frames that organize different levels of conceptual knowledge. These semantic frames capture a level of meaning generalization that captures meanings of situations, events, and states and the LUs that evoke the same frame. Recall from the previous subsection that the `Compliance` frame is not only evoked by the verb *comply*, but by many other verbs such as *adhere*, *breach*, *circumvent*, *follow*, *honor*, and *obey*, as well as by nouns such as *compliance*, *contravention*, and *adherence* and adjectives such as *compliant*, *contrary*, *lawless*, *obedient*, and *observant*.

NSM does not appear to offer systematic ways of expressing such broader-scale generalizations that make it possible to capture layers of meanings shared by semantically related LUs at different levels of abstraction while at the same time accounting for distinctions in meaning between different LUs evoking the same frame. Consider, for example, the NSM analysis of *jog* and *stroll* in (3) and (4) above. The NSM explications offer fine-grained individual analyses of the meanings of these verbs without explicitly capturing their similarities or differences in how their meanings are realized syntactically. In contrast, FN captures the meaning similarities by explicitly stating that the two LUs evoke the same `Self_motion` frame[28] while at the same time capturing the meaning differences in the definitions of the individual lexical entries (*to jog: run at a steady, gentle pace, especially as a form of exercise; to stroll: walk in a leisurely way*).

In addition, some FN frames are evoked by only a few LUs, while other frames are evoked by dozens of different LUs. At an even higher level of abstraction, frames are related to other frames via the frame hierarchy that can be visualized using the FrameGrapher tool discussed in the previous section. Consider, for example, Figure 4 that illustrates a set of frames related to the overall concept of employment. The dashed lines indicate Subframe relations, the solid lines indicate Perspective On relations. The

**28** https://framenet.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Self_motion.

frames at the bottom in Figure 4 are related to each other (they represent the different stages of employment) via the higher-level frames that make up the entire Employment Scenario.

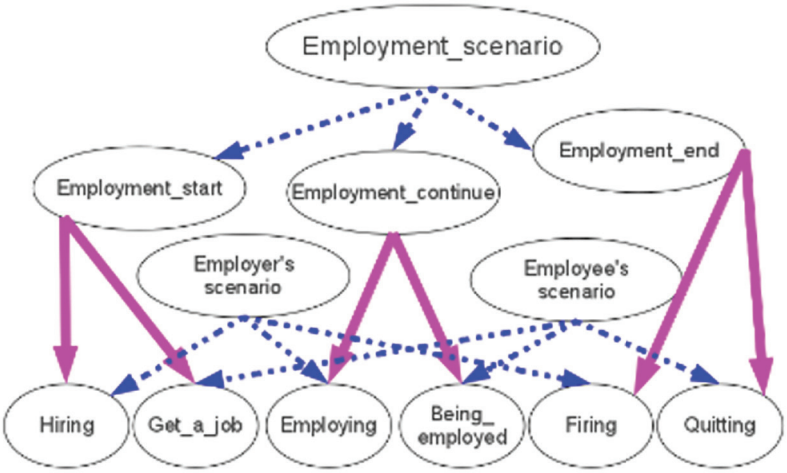



**Figure 4:** Relations among frames related to employment (based on Boas et al. 2024).

Another major difference between the two approaches is that NSM makes an explicit statement about the universal applicability of semantic primes and their usefulness for semantic analysis. As summarized in Section 2.2 above, NSM claims to avoid cultural bias by using universal semantic primes, which are supposed to work across all languages and cultures since they supposedly rely on universal concepts. In contrast, FS does not make any claims about universal applicability of semantic frames to all of the world's languages. More specifically, FS places a heavy emphasis on describing and analyzing meanings primarily within single languages without proposing any universal status of semantic frames used to account for these meanings. On the FS view, meanings in each language are primarily accounted for individually and not cross-linguistically.

This is not to say that semantic frames derived on the basis of one language are not applicable to other languages. For example, the semantic frames created in the context of the Berkeley FN for English have been shown to also be applicable (for the most part) to the creation of framenets for a diverse set of other languages, including Brazilian Portuguese, Chinese, Finnish, French, German, Hebrew, Japanese, Korean, Spanish, and Swedish, among others (see, e.g. Boas 2005a and the contributions in Boas 2009). Over the last few years, the Global FN initiative has made significant progress towards

identifying semantic frames that are applicable across different languages.[29] The important difference between the NSM approach and the FS approach is that the latter does not make any a priori assumptions about the universality of the descriptive tools (i.e. semantic frames) used for the analysis of meanings across different languages. Instead, FS takes a usage-based bottom-up approach and only makes claims about the status of semantic frames, such as any cross-linguistic applicability, if there is empirical evidence for it (for details, see Boas 2020).

A closely related point is the amount of building blocks required for semantic analysis. One of the goals of using semantic primes for explications is to keep their number relatively small. Over the years, the number of semantic primes of NSM has changed back and forth, it currently stands at 65. However, it is not entirely clear what the exact criteria are for deciding which semantic primes should be added or dropped from the list or how to decide on new primes if one encounters new words whose meanings are not possible to explicate using the currently existing set of semantic primes. In contrast, FS does not make any claims about a limited number of semantic frames or FEs necessary for semantic analysis. To the contrary, every time FN researchers encounter new word meanings that cannot be accounted for with existing semantic frames, they formulate new frames with new FEs.

Since 1997, FN has defined more than 1,200 semantic frames, containing more than 10,000 frame-specific FEs, covering more than 13,000 LUs (based on more than 200,000 instances of frames in naturally occurring sentences) (cf. Boas et al. 2024: 13). Recall that the number of FEs that form the core of frame descriptions is potentially open-ended. This means that until FN comes closer to achieving a more elaborate coverage of the English lexicon it is close to impossible to arrive at any definite claims about the possible number of FEs (and semantic frames) needed to account for the structure of the English lexicon, let alone that of other languages.[30]

Another key difference between NSM and FS is the ability to reproduce and verify the building blocks of the two approaches in a systematic way. NSM claims to provide objective, empirically verifiable representations of meaning using a finite set of semantic primes that are supposedly universal across languages and cultures. I argue that NSM explications are not always entirely free from subjectivity because they involve paraphrasing complex meanings using a limited set of primes. In my view, the paraphrasing relies heavily on the researcher's interpretation of how speakers understand a word or concept, which might lead to blurry boundaries between explicating a meaning and imposing a subjective interpretation. This issue could probably be resolved by having groups of NSM researchers develop explications together.

**29** See, e.g., Torrent et al. (2018).

**30** Even though FN offers a large number of semantic frames and lexical entries, its coverage of the English lexicon has large gaps, which are primarily due to a lack of time and funding, see Boas et al. (2024) for details.

Consider, for example, Goddard's (2008a) discussion of *to think* in (2) above. There is relatively little empirical testing of whether native speakers (laypersons) in fact agree with the explications offered for words such as *to think* (cf. Evans and Levinson 2009). The process of refining NSM explications iteratively based on new linguistic data or an improved understanding of a word's meaning relies on the researcher's interpretations, which might introduce another level of subjectivity. See, for example, the different refinements of *think* offered by Wierzbicka (1996), Goddard/Wierzbicka (2002), Goddard (2010), and Goddard/Wierzbicka (2014).

In contrast, FS as it is implemented in FN offers various levels of empirical testing of meaning descriptions as a part of the FN workflow. First, as discussed above, it is not a single researcher who formulates a frame description (together with FE definitions and lists of LUs evoking the frame). Instead, it is a group of several FN lexicographers who together formulate frame descriptions and who have to agree on the level of granularity of meaning(s) as well as the boundaries of frames and the LUs evoking the frame. This process is based on a combination of linguistic intuitions by several researchers (who need to agree) and objective verifications of these intuitions based on corpus evidence. Second, the group of FN annotators who receive the output of the work of the first group of FN lexicographers have to apply the frame descriptions with FE definitions to automatically extracted corpus data and identify specific constitutions in the context of the relevant target LUs in order to annotate them with the correct FE labels. During this process, FN annotators first need to understand the meanings of the FE definitions vis-a-vis the frame and then they have to carefully read each new corpus example to identify which constituents fit specific FE definitions and annotate them accordingly. In my view, the annotation process is a type of empirical verification of the frame definitions compiled by the FN lexicographers, because FN annotators need to "apply" the FE definitions to corpus data that they have not seen before.[31] If annotators are able to successfully annotate corpus examples based on the frame definitions this can be seen, in my view, as an empirical verification of the frame definitions derived by the group of FN lexicographers, because the frame definitions can be replicated with the support of new corpus data.[32]

Another difference between NSM and FS concerns the treatment of polysemy. Verbs such as *think*, like most other common words, are polysemous and NSM

**31** Recall from above that if the FN annotators are unable to correctly apply the FE labels to the extracted corpus data, then most often there is a problem with the frame definition and FN annotators meet with the group of FN lexicographers to revise the frame and frame descriptions.

**32** Once all the LUs that evoke the same semantic frame have been annotated and their lexical entries have been compiled and stored in the FN database, the frame descriptions and associated lexical entries typically do not get changed. In the over 25-year long history of FN, the only changes affecting the status of existing frames happen when FN researchers are working on another closely related semantic frame. During this process, it sometimes happens that existing frames need to be re-framed, i.e. split up in different ways. See Petruck et al. (2004) for discussion.

explications should offer a systematic way for distinguishing different senses in context (see Hanks 2013 for details). However, it is not clear how to systematically break a word's meanings down into separate NSM explications. For example, Goddard's (2008a) explication of *think* in (2) above does not make it clear which senses of the verb it covers. While refinements of the NSM explanations of *think* over the years have improved, its broad semantic range continues to pose challenges for a single universal explanation.[33] In contrast, FN does not per se place an emphasis on a specific sense of a word and it also does not aim for a single universal explication. Instead, FN researchers first carefully study the full range of a word's distribution in different contexts in corpus data before working on distinguishing different senses based on the situations they describe (cf. Fillmore/Atkins 2000, Boas 2001, Ruppenhofer et al. 2016). Then, each of the proposed senses of a word such as *think* is further verified based on different syntactic contexts in which they occur, before FN researchers decide on which sense to work on first.

Thus far, FN lexicographers have documented four distinct senses of *think* and developed separate semantic frames for each of the four LUs: (1) `Awareness`[34] (e.g. *I thought about what he said*), which is also evoked by other verbal LUs such as *conceive*, *imagine*, *presume*, and reckon, nominal LUs such as *awareness*, *presumption*, and *understanding*, and adjectival LUs such as *aware*, *cognizant*, and *knowledgeable*; (2) `Cogitation`[35] (e.g. *I think we know what we're going to speak about*), which is also evoked by other verbal LUs such as *contemplate*, *dwell*, and *ponder* and nominal LUs such as *consideration*, *reflection*, and *thought*; (3) `Opinion`[36] (e.g. *I think that is why I welcomed doing a book*), which is also evoked by other verbal LUs such as *believe*, *hold*, *subscribe*, and *feel* and nominal LUs such as *believer*, *sense*, and *view*; and (4) `Regard`[37] (e.g. *I think better of the law than that*), which is also evoked by other verbs such as *appreciate*, *find*, and *regard*, nouns such as *esteem* and *impression*, and adjectives such as *appreciative*.

Another important difference between the FN approach and the NSM is that the former is corpus-based and that it combines semantic analysis with documentation of its syntactic form and function, while the latter does not. In the previous paragraphs I have already compared how the two approaches go about verifying the status of their building blocks (semantic frames with FEs vs. semantic primes) and how they differ in their treatment of polysemy. Closely related to these issues is the question of how it is possible to clearly identify the building blocks and verify them in corpus data. While FN follows an objective corpus-based workflow that seeks to validate linguistic intuitions of multiple FN lexicographers to check on the validity of its building blocks for semantic analysis, researchers such as Levinson (2000) and Evans/Levinson (2009) have argued

**33** For different evolving NSM explications of *think*, see Wierzbicka (1992), Wierzbicka (1996), Goddard/Wierzbicka (2002), Goddard (2010), and Goddard/Wierzbicka (2014).

**34** https://framenet.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Awareness.

**35** https://framenet.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Cogitation.

**36** https://framenet.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Opinion.

**37** https://framenet.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Regard.

that NSM explications are too subjective, because they rely too heavily on linguistic intuition. Note that intuition plays a role in both approaches, but in FN, it is constrained by the commitment to find corpus evidence for the representations proposed by linguists. In fact, the valence tables are generated automatically from data created by the annotation decisions made while looking at individual sentences.

A related point is how the two approaches deal with the relationship between meaning, form, and function. Usually, NSM explications make no direct mention of this relationship, as Al-Hammadi/Yagi's (2024) comparison of *jog* and *stroll* above has shown. Goddard's (2008) analysis of *think* discussed in Section 2.2 above does mention the "full valency array for THINK" (Goddard 2008a: 14), but it is unclear how the four options of the supposedly full valency array for THINK in (2a)–(2d) above link meaning with form or function, or which exact meanings are expressed by each of the four valency options. In contrast, the FN approach distinguishes between different senses of a word, as discussed in the previous paragraphs, explicitly stating which LU of a word evokes which frame. In the case of *think*, one of the four frames documented by FN is the `Opinion` frame, in which a "Cognizer holds a particular Opinion, which may be portrayed as being about a particular topic" (FN).[38]

As shown in Section 3.2 above, each lexical entry contains a valence table (derived on the basis of the manually annotated corpus data), which lists how the combinations of the FEs of a frame are realized syntactically in terms of PT and GF. In the case of the lexical entry of *think* evoking the `Opinion` frame, its valence table looks as in Figure 5. The valence table shows how different configurations of FEs are realized differently in terms of PT and GF. For example, the FE configuration *Circumstances*, *Cognizer*, and *Opinion* in the first line of the valence table can be realized syntactically in two different ways: First with the valence pattern <PP[as]/Dep, NP/Ext, Sfin;Obj> as in *[<Circumstances>As she was walking] [<Cognizer>she] thought[tgt] [<Opinion>they were in danger],* and second with the valence pattern <PP[from]/Dep, NP/Ext, NP/Obj>), as in *[<Circumstances>From where I was sitting] [<Cognizer>I] thought[tgt] [<Opinion>the Microsoft trial has been the really obvious turning point]*. In contrast to the two syntactic realizations of the first FE configuration, the fourth FE configuration from the top in Figure 5, *Cognizer* and *Opinion*, has six different syntactic realizations in terms of PT and GF.

**38** https://framenet.icsi.berkeley.edu/fnReports/data/frameIndex.xml?frame=Opinion.

| Number Annotated | Patterns | | |
|---|---|---|---|
| 2 TOTAL | Circumstances | Cognizer | Opinion |
| (1) | PP[as]<br>Dep | NP<br>Ext | Sfin<br>Obj |
| (1) | PP[from]<br>Dep | NP<br>Ext | NP<br>Obj |
| 1 TOTAL | Cognizer | Constancy | Opinion |
| (1) | NP<br>Ext | PP[for]<br>Dep | Sub<br>Dep |
| 1 TOTAL | Cognizer | Evidence | Opinion |
| (1) | NP<br>Ext | Sub<br>Dep | Sfin<br>Dep |
| 26 TOTAL | Cognizer | Opinion | |
| (1) | NP<br>Ext | QUO<br>Obj | |
| (19) | NP<br>Ext | Sfin<br>Dep | |
| (2) | NP<br>Ext | Sfin<br>Obj | |
| (2) | NP<br>Ext | Sub<br>Dep | |
| (1) | NP<br>Obj | Sfin<br>Dep | |
| (1) | NP<br>Obj | Sfin<br>Obj | |

**Figure 5**: Partial FN valence table of the lexical entry of *think* evoking the `Opinion` frame.[39]

Figure 5 shows that in contrast to Wierzbicka's NSM, the corpus-based FN approach offers a much greater level of detail regarding the scope of valency options that are possible for realizing a word's different facets of meanings syntactically. Note, however, that the information shown in Figure 5 is only a part of the valence table of the LU *think* that evokes the `Opinion` frame. Other verbal LUs evoking the `Opinion` frame include *believe*, *feel*, *hold*, and *suppose* and the valence tables of each of these LUs differ from that of think in the `Opinion` frame, thereby providing different syntactic realizations of the semantics of the frame.

Furthermore, each of the three other frames which *think* can evoke, namely `Awareness`, `Cogitation`, and `Regard`, offers additional valence tables showing how the semantics of the LU in that frame are realized syntactically. Each of these three other frames are evoked by other LUs, as well. For example, the `Awareness` frame is also evoked by other verbal LUs (as well as nominal and adjectival LUs) such as

39 https://framenet.icsi.berkeley.edu/fnReports/data/lu/lu11959.xml?mode=lexentry.

*comprehend*, *conceive*, *imagine*, *presume*, *reckon*, and *suspect*. The `Cogitation` frame is also evoked by other verbal LUs, including *consider*, *contemplate*, *deliberate*, *muse*, *reflect*, and *wonder*. The `Regard` frame is also evoked by other verbal LUs such as *appreciate*, *find*, and *regard*. The crucial point is that each of the LUs in each of these frames have their own unique valence tables that set them apart from the valence tables of the different LUs of *think* in the respective other frames, thereby showing how each LU comes with a unique syntactic realization of a frame.

The FN approach also makes it possible to use the same semantic metalanguage (semantic frames with their FEs) to study how different LUs evoking the same frame realize the semantics of that frame in different ways. For example, in the case of the `Opinion` frame, which is evoked by a total of 15 different nominal and verbal LUs, researchers can investigate how the semantics of the frame is realized differently by each of the different LUs by carefully studying the valence tables in the entries of the LUs to determine how different FE configurations are realized in terms of different combinations of PTs and GFs.[40] As previous case studies by Boas (2010) and Boas (2011) show, the insights derived from such detailed investigations of verbal semantics are directly transferable to Construction Grammar, the sister theory of Frame Semantics. The influence of meaning on the realization of syntactic form and function strongly suggests that a fine-grained and potentially open-ended analysis of word meaning as implemented in the FN project is advantageous.

# 4 Conclusions

In this paper I proposed that semantic frames (together with their FEs) and their implementation in the FN database should be regarded as an empirical semantic metalanguage. In Section 2, I first provided a brief overview of different semantic metalanguages. Then, I reviewed the main ideas of Wierzbicka's NSM that uses universal semantic primes (irreducible atoms of meaning in NSM) to arrive at explanations for capturing meanings of words.

In Section 3, I introduced Fillmore's (1982) theory of Frame Semantics and showed how it has been applied to the creation of the Berkeley FN project, which is in the process of compiling a lexicographic database of English based on frame-semantic principles. Focusing on the workflow of FN, I pointed out that it offers a systematic procedure to test and verify frame-semantic analyses of meanings that relies on data from large natural language corpora. This observation led me to argue that semantic frames,

**40** Space limitations do not allow for a detailed discussion of the details of such an analysis. See Boas (2010) for a case study for communication verbs that develops such an approach and Boas (2011) that applies this methodology to *build* verbs. Dux (2020) presents a similar approach, comparing the syntactic realization patterns of different verb classes in English and German.

together with their descriptive and analytical apparatus that also involves representations of how meaning is realized syntactically (and how semantic frames are related to each other in a hierarchy), should be regarded as an empirical semantic metalanguage.

The comparison of Wierzbicka's NSM and Fillmore's Frame Semantics as it is implemented in the context of the Berkeley FN project showed a number of important methodological and theoretical differences. First, the unit of analysis in Frame Semantics is the semantic frame, which seeks to account for a situation or state of affairs that can be described by multiple words (more specifically, lexical units), often of different parts of speech (both from a perspective of decoding and encoding). The unit of analysis in NSM explications are individual words.

Second, the building blocks of Frame Semantics are the FEs that make up the semantic frames, together with the relations between the FEs as well as the relations between frames. The exact number of FEs is to date impossible to determine, because we do not know yet the number and types of semantic frames needed to cover the (core) vocabulary of English (and other languages).[41] Frame Semantics makes no specific claim about the universality of semantic frames (yet), though it is very likely that many (especially higher-level) frames that are universal to human cognition, such as `Motion`, `Communication`, and `Ingestion`, are good candidates. In NSM, the building blocks of explications are the universal primes that are assumed to be limited in number and universally applicable across all languages.

Third, semantic frames are based on the FN workflow involving two groups of researchers that use both linguistic intuition and corpus evidence to discover, define, and apply semantic frames to the analysis of data from large balanced natural language corpora. In my view, the NSM workflow is different, because it does not involve two separate groups of researchers (lexicographers and annotators) that work together to check each other's results. Second, the semantic frames and associated lexical entries in FN are derived on the basis of a number of different manually annotated corpus sentences, which form the primary source data on which the analysis of each LU and each semantic frame is based. Since they are readily accessible on the FN website, it allows other researchers to determine whether the information in the lexical entries and the definitions of semantic frames are accurate or not, because the primary source data makes it possible to recreate the annotation process and linguistic analysis that formed the basis for the creation of the lexical entries and the frame definitions. In contrast, the primes and explications of NSM appear to be usually based on the intuitions of individual researchers studying selected texts, which can then be further refined in an iterative

**41** Goddard (2018: 340) views the unconstrained growth of FEs and semantic frames as a problem: "I think the FrameNet linguists are making trouble for themselves by not adopting a systematic approach to the metalanguage." In my opinion, this view is problematic, because at this time it is not clear how big the inventory of frames of a language like English really is. Put differently, it is too early to decide what the "correct" number of frames or semantic primes should be, because of our limited coverage to date.

process by other researchers. For researchers not intimately familiar with the latest developments in NSM it is sometimes difficult to follow this process by which NSM researchers develop specific semantic primes and explications, because the full range of primary data on which they are based is not always readily available for verification. There is an additional practical issue with NSM, namely that there is no publicly shared online repository of all NSM explications, parallel to the online lexicographic database that publicizes the research results of the FN project.[42]

Fourth, the FEs, i.e. situation-specific semantic roles, that form the basis of each frame description, can be empirically verified through analysis of new data, which is a part of the FN workflow described in Section 3.2. This process allows researchers to validate or falsify Fes and the frames that they constitute. NSM offers a similar process by drafting and testing explications that are then refined iteratively, but this process does not typically involve the systematic use of large balanced natural language corpora such as the British National Corpus (cf. Levisen 2012). NSM could perhaps benefit from adopting a workflow similar to that of FN whereby two different groups of researchers work together in order to analyze data, draft first meaning descriptions, verify these in corpus data, and finally have the proposed explications and primes tested.

Fifth, in FN semantic frames and their FEs are almost always paired with their respective forms and functions in the lexical entries of the words that evoke the frame. Following the principles of Construction Grammar (the sister theory of Frame Semantics) (cf. Fillmore/Kay 1993, Goldberg 1995, Hoffmann 2022), a difference in meaning spells out a difference in meaning/function.[43] These pairings of form with meaning and function are documented in great detail in the lexical entries of FN. This allows researchers to systematically validate frame-semantic descriptions using new data, thereby leading to a more empirically accurate semantic metalanguage with semantic frames. Frame Semantics is thus different from NSM, because it makes it possible to explicitly relate semantics to syntax, not just at the lexical level but also at more abstract levels of grammar (cf. Boas 2017a, Boas et al. 2019).

Finally, FN offers meanings descriptions at two different levels of abstraction, i.e. individual lexical entries and semantic frames, as well as higher-level meaning relations through frame relations in the FN frame hierarchy. This "macro" view of meaning, which looks at how words fit into larger cognitive structures, is different from the "micro" view of meaning, which breaks meanings of individual words down into what are thought to be the most basic elements.

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**42** I thank Josef Ruppenhofer for pointing out this important difference to me.

**43** Note that there are exceptions to this generalization (mainly of a diachronic nature). This principle has been tested empirically by different scholars (cf. Hilpert et al. 2023, Laporte et al. 2021 and Levshina/Lorenz 2022), and it seems the principle does not always work at a lower level of resolution, while at a middle and high level of resolution, it does work. I thank Francisco Gonzálvez-García for this observation.

A comparison of NSM explications and their primes with the frames and FEs of FS as implemented in FN show that they take two different and perhaps complementary approaches to meaning analysis. In my view, both approaches could probably benefit from each other in various aspects. For example, the FN workflow might benefit from the NSM approach by writing definitions of word senses in lexical entries and definitions of FEs with semantic primes. This might help with breaking the meaning of FEs down into more basic bits of meaning that require less interpretation. NSM might benefit from the frames approach by considering different ways of mapping relations between explications similar to the relations between frames and FEs in FS. This would help with capturing similarities and interconnections between different senses of words.[44]

Obviously, future research is required to investigate in more detail how the two approaches could benefit from each other, both methodologically and theoretically. A possible blueprint for how to go about combining insights from two different but compatible approaches with each other is proposed by Perek/Patten (2019). They show how the semantic frames from FN can be combined with the grammar patterns documented by the *COBUILD* project (Francis et al. 1996, 1998; Hunston/Francis 2000) in order to arrive at construction descriptions that combine information from both approaches. The goals of the present paper have been more modest: To compare the NSM approach with the Frame Semantics approach, and to discuss the various ways in which they describe and analyze meanings.

# 5 Bibliography

Ágel, Vilmos/Höllein, Dagobert (2021): Satzbaupläne als Zeichen: Die semantischen Rollen des Deutschen in Theorie und Praxis. In: Binanzer, Anja/Gamper, Jana/Wecker, Verena (eds.): Prototypen – Schemata – Konstruktionen. Berlin/Boston: de Gruyter, 125–251.

Alhammadi, Nada/Yagi, Sane (2024): An NSM-based contrastive semantic analysis of 'strolling' and 'jogging' in English and Arabic. In: Cogent Arts & Humanities 11.1, 1–15.

Atkins, Beryl T.S. (1994): Analyzing the verbs of seeing: a frame semantics approach to corpus lexicography. In: Annual Meeting of the Berkeley Linguistics Society, 42–56.

Bach, Emmon (1989): Informal Lectures on Formal Semantics. Albany: SUNY Press.

Baker, Collin F./Fillmore, Charles J./Lowe, John B. (1998): The Berkeley FrameNet Project. In: COLING 1998 Volume 1: The 17th International Conference on Computational Linguistics. Montreal: Association for Computational Linguistics, 86–90.

**44** To this end, Goldberg (1995) points to various similarities between her own work on meaningful grammatical constructions in the context of Construction Grammar (where the meaning of constructions is modelled in terms of Frame Semantics) and Wierzbicka's (1988) research on the meaning of grammatical constructions. More specifically, Goldberg (1995: 223) states the following: "Wierzbicka's approach fits squarely into the approach of construction grammar, generally defined."

Barlow, Michael/Kemmer, Suzanne (2000) (eds.): Usage-based models of languages. Stanford: CSLI Publications.
Berry, Roger (2005): Making the most of metalanguage. In: Language Awareness, 14.1, 3–20.
Boas, Hans C. (2001): Frame Semantics as a framework for describing polysemy and syntactic structures of English and German motion verbs in contrastive computational lexicography. In: Rayson, Paul/Wilson, Andrew/McEnery, Tony/Hardie, Andrew/Khoja, Shereen (eds.): Proceedings of Corpus Linguistics 2001, Lancaster, U.K., 64–73.
Boas, Hans C. (2005a): From Theory to Practice: Frame Semantics and the Design of FrameNet. In: Langer, Stefan/Schnorbusch, Daniel (eds.): Semantik im Lexikon. Tübingen: Narr, 129–160.
Boas, Hans C. (2005b): Semantic Frames as Interlingual Representations for Multilingual Lexical Databases. In: International Journal of Lexicography 18.4, 445–478.
Boas, Hans C. (2006): A frame-semantic approach to identifying syntactically relevant elements of meaning. In Steiner, Petra/Boas Hans C./Schierholz, Stefan J. (eds.): Contrastive Studies and Valency. Studies in Honor of Hans Ulrich Boas. Frankfurt/New York: Peter Lang, 119–149.
Boas, Hans C. (2009) (ed.): Multilingual FrameNets in Computational Lexicography. Methods and Applications. Berlin/New York: Mouton de Gruyter.
Boas, Hans C. (2010): The syntax-lexicon continuum in Construction Grammar: A case study of English communication verbs. In: Belgian Journal of Linguistics 24, 58–86.
Boas, Hans C. (2011): A frame-semantic approach to syntactic alternations with build-verbs. In: Guerrero Medina, Pilar (ed.): Morphosyntactic alternations in English. London: Equinox, 207–234.
Boas, Hans C. (2017a): Computational Resources: FrameNet and Constructicon. In: Dancygier, Barbara (ed.): The Cambridge Handbook of Cognitive Linguistics. Cambridge: Cambridge University Press, 549–573.
Boas, Hans C. (2017b): What you see is not what you get: Capturing the meaning of missing words with Frame Semantics. In: Proceedings of the Chicago Linguistics Society 52, 53–70.
Boas, Hans C. (2020): A roadmap for determining the universal status of semantic frames. In: Enghels, Renata/Defrancq, Bart/Jansegers, Marlies (eds.): New Approaches to Contrastive Linguistics. Berlin/Boston: de Gruyter, 21–52.
Boas, Hans C. (2025): What happened to Frame Semantics? Journal of English Linguistics 41, 1–55.
Boas, Hans C./Dux, Ryan (2017): From the past into the present: From case frames to semantic Frames. In: Linguistics Vanguard 2017, 1–14.
Boas, Hans C./Lyngfelt, Benjamin/Torrent, Tiago (2019): Framing Constructicography. In: Lexicographica 35, 41–95.
Boas, Hans C./Ruppenhofer, Josef/Baker, Collin (2024): FrameNet at 25. In: International Journal of Lexicography 37.3, 263–284.
Boas, Hans C./Ziem, Alexander (2022): Debunking some myths about the role and relevance of (restricted) semantic role sets: Some thoughts on Ágel & Höllein 2021. In: Gallez, Françoise /Hermann, Manon (eds.): Cognition and Contrast. Festschrift for Sabine De Knop. Brussels: Saint-Louis University Press, 65–96.
Busse, Dietrich (2012): Frame Semantik. Berlin/New York: Mouton de Gruyter.
Bybee, Joan (2023): What is usage-based linguistics? In: Diaz-Campos, Manuel/Balasch, Sonia (eds.): The Handbook of Usage-based Linguistics. Oxford: Wiley Blackwell, 9–30.
Chierchia, Gennaro/McConnell, Sally (1989): Meaning and Grammar. Cambridge: MIT Press.
Chomsky, Noam (1965): Aspects of a Theory of Syntax. Cambridge: MIT Press.
Coupland, Nikolas/Jaworski, Adam (2004): Sociolinguistic perspectives on metalanguage: Reflexivity, evaluation and ideology. In: Language Power and Social Process 11, 15–52.
Croft, William (2001): Radical Construction Grammar. Oxford: Oxford University Press.
Cruse, Allan (1986): Lexical Semantics. Oxford: Oxford University Press.

Dowty, David. R./Wall, Robert E./Peters, Stanley (1981): Montague's General Semiotic Program. In: Dowty, David R./Wall, Robert E./Peters, Stanley (eds.): Introduction to Montague Semantics. Dordrecht: Kluwer, 252–268.
Dux, Ryan (2020): Frame-constructional verb classes. Amsterdam/Philadelphia: John Benjamins.
Evans, Nick/Levinson, Steven C. (2009): The myth of language universals: Language diversity and its importance for cognitive science. In: Behavioral and brain sciences 32.5, 429–448.
Everett, Dan L. (2005): Cultural Constraints on Grammar and Cognition in Pirahã: Another Look at the Design Features of Human Language. In: Current Anthropology, 46.4, 621–646.
Fillmore, Charles J. (1968): The case for case. In: Bach, Emmon/Harms, Robert T. (eds.): Universals in Linguistic Theory. New York: Holt, Rinehart and Winston, 1–88.
Fillmore, Charles J. (1982): Frame Semantics. In: Linguistic Society of Korea (ed.): Linguistics in the Morning Calm. Seoul: Hanshin, 111–137.
Fillmore, Charles J. (1986): Pragmatically controlled zero anaphora. In: Proceedings of the 12th annual meeting of the Berkeley Linguistics Society, 95–107.
Fillmore, Charles J. (2003): Valency and semantic roles: The concept of deep structure case. In: Ágel, Vilmos (ed.): Dependenz und Valenz: Ein internationales Handbuch der zeitgenössischen Forschung. Berlin/New York: Mouton de Gruyter, 457–474.
Fillmore, Charles J./Atkins, Berly T. S. (1992): Toward a Frame-based Lexicon: The Semantics of RISK and its Neighbors. In: Lehrer, Adrienne/Kittay, Eva F. (eds.): Frames, Fields and Contrasts: New Essays in Semantic and Lexical Organization. Hillsdale: Erlbaum, 75–102.
Fillmore, Charles J./Atkins, Berly T. S. (1994): Starting where the dictionaries stop: The challenge of corpus lexicography. In: Atkins, Berly T. S./Zampolli, Antonio (eds.): Computational Approaches to the Lexicon. Oxford: Oxford University Press, 349–394.
Fillmore, Charles J./Atkins, Berly T. S. (2000): Describing polysemy: The case of crawly. In: Ravin, Yael/Laecock, Claudia (eds.): Polysemy. Oxford: Oxford University Press, 91–110.
Fillmore, Charles J./Baker, Collin (2010): A frames approach to semantic analysis. In: Heine, Bernd/Narrog, Heiko (eds.): The Oxford Handbook of Linguistic Analysis. Oxford: Oxford University Press, 13–340.
Fillmore, Charles J./Johnson, Christopher R./Petruck, Miriam R. L. (2003): Background to FrameNet. In: International Journal of Lexicography 16.3, 235–250.
Francis, Gill/Hunston, Susan/Manning, Elizabeth (1996): Collins COBUILD Grammar Patterns 1: Verbs. London: HarperCollins.
Francis, Gill/Hunston, Susan/Manning, Elizabeth (1998): Collins COBUILD Grammar Patterns 2: Nouns and Adjectives. London: HarperCollins.
Gawron, Mark. (2019): Frame Semantics. In: Maienborn, Claudia/v. Heusinger, Klaus von/Portner, Paul (eds.): Semantic Theories. Berlin/Boston: de Gruyter, 57–85.
Goddard, Cliff (ed.) (2008a): Cross-Linguistic Semantics. Amsterdam: John Benjamins.
Goddard, Cliff (2008b): Natural Semantic Metalanguage: The state of the art. In: Goddard, Cliff (ed.): Cross-Linguistic Semantics. Amsterdam: John Benjamins, 1–34.
Goddard, Cliff (2010): The Natural Semantic Metalanguage Approach. In: Heine, Bernd/Narrog, Heiko (eds.): The Oxford Handbook of Linguistic Analysis. Oxford: Oxford University Press, 459–484.
Goddard, Cliff (2018): Ten Lectures on Natural Semantic Metalanguage. Leiden: Brill.
Goddard, Cliff/Karlsson, Susanna (2008): Re-thinking THINK in contrastive perspective: Swedish vs. English. In: Cross-linguistic semantics, 225–240.
Goddard, Cliff/Wierzbicka, Anna (1994): Semantic and Lexical Universals. Amsterdam: John Benjamins.
Goddard, Cliff/Wierzbicka, Anna (2002): Meaning and Universal Grammar: Theory and Empirical Findings. Amsterdam/Philadelphia: John Benjamins.
Goddard, Cliff/Wierzbicka, Anna (2014): Words and Meanings: Lexical Semantics Across Domains, Languages, and Cultures. Oxford: Oxford University Press.

Goldberg, Adele E. (1995): Constructions. A Construction Grammar Approach to Argument Structure. Chicago: Chicago University Press.
Gruber, Jeffrey S. (1965): Studies in lexical relations. Ph.D. Cambridge: Dissertation.
Gumperz, John T./Levinson, Stephen (1996): Rethinking linguistic relativity. Cambridge: Cambridge University Press.
Halliday, Martin A. K. (1978): Ideas about language. In: Arts: The Journal of the Sydney University Arts Association 11, 20–38.
Hanks, Patrick (1987): Definitions and explanations. In: Sinclair, John M. (ed.): Looking Up. London: Collins.
Hanks, Patrick (2013): Lexical Analysis. Cambridge: MIT Press.
Haspelmath, Martin (2010): Comparative concepts and descriptive categories in crosslinguistic studies. In: Language, 86.3, 663–687.
Heim, Irene/Kratzer, Angelika (1998): Semantics in Generative Grammar. Oxford: Blackwell.
Henrich, Joseph/Heine, Steven/Norenzayan, Ara (2010): The weirdest people in the world? In: Behavioral and Brain Sciences 33, 61–135.
Hilpert, Martin/Correia Saavedra, D./Rains, Jennifer (2023): Meaning differences between English clippings and their source words: A corpus-based study. In: ICAME Journal, 47.1, 19–37.
Hjelmslev, Louis (1972): Structural analysis of language. In: Malmberg, Bertil (ed.): Readings in Modern Linguistics. Berlin/Boston: de Gruyter, 97–105.
Hockett, Charles (1958): A course in modern linguistics. New York: McMillan.
Hunston, Susan/Francis, Gill (2000): Pattern Grammar: A Corpus-driven Approach to the Lexical Grammar of English. Amsterdam/Philadelphia: John Benjamins.
Jackendoff, Ray (2002): Foundations of Language. Oxford: Oxford University Press.
Jaworski, Adam/Coupland, Nikolas/Galasinski, Dariusz (2004) Metalanguage: Why now? In: Jaworski, Adam/Coupland, Nikolas/Galasinski, Dariusz (eds.): Metalanguage: Social and Ideological Perspectives. Berlin/New York: Mouton de Gruyter, 3–8.
Johnson, Marc (1987): The Body in the Mind. Chicago: Chicago University Press.
Kamp, Hans/Reyle, Uwe (1993): From Discourse to Logic. Introduction to Modeltheoretic Semantics of Natural Language, Formal Logic and Discourse Representation Theory. Dordrecht: Springer.
Lakoff, George (1987): Women, Fire, and Dangerous Things. Chicago: Chicago University Press.
Laporte, Samantha/Larsson, Tove/Goulart, Larissa (2021): Testing the Principle of No Synonymy across levels of abstraction: A constructional account of subject extraposition. In: Constructions and Frames 13.2, 230–262.
Levin, Beth (1993): English Verb Classes and Alternations. Chicago: Chicago University Press.
Levin, Beth/Rappaport Hovav, Malka (2005): Argument Realization. Oxford: Oxford University Press.
Levinson, Stephen C. (2000): Presumptive Meanings. Cambridge: MIT Press.
Levinson, Stephen C. (2003): Space in language and cognition: Explorations in cognitive diversity. Cambridge: Cambridge University Press.
Levisen, Carsten (2012): Cultural Semantics and Social Cognition: A Case Study on the Danish Universe of Meaning. Berlin/New York: de Gruyter Mouton.
Levshina, Natalia/Lorenz, David (2022): Communicative efficiency and the Principle of No Synonymy: Predictability effects and the variation of *want to* and *wanna*. In: Language and Cognition 14.2, 249–274.
Lucy, John A. (1992): Language diversity and thought: A reformulation of the linguistic relativity hypothesis. Cambridge: Cambridge University Press.
Lyons, John (1977): Semantics: Volume 1. Cambridge: Cambridge University Press.
Lyons, John (1995): Linguistic Semantics. An Introduction. Cambridge: Cambridge University Press.
Nevins, Andrew/Pesetsky, David/Rodrigues, Cilene (2009): Evidence and argumentation: A reply to Everett (2009). In: Language 85.3, 671–681.
Partee, Barbara (2004): Compositionality in Formal Semantics. Oxford: Blackwell.