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Hans C. Boas (Austin, Texas)

## A frame-semantic approach to identifying syntactically relevant elements of meaning

### 1 Introduction<sup>1</sup>

Levin (1993) claims that, for the most part, syntactic subcategorization can be predicted from the meanings of verbs:

The behavior of a verb, particularly with respect to the expression and interpretation of its arguments, is to a large extent determined by its meaning. Thus verb behavior can be used effectively to probe for linguistically relevant pertinent aspects of verb meaning. (Levin 1993:1)

On this view, native speakers are capable of making "extreme subtle judgments concerning the occurrence of verbs with a range of possible combinations of arguments and adjuncts in various syntactic expressions" (Levin 1993:2). One of the most-cited examples is the locative alternation (Fillmore 1968, Anderson 1971, Salkoff 1983, Rappaport and Levin 1985, Iwata 2005), where members of a specific semantic class of verbs exhibit two surface variants, a locative variant and a *with*-variant as *spray* in (1).

- |     |  |                    |
|-----|--|--------------------|
| (1) | a. Sophie sprayed water on the bushes.   | (locative variant) |
|     | b. Sophie sprayed the bushes with water. | (with-variant)     |

Other transitive verbs relating to putting and covering such as *brush*, *load*, *pump*, *smear*, and *stuff* are also found in the locative alternation (Levin 1993:51). These similarities are used to characterize verb classes whose members all exhibit a certain degree of semantic coherence (cf. Rappaport and Levin 1988, Pinker 1989). The identification of the common meaning among the members of a verb class also allows for predictions about the uniformity and the range of argument realizations. In the case of verbs of putting and covering, this means that all members of the two verb classes are expected to participate in the locative alternation.

Following this line of research, a number of other analyses use class membership to explain a verb's range of argument realization, most notably projectionist approaches (e.g., Rappaport Hovav and Levin 1998, Levin and Rappaport Hovav 2005) and constructional approaches (e.g., Goldberg 1995, 2002). This paper argues that the ways in which verb classes have traditionally been defined

<sup>1</sup> Thanks to Jóhanna Barðdal, Hans Ulrich Boas, Seizi Iwata, Kyoko Hirose Ohara, Miriam Petrucci, Stefan Schierholz, and Petra Steiner for their valuable feedback on the issues discussed in this paper. Only I am responsible for any errors which remain.

should be reconsidered, because they do not always yield the types of predictions about argument realization for which they have been initially postulated.

The argument will move along these lines: First, I give an overview of how verb classes are used in different frameworks to determine a verb's ability to occur in argument alternations. Second, I discuss some general problems with the concept of semantic verb classes in these approaches. Third, I argue that an alternative way of defining verb classes more precisely necessitates the incorporation of frame semantic descriptions (Fillmore 1982). Finally, I outline how Snell-Hornby's (1983) notion of verb descriptivity can be employed for more fine-grained frame semantic descriptions and cross-classifications. I propose that such an approach helps to describe more fine-grained verb classes that eventually will allow the identification of those aspects of verb meaning that are grammatically relevant.

## 2 Using syntactic behavior for defining verb classes

Although various frameworks refer to different types of verb classes, they all share the idea that membership in a certain verb class allows for predictions about the range of syntactic argument realizations. In order to explore this issue in more detail, I discuss Pinker's (1989) and Levin's (2003) approaches that have used verb class membership for the purpose of explaining syntactic behavior in the locative alternation.<sup>2</sup>

### 2.1 Verb classes and lexical rules

Pinker's (1989) *lexical rule approach* accounts for syntactic alternations in terms of lexical rules operating over semantic structures. Analyzing the distribution of verbs of putting and covering in the locative alternation, Pinker observes that only 34 out of 142 verbs described by Rappaport and Levin (1985) exhibit the locative alternation, whereas the rest are attested either with the locative variant or the *with*-variant, but not with both. Using a set of semantic criteria such as force, aspects of the dimensional geometry of solids, and a classification similar to the count/mass distinction (1989:125), Pinker arrives at two verb classes, summarized in the following two tables.

Table 1: Content-oriented *into/onto* verbs (see Pinker 1989:126)

Alternating		Non-alternating	
1.	(a) Simultaneous forceful contact and motion of a mass against a surface: <i>brush, dab, dab, plaster, rub, slather, smear, smudge, spread, streak</i>	(b) A mass is enabled to move via the force of gravity: <i>dribble, drip, drizzle, dump, ladle, pour, shake, slop, splash, spill</i>	
2.	(a) Vertical arrangement on a horizontal surface: <i>heap, pile, stack</i>	(b) Flexible object extended in one dimension is put around another object: <i>coil, spin, twirl, twist, whirl, wind</i>	
3.	(a) Force is imparted to a mass, causing ballistic motion in a specified spatial distribution along a trajectory: <i>inject, spatter, splash, splatter, spray, sprinkle, squirt</i>	(b) Mass is expelled from inside an entity: <i>emit, excrete, expectorate, expel, exude, secrete, spew, vomit</i>	
4.	(a) Mass is caused to move in a wide-spread or non-directed distribution: <i>bestrew, scatter, sow, strew</i>		

Table 2: Container-oriented *with*-verbs (see Pinker 1989:126-27)

Alternating		Non-alternating	
1.	(a) A mass is forced into a container against the limits of its capacity: <i>pack (wedding sense), cram, crowd, jam, stuff, wad</i> .	(b) A layer completely covers a surface: Layer may be liquid: <i>deluge, douse, flood, inundate</i> . Layer may be solid: <i>blanket, blanket, coat, cover, encrust, face, inlay, pad, pave, plate, shroud, smother, tile, line, edge, fill, occupy</i> .	
2.	(a) A mass of a size, shape, or type defined by the intended use of a container (and not purely by its geometry) is put into the container, enabling it to accomplish its function: <i>load, pack (what one does to suitcases), stock (what one does to shelves)</i> .	(b) Addition of an object or mass to a location causes an esthetic or qualitative, often evaluative, change in the location: <i>adorn, burden, clutter, deck, dirty, embellish, embellish, endow, enrich, festoon, garnish, imbue, infect, litter, ornament, pollute, replenish, season, soil, stain, taint, trim</i> .	
3.		A mass is caused to be coextensive with a solid or layer like medium: Mass composed of layers of strings: <i>interlace, interlard, interleave, intersperse, interweave, lard, ripple, vein</i> . Of liquids: <i>drench, impregnate, infuse, saturate, soak, stain, suffuse</i> .	
4.		An object or mass impedes the free movement of, from, or through the object in which it is put: Liquids in containers: <i>block, choke, clog, dam, plug, stop up</i> . Bound movable objects: <i>bind, chain, entangle, lash, lasso, rope</i> .	
5.		A set of objects is distributed over a surface: <i>bombard, blot, dapple, riddle, speckle, splotch, spot, staid</i> .	

2 This paper focuses on approaches that rely on verb class membership as one of the determining factors for whether a verb can occur in certain argument structure alternations or grammatical constructions. It does not aim to discuss other approaches that explain these phenomena in terms of thematic role properties such as affectedness (Dowty 2000, Jackendoff 1990) or causal chains (Croft 1998).

The first verb class in Table 1 includes verbs for which the *into/onto* form is basic. The second class in Table 2 consists of verbs for which the *with*-form is basic. Each verb class is subdivided into verbs which alternate, and those which do not. Pinker motivates the verb classification as follows: "the classes are clearly compatible with their respective thematic cores", i.e., all *into/onto* verbs "specify the kind of force or direction of motion according to which the theme moves or is caused to move" (1989:127-128).<sup>3</sup> Pinker proposes a derivational approach

3 The concept of thematic core is crucial to Pinker's approach. In his view, "a thematic core

that includes a lexical rule, which relates the two variants of the locative alternation and only operates over "sets of subclasses" (1989:124), which distinguish them from other, non-alternating verb classes. On this view, a lexical rule ...

... takes a verb containing in its semantic structure the core 'X causes Y to move into/onto Z', and converts it into a new verb whose semantic structure contains the core 'X causes Z to change state by means of moving Y into/onto it. (Pinker 1989:79)

Pinker's descriptive apparatus is reduced to representations of verb meanings of the type suggested by Rappaport and Levin (1988). In this view, the "verbs" meaning representations are built around a distinctive set of semantic structures corresponding to aspects of motion, location, force, causation, time, and object type" (1989:353). Different combinations of semantic structures result in skeletal verb meanings such as "X CAUSE Y to GO" or "X ACT", which are syntactically pertinent and may serve as the relevant input to lexical rules, according to Pinker (see also Jackendoff 1990). The lexical rule may either derive the *with*-variant from the locative variant, or the locative variant from the *with*-variant. The directionality of the lexical rule is determined by the ability of the direct argument to stand as the sole complement, according to Pinker. In cases where the goal NP is capable of standing alone, the derivation takes place from the *with*-variant to the locative variant as in (2). In cases where the theme NP is capable of standing alone, the lexical rule applies to the locative variant to derive the *with*-variant as in (3). The rule may apply in both directions whenever either argument can stand alone as in (4).

- (2) a. \*He stuffed the breadcrumbs.  
b. He stuffed the turkey.
- (3) a. He piled the books.  
b. \*He piled the shelf.
- (4) a. He loaded the gun.  
b. He loaded the bullets. (Pinker 1989:125)

Once the sole-complement condition is satisfied, the different syntactic frames are automatically licensed by different linking properties that map the underlying thematic roles to the syntactic level. Pinker states:

The difference in argument structure follows from the linking rules: in the old verb, the moving thing was the theme and hence was linked to direct object; in the new verb, the location is the theme (of a state change) and hence is linked to object. The argument not linked to object gets linked to an oblique function or position by virtue of other linking rules in combination with lexical entries for specific prepositions. (Pinker 1989:79)

is a schematization of a type of event or relationship that lies at the core of the meanings of a class of possible verbs" (1989:73). So-called conflation classes cluster around the thematic cores and "are inherently incapable of allowing new forms to be derived productively." Instead, Pinker argues that the function of productively deriving new forms "is reserved for lexical rules, which allow a speaker to take the sound paired with a verb in one conflation class and use it with a new, related meaning belonging to another conflation class" (1989:76).

With this overview of Pinker's analysis, we now turn to three problems with his account. The first problem is that his sole complement diagnostic does not always make the correct predictions. Iwata (2005:359) shows that "it is rather doubtful whether the possibility of standing as a sole complement truly serves as a diagnostic for the derivational base." To support his argument, Iwata points out that "some verbs allow neither the theme nor the goal argument to stand alone," as the examples in (5) illustrate.<sup>4</sup>

- (5) a. John heaped books on the shelf.  
b. John heaped the shelf with books.  
c. \*?John heaped the books.  
d. \*John heaped the shelf. (Pinker 1989:38)
- (6) a. John packed books into the box.  
b. John packed the box with books.  
c. John packed the books.  
d. John packed the box. (Pinker 1989:39)

Other verbs, such as *pack* in (6), allow either argument to stand alone, contrary to Pinker's predictions. On the basis of these examples Iwata (2005:360) suggests that "the possibility of sole complement does not always serve as a diagnostic" (see also Boas 2003a).

Additionally, it is not entirely clear under what circumstances Pinker's lexical rule may apply to the semantic structures of different verb classes in order to derive "new" verbs. Take, for example, *scatter*, which belongs to his alternating verbs of dispersal whose basic variant is the *into/onto* form (Table 1, (4a)). Pinker characterizes the members of this subclass as verbs which "require patient/themes with the property 'aggregate' and a path eventuating in a place defined by a place-function roughly similar in meaning to the English particles *about*, *around*, and *all over*" (1989:233). This subclass is different from a closely related *into/onto* subclass, which is characterized by situations in which a mass is enabled to move via the force of gravity, and whose members include *dribble*, *drip*, *dump*, and *pour* (see Table 1, (1b)). The important point about this subclass is the fact that its members are not supposed to alternate, according to Pinker. However, consider the following examples, which demonstrate that some of the verbs included in the class exhibit a *with*-variant (besides attested *into/onto* variants), contrary to Pinker's claims.<sup>5</sup>

- (7) I tried using a normal bit with a standard drill as I dripped it with oil.  
(re:antiques.radio+phono)
- (8) I made a fresh mashed-spider cake and drizzled it with raspberry sauce just for you.  
(acadia.chat)

4. \*\* indicates that a sentence is not acceptable. '?' and '??' indicate that a sentence is marginally acceptable.  
5. Data for this paper are taken from GOOGLE groups (<http://groups.google.com>) and the British National Corpus. Data from GOOGLE groups indicate the name of the group where the relevant data was found.

- (9) I stopped it with Ketchup, smacked my lips, and took a bite.  
(alt.religion.christian.roman-catholic)

These data illustrate that Pinker's classification system needs modification in a way that would explain why certain verbs such as *drip*, *drizzle*, and *stop* exhibit alternations (contrary to his predictions), but other verbs belonging to the same class such as *pour*, *dump*, and *dribble* do not. One way of achieving this goal would be for Pinker to re-define his verb classes. The resulting category (1b) verbs in Table 1 would then be the truly non-alternating verbs. However, this step raises the question of the usefulness of Pinker's lexical rule(s). That is, if verb classes have to be re-defined until both alternating and non-alternating classes contain all relevant verbs (Pinker's original goal), then there is no need for lexical rules because the verb classes already list which alternate and which do not. This procedure would in principle lead to a system of closed classes of alternating and non-alternating verbs.<sup>6</sup> I return to question of verb-class restructuring in section 4.

Finally, it is unclear how one determines which verb sense is the "basic" variant among alternating verbs. Without a clear concept of what a base form is, lexical rules may fail to apply adequately. Consider, for example, Pinker's alternating container-oriented verbs in Table 2. So-called *stuff*-verbs such as *crum*, *crowd*, and *stuff* are assumed to denote events where a mass is forced into a container against the limits of its capacity. According to Pinker, these verbs "can trigger the formation of corresponding content-oriented or *into/onto* forms" which "involve the notion of a container's intended capacity" (1989:234). While his account captures the properties of his *stuff*-verbs ((1a) in Table 2), it does not explain why verbs such as *squeeze*, which fit his definition of *stuff*-verbs, do not exhibit similar syntactic behavior.

- (10) a. Dawn stuffed the turkey with breadcrumbs.  
b. Dawn stuffed breadcrumbs into the turkey.  
(11) a. \*Christian squeezed the turkey with breadcrumbs.  
b. Christian squeezed breadcrumbs into the turkey.

Assuming that *stuff* and *squeeze* are members of the same verb class, we would have to explain why only *stuff* appears in the basic container-oriented verb realized by *with*, but not *squeeze*. In other words, there appears to be a basic *with*-variant for *stuff*, but not for *squeeze*. This difference calls into question the usefulness of Pinker's lexical rules, because we would expect the rule to apply equally to both verbs, deriving similar types of outputs. However, for *squeeze*, we do not find an appropriate basic input verb to which the lexical rule could apply.<sup>7</sup> This suggests that there may not be a need for lexical rules to account for the locative alternation. An alternative solution would be to assume two

<sup>6</sup> A problem I leave aside for now is the question of how to deal with productivity. I address this issue in section 4.

<sup>7</sup> For similar observations about the nature of lexical rules, see Goldberg (1995:21-23, 224-225).

separate but related conventionalized verb senses for verbs such as *stuff*. Other container-oriented verbs such as *squeeze*, which do not appear in the locative alternation but are otherwise semantically classified as *stuff*-verbs, would have only one verb sense realized syntactically by the *into*-variant.<sup>8</sup>

In this section I have shown that Pinker's approach does not make the correct generalizations, mainly because the proposed lexical rules do not appear to have access to the proper types of inputs. We now turn to Levin's (2003) projectionist analysis, which employs different types of verb classes to explain the distribution of verbs in the locative alternation.

## 2.2 Verb classes and event structures

Levin's (2003) projectionist analysis relies on Rappaport Hovav and Levin's (1998) concept that a verb's meaning consists of two parts, namely (1) a root and (2) a structural part, also known as the lexical semantic template or event structure. The root represents the core meaning and its most important property is the ontological type to which it belongs. There is a small set of these types, which include state, *stuff*, thing, place, manner, and instrument. According to Rappaport Hovav and Levin (henceforth: RH&L), the root does not include any information relevant to the grammatical behavior of the verb. The number of roots, or idiosyncratic verb meanings, is in principle open-ended. In contrast, the structural part of a verb's meaning (its event structure) represents grammatically relevant information and is described in terms of event structure representations combining primitive predicates such as ACT, CAUSE, or BECOME. There is only a limited set of possible event structures, according to RH&L (1998:107-111).

An important distinction made between verbs is whether they have simple or complex event structures. This classification is based on the observation that verbs may be associated with more than one subevent, each with its own temporally aligned sets of properties. On this view, simple events such as *Joe runs* (represented by (12a) are associated with one subevent, and complex events such as *Miriam broke the cup* (represented by (12b)) are associated with two subevents.

- (12) a. [x ACT <MANNER>]  
b. [[x ACT <MANNER>] CAUSE [ BECOME [y <STATE> ]]]  
(Rappaport Hovav and Levin 1998:108)  
(13) The argument-per-subevent condition  
There must be at least one argument XP in the syntax per subevent in the event structure.  
(Rappaport Hovav and Levin 2001:779)

<sup>8</sup> One obvious explanation for why there is no *with* counterpart found with *squeeze* in the locative alternation is the fact that this is an existing conventionalized sense of *squeeze* that has a different semantics. That is, in sentences such as *They squeezed ball with their hand* the PP headed by *with* expresses an instrument.

Event complexity is taken as a determinant for a verb's range of argument realizations. RH&L's "argument-per-subevent condition" in (13) ensures that verbs describing simple events such as *run* typically appear with only one argument, whereas verbs describing complex events such as *break* usually appear with two arguments. Usually, it is the ontological type of the root which determines its basic association with an event structure type, according to the authors (Levin and Rappaport Hovav 2005:71). They claim that having a limited set of predicate decompositions makes it possible to identify broad verb classes based on the types of predicate decompositions they share. For example, manner of motion verbs such as *run* all share the simple event structure representation consisting of the predicate ACT in (12a). However, they differ in their manner roots, which specify the manner of motion. This type of classification allows us to identify for all members of a given class of verbs the "syntactically salient properties, including those relevant for determining argument realization" (2005:72). One of the advantages of describing syntactically relevant aspects of verb meanings in terms of event structure representations is that "relatively small sets of overlapping primitive predicates recur in various proposed systems of predicate decomposition, and the number of predicates is smaller than the number of semantic roles suggested in the literature" (2005:74).<sup>9</sup>

Levin's (2003) analysis of object alternations regards alternating verbs as means/manner verbs, i.e., they are associated with a simple event structure, which does not entail a result. Since these verbs only have a single structure participant that is realized as the subject, they have the flexibility when it comes to the choice of objects in alternations. The option of choosing different types of objects is thus explained by the fact that, for example, in the locative alternation simple event structure verbs are found in complex event structures, each characterized by a particular type of end result (Levin 2003:10). Complex event structures of the type in (12b) may thus be derived by augmenting simple event structures of the type in (12a), according to the following principle.

(14) Template Augmentation

Event structure templates may be freely augmented up to other possible templates in the basic inventory of event structure templates.

(Rappaport Hovav and Levin 1998:111)

These proposals lead Levin to arrive at a number of general predictions about the types of verbs participating in object alternations. Her first prediction is that only those verbs which have roots describing means or manner (and which can be used to obtain various types of results) may exhibit multiple alternations. For example, she suggests that *sew* can alternate (1) because it has a root that is as-

<sup>9</sup> Levin and Rappaport Hovav (2005:74) acknowledge that the number of primitive predicates differs depending on the analysis. For example, reviewing the different semantic predicates proposed by Jackendoff (1972) and Jackendoff (1990), they observe that "once predicates begin to proliferate, theories of predicate decompositions encounter the same problems as theories of semantic roles: identifying a small, well-motivated set of primitive elements."

sociated with a simple event structure, and (2) because sewing can be used to arrive at different results: creating an object (cf. (15)), covering a surface (cf. (16)), and attaching things, or impressing an image (cf. (17)). All three types of results allow object alternations as the following examples illustrate.

- (15) a. Dale sewed the piece of silk into a ball gown.  
b. Dale sewed a ball gown out of the piece of silk.
- (16) a. Dale sewed bows on the costume.  
b. Dale sewed the costume with bows.
- (17) a. Dale sewed the lining to the skirt.  
b. Dale sewed the lining and skirt together. (Levin 2003:10)

In contrast to verbs such as *sew*, other verbs such as *vacuum* are represented by roots which describe a means/manner used only to obtain a very specific result. Such verbs do not show a range of object alternations similar to that found with *sew*. The syntactic differences between *sew* and *vacuum* are thus attributed to the fact that the root of *sew*, but not the root of *vacuum* may be associated with various types of results.

- (18) a. Avery vacuumed the dust off the rug.  
b. Avery vacuumed the rug.
- (19) a. \*Avery vacuumed the dust onto the rug.  
b. \*Avery vacuumed the rug with the dust.
- (20) a. \*Avery vacuumed the dust into a pile.  
b. \*Avery vacuumed a pile from the dust. (Levin 2003:10-11)

Besides verbs with only one participant, Levin discusses other verbs such as *smear* that may have roots which are basically associated with three participants. These verbs are associated with the participants actor, stuff, and surface. According to Levin (2003:10), either the stuff or the surface can be expressed as the object with verbs such as *smear* (*smear the jam/smear the bread*). The locative alternation arises when all three arguments are expressed, as there are two appropriate predicates to license a third argument: the *with*-argument and a spatial PP (2003:10). Levin explains the differences between alternating and non-alternating verbs by pointing to the various event structure types. Verbs such as *fill* or *pour* in (21) and (22) that do not alternate show only one variant of an alternation, because they have roots associated with complex "result state" event structures (cf. (12b)), not with simple means/manner event structures (cf. (12a)) as required for verbs that participate in object alternations.

- (21) a. Ashley filled the bucket with water.  
b. \*Ashley filled water into the bucket.
- (22) a. Ashley poured water into the bucket.  
b. \*Ashley poured the bucket with water. (Levin 2003:11)

Levin attributes the semantic overlap between alternating and non-alternating verbs to the fact that both may appear with complex event structures. The crucial difference between the two verb classes lies in the fact that manner/means verbs such as *sew* or *smear* are typically only associated with simple event structures.



They may only be associated with complex event structures in terms of template augmentation (cf. (14)). In contrast, non-alternating verbs are always associated with a complex event structure indicating that they lexicalize for specific types of end results (2003:11). Because of this pre-existing association with a complex event structure, the templates of these verbs cannot be augmented further.

With this background in mind, we now turn to some problems with Levin's (2003) account of object alternation phenomena. One problem is that once her approach is applied to other semantically related verbs, Levin's predictions about different argument realizations do not always hold. For example, among verbs whose roots describe means/manner there appears to be no tight correlation between obtaining various end results and the ability to appear in multiple alternations. Comparing the properties of *sew* in (15) – (17), above, with those of *stitch*, which is closely related in meaning, we see that the two verbs differ in the types of object alternations they license:

- (23) a. \*Johannes stitched the piece of silk into a ball gown.  
b. \*Johannes stitched a ball gown out of the piece of silk.
- (24) a. Johannes stitched bows on the costume.  
b. \*Johannes stitched the costume with bows.
- (25) a. Johannes stitched the lining to the skirt.  
b. Johannes stitched the lining and skirt together.

The syntactic differences between the two semantically related verbs *sew* and *stitch* suggest that Levin's (2003) verb classification based on event structure types may need to be refined further to explain why one verb exhibits a wider range of object alternations than the other. In other words, if the syntactic differences between the two verbs are indeed semantically based, then we need to develop a more adequate classification that articulates what semantic factors lead to this variation in verb behavior.

Another problem with Levin's (2003) approach is the proposal that manner/means verbs that are associated with a specific root used to obtain a specific result are not supposed to alternate. To illustrate, compare Levin's example of *vacuum* (cf. (18)–(20)), whose limited alternating behavior is explained by this property. A closer look at other verbs of removal, such as *wipe*, *sweep*, and *rub* shows that they share some syntactic and semantic properties with *vacuum*, but not others. For example, all four verbs allow the omission of the moved substance as the sentences in (18) and (26) illustrate.

- (26) a. Collin {wiped/swept/rubbed} the dust off the rug.  
b. Collin {wiped/swept/rubbed} the rug.
- (27) a. Russell {wiped/swept/rubbed} the dust onto the rug.  
b. \*Russell {wiped/swept/rubbed} the rug with the dust.
- (28) a. Petra {wiped/swept/rubbed} the dust into a pile.  
b. \*Petra {wiped/swept/rubbed} a pile from the dust.

The four verbs exhibit other differences in syntactic properties, which are explained in terms of their semantic classification. Recall that Levin attributes the

non-alternating behavior of *vacuum* to the fact that its root may not be associated with various types of results, cf. (19a) and (20a). Applying this type of explanation to other semantically related verbs such as *wipe*, *sweep*, and *rub*, we would anticipate similar restrictions with these verbs. However, this is not the case, as the data in (27) and (28) illustrate. The three verbs do not alternate despite their root being capable of expressing different types of results. Thus, we see that the syntactic differences between *vacuum* on the one hand and *wipe*, *sweep* and *rub* on the other hand are likely to be caused by other factors than a root's capability of being associated with various result states, as proposed by Levin (2003). I return to this point in section 4, where I propose a more fine-grained semantic approach to the study of syntactically relevant aspects of verb meaning.

Another issue is the question of how one can decide whether a verb's root meaning is associated with a simple or complex event structure. Consider the verb *hang*, which entails a specific result, namely that an object ends up attached to a vertical surface. As such, we would expect this verb to be associated with a complex event structure. This property would lead us to think that *hang*, just like other verbs with complex event structures focusing on specific end results such as *fill* (cf. (21)) and *pour* (cf. (22)) would not alternate. However, despite a similar association with a complex event structure, *hang* alternates as the following sentence pair shows.

- (29) a. They hung pictures of the president onto their walls.  
b. They hung their walls with pictures of the president.

Comparable problems exist among members of Levin's means/manner verb class, which are associated with three event participants (e.g. *smear*). Consider the meanings of so-called *tape*-verbs such as *anchor*, *band*, *beli*, *bolli*, *bracket*, *buckle*, *button*, *cement*, *chain*, *clamp*, *clasp*, *clip*, *epoxy*, *fetter*, *glue*, *gun*, etc., which "relate to the manner/means in which things are combined, rather than the result of the combining" (Levin 1993:163). Parallel to *smear*, we would expect these manner/means verbs to be associated with three participants (actor, undergoer, surface). In turn, we would think that either the undergoer or the surface can be realized as an object whenever all three arguments are expressed. But as the examples in (30) show, this expectation is not borne out. The data suggest that Levin's semantic classification of verb roots in terms of "means/manner" and "result" does not always yield the desired results.

- (30) a. Paul taped pictures onto the wall.  
b. \*Paul taped the wall with pictures.

## 2.3 Summary

In this section I have argued that the way in which verb classes are defined by Pinker (1989) and Levin (2003) is too coarse-grained to account for the distribution of verbs in the locative alternation. When comparing the syntactic properties of two verbs, we often find that one verb participates in the locative alterna-

tion, but not another verb that is closely related in meaning. This observation leads to the suggestion to reconsider the way in which verb classes are defined. In Boas (2003a), I argue that Goldberg's (1995/2002) constructional account of the locative alternation faces similar problems, because it does not take the fine-grained semantics associated with individual verbs into account.<sup>10</sup> In the following section, I present further data, which demonstrate that the problems surrounding verb classification discussed here do not only pertain to the locative alternation, but are in fact more widespread.

### 3 Multiple class membership and limitations on predictability

Levin (1993) seeks to establish verb classes based on the types of syntactic alternations in which verbs occur. Consider, for example, her summary of the syntactic behavior of *touch*, *hit*, *cut*, and *break*, which share the feature of being transitive. However, they differ in terms of whether they can appear in the conative construction, the body-part-possessor ascension alternation, and the middle construction, as Table 3 illustrates.<sup>11</sup>

Table 3: Syntactic distribution of different verbs (cf. Levin 1993:7)

	<i>touch</i>	<i>hit</i>	<i>cut</i>	<i>break</i>
Conative:	No	Yes	Yes	No
Body-Part Possessor Alternation:	Yes	Yes	Yes	No
Middle:	No	No	Yes	Yes

Levin points out that "the four patterns of behavior observed here cannot simply be dismissed because they are linked to four different verbs." Instead, she suggests that "corresponding to each one of these four verbs are other verbs that show the same pattern of behavior" (1993:7). This observation leads her to propose the following verb classes (among others):

- (31) a. *Break* Verbs: break, crack, rip, shatter, snap, ...
- b. *Cut* Verbs: cut, hack, saw, scratch, clash, ...
- c. *Touch* Verbs: pat, stroke, tickle, touch, ...
- d. *Hit* Verbs: bash, hit, kick, pound, tap, whack, ... (Levin 1993:7)

Observing that the verbs in (31) share certain aspects of meaning, Levin seeks to identify the relevant meaning components that are common among the members of each class. By first focusing on the body-part possessor ascension alternation,

<sup>10</sup> Note that I am not arguing against the design of Pinker's, Levin's, or Goldberg's frameworks per se. Instead, I suggest that the way their analyses define and employ verb classes to determine syntactic behavior is problematic.

<sup>11</sup> Conative construction: *Paula hit the fence/Paula hit at the fence* (Levin 1993:41). Body-part possessor ascension alternation: *Selina touched the horse on the back/Selina touched the horse's back* (Levin 1993:71-72). Middle construction: *The butcher cuts the meat/The meat cuts easily* (Levin 1993:25).

she finds that *touch*, *hit*, and *cut* necessarily involve contact, but *break* does not. Thus, she identifies the meaning component 'contact' as the relevant semantic factor that sets *break* apart from the other verbs, with a direct influence on its syntactic behavior (cf. Levin 1993:7-8). After specifying the details of the syntactic differences between the verbs in the conative alternation, Levin identifies three additional meaning components that set the four verbs apart, and concludes the following:

*Touch* is a pure verb of contact, *hit* is a verb of contact by motion, *cut* is a verb of causing a change of state by moving something into contact with the entity that changes state, and *break* is a pure verb of change of state. These characterizations are not intended to exhaust the meaning of these verbs; rather, they simply capture those aspects of meaning that serve minimally to distinguish the verbs participating in the alternations discussed here. The notions of motion, contact, change of state, and causation that figure in these characterizations must be taken into account in selecting a lexical representation of verb meaning.

(Levin 1993:10)

Here, Levin's analysis demonstrates that it is indeed possible to identify specific meaning components such as contact or motion, thereby indicating whether a certain verb may participate in an alternation. The interesting question is whether all members of a verb class defined in terms of such meaning components exhibit identical syntactic behavior. Consider Levin's *cut* verbs (*chip*, *clip*, *cut*, *hack*, *hew*, *saw*, *scrape*, *scratch*, *slash*, and *snip*), whose meanings involve notions of motion, contact, and effect. She points out that all verbs of this class participate in the middle alternation and the instrument subject alternation, but only some "show the body-part possessor ascension alternation; this limitation may arise because only some of them can take body parts as objects" (1993:157). For example, *cut* participates in this alternation (*Carol cut herself on the thumb/Carol cut her thumb*), but *hew* does not (*\*Carol hewed herself on the thumb/Carol hewed her thumb*). Such differences can also be found among *cut* verbs in the characteristic property of instrument alternation (*This knife cut the bread/This knife cuts well*). According to Levin, only some *cut* verbs participate in this alternation, but not all. Thus, we see that her *cut* verbs exhibit uniform behavior in some alternations, but not in others.<sup>12</sup>

Comparable limitations hold for the ability of *cut* verbs to appear in specific syntactic constructions such as the resultative construction (cf. RH&L 2001, Boas 2003b, Goldberg and Jackendoff 2004). In Boas (2003b:223, 228-229) I demonstrate that *cut* may appear with resultatives to render a vague endpoint of an event more precise (cf. *Collin cut the bread {to pieces/into thick slices/too short}*). I also show that verbs closely related in meaning, such as *carve*, *split*, *slash*, and *hew* "do not share the same distribution of resultative phrases." The idiosyncratic distribution leads me to formulate specific prototypical event-frames for each sense of a verb, because each of the verbs denotes different

<sup>12</sup> A similar point is made by Levin and Rappaport Hovav (2005) about verbs that exhibit uniform syntactic behavior in the locative alternation, but not in other alternations. They point out that "splash shows the transitive and intransitive uses characteristic of the causative alternation, while smear does not" (2005:17).

types of semantic concepts with greater connotational force (cf. 2003b:229). On this view, each sense of a verb is represented in terms of a conventionalized mini-construction (form-meaning pairing) that specifies whether it may occur in the resultative pattern, and if it does, what types of resultative phrases are permissible. The limited ability of *cut* verbs to occur in other alternations or with resultatives thus shows that semantic class membership may only be useful for determining verbal behavior with respect to a limited range of syntactic phenomena. Similar observations can be made about the syntactic distribution of members of other verb classes, such as Levin's *spark* verbs (cf. 1993:151-152), *hit* verbs (cf. 1993:148-149), and *wipe* verbs (cf. 1993:125-126).

Our discussion suggests that not all verbal syntax is indicative of a verb's lexical semantic information and classification. This position is also held by Baker and Ruppenhofer (2002), who point out that some alternations truly reflect the underlying lexical semantics, while others do not. They show that both *bite* and *break* can occur in the simple transitive construction (cf. *The dog bit/broke the candle*), but only *bite* can occur in the conative construction (cf. *The dog bit at the candle*). This fact leads them to argue that a verb's alternation between the conative and simple transitive constructions should be regarded as a diagnostic for different lexical semantic representations. In this case, the crucial meaning component that distinguishes the two verbs is completed change of state, according to the authors. In contrast, other types of syntactic behavior are not indicative of differences in the underlying lexical semantics of verbs. As an example, Baker and Ruppenhofer (2002) point to Thers-Insertion (cf. *Out of this blur there stares a single set of eyes*) and the Locative Inversion (cf. *Into the room came Harry*), which Levin takes as indicators for membership in certain semantic classes (e.g., verbs of existence, verbs of inherently directed motion, etc) (cf. 1993:88-92, 92-94). Baker and Ruppenhofer argue that a verb's ability to appear in these syntactic patterns should not be attributed to a specific underlying lexical semantic representation. More specifically, they "do not want to posit an 'appearance/existence' sense for all the verbs that can occur in them." Instead, they attribute the occurrence of verbs in these syntactic patterns to the fact that the semantics of verbs belonging to specific semantic frames (cf. Fillmore 1982) such as *Perception\_active* (*stare*) and *Self\_motion* (*come*) "is compatible with the discourse-pragmatic function of introducing new referents" (2002:36). Baker and Ruppenhofer's comparison thus illustrates that not all syntactic alternations reflect lexical semantics in a narrow sense.

These issues raise a crucial question about Levin's (1993) approach to verb classification: What is the meaning associated with a Levin class? Some verb classes such as *break* verbs (*break, chip, crack, crash, crush, fracture, rip, shatter, smash, snap, splinter, split*, and *tear* (1993:241)) share a clearly definable and somewhat homogenous meaning describing the disintegration of a patient (change of state) as the result of an agent's actions. Members of this semantic class also exhibit clearly observable syntactic properties, such as the ability to participate in the causative/inchoative alternation (cf. Levin 1993:27). As such, these meanings are also comparable to traditional sense definitions found in dic-

tionaries. Closely related to Levin's *break* verbs is her class of *split* verbs (*blow, break, cut, draw, hack, hew, kick, knock, pry, pull, push, rip, roll, saw, shove, slip, split, tear, tug*, and *yank* (1993:166)), which also contains *break* as well as other members of the *break* class. The distinguishing feature of the *split* class is that "each of these verbs manifests an extended sense which might be paraphrased 'separate by V-ing,' where 'V' is the basic meaning of that verb" (1993:166-167). Syntactically, the two classes differ in that only verbs belonging to the *split* class allow the intransitive *apart* reciprocal alternation (*The twig broke off (off) the branch/The twig and the branch broke apart*). Although such a syntactic discrepancy exists between the two Levin classes, it is unclear what relevant semantic components are identified by it. In other words, there does not seem to be an obvious correlation between the syntactic ability of the *split* verbs (and not the *break* verbs) to occur in the intransitive *apart* reciprocal alternation and a distinctive component of verb meaning. Levin herself acknowledges the problem of precisely defining the shared meaning of *split* class verbs by pointing out that "it is possible that additional verbs from these other classes might qualify as *split* verbs" (1993:167). Thus we see that it is not always clear what exact meaning we should attribute to a Levin verb class.

Given this problem, we are faced with another methodological question: How far should syntactic behavior be regarded as an indicator for the splitting of verb classes? Given the problems outlined above, it seems difficult to precisely define verb classes, because for each syntactic phenomenon there may be a different verb class definition. A similar point is also made by Levin and Rappaport Hovav (2005:17), who claim that "the finer elements of meaning that crosscut recognized verb classes result in an intricate system of cross-classification." This observation leads them to the conclusion that "it is the elements of meaning that define verb classes that are most important, and ... verb classes themselves are epiphenomenal" (2005:16).

These problems show that defining verb classes in order to predict a verb's multiple argument realization patterns is a very complicated matter. In my understanding, the problem is largely caused by what can be called the *lexicalist paradox*, namely two contradictory goals for constructing lexical entries. The first goal is to seek ideal lexical entries for words that minimize the amount of information provided. For example, Levin suggests that "this goal can be achieved by factoring predictable information out of lexical entries, leaving only idiosyncratic information." She then argues that "if the syntactic properties of a verb indeed follow in large part from its meaning, then it should be possible to identify general principles that derive the behavior of a verb from its meaning" (Levin 1993:11). This is the strategy followed by Pinker (1989), Levin (2003), and Goldberg (1995, 2002), who posit some version of a basic lexical entry which licenses the default argument structure. To license additional (alternating) argument structures, they must apply different types of mechanisms (lexical rules, template augmentations, grammatical constructions) in order to provide the basic entry with additional information (see also Pustejovsky 1995).



The tendency to minimize the information contained in a verb's lexical entry is in stark contrast to the second goal, namely to explain a verb's syntactic behavior not only in one alternation, but preferably in many more. Levin mentions this point in her discussion of the data in Table 3 above. Discussing the various meaning components relevant to each of the four alternations, she claims that (1) the body-part possessor ascension alternation is sensitive to the notion of contact; (2) the conative is sensitive to both contact and motion; (3) the causative/inchoative alternation is found only with verbs of pure change of state, and (4) the middle alternation is found with verbs whose meanings involve causing a change of state (Levin 1993:10). Similar observations obtain for the ability of all verb class members to appear in different alternations and constructions. As we have seen above, all *cut* verbs participate in the middle alternation, but not in the resultative construction. This distribution suggests that the semantic components of motion, contact, and effect are relevant to the verbs' abilities to occur in the middle alternation, but not necessarily in other constructions.

The lexicalist paradox is the situation in which we would like to explain all of a verb's argument realization options based on a very minimal lexical entry and a number of generative mechanisms or constructions. However, this methodology appears to be very problematic. I have argued that most types of minimal lexical entries are only relevant for describing one or two syntactic phenomena. The current methodology thus arrives at lexical entries containing very limited idiosyncratic information, which is only relevant for the licensing of a very small number of alternations. For all other alternations, additional minimal lexical entries that contain information relevant only to them must be posited. Taken to its extreme, this methodology would result for each verb in a broad collection of minimal lexical entries for each verb, each pertinent to a small number of alternations. In discussing Levin's verb classes and alternations, Dang et al. (1998) reach somewhat parallel conclusions. They point out that a verb classification based solely on alternations would give much finer distinctions, including splitting of many semantically coherent classes.

#### 4 A frame-semantic approach to verb classification

##### 4.1 Frame Semantics

The alternative approach for defining verb classes subscribes to the idea that word meanings must be described in relation to *semantic frames*, that is "schematic representations of the conceptual structures and patterns of beliefs, practices, institutions, images, etc. that provide a foundation for meaningful interaction in a given speech community" (Fillmore et al. 2003:235). In Frame Semantics (Fillmore 1982), the primary unit of analysis at the word level is the lexical unit (LU) (cf. Cruse 1986), that is, a pairing of a word with a sense. Each

sense is described with respect to the semantic frame that it evokes.<sup>13</sup> Consider the verb *load*, which is associated with at least two different LUs each of which evokes a distinct frame. Part of the description of each LU is the identification of the semantic frame underlying its interpretation.

The first semantic frame is the *FILLING* frame, which is also evoked by semantically related verbs such as *brush*, *daub*, *drape*, and *pack*, among many others (cf. Ruppenhofer et al. 2005). The *FILLING* frame represents a situation in which different types of relationships hold between Frame Elements (FEs), which are defined as situation-specific semantic roles.<sup>14</sup> This frame is evoked by words that relate to situations in which an AGENT fills containers or covers areas with a THEME, which is some thing, things, or substance. The area or container can appear as the direct object with all these verbs, and is designated GOAL because it is the goal of the motion of the THEME (cf. Ruppenhofer et al. 2005). Lexical entries for the LUs evoking the *FILLING* frame include descriptions of the frame itself, and exhaustive inventories of how the different FEs are realized syntactically. Some of the verbs that evoke the *FILLING* frame are also capable of evoking the *PLACING* frame, which describes situations in which an AGENT places a THEME at a location (the GOAL), which is profilled (cf. Langacker 1987). An important point is that the THEME is under the control of the AGENT at the time of its arrival at the GOAL (cf. Ruppenhofer et al. 2005). Verbs evoking this frame include *bag*, *brush*, *drape*, *load*, and *pack*, among others.

One of the key differences between Frame Semantics and the other approaches discussed above is that Frame Semantics (as implemented in FrameNet, see <http://framenet.icsi.berkeley.edu>) takes a "splitting" approach to sense descriptions instead of a "lumping" approach, where the latter considers one sense as basic and derives other senses from it (cf. Pinker 1989). By describing a word's various LUs with respect to the semantic frames that they evoke, it becomes possible to offer a classification with a level of description that is more precise than the other approaches discussed above. Defining verb classes semantically offers a number of advantages over the syntactic criteria employed by other approaches such as Levin (1993), three of which are considered here.

The first advantage is that frame semantic criteria allow for a more fine-grained classification. Consider Levin's *correspond* verbs (1993: 200-201), which are classified syntactically by their inability to occur in the understood reciprocal object alternation (\**Brenda bantered Molly/Brenda and Molly bantered* (1993:200)). Members of this verb class, which includes *argue*, *bicker*, *combat*, *collaborate*, *dispute*, *skirmish*, *squabble*, and *struggle*, also appear in the simple intransitive reciprocal alternation (*Brenda bantered with*

<sup>13</sup> For an overview of Frame Semantics, see Petrucci (1996).

<sup>14</sup> Names of Frame Elements (FEs) are capitalized; names of frames appear in typewriter font. Frame Elements differ from traditional universal semantic (or thematic) roles such as Agent or Patient in that they are specific to the frame in which they are used to describe participants in certain types of scenarios.

*Molly/Brenda and Molly bantered* (1993:200)), and require a collective NP subject (\**Brenda bantered/The committee bantered* (1993: 200)). The syntactic properties of Levin's *correspond* verbs are taken as an indicator of their common semantics encompassing some notion of reciprocity. Note, however, that Levin misses some crucial semantic differences between the members of this verb class, because of her reliance on syntactic criteria. Whereas some verbs describe situations involving verbal communication, others involve violent activities that do not necessarily entail any communication. In contrast, a frame semantic approach classifies Levin's *correspond* verbs according to semantic criteria, some of which are pointed out by Levin herself: "There are significant subclasses dealing with verbal interactions and fighting" (1993:201). On this alternative view, verbs such as *argue*, *bicker*, *chat*, and *gossip* evoke the Quarreling frame, whereas verbs such as *struggle*, *skirmish*, and *combat* evoke the Hostile encounter frame (cf. Baker and Ruppenhofer (2002) and Ruppenhofer et al. (2005)).<sup>15</sup> Other verbs of Levin's *correspond* class such as *collaborate* and *cooperate* evoke the Collaboration frame, which describes different types of scenarios than the two other frames.<sup>16</sup> We thus see that verbs exhibit quite different semantics despite similarities in syntactic behavior. I suggest that these differences are more readily accounted for in Frame Semantics than in syntactico-centric approaches such as Levin's (see also Baker and Ruppenhofer 2002, Boas 2003b).

Additionally, classifying verbs according to the semantic frames they evoke precludes the need to rely on syntactic criteria for their categorization. For example, Levin's requirement that *correspond* verbs occur with a collective NP subject does not hold for all members of that class as *argue* illustrates (cf. *Rachel argued about coming to London* (BNC)). Utilizing semantic frames for classifying verbs avoids the problem of applying syntactic tests that do not always produce uniform results. Similar observations are made by Faber and Maral Usón (1999:2), who maintain that "semantic considerations are all-important because syntactic distinctions in themselves are not sufficient as a basis for the establishment of an inventory of semantic categories."

Finally, employing Frame Semantics allows the classification of verbs that do not fit Levin's syntactic criteria with semantically related verbs that do. Consider, for example, verbs such as *collude*, *conspire*, and *partner*, which are not members of Levin's *correspond* class. Because of their semantics, they all evoke the Collaboration frame and can thus be described with the same inventory

<sup>15</sup> Definition of Quarreling frame: A group of ARGUERS (also expressible as ARGUER1 and ARGUER2) express incompatible opinions or beliefs about an ISSUE. Definition of Hostile\_encounter frame: This frame consists of words that describe a hostile encounter between opposing forces (SIDE1 and SIDE2, or SIDES) over a disputed ISSUE and/or in order to reach a specific GOAL (cf. Ruppenhofer et al. 2005).

<sup>16</sup> Definition of Collaboration frame: PARTNER\_1 and PARTNER\_2 or a group of PARTNERS work together in some UNDERTAKING. The PARTNERS are taken to be of equal status even when expressed disjointly (cf. Ruppenhofer et al. 2005).

of FEs as other LUs belonging to this frame.<sup>17</sup> The example illustrates that Frame Semantics allows the categorization of verbs in the same class despite differences in syntactic behavior. The syntactic properties of the LUs under investigation are also of considerable importance. That is, a lexical entry of any given LU includes the frame it evokes, as well as an exhaustive inventory of how the FEs of that frame are realized syntactically (see Fillmore et al. 2003).

This strategy also captures Levin's syntactic insights, albeit at different descriptive levels of the lexicon. The inability of Levin's *correspond* verbs to appear in the understood reciprocal object alternation is captured for each LU within its frame semantic description. For example, the lexical entry for *bicker* includes information about the semantic frame it evokes (Quarreling) as well as how its FEs are realized syntactically. The absence of the syntactic frame [NP V NP] (cf. \**Michael bickered Joe*) in the lexical entry of *bicker* shows that it does not participate in the understood reciprocal object alternation. The lexical entry states explicitly when a given LU participates in an alternation such as the simple intransitive reciprocal alternation, this is explicitly stated in its lexical entry. As such the entry of *bicker* includes information showing that the ARGUERS may be syntactically realized as one NP as in *Michael and Joe bickered*, or as separate NPs, as in *Michael bickered with Joe*. Frame Semantics thus captures syntactic alternations by describing patterns across different frames. An example is *load*, which has two distinct LUs, each evoking a different frame (Filling and Placing frames), as shown above. In this case, the lexical entries of the two LUs list the different syntactic patterns occurring with *load*.<sup>18</sup>

To summarize, in Frame Semantics the syntactic alternations in which a verb participates do not determine its membership in a specific class. Instead, verbs are classified based on the types of semantic frames that they evoke, which, in turn may result in an intricate system of cross-classification where different LUs associated with the same verb evoke distinct frames. At the same time, the frame semantic approach to verb classification captures Levin's observations about the syntactic behavior of verbs, as demonstrated with the computational implementation of Frame Semantics in FrameNet (cf. Fillmore et al. (2003), Boas (2005a, 2005b), and <http://framenet.icsi.berkeley.edu>).

<sup>17</sup> Note that other parts of speech such as nouns and adjectives may also evoke the same frames as verbs and can therefore be described with the same inventory of frames as verbs. For example, *altercation*, *argument*, and *bickering* all evoke the Quarreling frame.

<sup>18</sup> This semantically based approach to verb classification also allows us to capture relevant cross-linguistic generalizations. For example, the locative alternation in German (cf. Michaels and Ruppenhofer 2001) is realized by two separate verbs *laden* ('load', with variant) and *beladen* ('load', locative variant), which evoke the Filling and Placing frames, respectively. A contrastive account of the locative alternation using frame semantic criteria would capture the commonalities between the two LUs of *load* and the LUs associated with *laden* and *beladen* at the level of semantic frames.

## 4.2 Verb descriptivity

Assuming an approach that primarily relies on frame semantic criteria for defining verb classes leaves us with an obvious question: What is the relationship between the syntactic behavior of a verb and its meaning? I propose that it is possible to infer a great deal about this relationship by pursuing an approach that does not rely on a verb's participation in syntactic alternations (cf. Levin 1993). Instead, I suggest refining the frame semantic approach to verb classification by employing the notion of verb descriptivity as proposed by Snell-Hornby (1983).

Snell-Hornby observes that the semantics of verbs are intrinsically complex. This is because they describe participants and circumstances, as well as further semantic elements that are expressed in the verbs' definition by one or more adjectives or manner adverbs. To illustrate, consider the verb *strut*, whose semantics can be divided into its act-nucleus (ANu) *walk*, and its modifying adverbial or modificants (Mod).<sup>19</sup> The Mod is a semantic complex further analyzable into distinct physical characteristics (*stiff, erect*) and value-judgments passed on the character of the agent and his manner of walking (*self-satisfied, proud, pompous, with affected dignity*). These properties, in turn, result in the speaker's negative evaluation of both agent and act. According to Snell-Hornby, verbs such as *strut* exhibit a high degree of *verb-descriptivity*. This is the reason why they are called *descriptive verbs* (DVs). They can be represented by the formula in (32), where *x* is understood "as an optional element without evaluative properties and not expressible in terms of adjectives or manner adverbs" (1983:25-26).

(32) DV = ANu + Mod (+x)

Snell-Hornby proposes that there are two different types of verb descriptivity, which are usually present in a verb. Direct descriptivity captures events where the modificant refers directly to the activity described by the verb, as in *shout*. Indirect descriptivity holds when "the modificant refers to a participant (or participants) or a circumstance (or circumstances) behind the action or a combination of these." This may "involve a value-judgment passed on the agent's character or can reveal background information on the verbal action" (1983:30). An example of indirect descriptivity is the speaker's value judgment about the agent of the verb *strut* (see above). Snell-Hornby identifies an additional feature of the modificant. It is typically composed of dynamic adjectives, which are susceptible to subjective measurement and express a distinct attitude of the speaker (i.e. speaker-evaluation). In addition, they are gradable, expressing relative value that can be judged in terms of an implied and accepted norm, whether set by the

speaker personally or by his social environment (cf. 1983:43).<sup>20</sup> Examples of dynamic adjectives are *brave, careless, lovely*, and *pompous*.

By classifying several hundred English and German verbs according to their level of verb descriptivity and their membership in certain semantic fields (Trier 1931, Coseriu 1967), Snell-Hornby arrives at a number of important conclusions. First, approaches employing componential analysis that use bundles of features indicating binary opposites (e.g., Wojak 1971) are inadequate for explaining verb descriptivity. Such analyses cannot adequately explain the nature of dynamic adjectives, "which are themselves elements of language, relative and not absolute, and dependent on precise wording" (1983:65). This problem is a consequence of componential analyses that do not take into consideration the "blurred edges" of concepts (Wittgenstein 1953:34), which are important when classifying the modificants of descriptive verbs. Snell-Hornby thus argues for a description of modificants as complexes of distinguishable but merging elements, where dynamic adjectives permit variations in degree and measurement on a scale. Hence their value is not absolute but relative and can be judged in terms of an implied and accepted norm (1983:38). Another significant observation is that the descriptive elements of the modificant have "a weighed focus beside peripheral elements." This is in stark contrast to componential analyses, where the bundle of features is of evenly distributed importance (cf. 1983:65-66).

Snell-Hornby's second point concerns the relationship between the act-nucleus and the modificant: "The more semantic weight that is taken by the modificant as against the act-nucleus, the higher is the degree of descriptivity. In other words, when the act (that is, the strictly verbal element) is vague, variable or only loosely definable, while the modificant is clearly definable, evocative and complex, the degree of descriptivity is high" (1983:33). *Bustle* is an example of a verb with high descriptivity, where the modificant can be defined as *excitedly, energetically, often with apparent purpose, but usually noisily or inefficiently*. The act-nucleus of *bustle* is not clearly definable, and can best be described as an activity roughly paraphrasable as *behave, move about*, according to Snell-Hornby. In contrast, *shout* is a verb with low descriptivity, whose modificant is relatively simple, compared to that of *bustle*, describing the activity as *loudly*. The act-nucleus of *shout* identifies the activity as *say, speak*, or simply *cry out* (cf. 1983:34).<sup>21</sup>

<sup>20</sup> Besides dynamic adjectives, Snell-Hornby also discusses stative adjectives which "refer to such inherent properties as size, shape and substance (as for example *tall, circular, liquid*)" (1983:31).

<sup>21</sup> Faber and Mairal Usón (1999) present an approach to the English verbal lexicon, which is in principle compatible with Snell-Hornby's observations. They develop enriched lexical entries that include "the necessary conditions in the environment that allow the situation/event denoted by the verb to take place." In their framework, "a conceptual representation of a verb necessarily includes a specification of the number of arguments, their obligatoriness, and their semantic characteristics" (1999:89). Segmentations of lexical entries result in the following list of attributes: nuclear meaning, agent, goal, source, recipient

<sup>19</sup> Snell-Hornby's (1983) notion of modificant is roughly equivalent to Faber and Mairal Usón's concept of *differentiae*, used to distinguish closely related verbs from each other: "The semantic information in the meaning definition of a lexeme which distinguishes it from others in the same lexical domain" (1999:59).

The observation that the degree of descriptivity can be correlated with the range of application covered by the verb is Snell-Hornby's third, and for our discussion most crucial, point. She maintains that a "verb with a broad range of application leaves participants and circumstances open and can be used in varying situations, the best example in English probably being *to get*" (1983:34). This characterization of *get* is similar to that found in the literature on so-called light verbs, which occur with a relatively high frequency in English. For example, Pinker (1989:171) discusses the syntactic and semantic properties of light verbs such as *come*, *go*, *make*, *bring*, *take*, *get*, and *give*: "Syntactically, they are full-fledged verbs, but semantically they are less filling, resembling closed-class elements. Their meanings are fairly nonspecific and may correspond to simple semantic configurations that are encoded into affixes in other languages (...). They often function as little more than tense-carriers or verb-slot-fillers in idioms whose objects carry most of the meaning of the predicate." Descriptive verbs differ from light verbs in that they have a narrower range of application. Snell-Hornby claims that *shout* has a relatively wide range of application among all participants and circumstances are left open, hence the scope for *shout* is considerable." In contrast, *grovel* is a verb with a narrow range of application, as it "limits its participants and circumstances, and hence the situations in which it could occur." According to Snell-Hornby, *grovel* "presupposes two participants, the agent being lower in status than the addressee and behaving abjectly and subserviently towards him, hence earning the speaker's negative evaluation." These observations lead her to the conclusion that "the higher the degree of descriptivity (in other words, the more that is specified by the modificant), the narrower the verb's range of application is likely to be" (1983:35).

### 4.3 Correlating verb descriptivity with syntactic behavior

Combining Snell-Hornby's methodology with Frame Semantics facilitates investigating how different LUs that evoke the same frame differ in their degree of descriptivity. In addition, it is possible to determine whether there is any correlation between a verb's level of descriptivity and the range of syntactic patterns in which it may occur. This is important for two reasons. First, we are searching for a viable strategy that allows the identification of semantic elements which influence syntactic behavior. Second, although Snell-Hornby mentions a verb's range of application, the sole focus is on semantic properties of verbs without even attempting to correlate them with syntactic behavior.

Due to space limitations, I focus here on a few illustrative LUs from the motion domain, which have been well described in the literature (cf. Fillmore 1977, Snell-Hornby 1983, Talmy 1985, Jackendoff 1990, Levin 1993, Faber and Mairal Usón 1999, Boas 2001, among many others), and which differ in their degree of descriptivity. The *Self\_motion* frame describes situations in which the *Self\_mover*, a living being, moves under its own power in a directed fashion,

ion, i.e. along what could be described as a *PATH*, with no separate vehicle. The presence of the *FE\_PATH* presupposes the presence of other FEs such as *SOURCE* (any expression which implies a definite starting-point of motion), *GOAL* (any expression which tells where the *Self\_mover* ends up as a result of the motion), *DIRECTION* (the direction that the *Self\_mover* heads in during the motion), and *AREA* (expressions which describe a general area in which motion occurs when it is understood to be irregular and not to consist of a singular linear path) (cf. Ruppenhofer et al. 2005). Table 4, compiled from the online versions of the Merriam-Webster Dictionary and the Oxford English Dictionary, lists definitions of the most prominent intransitive uses of four LUs that evoke the *Self\_motion* frame.

Table 4: Some intransitive uses of motion verbs listed in Merriam-Webster and the OED22

Verb	Merriam-Webster	OED
<i>walk</i>	1. To move along on foot: advance by steps. 2. To come or go easily or readily. 3. To go on foot for exercise or pleasure.	1. To journey, move about, esp. on foot. 2. To travel or move about on foot. Also with advs. <i>about</i> , <i>on</i> , etc. 3. More explicitly, <i>to walk on foot</i> , also (now rarely) <i>afloat</i> . 4. To move about or go from place to place on foot for the sake of exercise, pleasure, or pastime; to take a walk or walks.
<i>parade</i>	1. To march in or as if in a procession. 2. Promenade. 3. a: show off; b: masquerade.	1. To march in procession or with great display or ostentation; to walk up and down, promenade, etc., in a public place, esp. in order to be seen; to show off. 2. Of troops, etc.: to assemble for parade. 3. To walk or move with unsteady steps; to go shakily or feebly; to toddle; also, to walk with difficulty; to reel, stagger.
<i>toller</i>	1. To tremble or rock as if about to fall: sway; to become unstable; threaten to collapse. 2. To move unsteadily: stagger, wobble.	1. To march in procession or with great display or ostentation; to walk up and down, promenade, etc., in a public place, esp. in order to be seen; to show off. 2. Of troops, etc.: to assemble for parade. 3. To walk or move with unsteady steps; to go shakily or feebly; to toddle; also, to walk with difficulty; to reel, stagger.
<i>stagger</i>	1. To reel from side to side: totter; to move on unsteadily; 2. To waver in purpose or action: hesitate.	1. Of a person or animal: to sway involuntarily from side to side when trying to stand or walk erect; to totter or reel as if about to fall; to walk with a swaying movement of the body and unsteady and devious steps, as from weakness, giddiness. 2. Said of the legs or feet

When comparing the definitions of the different LUs (a verb in one of its senses), a number of interesting details emerge. While the definitions are similar in that they evoke the *Self\_motion* frame, the semantic make-up of the FEs describing the individual LUs differs quite drastically from each other. For ex-



ample, the description of the AGENT of *walk* is somewhat vague in that it only specifies the means of self moving, namely on foot. The AGENT of *parade* is different in that it presents a close-up view of the act of walking, "focusing especially on the agent's gait and the individual steps he takes" (Snell-Hornby 1983: 135). More specifically, the AGENT of *parade* engages in an act of public self-presentation with the intention of being seen by others while conducting a regular, purposeful, energetic walk. This goal may be intensified when the AGENT is a part of a larger group that is engaged in coordinated movement. The AGENT of *totter* differs from the AGENT of the other two LUs in that its steps deviate from the norm of regular intervals and that it appears to have difficulties maintaining an upright position. These properties cause an observer to conclude that the AGENT may be weak or intoxicated. The AGENT of *stagger* appears to have even less control of his forward movement than the AGENT of *totter*. That is, his steps are even less synchronous and it appears to have extreme difficulty maintaining an upright posture, even when trying purposefully to maintain balance. Moreover, "*stagger* can also refer to an agent carrying a heavy burden or who is semi-conscious" (Snell-Hornby 1983:138).

The semantic differences between the AGENTS of the four LUs have direct repercussions for the semantic interpretation of other FEs in that frame. For example, the SOURCE, PATH, and GOAL FEs of *walk* and *parade* are understood as describing a clear movement in a certain direction. However, this is not the case with *totter* and *stagger*, where the AGENT typically has difficulties maintaining his PATH, and thereby has problems with reaching the GOAL. Using Snell-Hornby's classification of verb descriptivity, we can now summarize our observations about the four LUs evoking the SELF\_motion frame can be summarized as follows:

Table 5: LUs in the SELF\_motion frame ranked by their degree of descriptivity

Verb	ANu	Mod
<i>walk</i>	AG [S→P→G]	(a,...)
<i>parade</i>	AG [S→P→G]	(a, b, c,...)
<i>stagger</i>	AG [S→P→G]	(a, b, c, d,...)
<i>totter</i>	AG [S→P→G]	(a, b, c, d, e,...)

The four LUs in Table 5 are ranked by their degree of descriptivity. The middle column "ANu" (act-nucleus) represents in very schematic form the type of world knowledge associated with a moving event in the SELF\_motion frame, that is, an AGENT (Ag) is moving from a SOURCE (S) along a PATH (P) to a GOAL (G) (For a more detailed formalization of world knowledge associated with verbs, see Boas (2003b)). The decreasing font size indicates a lesser prominence of the schematic directed motion semantics associated with the SELF\_motion frame. This captures the intuition that *walk* can be regarded as one of the most prototypical LUs evoking the SELF\_motion frame. At the same time, the most difficult ("Mod") of *walk* in the right-most column of Table 5 contains very little

information and is represented by a single modificant variable that stands for something like *using feet*. The combination of a prominent act-nucleus with an insignificant modificant means that *walk* shows a low degree of descriptivity. In contrast, the modificants of *parade*, *stagger*, and *totter* are increasingly more complex, which is indicated by the larger font size and number of variables contained in the modificant. As such, *totter* exhibits the highest degree of descriptivity among the verbs, because its modificant is the most complex (cf. *loss of balance* and *upright position*, *against one's will*, etc.). Borrowing from Pinker's (1989) terminology, *walk* is the lightest verb of the four, whereas *totter* is the heaviest verb among the group of verbs under investigation.

Having established a descriptivity hierarchy for the four LUs, I now return to the question of whether there is any correlation between the degree of descriptivity and the types of syntactic patterns in which these LUs can occur. To determine their syntactic range, I employ a number of grammatical constructions and syntactic alternations discussed by Levin (1993). The examples in (33) and (34) illustrate that all four LUs allow for the inclusion of a location PP, and that there are zero-related nominals corresponding to them.

(33) a. Gerry {walked/paraded/staggered/tottered}.

b. Gerry {walked/paraded/staggered/tottered} down the street.

(34) a. walk, a parade, a stagger, a totter

In contrast, only *walk* appears to be acceptable with resultative (35a) and caused-motion (35b) constructions, while *parade* seems to be barely acceptable with the resultative. In contrast, *stagger* and *totter* appear to be unacceptable.

(35) a. Cathy {walked/?paraded/\*staggered/\*tottered} herself to exhaustion.

b. Cathy {walked/\*paraded/\*staggered/\*tottered} Pat off the street.

Next, consider the locative preposition drop alternation (Levin 1993:43-44).

(36) a. Julia {walked/paraded/staggered/tottered} across the town.

b. Julia {walked/paraded/\*staggered/\*tottered} the town.

The examples show that *walk* and *parade* participate in the locative preposition drop alternation, while *stagger* and *totter* do not. The four LUs exhibit a similar mixed distribution in the induced action alternation, where the causee is typically an animate volitional entity that is induced to act by the causer (cf. Levin 1993:31).

(37) a. Claire {walked/paraded/\*staggered/\*tottered} the dog down the street.

b. The dog {walked/paraded/staggered/tottered} down the street.

Finally, adjectival passive participles (Levin 1993:86/87) sound more acceptable when formed from *walk*, than when derived from *parade*, *stagger*, or *totter*.

(38) the {walked/?paraded/\*staggered/\*tottered} dog

The preceding discussion of the syntactic behavior of the four LUs shows that *walk* is the most flexible among the four LUs in the SELF\_motion frame. In contrast, *parade* exhibits a somewhat more limited distribution, and the range of



syntactic patterns in which *stagger* and *totter* occur is the most restricted.<sup>23</sup> The results from (33) – (38) are summarized in Table 6. Comparing the results in Table 6 with those in Table 5 shows a noteworthy correlation between the degree of descriptivity and the range of syntactic constructions in which a LU may occur. LUs such as *walk* with a low level of descriptivity occur in a wider range of syntactic contexts than LUs such as *totter*, which are much more descriptive. Thus, these results confirm Snell-Hornby's claims, namely that the higher the degree of descriptivity (i.e., the more that is specified by the modificant), the narrower the verb's range of application is likely to be (1983: 35). In addition, I have extended Snell-Hornby's proposals by showing that the semantic properties she identifies (she does not mention syntactic properties in this context) influence the syntactic behavior of the four LUs under discussion.

Table 6. Summary of syntactic distribution of *walk*, *parade*, *stagger*, and *totter*

	<i>walk</i>	<i>parade</i>	<i>stagger</i>	<i>totter</i>
Location PP	+	+	+	+
Zero-related Nominal	+	+	+	+
Resultative Construction	+	?	-	-
Caused-motion Construction	+	-	-	-
Preposition Drop Alternation	+	+	-	-
Induced Action Alternation	+	+	-	-
Adjectival Passive Participle	+	??	-	-

Interestingly, Faber and Mairal Usón's (1999) study of the English lexicon arrives at somewhat similar conclusions using syntactic complementation data. Investigating different semantic domains, their analysis looks at how semantic information influences syntactic behavior. Identifying a number of semantic and pragmatic parameters that can be used to distinguish verbs from each other, they show that verbs which are closely related in meaning differ in their syntactic complementation. For example, Faber and Mairal Usón (1999: 108) analyze verbs describing possession and identify a number of semantic distinctions that trigger differences at the syntactic level: manner specifications (through instrumentality or specification of intensity), optional argument focus (source), or pragmatic parameters such as formality. These observations lead them to claim that the mapping between the lexical representation of a predicate and its syntactic expression is predictable in that syntax is semantically motivated: "The superordinate term of each subdomain tends to take a greater number of comple-

23 It is important to point out that both *walk* and *promenade* are also conventionalized with a variety of transitive and causative senses, whereas *stagger* and *totter* are not. Given the extreme splitting approach to verb sense classification, some of the syntactic patterns discussed in this section could be seen as a reflection of (or reason for) a separate semantic frame. In other words, we could also say that there are separate LUs for *walk* and *parade*, both evoking a distinct semantic frame, namely the Cotheme frame, which contains words that necessarily indicate the motion of two distinct objects. Nevertheless, the range of syntactic patterns in which each of the LUs in the Self\_motion frame may occur should be regarded as an indicator of syntactic flexibility.

mentation patterns than its more specific troponyms. (...) If we compare the entries of *buy* and *purchase*, *purchase* obviously has fewer possible complementation patterns than *buy* because it is more specific." Besides investigating verbs denoting possession, the authors also analyze the syntactic complementation patterns of verbs from a variety of other semantic domains and come to a conclusion that is similar to my proposals: "A verb's subcategorization is semantically motivated, since the semantics of a lexical domain activates or triggers its complementation patterns" (Faber and Mairal Usón 1999: 142).

## 5 Conclusion and Outlook

The proposals presented are not meant to imply that syntactic alternations and grammatical constructions play no role in the definition of verb classes. However, our discussion of Pinker's (1989) and Levin's (1993/2003) analyses has shown that the reliance on primarily syntactic criteria for defining verb classes poses a number of problems. This observation has led to arguing for classifying verbs based on the principles of Frame Semantics (Fillmore 1982). By describing similarities among LUs that evoke the same semantic frame(s), it becomes possible to reach uniform semantic classifications, which offer a more fine-grained inventory of verb classes than those proposed by purely syntactic approaches. Moreover, frame-based entries contain detailed information about the different ways in which Frame Elements may be realized syntactically. As such, frame-based verb classes also encode the types of syntactic information analyzed by other approaches such as Levin's. An important insight emerging from this work is the influence of verb descriptivity on a verb's syntactic behavior. By adopting Snell-Hornby's (1983) approach to identifying different types of meaning components in verbs, I have shown that LUs evoking the same semantic frame may differ in their degree of descriptivity, which in turn influences the range of syntactic patterns in which they appear. The data suggest that the higher the degree of descriptivity, the narrower a verb's syntactic range is likely to be.

Before concluding, I want to stress that these proposals are only a first step towards a more comprehensive classification of verb classes and an in-depth investigation of syntactically relevant aspects of meaning. There are three major points that require further examination for the development of a more comprehensive analysis of frame-based verb classes. First, a usage-based analysis that is based on a greater breadth and depth of data (cf. Langacker 1987:494) is desirable. With a sophisticated frame-based lexicon such as FrameNet (Fillmore et al. 2003) and a number of large electronic corpora, the present analysis would be expanded to include all LUs evoking the Self\_motion frame. At the next stage, our results should also be complemented with comparative analyses of other semantic frames such as the Statement or Attaching frames.

Secondly, the exact nature of verb descriptivity requires further investigation. The data suggest that there is a correlation between the degree of a verb's descriptivity and the range of syntactic patterns in which it may occur. However, it

is not yet evident what type of descriptive inventory is necessary for specifying and categorizing different aspects of a verb's descriptivity. A first step towards elucidating Snell-Hornby's complex notion of modificant could be taken by applying Faber and Mairal Usón's (1999) analysis, which offers different parameters of semantic differentiation, each belonging to different layers of the structure of the lexicon. Using their methodology may result in the identification of meaning elements similar in status to distinctive features in phonology (cf. Levin and Rappaport Hovav 2005:18). To achieve this goal, we need to develop tests that can be employed to classify specific semantic features that would be correlated with syntactic behavior. It is conceivable that this could be achieved by comparing sets of closely related verbs such as *totter* and *stagger* with each other. The results would then be compared with verbs such as *walk* and *run*, which exhibit higher degrees of schematicity, i.e., lower degrees of descriptivity (or, semantic content). Using a set of semantic features developed this way would facilitate studying their interaction with syntactic behavior in greater detail. In the end, it may turn out that certain elements of meaning are syntactically relevant, while others are not. Such a result would not be surprising since not all syntactic alternations are equally relevant for the identification of verb classes, as demonstrated in the present work.

Finally, the nature of productivity as pertaining to verb classes must be studied in more detail. The discussion of Pinker's (1989) fine-grained verb classes above has shown that some of his non-alternating verbs may indeed be found to alternate. This suggests that under certain circumstances, verbs may exhibit novel syntactic patterns. In other work I have argued that conventionalized verb senses may take on new syntactic patterns in specific contexts, based on analogical associations (Boas 2003b). Analogy has also been shown to be at work when new verbs enter a language (cf. Barðdal 2003). Applying these findings to semantic verb classes may help us with identifying those components of meaning which are syntactically relevant, and which in turn may license two types of productivity: the association of existing verbs with novel subcategorization frames (cf. also Salkoff 1983) and the types of subcategorization frames generally available for new verbs in a language (cf. Barðdal 2003). Closely related to this issue is the question of how much world knowledge should be included in lexical descriptions. The fine-grained differences in verb descriptivity among the four LUs discussed above suggest the need to encode a great deal more of world knowledge than previously assumed (see also Taylor (1996), Langacker (2000, 2005), Boas (2003b), Lemmens (2006)). The results of this investigation will eventually also shed light on the question of why some verbs alternate, but other verbs, which are closely related in meaning, do not.

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# **Contrastive Studies and Valency Kontrastive Studien und Valenz**

Studies in Honor of Hans Ulrich Boas  
Festschrift für Hans Ulrich Boas

Edited by/Herausgegeben von  
Petra C. Steiner, Hans C. Boas  
and/und Stefan J. Schierholz



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