Predicting Semantics from Syntactic Cues – An Evaluation of Levin's English Verb Classes and Alternations

Doug Jones
Institute for Advanced Computer Studies
A. V. Williams Building
University of Maryland
College Park, MD 20742
jones@umiacs.umd.edu *

Abstract

The relationship between the meaning of verbs and their syntactic patterns has recently been explored in the landmark study of (Levin, 1993). Although the central thesis of this book is that verb semantics and syntactic behavior are predictably related, the large scope of the work makes it difficult to verify. I show that it is possible to guess the semantic class of a verb based on syntactic cues automatically extracted from the example sentences in her book. In particular, it is possible to correctly guess 94.8% of Levin's semantic classes if the parses contain prepositions, negative evidence is included, and word senses are disambiguated. This report includes the syntactic signatures of Levin's 191 semantic classes, in addition to a detailed description of how the syntactic signatures behave according to the different parameters involving negative evidence, prepositions, and disambiguation.

1 Introduction

The central thesis of (Levin, 1993) is that the semantics of a verb and its syntactic behavior are predictably related. As a demonstration that such predictable relationships are not confined to an insignificant portion of the vocabulary, Levin surveys 4183 verbs, grouped into 191 semantic classes in Part Two of her book. The syntactic behavior of these classes is illustrated with 1525 example sentences, an average of 8 sentences per class. Given the scope of Levin's work, it is not easy to verify the central thesis. To this end, I created a database of Levin's verb classes and example sentences, and wrote a parser to extract basic syntactic information from the sentences. [1]

The core idea of the experiment is to automatically extract syntactic patterns from the example sentences. The semantic classes are characterized by groups of syntactic patterns. Let us refer to these groups of patterns as *syntactic signatures*. The purpose of the experiment is to discover whether the syntactic signatures tell us anything about the meaning of the verbs.[2]

There are two ways to run the experiment, and each way has different results. The first way (the class-based experiment) is to try to link the syntactic signatures to semantic classes, abstracting away from the particular verbs in the classes. The second way (the verb-based experiment) is to compare the way the verbs are grouped semantically versus the way they are grouped syntactically, and to see whether these two groupings are related. The class-based experiment shows that as many as 94.8% of the 191 semantic classes have uniquely identifying syntactic signatures, depending upon what information is included in the parse. The verb-based experiment shows that 5.8% of the verbs are grouped identically by both the semantic classes and the syntactic signatures. As we will see, it is word-sense ambiguity that is responsible for the poor performance of the verb-based experiment. Let us turn to the details of each experiment.

2 Class-based Experiment

In the class-based experiment, we attempt to discover whether the syntactic behavior of a semantic

*The research reported herein was supported, in part, by Army Research Office contract DAAL03-91-C-0034 through Battelle Corporation, NSF NYI IRI-9357731, Alfred P. Sloan Research Fellow Award BR3336, and a General Research Board Semester Award.

[1] Both the database and the parser are encoded in Quintus Prolog.

[2] The design of this experiment is inspired by work by Patrick Saint-Dizier. In particular, I depart from the alternation-based data in (Levin, 1993), which is primarily binary in that sentences are presented in pairs which constitute an alternation. Following Saint-Dizier's work, I construct N-ary syntactic characterizations. The choice is of no empirical consequence, but it simplifies the experiment by eliminating the problem of naming the syntactic patterns.

Figure 1: Change of State – *break* subclass

Verbs: `break, chip, crack, crash, crush, fracture, rip, shatter, smash, snap, splinter, split, tear`

Positive Example Sentences:
`Crystal vases break easily. The hammer broke the window. The window broke. Tony broke her arm. Tony broke his finger. Tony broke the crystal vase. Tony broke the cup against the wall. Tony broke the glass to pieces. Tony broke the piggy bank open. Tony broke the window with a hammer. Tony broke the window.`

Negative Examples:
`* Tony broke at the window. * Tony broke herself on the arm. * Tony broke himself. * Tony broke the wall with the cup.`

class of verbs uniquely identifies that class. Consider class 45.1, the *break* subclass of the Change of State verbs, shown in Figure 1. The primary question is what syntactic information to extract. We cannot use complete parse trees, since these would include the terminal nodes and would therefore contribute no usable level of abstraction. Simply stripping the terminal nodes would be a start, but we immediately face a potential bias in the experiment: what aspects of a fine-grained syntactic analysis could end up providing accidental information that makes the syntactic signature spuriously unique? [3]

It turns out that a very simple strategy works very well, namely, flat parses that contains lists of the major categories in the sentence, the verb, and the handful of other elements shown below: [4]

```
np v pp adjective infinitive
s_comp poss expletive self w_comp
quotation vp appositive
```

Other syntactic elements are simply ignored by the parser. The "parse", then, for the sentence `Tony broke the crystal vase` is simply the pattern `[np,v,np]`. For `Tony broke the vase to pieces` we get `[np,v,np,pp]`.

[3]For example, what if a sentence from one semantic class is just like a sentence from a different semantic class except that one of these has a noun phrase modified by an adjective whereas the other has an unmodified noun phrase? If the syntactic patterns extracted from these sentences reflects such a difference, the signatures will differ accidentally.

[4]Most of these elements are self-explanatory: `np` = noun phrase, `v` = verb, `pp` = prepositional phrase, `s_comp` = sentential complement, `poss` = possessive pronoun, `expletive` = expletive pronoun (*it, there*), `self` = reflexive pronoun, `w_comp` = *WH*-complement, `vp` = verb phrase complement, such as gerund complements.

Figure 2: Syntactic Signature for Change of State – *break* subclass

Verbs: `break, chip, crack, crash, crush, fracture, rip, shatter, smash, snap, splinter, split, tear`

Example Sentences:
`Crystal vases break easily. The hammer broke the window. The window broke. Tony broke her arm. Tony broke his finger. Tony broke the crystal vase. Tony broke the cup against the wall. Tony broke the glass to pieces. Tony broke the piggy bank open. Tony broke the window with a hammer. Tony broke the window. * Tony broke at the window. * Tony broke herself on the arm. * Tony broke himself. * Tony broke the wall with the cup.`

Derived Syntactic Signature:
```
1-[np,v] 1-[np,v,np]
1-[np,v,np,adjective] 1-[np,v,np,np]
1-[np,v,np,pp] 1-[np,v,poss,np]
0-[np,v,np,pp] 0-[np,v,pp]
0-[np,v,self] 0-[np,v,self,pp]
```

The outline for the class-based experiment is as follows:

1. Automatically extract syntactic information from the example sentences to yield the syntactic signature for the class.
2. Discover which semantic classes have uniquely-identifying syntactic signatures.

If we parse the 1525 example sentences (including the negative examples), these sentences reduce to 118 unique patterns. The 191 sets of sentences listed with each of the 191 semantic classes in turn reduces to 171 unique syntactic signatures. 153 of them uniquely identify a semantic class, meaning that 80.1% of the classes have uniquely identifying syntactic signatures.

To show a concrete example, let us return to semantic class 45.1, the *break* subclass of the Change of State verbs. The example sentences, both positive and negative, are parsed, yielding a set of syntactic patterns. This set of patterns constitutes the syntactic signature. Notice that duplicate patterns have been removed in forming the signature. Positive patterns are marked with `1-` and negative patterns are marked with `0-`. The signature is shown in Figure 2.

Not every one of the 171 signatures corresponds uniquely to a semantic class. For example, signature #127 , composed of the patterns `0-[np,v,np,pp] 1-[np,v,np] 1-[np,v,np,pp]` , corresponds to three semantic classes: 25.3 (*Illustrate* Verbs), 25.4 (*Transcribe* Verbs), and 34 (Verbs of Assessment). This signature illustrates a shortcoming of this parsing strategy: notice that the pattern `[np,v,np,pp]` is both a positive example and a negative example. The pattern is not capturing the distinction that differentiated the positive and negative example sentences. For example, in class 25.3 (*Illustrate* Verbs), these two sentences are listed: the positive example: `The jeweller decorated the ring with the name.` and the negative example: `* The jeweller decorated the name on the ring.` On the one hand, the signature is in fact coherent, since what it means is that there is some sentence that matches this pattern that is grammatical, and another sentences that also matches this pattern that is ungrammatical. But the signature is not very informative. Furthermore, it is easy to enhance the parser: if we simply annotate the `pp` element with the actual preposition in the prepositional phrase, then the signatures will encode the information that minimally distinguishes the sentences. The pattern, then, for the positive sentence would be `1-[np,v,np,pp(with)]` and the pattern for the negative sentence would be `0-[np,v,np,pp(on)]`. [5]

2.1 The Best Signatures

Repeating the experiment outlined above, the 1525 example sentences now reduce to 272 patterns, where the `pp`'s of the parse patterns are marked with the head preposition. There are more patterns than before because the prepositions distinguished many of them. For the 191 sets of sentences that correspond to the 191 semantic classes, this time there are 186 unique syntactic signatures. Of these, 181 uniquely identify a semantic class. That means that 94.8% of the semantic classes have unique syntactic signatures with this parsing strategy. Ten of the semantic classes do not have a unique syntactic signature. As it turns out, these ten classes are underdetermined by syntactic information. Let us look at the details of these classes.

2.2 The Ten Underdetermined Semantic Classes

Ten of the 191 semantic classes do not have enough purely syntactic information to differentiate them. Coincidentally, there are five syntactic signatures for these ten semantic classes: each signature maps onto two semantic classes each, as shown in Figure 3.

Three of these conflations are because the syntactic descriptions for the semantic classes are genuinely the same. The other two conflations occur because the parser is only looking at sentential syntax, but if morphological information and nominal syntax is included, the remaining two conflations receive the necessary distinctions to differentiate them.

Figure 3: Semantic Classes with Non-Unique Syntactic Signatures

Sig.	Patterns	Semantic Classes
#44	1-[np,v,np] 1-[np,v,np,pp(from)] 0-[np,v] 0-[np,v,np,pp(of)]	10.7 Pit Verbs 10.8 Debone Verbs
#86	1-[np,v] 0-[np,v,np]	40.4 Snooze Verbs 45.5 Verbs of Entity-Specific Change of State
#60	1-[np,v,np] 0-[np,v]	27 Engender Verbs 55.2 Complete Verbs
#89	1-[np,v] 1-[np,v,pp(at),pp(of)] 1-[np,v,pp(from)] 0-[np,v,np]	40.6 Verbs of Body-Internal States of Existence 40.8.4 Verbs of Change of Bodily State
#143	1-[np,v,np] 0-[np,v,pp(from)	51.2 Leave 52 Avoid Verbs

Signature #60 conflates classes 27 (*Engender* Verbs) and 55.2 (*Complete* Verbs). The sets of sentences for each class illustrate the same thing: the verbs must be transitive. Intransitive uses are not allowed. It is interesting, though, that these two semantic classes look like they may have something in common. Class 27 (*Engender* Verbs), which are `beget, cause, create, engender, generate, shape, spawn`, are described as follows: "These verbs describe a causal relationship between two arguments, which are typically both abstract NP's. One argument brings about the existence of the other." Class 55.2 (*Complete* Verbs, which are `complete, discontinue, initiate, quit`, are described as follows: "The members of this set of aspectual verbs again describe the initiation, continuation, or termination of an activity, but unlike the members of the other subset of aspectual verbs above, complete verbs are not used intransitively...". Both sets of verbs have a sense in which they bring something about, for class 27, in terms of causation, and for class 55.2, in terms of completion. These transitions of course are not synonymous. Nonetheless, there may be some overlap in their semantic descriptions. In any case, the syntactic information automatically extracted from the example sentences is not sufficient to yield uniquely identifying clues for the semantic classification. That is, the semantic distinction is underdetermined by the example sentences.

Signature #89 conflates sections 40.6 and 40.8.4. Class 40.6 is "Verbs of Body-Internal States of Existence": `convulse, cower, quake, quiver, shake, shiver, shudder,`

[5] Similar improvements in the utility of syntactic signatures for semantic extraction were obtained in the research reported in (Dorr et al., 1995) in which the syntactic codes of the Longman's Dictionary of Contemporary English were enhanced by adding the head preposition to the code.

tremble, writhe. Class 40.8.4 is "Verbs of Change of Bodily State": **blanch, faint, sicken, swoon**. The semantic distinction between these two classes is underdetermined by the four syntactic patterns extracted from the example sentences given.

Signature #143 conflates classes 51.2 (the *Leave* verbs) and 52 (the *Avoid* verbs). The semantic difference between the classes is underdetermined by two syntactic patterns corresponding to the example sentences.

The reason that class 10.7 (*Pit* Verbs) and class 10.8 (*Debone* Verbs are conflated by their syntactic signatures is also that the sentences patterns for the two classes are identical. However, the two classes are distinguished on morphological grounds: all of the *Debone* verbs have the prefix *de-*.

The two classes 40.4 (*Snooze* Verbs) and 45.5 (Verbs of Entity-Specific Change of State) also have the same set of sentence patterns. The two classes are distinguished by differences in nonsentential syntax: most of the verbs in class 40.4 have zero-related nominals whereas some of the verbs in class 45.5 have adjectival perfect participles.

2.3 The Role of Prepositions

Recall that when prepositions were added to the syntactic patterns, the number of semantic classes with uniquely identifying syntactic signatures increased from 153 to 181 , an increase from 80.1% to 94.8% of the 191 semantic classes. What would happen if we composed syntactic signatures based on prepositions alone? For the sentence `Nora sent books to the children.`, the original experiment had a sentence of pattern of `[np,v,np,pp]`. With the preposition-enhanced parse, the pattern is `[np,v,np,pp(to)]`. The pattern with *only* prepositions throws away everything that is not a `pp`. The pattern for this sentence is `[pp(to)]`. A sentence with no prepositions has a null pattern: `[]`. What is interesting is that in this case, we still get useful results. The 1525 sentences reduce to 102 patterns, which in turn compose the 149 syntactic signatures. 128 of the 191 semantic classes have uniquely identifying signatures. Thus 67.0% of the classes can be identified with prepositions alone.

2.4 The Role of Negative Evidence

There are 971 positive examples and 554 negative examples. Negative examples present plausible uses of the verb in contexts which are disallowed. Although this evidence is useful, it is not available in dictionaries, corpora, or other convenient resources that could be used to extend Levin's classification. For these reasons, we would like to know how important the negative evidence is for building uniquely identifying syntactic signatures, since we will most likely have to do without it.

As we might expect, throwing out the negative evidence degrades the usefulness of the signatures across the board, but if we keep the positive instances of prepositions in the pattern, the best result still gives 83.2% of the semantic classes uniquely identifying syntactic signatures. The results of the other conditions are more radically degraded, as shown in Figure 4.

Figure 4: Unique Mappings between Semantic Classes and Syntactic Signatures

	With Negative Evidence	No Negative Evidence
With Prepositions		
Percentage:	94.8%	83.2%
Classes:	(181 of 191)	(159 of 191)
No Prepositions		
Percentage:	80.1%	37.7%
Classes:	(159 of 191)	(72 of 191)
Only Prepositions		
Percentage:	67.0%	43.5%
Classes:	(128 of 191)	(83 of 191)

Figure 5: Number of Appearances of Verbs

Number of Appearances	Verbs with that number of appearances
1	2239
2	536
3	173
4	43
5	23
6	7
7	2
10	1

3 The Verb-Based Experiment

In the class-based experiment, the goal was to find unique mappings between syntactic signatures and semantic classes. Although the semantic classes clearly play a meaningful role in the semantics of each particular verb, this experiment does not give us mappings between individual verbs and syntactic signatures. What the class-based experiment does is abstract away from word sense ambiguity. In fact, 46% appear more than once. One verb (*roll*) appears ten times. The distribution of number of appearances is shown in Figure 5.

In some cases, the verb appears to have related sense even though it appears in different classes. For example, the verb *roll* appears in two subclasses of Manner of Motion Verbs that are distinguished on the basis of whether the grammatical subject is animate or inanimate. In other cases, the verb may have (largely) unrelated senses. For example, the verb *move* is both a Manner of Motion verb and verb of Psychological State. What happens if we add the word sense ambiguity into the experiment?

3.1 The Role of Word Sense Ambiguity

The composition of a syntactic signature is different for this experiment. Here, we collect all of the syntactic patterns associated with every class a particular verb appears in, regardless of whether that verb is semantically related in the different classes. Now a syntactic signature is the union of the syntactic patterns extracted from every example sentence associated with each verb. The outline of the verb-based experiment is as follows:

1. Automatically extract syntactic information from the example sentences.
2. Group the verbs according to their syntactic signature.
3. See where the two ways of grouping verbs overlap:
    (a) the semantic classification given by Levin.
    (b) the syntactic classification based on the derived syntactic signatures.

To return to the familiar Change of State verbs from above, we now consider the syntactic signature of the verb *break*, rather than the signature of the semantic class as a unit. The verb *break* belongs not only to the Change of State class, but also four other classes: [6] Each of these classes is characterized syntactically with a set of sentences. The union of the syntactic patterns corresponding to these sentences forms the syntactic signature for the verb.

One way to view the difference in this experiment is the difference between the *intension* of a function versus its *extension*. In this case, we are interested in the functions that group the verbs syntactically and semantically. Intensionally speaking, the definition of the function that groups verbs semantically would have something to do with the actual meaning of the verbs. [7] Likewise, the intension of the function that groups verbs syntactically would be defined in terms of something strictly syntactic, such as subcategorization frames. But the intensions of these functions are matters of significant theoretical investigation, and although much has been accomplished in this area, the question of mapping syntax to semantics and vice versa is an open research topic. Therefore, we can turn to the *extensions* of the functions: the actual groupings of verbs, based on these two separate criteria. The semantic extensions are sets of verb tokens, and likewise, the syntactic extensions are sets of verb tokens. To the extent that these functions map between syntax and semantics intensionally, they will pick out the same verbs extensionally.

Figure 6: Verb-based versus Class-based Syntactic Signatures

Class-based Signature for Class 45.1 (Change of State Verbs; *break* subclass)	Verb-based Signature for the verb *break*. Belongs to these classes 10.6 Cheat Verbs 23.2 Split Verbs 40.8.3 Hurt Verbs 45.1 Break Verbs 48.1.1 Appear Verbs
`1-[np,v]`	`1-[expletive,v,np,pp]`
`1-[np,v,np]`	`1-[np,v]`
`1-[np,v,np,adjective]`	`1-[np,v,np]`
`1-[np,v,np,pp]`	`1-[np,v,np,adjective]`
`1-[np,v,poss,np]`	`1-[np,v,np,pp]`
`0-[np,v,np,pp]`	`1-[np,v,poss,np]`
`0-[np,v,pp]`	`1-[np,v,pp]`
`0-[np,v,self]`	`1-[np,v,self]`
`0-[np,v,self,pp]`	`1-[pp,v,np]`
	`0-[np,v]`
	`0-[np,v,np]`
	`0-[np,v,np,pp]`
	`0-[np,v,pp]`
	`0-[np,v,self]`
	`0-[np,v,self,pp]`
	`0-[np,v,w_comp]`

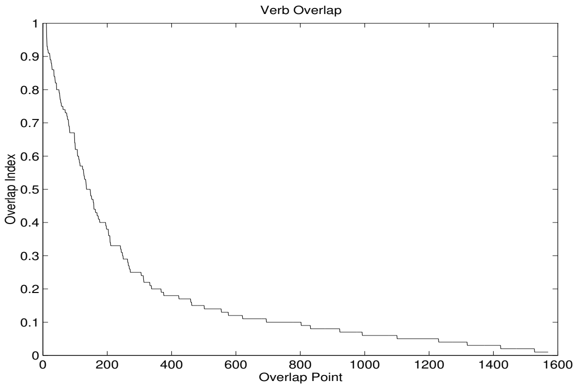
So for the verb-based experiment, we need a different methodology to establish relatedness between the syntactic signatures and the semantic classes, since the signatures are now mediated by the verbs themselves. A direct method is to compare the two orthogonal groupings of the inventory of verbs: the semantic clases defined by Levin and the sets of verbs that correspond to each of the derived syntactic signatures. When these two groupings overlap, we have discovered a mapping from the syntax of the verbs to their semantics. More specifically, let us define the overlap index as the number of overlapping verbs divided by the average of the number of verbs in the semantic class and the number of verbs in the syntactic signature. Thus an overlap index of 1.00 is a complete overlap and an overlap of 0 is completely disjoint. In this experiment, the sets of verbs with a high overlap index are of interest.

If we re-run the experiment that had the best results for the class-based syntactic signatures, where the `pp`'s of syntactic patterns are marked for the specific prepositions and negative evidence is used, the 1525 example sentences reduce to 272 syntactic patterns, just as before. But now there are 741 verb-based syntactic signatures, as compared with 186 class-based signatures from before. Since there are far more syntactic signatures than the 191 semantic classes, it is clear that the mapping between signatures and semantic classes is not direct. With 741 syntactic signatures and 191 semantic classes, there

[6] The verb *break* belongs to these classes: 10.6 *Cheat* Verbs. 23.2 *Split* Verbs. 40.8.3 *Hurt* Verbs. 45.1 *Break* Verbs. 48.1.1 *Appear* Verbs.

[7] A very important example of an intensional characterization of the Levin classes is Bonnie Dorr's definitions of Lexical Conceptual Structures which correspond to each of Levin's semantic classes. See (Dorr, 1995).

Figure 7: The Best Overlap for the Verb-Based Experiment



are 141531 points of potential overlap. Since there are only 4183 verbs, we know that most of these points of potential overlap must be empty. In this experiment, 1674 of these points have non-zero overlaps. Only 11 of these are complete overlaps. That means 5.8% of the 191 semantic classes have a complete overlap with a syntactic signature. The median overlap is 0.10 , and the mean is 0.17 The sorted overlap indices are shown in Figure 7.

An example of a full overlap is the overlap of Semantic Class 37.9 (Verbs of Communication; *advise* subclass) and Syntactic Signature #540 , shown in Figure 8.

An example of a partial overlap is the overlap of Semantic Class 47.2 (Verbs of Entity-Specific Modes of Being) and Syntactic Signature #472 , shown in Figure 9. In this case, the overlap index is 0.50. There are 42 verbs that belong to Semantic Class 47.2 and 14 verbs that are picked out by Syntactic Signature #472 . There are 14 verbs in the overlap. The overlap index is the number of verbs in the overlap divided by the average size of the semantic class and the syntactic signature.

To get a better comparison between the verb-based experiment and the class-based experiment, let us try a third experiment in which the verbs listed in the semantic classes are annotated with arbitrary indices that disambiguate them. [8] In this experiment, we will still consider the overlap indices as the measure of the relationship between the syntactic signatures and the semantic classes. The percentages are the same, but their interpretation is

[8]To disambiguate the verbs in the study, they were given a unique index if the they appeared in more than one semantic class. They were simply marked with the class number, for example, `break:45.1` refers to the change of state reading of *break*. Verbs which appeared only once got a zero index. The content of the indices were not used directly by the system for the grouping the verbs – they served only to make different appearances of the verbs unique.

Figure 8: Example of Full Overlap

	Verbs belonging to this group:
Semantic Class 37.9 (Verbs of Communication; *advise* subclass)	[admonish,advise, alert,caution,counsel instruct,warn]
Syntactic Signature #540 0-[np,v,pp] 0-[np,v,pp,infinitive] 1-[np,v,infinitive] 1-[np,v,np] 1-[np,v,np,infinitive] 1-[np,v,np,pp] 1-[np,v,np,quotation] 1-[np,v,np,s_comp] 1-[np,v,np,w_comp] 1-[np,v,pp] 1-[np,v,quotation] 1-[np,v,s_comp] 1-[np,v,w_comp] 1-[appositive([np,v])] 1-[appositive([np,v,np])]	[admonish,advise,alert, caution,counsel, instruct,warn]
Overlap	[admonish,advise,alert, caution,counsel instruct,warn]

Figure 9: Example of Partial Overlap

Semantic Class 47.2 (Verbs of Entity-Specific Modes of Being)	[billow, bloom, blossom, blow, breathe, bristle, bulge, burn, cascade, corrode, decay, decompose, effervesce, erode, ferment, fester, fizz, flow, flower, foam, froth, germinate, grow, molt, propagate, rage, ripple, roil, rot, rust, seethe, smoke, smolder, spread, sprout, stagnate, stream, sweep, tarnish, trickle, wilt, wither]
Syntactic Signature #472 1-[np,v] 1-[np,v,pp] 1-[pp,expletive,v,np] 1-[pp,v,np] 0-[np,v,np] 0-[np,v,np,pp]	[bloom, blossom, decay, erode, ferment, flower, germinate, molt, rot, rust, stagnate, tarnish, wilt, wither]
Overlap	[bloom, blossom, decay, erode, ferment, flower, germinate, molt, rot, ruststagnate, tarnish, wilt, wither]

different than before. In the class-based experiment, we counted the percentage of semantic classes that had uniquely identifying signatures. Here, we count the number of perfect overlaps (overlaps with an index of 1.00) between the verbs as grouped in the semantic classes and grouped by syntactic signature. There is also additional information in this experiment, namely, the partial overlaps. The experiments that perform best have mostly perfect overlaps, for example, the experiments that include information about prepositions. In even the poorest performing experiments, at least one third of the overlaps are perfect. This is interesting because the alternative would be that throwing away information would decrease the overlaps across the board. Instead of that, we see a significant proportion of very robust syntactic signatures that yield perfect overlaps, that is, they still uniquely identify semantic classes even though they have lost information. These results are shown in the appendix.

The overall results of the suite of experiments, illustrating the role of disambiguation, negative evidence, and prepositions, is shown in Figure 10. Here we see the percentage of perfect overlaps, as well as both the median and mean overlap ratios for each experiment. The two columns on the left have strikingly better results than the two columns on the right. These data show that the most important factor in the experiments is word-sense disambiguation. Having negative evidence and having prepositions in the syntactic patterns is also important. But if we have to do without negative evidence, if we at least have the positive instances of preposition patterns, 83.2% of the semantic classes can still be linked to unique syntactic patterns.

Figure 10: Overall Results

Disambiguated

	Overlap	With Negative Evidence	No Negative Evidence
With Prepositions	Median	1.00	1.00
	Mean	0.98	0.90
	Perfect	94.8%	83.2%
No Prepositions	Median	1.00	0.56
	Mean	0.92	0.56
	Perfect	80.1%	37.7%
Only Prepositions	Median	1.00	0.56
	Mean	0.82	0.57
	Perfect	67.0%	43.5%
Not Disambiguated			
With Prepositions	Median	0.10	0.09
	Mean	0.17	0.16
	Perfect	5.8%	4.2%
No Prepositions	Median	0.10	0.09
	Mean	0.17	0.15
	Perfect	5.2%	2.6%
Only Prepositions	Median	0.10	0.09
	Mean	0.17	0.15
	Perfect	3.7%	3.7%

4 Summary

There were two ways of running the experiment: either constructing syntactic signatures for the verbs themselves, or else constructing signatures for the semantic classes as units. In the verb-based experiment, verbs that appeared in different classes collected the syntactic information from each class it appeared in. Therefore, the syntactic signature was composed from all of the example sentences from every class the verb appeared in. In some cases, the verbs were semantically unrelated and consequently the mapping from syntax to semantics was muddied. The class-based experiment, on the other hand, abstracted away from the verbs themselves and attempted to determine a relationship between a semantic class and the syntactic information associated with each class. Not surprisingly, but not insignificantly, this relationship was much clearer, since this experiment avoided the problem of word sense ambiguity.

The method for establishing a relationship between semantic classes and syntactic signatures was different for each experiment. For the class-based experiment, we classified each semantic class in terms of the syntactic information extracted from the example sentences in that class. We composed the syntactic signature locally for the class. Then we saw how many of the syntactic signatures uniquely identifed a semantic class. In some cases, the syntactic information extracted from different classes was the same, either because the parser was throwing away relevant information, or because the syntactic patterns really were the same for the two semantic classes. In either case, the method for establishing a relationship was to see how many syntactic signatures had a one-to-one mapping onto a semantic class. In the best result (which includes negative evidence and prepositions) 181 of the 191 semantic classes had syntactic signatures that identified them uniquely. That is, 94.8% of the semantic classes could be identified with syntactic information.

For the verb-based experiments, it was more complicated to establish a relationship between semantic classes and syntactic signatures. Here, there were two orthogonal ways of grouping the same inventory of verbs: by semantic class, as given by Levin, and by syntactic signature, as automatically extracted from the example sentences. We were interested in seeing the overlap between the two groupings. Clearly, when there was complete overlap, we identified a direct mapping. A complete overlap meant that the same verbs that belong to a particular semantic class had the same syntactic signature. That signature, in turn, picked out only those verbs that belong to that class, and that class contained no verbs with other signatures. As it turned out, there were very few complete overlaps in this experiment. The best result (which included negative evidence and prepositions) had a median overlap of 0.10 and a mean overlap of 0.17 , with 5.8% of the semantic classes receiving 100% overlaps. The relatively poor performance of this experiment was striking in contrast with the exceptional performance of the class-based experiment. [9]

5 Next Steps

We would like to use these results to help in constructing and augmenting online dictionaries for natural langauge processing, and in particular for machine translation. Bonnie Dorr has constructed lexical representations for Levin's semantic classes: these are encoded in LCS structures, which serve as the interlingua for her machine translation system. (See (Dorr, 1993), (Dorr, 1995), (Dorr et al., 1995) and the references listed there for relevant discussion.) We would like to use these syntactic signatures to categorize new verbs into Levin's classes, using online dictionaries such as Longman's Dictionary of Contemporary English and the COMLEX dictionary. We would also like to formulate correspondences between particular frames in the signatures and particular portions of the LCS representation of the verb semantics. This information would help us to construct classes beyond those categorized in Levin's book. We would also like to extend this analysis to other languages, along the lines that Saint-Dizier and his colleagues are pursuing for French (See (Staint-Dizier, 1995)) and explored in (Jones (editor), 1994).

6 Acknowledgements

I would like to express my gratitude to Bonnie Dorr for getting me started on this project and for her invaluable expertise and support. I would especially like to thank her for checking over all of the DCG parses for the 1525 example sentences which were used to composed the signatures: she found many errors which I was able to correct for this report. Thanks also to Amy Weinberg and Wade Shen for helpful feedback and discussion. I would also like to thank Robert C. Berwick for insightful comments about the verb-based experiment. Many thanks also to Beth Levin and Mari Olsen for very helpful suggestions and comments on the penultimate draft of this report. I would also like to thank Brian Ulicny's for permission to use the DCG parser he wrote for the sentences in Part One of Levin's book, from which I extracted applicable lexical entries and grammar rules for this project.

References

Bonnie Dorr 1993. *Machine Translation – A View from the Lexicon* MIT Press.

Bonnie Dorr 1995. "Large Scale Dictionary Construction for Foreign Language Tutoring and Interlingual Machine Translation" Manuscript. University of Maryland.

Bonnie Dorr, Joseph Garman, and Amy Weinberg 1995. "From Syntactic Encodings to Thematic Roles: Building Lexical Entries for Interlingual MT" *Machine Translation*:9:3, 71-100. Kluwer Academic Publishers, Boston.

Daniéle Dubois and Patrick Saint-Dizier. 1995. *Construction et representation de classes sémantiques de verbes: une coopération entre syntaxe et cognition.* manuscript, IRIT-CNRS, Toulouse, France.

Doug Jones (editor). 1994. *Working Papers and Projects on Verb Class Alternations in Bangla, German, English, and Korean* Manuscript, MIT AI Lab.

Beth Levin. 1993. *English Verb Classes and Alternations* University of Chicago Press.

Patrick Saint-Dizier. 1995. Colloqium Talk at University of Maryland, UMIACS. Contact: `stdizier@langnat.irit.fr`

7 Appendix

7.1 Overlap Indices

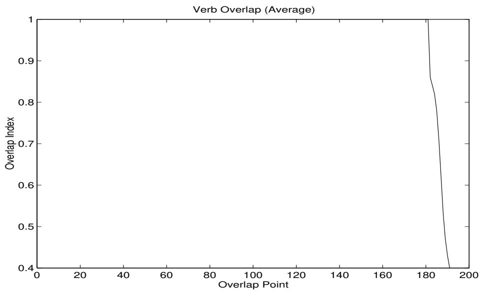
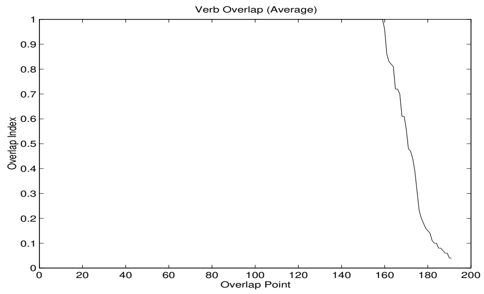
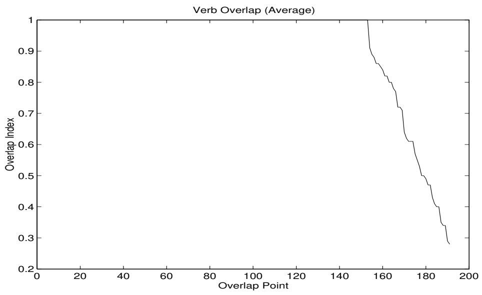
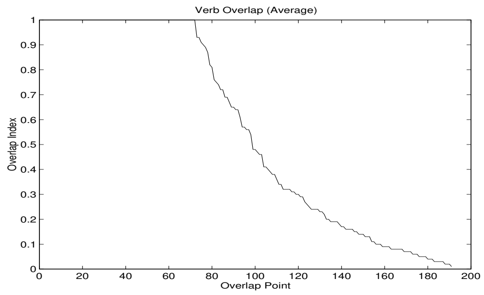
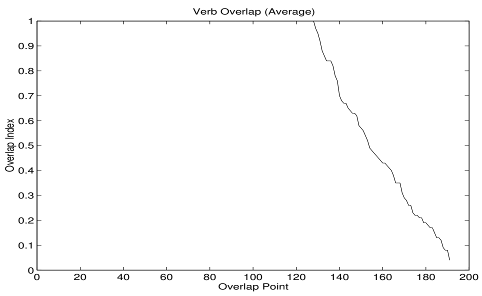
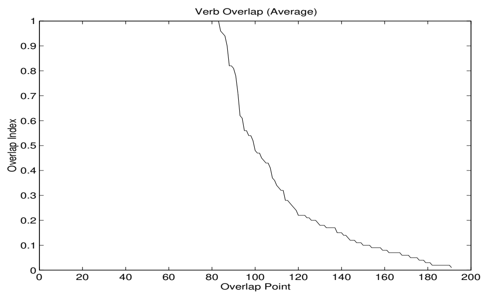
The distribution of sorted overlaps is shown in the graphs in Figure 11. Each graph shows the sorted distribution of overlap indices: when the overlap is 1.0, there is a perfect match in the verbs as grouped both by semantic class and by syntactic signature. The graphs in the left-hand column show experiments that used negative evidence. Each of these has higher a higher rate of overlap than its corresponding experiment that ignored negative evidence, shown in the right-hand column. The overlap ratios shown in Figure 11. correspond to the two columns of numbers on the left in 10.

7.2 Other Overlap Indices

Following a suggestion by Beth Levin, I have inspected the overlaps using different metrics than the one presented in the body of the paper. Recall that I defined the overlap index to be the number of verbs in the overlap divided by the average size of the semantic class and the syntactic signature. That definition abstracts away from the absolute sizes of the sets of verbs corresponding to the semantic classes

[9] To get better results with the verb-based experiment, it would probably be necessary either to employ a statistical analysis of the overlaps or to develop a way to disambiguate the verbs based on other information in the example sentences, but I will not explore these possibilities here.

Figure 11: Sorted Overlap Indices

<table>
<tr><th></th><th>With Negative Evidence</th><th>No Negative Evidence</th></tr>
<tr><td>With Prepositions</td><td>
</td><td>
</td></tr>
<tr><td>No Prepositions</td><td>
</td><td>
</td></tr>
<tr><td>Only Prepositions</td><td>
</td><td>
</td></tr>
</table>

and to the syntactic signatures. It also abstracts away from the relative proportion of the size of the overlap to the size of the syntactic class and the semantic class separately. Since the number of verbs in the syntactic classes varies, as defined by the different sets of syntactic signatures, it may be informative to look at the overlaps related independently either to the size of the syntactic class or to the size of the semantic class. For the moment, I have simply summarized the relevant information in Figure 12 and Figure 13. In future work, we will consider this additional information systematically.

7.2.1 Key to Figure 12

The table in Figure 12 shows relevant information from each of the twelve experiments:

- **N Sent** – The number of example sentences used in the experiment (recall that some of the experiments only use the positive sentences),
- **N Syn Pat** – The number of syntactic patterns these reduce to,
- **N Syn Class** – The number of syntactic signatures composed of these syntactic patterns,
- **Mean N Verbs in Syn Class** – The average number of verbs associated with each syntactic signature,
- **Median N Verbs in Syn Class** – The median number of verbs associated with each syntactic signature,
- **N Sem Class** – The number of semantic classes
- **Mean N Verbs in Sem Class** – The average number of verbs in each semantic class.
- **Median N Verbs in Sem Class** – The median number of verbs in each semantic class.

7.2.2 Comments on Figure 12

The number of sentences varies according to whether negative evidence is used or not. For example, there are 1525 sentences in the experiemnts in which all sentences are used, and there are 971 sentences in the experiments which use only the positive example sentences. The less information used to construct the parses, the fewer syntactic patterns there are. Consequently there are fewer distinct syntactic signatures for these, which in turn leads to fewer syntactic classes. The number of semantic classes is constant (191). Therefore the mean and median number of verbs corresponding to each semantic class is constant. These values are shown for easy comparison with the syntactic classes.

In first experiment listed – the first disambiguated case, shown in the first row of the table – it is apparent that the syntactic classification is similar in proportion to the semantic classification. Notice that the median number of verbs in both classifications is 13.00 . For the other experiments, the more information that is ignored, the fewer classes there are, and the more verbs there are in each class.

The number of verbs per syntactic class drops dramatically in the experiments in which verb senses are not disambiguated. Notice that the mean number of verbs per syntactic class is 22.49 in the first experiment, whereas its equivalent in the undisambiguated case drops to 4.08 . In the undisambiguated experiments, most of the syntactic classes only have one verb in them, as is apparent by looking at the value of the median number of verbs in the syntactic classes.

7.2.3 Key to Figure 13

The breakdown of the factors that are used to calculate the overlap index is shown. The proportion of verbs in the overlap as compared to the syntactic class and the semantic class is shown separately for each case. The table in Figure 13 shows information about the factors used to compose the overlap index. The two factors of the overlap index are shown directly: the column under **Syn** shows the number of verbs in the overlap divided by the number of verbs in the syntactic class. The **Sem** column is similar, only it is the number of verbs in the overlap divided by the number of verbs in the semantic class. The column under **Both** is the overlap index used in the experiments reported in the main text of this paper. It is the number of verbs in the overlap divided by the size of the syntactic class averaged with the size of the semantic class. Both the medians and the means of these values are shown. The absolute number of verbs in the overlaps are also shown. Both the mean and the median number of verbs have been calculated.

To give an example: the fifth column from the right, under the heading **Value of Overlap Index**, **Mean**, and **Syn**, which has the value of 0.97 , is the mean value for the number of verbs in the overlap divided by the number of verbs in the syntactic class. The sixth column (1.00) shows the equivalent value but calculated using the size of the semantic class.

7.2.4 Comments on Figure 13

Notice that the number of nonzero overlaps is always 191 for the disambiguated experiments. This is because there is only one signature for each semantic class (the disambiguated experiments are equivalent to the class-based experiments). Recall that for each of these cases, there are fewer signatures than classes: from as many as 186 in the first disambiguated experiment listed to as few as 97 in the fifth one, as shown in Figure 12. Although the signatures are do not necessarily uniquely identify a semantic class – each signature may correspond to more than one semantic class – no semantic class has more than one signature. Therefore, there are only as many nonzero overlaps as there are semantic classes. Of course there is no equivalent restriction on the undisambiguated experiments, and in these cases there are as many as 1674 nonzero overlaps.

In the undisambiguated experiments, notice that the mean values of the syntactic portions of the overlap index is much higher than the semantic portion. For example, in the first undisambiguated experiment shown, the mean value of the syntactic overlap is 0.99 , whereas the mean value of the semantic overlap is 0.11 . Nevertheless, the combined value is 0.17 . The reason for this is that there are many more syntactic classes than there are semantic classes, and there are a large number of overlaps to multiply this effect out. In this experiment, for example, there are 741 syntactic classes, and only 191 semantic classes. There are 1674 nonzero overlaps overwhich these values are multiplied. Since there are so many more syntactic classes, the average number of verbs per syntactic class is lower (only 4.08), whereas the average number of verbs per semantic class is 21.90 . Therefore, the proportion of the overlap as compared with the size of the syntactic class is high. The median values show similar results.

7.3 Levin's Semantic Classes and Their Signatures

The actual signatures, as constructed from the parses including negative evidence and prepositions, are shown below. I inspected all of the parses of the example sentences, and corrected some errors in the parses such as incorrect PP-attachments and incorrect category assignments in cases of ambiguity. Bonnie Dorr inspected all of these, and found additional errors, which were corrected for this experiment. The signatures based on the uncorrected parses give roughly the same results as reported here.

Only fully grammatical parses are counted as positive. Deviant and mildly deviant parses, annotated as '??' and '?' in the example sentences, are encoded with the codes of `2-` and `3-` respectively. Patterns with these codes are not counted as positive in the entries below.

The entries also say whether the signature shown uniquely identifies that class. This means that the *full* signature, including non-positive frames, identifies the semantic class.

Furthermore, if the positive portion of the signature is a subset of a signature that is associated with some *other* semantic class, that fact is noted and the classes are listed.

Figure 12: Classification Survey

	N Sent	N Syn Pat	N Syn Class (Sig)	Mean N Verbs in Syn Class	Median N Verbs in Syn Class	N Sem Class	Mean N Verbs in Sem Class	Median N Verbs in Sem Class
Disambiguated With Negative With Prepositions	1525	272	186	22.49	13.00	191	21.90	13.00
Disambiguated With Negative No Prepositions	1525	118	171	24.46	15.00	191	21.90	13.00
Disambiguated With Negative Only Prepositions	1525	102	149	28.07	18.00	191	21.90	13.00
Disambiguated No Negative With Prepositions	971	156	168	24.90	14.50	191	21.90	13.00
Disambiguated No Negative No Prepositions	971	62	97	43.12	20.00	191	21.90	13.00
Disambiguated No Negative Only Prepositions	971	51	101	41.42	18.00	191	21.90	13.00
Undisambiguated With Negative With Prepositions	1525	272	741	4.08	1.00	191	21.90	13.00
Undisambiguated With Negative No Prepositions	1525	118	671	4.51	1.00	191	21.90	13.00
Undisambiguated With Negative Only Prepositions	1525	102	626	4.83	1.00	191	21.90	13.00
Undisambiguated No Negative With Prepositions	971	156	684	4.42	1.00	191	21.90	13.00
Undisambiguated No Negative No Prepositions	971	62	419	7.22	1.00	191	21.90	13.00
Undisambiguated No Negative Only Prepositions	971	51	427	7.08	1.00	191	21.90	13.00

Figure 13: Breakdown of Index Factors

	Mean Class		Value of Overlap Index						Number of		
	Size		Mean			Median			Nonzero	Verbs in Overlap	
	Syn	Sem	Both	Syn	Sem	Both	Syn	Sem	Overlaps	Mean	Median
Disambiguated With Negative With Prepositions	22.5	21.9	0.98	0.97	1.00	1.00	1.00	1.00	191	21.90	13.00
Disambiguated With Negative No Prepositions	24.5	21.9	0.92	0.90	1.00	1.00	1.00	1.00	191	21.90	13.00
Disambiguated With Negative Only Prepositions	28.1	21.9	0.82	0.78	1.00	1.00	1.00	1.00	191	21.90	13.00
Disambiguated No Negative With Prepositions	24.9	21.9	0.90	0.88	1.00	1.00	1.00	1.00	191	21.90	13.00
Disambiguated No Negative No Prepositions	43.1	21.9	0.56	0.51	1.00	0.56	0.39	1.00	191	21.90	13.00
Disambiguated No Negative Only Prepositions	41.4	21.9	0.57	0.53	1.00	0.56	0.39	1.00	191	21.90	13.00
Undisambiguated With Negative With Prepositions	4.1	21.9	0.17	0.99	0.11	0.10	1.00	0.05	1674	2.50	1.00
Undisambiguated With Negative No Prepositions	4.5	21.9	0.17	0.95	0.12	0.10	1.00	0.05	1604	2.61	1.00
Undisambiguated With Negative Only Prepositions	4.8	21.9	0.17	0.93	0.12	0.10	1.00	0.05	1563	2.68	1.00
Undisambiguated No Negative With Prepositions	4.4	21.9	0.16	0.96	0.12	0.09	1.00	0.05	1627	2.57	1.00
Undisambiguated No Negative No Prepositions	7.2	21.9	0.15	0.76	0.14	0.09	1.00	0.05	1379	3.03	1.00
Undisambiguated No Negative Only Prepositions	7.1	21.9	0.15	0.76	0.14	0.09	1.00	0.05	1377	3.04	1.00

Semantic class 9.1 – Verbs of Putting: Put Verbs
13 Verbs

arrange immerse install lodge mount place position put set situate sling stash stow

Signature #55 (10 Patterns – 3 Positive) uniquely identifies semantic class 9.1

0-[np,v,np]
0-[np,v,np,pp(from)]
0-[np,v,np,pp(to)]
0-[np,v,np,pp(with)]
0-[np,v,adv(easily),pp(on)]
0-[np,v,pp(from),pp(to)]
0-[np,v,pp(on)]
1-[np,v,np,pp(near)]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(under)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 9.2 – Verbs of Putting: Verbs of Putting in a Spatial Configuration
9 Verbs

dangle hang lay lean perch rest sit stand suspend

Signature #110 (9 Patterns – 3 Positive) uniquely identifies semantic class 9.2

0-[np,v,np,pp(from)]
0-[np,v,np,pp(to)]
0-[np,v,np,pp(with)]
0-[np,v,adv(easily),pp(on)]
0-[np,v,pp(on)]
1-[np,v,np,pp(on)]
1-[np,v,np,pp([next,to])]
1-[np,v,pp(on)]
2-[np,v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 9.3 – Verbs of Putting: Funnel Verbs
26 Verbs

bang channel dip dump funnel hammer ladle pound push rake ram scoop scrape shake shovel siphon spoon squash squeeze squish sweep tuck wad wedge wipe wring

Signature #7 (10 Patterns – 1 Positive) uniquely identifies semantic class 9.3

0-[np,v]
0-[np,v,np]
0-[np,v,np,pp(from)]
0-[np,v,np,pp(from),pp(to)]
0-[np,v,np,pp(to)]
0-[np,v,np,pp(with)]
0-[np,v,adv(easily)]
0-[np,v,pp(into)]
1-[np,v,np,pp(into)]
3-[np,v,np,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 14 semantic classes:

17.1 19 22.1 22.3 25.4 26.1 26.2 26.5 26.6 45.2 51.3.2 9.3 9.5 9.7

Semantic class 9.4 – Verbs of Putting: Verbs of Putting with a Specified Direction
5 Verbs

drop hoist lift lower raise

Signature #95 (12 Patterns – 6 Positive) uniquely identifies semantic class 9.4

0-[np,v,np,np]
0-[np,v,np,pp(on)]
0-[np,v,np,pp(up)]
0-[np,v,np,pp(with)]
0-[np,v,adv(easily),pp(onto)]
0-[np,v,pp(onto)]
1-[np,v,np]
1-[np,v,np,pp(onto)]
1-[np,v,np,pp(to)]
1-[np,v,np,pp([out,of])]
1-[np,v,np,pp([up,to])]
1-[np,v,pp(from),pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 9.5 – Verbs of Putting: Pour Verbs
8 Verbs

dribble drip pour slop slosh spew spill spurt

Signature #135 (10 Patterns – 6 Positive) uniquely identifies semantic class 9.5

0-[np,v,np,pp(with)]
0-[np,v,adv(easily),pp(onto)]
0-[np,v,pp(at),pp(into)]
0-[np,v,pp(into)]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(into)]
1-[np,v,np,pp(onto)]
1-[np,v,np,pp(over)]
1-[np,v,np,pp([out,of])]
1-[np,v,pp(onto)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 9.6 – Verbs of Putting: Coil Verbs
9 Verbs

coil curl loop roll spin twirl twist whirl wind

Signature #139 (5 Patterns – 3 Positive) uniquely identifies semantic class 9.6

0-[np,v,np,pp(with)]
0-[np,v,pp(at),pp(around)]
1-[np,v,np,pp(around)]
1-[np,v,adv(easily),pp(around)]
1-[np,v,pp(around)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 9.7 – Verbs of Putting: Spray/Load Verbs
49 Verbs

brush cram crowd cultivate dab daub drape drizzle dust hang heap inject jam load mound pack pile plant plaster prick pump rub scatter seed settle sew shower slather smear smudge ...

Signature #106 (10 Patterns – 8 Positive) uniquely identifies semantic class 9.7

0-[np,v,np,pp(at)]
0-[np,v,pp(with)]
1-[np,v,np,pp(at)]
1-[np,v,np,pp(into)]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(onto)]
1-[np,v,np,pp(over)]
1-[np,v,np,pp(under)]
1-[np,v,np,pp(with)]
1-[np,v,pp(on)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 9.8 – Verbs of Putting: Fill Verbs
95 Verbs

adorn anoint bandage bathe bestrew bind blanket block blot bombard carpet choke cloak clog clutter coat contaminate cover dam dapple deck decorate deluge dirty dot douse drench edge embellish emblazon ...

Signature #120 (5 Patterns – 3 Positive) uniquely identifies semantic class 9.8

0-[np,v,np,pp(in)]
0-[np,v,pp(with)]
1-[np,v,np]
1-[np,v,np,pp(in)]
1-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

19 9.8

Semantic class 9.9 – Verbs of Putting: Butter Verbs
109 Verbs

asphalt bait blanket blindfold board bread brick bridle bronze butter buttonhole cap carpet caulk chrome cloak cork crown diaper drug feather fence flour forest frame fuel gag garland glove graffiti ...

Signature #24 (8 Patterns – 2 Positive) uniquely identifies semantic class 9.9

0-[np,v]
0-[np,v,np,pp(on)]
0-[np,v,pp(at)]
0-[np,v,pp(at),pp(with)]
0-[np,v,pp(with)]
1-[np,v,np]
1-[np,v,np,pp(with)]
2-[np,v,np,pp(with)]

The positive portion of this signature identifies these 4 semantic classes in the positive signature suite:

17.2 25.3 44 9.9

Also, the positive portion of this signature is a subset of the signatures of these 23 semantic classes:

11.1 11.4 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 24 25.1 25.3 31.1 39.1 42.1 44 45.1 45.2 45.4 9.8 9.9

Semantic class 9.10 – Verbs of Putting: Pocket Verbs
53 Verbs

archive bag bank beach bed bench berth billet bin bottle box cage can case cellar cloister coop corral crate dock drydock file fork garage ground hangar house jail jar jug ...

Signature #19 (5 Patterns – 1 Positive) uniquely identifies semantic class 9.10

0-[np,v]
0-[np,v,np,pp(in)]
0-[np,v,np,pp(with)]
1-[np,v,np]
3-[np,v,np,pp(in)]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 10.1 – Verbs of Removing: Remove Verbs
35 Verbs

abstract cull delete discharge disengage disgorge dislodge dismiss draw eject eliminate eradicate evict excise excommunicate expel extirpate extract extrude lop omit ostracize oust partition pry reap remove separate sever shoo ...

Signature #124 (9 Patterns – 3 Positive) uniquely identifies semantic class 10.1

0-[np,v,np,pp(of)]
0-[np,v,np,pp(to)]
0-[np,v,np,pp([off,of])]
0-[np,v,np,pp([out,of])]
0-[np,v,pp(at),pp(from)]
0-[np,v,pp(from)]
1-[np,v,np,pp(from)]
1-[np,v,np,pp([from,around])]
1-[np,v,np,pp([from,under])]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

10.1 10.3

Semantic class 10.3 – Verbs of Removing: Clear Verbs
4 Verbs

clean clear drain empty

Signature #86 (12 Patterns – 8 Positive) uniquely identifies semantic class 10.3

0-[np,v,np,adjective]
0-[np,v,pp(at)]
0-[np,v,pp(at),pp(of)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(of)]
1-[np,v,np,pp([from,around])]
1-[np,v,np,pp([from,behind])]
1-[np,v,np,pp([from,under])]
1-[np,v,pp(from)]
2-[np,v,pp(of)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 10.2 – Verbs of Removing: Banish Verbs
7 Verbs

banish deport evacuate expel extradite recall remove

Signature #126 (6 Patterns – 2 Positive) uniquely identifies semantic class 10.2

0-[np,v,np,pp(of)]
0-[np,v,pp(at),pp(from)]
0-[np,v,pp(from)]
0-[np,v,pp(from),pp(to)]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 5 semantic classes:

10.2 11.1 11.3 11.4 11.5

Semantic class 10.4.1 – Verbs of Removing: Wipe Verbs: Manner Subclass
39 Verbs

bail buff dab distill dust erase expunge flush leach lick pluck polish prune purge rinse rub scour scrape scratch scrub shave skim smooth soak squeeze strain strip suck suction swab ...

Signature #21 (15 Patterns – 11 Positive) uniquely identifies semantic class 10.4.1

0-[np,v]
0-[np,v,np,pp(of)]
0-[np,v,pp(at)]
0-[np,v,pp(from)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,adjective,pp(of)]
1-[np,v,np,pp(behind)]
1-[np,v,np,pp(from)]
1-[np,v,np,pp([from,inside])]
1-[np,v,np,pp([from,outside])]
1-[np,v,np,pp([from,under])]
1-[np,v,pp(at)]
1-[np,v,pp(behind)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 10.4.2 – Verbs of Removing: Wipe Verbs: Instrument Subclass
17 Verbs

brush comb file filter hoover hose iron mop plow rake sandpaper shear shovel siphon sponge towel vacuum

Signature #22 (14 Patterns – 10 Positive) uniquely identifies semantic class 10.4.2

0-[np,v]
0-[np,v,np,pp(of)]
0-[np,v,pp(at)]
0-[np,v,pp(from)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,adjective,pp(of)]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(under)]
1-[np,v,np,pp([from,among])]
1-[np,v,np,pp([from,near])]
1-[np,v,np,pp([from,under])]
1-[np,v,pp(under)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 10.6 – Verbs of Removing: Verbs of Possessional Deprivation: Cheat Verbs
48 Verbs

absolve acquit balk bereave bilk bleed break burgle cheat cleanse con cull cure defraud denude deplete depopulate deprive despoil disabuse disarm disencumber dispossess divest drain ease exonerate fleece free gull ...

Signature #111 (5 Patterns – 2 Positive) uniquely identifies semantic class 10.6

0-[np,v,np,pp(from)]
0-[np,v,np,pp([out,of])]
0-[np,v,pp(of)]
1-[np,v,np,pp(of)]
1-[np,v,np,pp([out,of])]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 10.5 – Verbs of Removing: Verbs of Possessional Deprivation: Steal Verbs
45 Verbs

abduct cadge capture confiscate cop emancipate embezzle exorcise extort extract filch flog grab impound kidnap liberate lift nab pilfer pinch pirate plagiarize purloin reclaim recover redeem regain repossess rescue retrieve ...

Signature #94 (6 Patterns – 2 Positive) uniquely identifies semantic class 10.5

0-[np,v,np,np]
0-[np,v,np,pp(of)]
0-[np,v,pp(at),pp(from)]
0-[np,v,pp(from)]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(from)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 4 semantic classes:

10.5 13.5.1 13.5.2 26.4

Semantic class 10.7 – Verbs of Removing: Pit Verbs
41 Verbs

bark beard bone burl core gill gut head hull husk lint louse milk peel pinion pip pit pith pod poll pulp rind scale scalp seed shell shuck skin snail stalk ...

Signature #23 (4 Patterns – 2 Positive) identifies semantic classes: 10.7 10.8

0-[np,v]
0-[np,v,np,pp(of)]
1-[np,v,np]
1-[np,v,np,pp(from)]

The positive portion of this signature identifies these 3 semantic classes in the positive signature suite:

10.7 10.8 10.9

Also, the positive portion of this signature is a subset of the signatures of these 13 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.4 11.5 13.5.1 13.5.2 23.3 26.4

Semantic class 10.8 – Verbs of Removing: Debone Verbs
50 Verbs

deaccent debark debone debowel debug debur declaw defang defat defeather deflea deflesh defoam defog deforest defrost defuzz degas degerm deglaze degrease degrit degum degut dehair dehead dehorn dehull dehusk deice ...

Signature #23 (4 Patterns – 2 Positive) identifies semantic classes: 10.7 10.8

0-[np,v]
0-[np,v,np,pp(of)]
1-[np,v,np]
1-[np,v,np,pp(from)]

The positive portion of this signature identifies these 3 semantic classes in the positive signature suite:

10.7 10.8 10.9

Also, the positive portion of this signature is a subset of the signatures of these 13 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.4 11.5 13.5.1 13.5.2 23.3 26.4

Semantic class 10.9 – Verbs of Removing: Mine Verbs
2 Verbs

mine quarry

Signature #43 (3 Patterns – 2 Positive) uniquely identifies semantic class 10.9

0-[np,v]
1-[np,v,np]
1-[np,v,np,pp(from)]

The positive portion of this signature identifies these 3 semantic classes in the positive signature suite:

10.7 10.8 10.9

Also, the positive portion of this signature is a subset of the signatures of these 13 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.4 11.5 13.5.1 13.5.2 23.3 26.4

Semantic class 11.1 – Verbs of Sending and Carrying: Send Verbs
23 Verbs

fed_ex u_p_s airmail convey deliver dispatch express forward hand mail pass port post return send shift ship shunt slip smuggle sneak transfer transport

Signature #136 (10 Patterns – 6 Positive) uniquely identifies semantic class 11.1

0-[np,v,np,pp(with)]
0-[np,v,adv(easily),pp(to)]
0-[np,v,pp(at),pp(to)]
0-[np,v,pp(to)]
1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]
1-[np,v,pp(from),pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 11.2 – Verbs of Sending and Carrying: Slide Verbs
5 Verbs

bounce float move roll slide

Signature #138 (12 Patterns – 8 Positive) uniquely identifies semantic class 11.2

0-[np,v,np,pp(with)]
0-[np,v,pp(at)]
0-[np,v,pp(at),pp(to)]
1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,pp(across)]
1-[np,v,np,pp(to)]
1-[np,v,adv(easily),pp(across)]
1-[np,v,pp(across)]
1-[np,v,pp(at)]
1-[np,v,pp(from),pp(to)]
2-[np,v,np,pp([away,from])]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 11.3 – Verbs of Sending and Carrying: Bring and Take
2 Verbs

bring take

Signature #85 (8 Patterns – 4 Positive) uniquely identifies semantic class 11.3

0-[np,v,np,adjective]
0-[np,v,adv(easily),pp(to)]
0-[np,v,pp(at),pp(to)]
0-[np,v,pp(to)]
1-[np,v,np,np]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

11.1 11.3

Semantic class 11.5 – Verbs of Sending and Carrying: Drive Verbs
11 Verbs

barge bus cart drive ferry fly row shuttle truck wheel wire

Signature #26 (12 Patterns – 4 Positive) uniquely identifies semantic class 11.5

0-[np,v]
0-[np,v,np,pp(with)]
0-[np,v,adv(easily)]
0-[np,v,adv(easily),pp(to)]
0-[np,v,pp(at)]
0-[np,v,pp(at),pp(to)]
0-[np,v,pp(to)]
1-[np,v,np]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(to)]
1-[np,v,pp(from),pp(to)]
2-[np,v,np,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

11.1 11.4 11.5

Semantic class 11.4 – Verbs of Sending and Carrying: Carry Verbs
15 Verbs

carry drag haul heave heft hoist kick lug pull push schlep shove tote tow tug

Signature #31 (14 Patterns – 8 Positive) uniquely identifies semantic class 11.4

0-[np,v]
0-[np,v,adv(easily)]
0-[np,v,adv(easily),pp(to)]
0-[np,v,pp(at)]
0-[np,v,pp(at),pp(to)]
1-[np,v,np]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]
1-[np,v,pp(against)]
1-[np,v,pp(at)]
1-[np,v,pp(from),pp(to)]
1-[np,v,pp(to),pp(with)]
2-[np,v,np,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 12 – Verbs of Exerting Force: Push/Pull Verbs
10 Verbs

draw heave jerk press pull push shove thrust tug yank

Signature #42 (10 Patterns – 9 Positive) uniquely identifies semantic class 12

0-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(against)]
1-[np,v,np,pp(through)]
1-[np,v,np,pp([away,from])]
1-[np,v,pp(against)]
1-[np,v,pp(at)]
1-[np,v,pp(on)]
1-[np,v,pp(through)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 13.1 – Verbs of Change of Possession: Verbs of Change of Possession
15 Verbs

feed give lease lend loan pass pay peddle refund render rent repay sell serve trade

Signature #17 (7 Patterns – 2 Positive) uniquely identifies semantic class 13.1

0-[np,v]
0-[np,v,np,pp(behind)]
0-[np,v,np,pp(near)]
0-[np,v,np,pp(with)]
0-[np,v,pp(to)]
1-[np,v,np,np]
1-[np,v,np,pp(to)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

13.1 13.3

Also, the positive portion of this signature is a subset of the signatures of these 11 semantic classes:

11.1 11.2 11.3 13.1 13.3 17.1 26.7 37.1 37.2 37.4 39.7

Semantic class 13.3 – Verbs of Change of Possession: Verbs of Future Having
19 Verbs

advance allocate allot assign award bequeath cede concede extend grant guarantee issue leave offer owe promise vote will yield

Signature #18 (6 Patterns – 2 Positive) uniquely identifies semantic class 13.3

0-[np,v]
0-[np,v,np,pp(behind)]
0-[np,v,np,pp(with)]
0-[np,v,pp(to)]
1-[np,v,np,np]
1-[np,v,np,pp(to)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

13.1 13.3

Also, the positive portion of this signature is a subset of the signatures of these 11 semantic classes:

11.1 11.2 11.3 13.1 13.3 17.1 26.7 37.1 37.2 37.4 39.7

Semantic class 13.2 – Verbs of Change of Possession: Contribute Verbs
18 Verbs

administer contribute disburse distribute donate extend forfeit proffer refer reimburse relinquish remit restore return sacrifice submit surrender transfer

Signature #15 (7 Patterns – 1 Positive) uniquely identifies semantic class 13.2

0-[np,v]
0-[np,v,np,np]
0-[np,v,np,pp(on)]
0-[np,v,np,pp(under)]
0-[np,v,np,pp(with)]
0-[np,v,pp(to)]
1-[np,v,np,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 27 semantic classes:

10.2 11.1 11.2 11.3 11.4 11.5 13.1 13.2 13.3 13.4.1 17.1 18.3 21.1 22.4 26.7 31.1 37.1 37.2 37.3 37.4 37.7 39.7 42.2 45.1 45.3 51.7 9.4

Semantic class 13.4.1 – Verbs of Change of Possession: Verbs of Providing: Verbs of Fulfilling
10 Verbs

credit entrust furnish issue leave present provide serve supply trust

Signature #104 (6 Patterns – 2 Positive) uniquely identifies semantic class 13.4.1

0-[np,v,np,pp(at)]
0-[np,v,np,pp(near)]
0-[np,v,np,pp(onto)]
0-[np,v,np,pp([next,to])]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 9 semantic classes:

11.1 11.3 11.4 13.4.1 18.3 21.1 22.4 31.1 45.1

Semantic class 13.4.2 – Verbs of Change of Possession: Verbs of Providing: Equip Verbs
10 Verbs

arm burden charge compensate equip invest ply regale reward saddle

Signature #90 (6 Patterns – 1 Positive) uniquely identifies semantic class 13.4.2

0-[np,v,np,np]
0-[np,v,np,pp(at)]
0-[np,v,np,pp(near)]
0-[np,v,np,pp(to)]
0-[np,v,np,pp([next,to])]
1-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 29 semantic classes:

11.1 11.3 11.4 13.4.1 13.4.2 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.1 22.2 22.4 24 25.1 25.3 31.1 39.1 42.1 44 45.1 45.2 45.4 9.7 9.8 9.9

Semantic class 13.5.2 – Verbs of Change of Possession: Verbs of Obtaining: Obtain Verbs
19 Verbs

accept accumulate acquire appropriate borrow cadge collect exact grab inherit obtain purchase receive recover regain retrieve seize select snatch

Signature #93 (7 Patterns – 4 Positive) uniquely identifies semantic class 13.5.2

0-[np,v,np,np]
0-[np,v,np,pp(of)]
0-[np,v,np,pp(to)]
1-[np,v,np]
1-[np,v,np,pp(at)]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(from)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

13.5.1 13.5.2

Semantic class 13.5.1 – Verbs of Change of Possession: Verbs of Obtaining: Get Verbs
33 Verbs

book buy call cash catch charter choose earn fetch find gain gather get hire keep lease leave order phone pick pluck procure pull reach rent reserve save secure shoot slaughter ...

Signature #125 (7 Patterns – 5 Positive) uniquely identifies semantic class 13.5.1

0-[np,v,np,pp(of)]
0-[np,v,np,pp(to)]
1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,pp(at)]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(from)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 13.6 – Verbs of Change of Possession: Verbs of Exchange
6 Verbs

barter change exchange substitute swap trade

Signature #96 (3 Patterns – 1 Positive) uniquely identifies semantic class 13.6

0-[np,v,np,np]
0-[np,v,np,pp(to)]
1-[np,v,np,pp(for)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

13.6 35.4

Also, the positive portion of this signature is a subset of the signatures of these 17 semantic classes:

10.5 13.5.1 13.5.2 13.6 26.1 26.3 26.4 26.7 31.2 32.1 33 34 35.1 35.2 35.3 35.4 54.5

Semantic class 13.7 – Verbs of Change of Possession: Berry Verbs
26 Verbs

antique berry birdnest blackberry clam crab fish fowl grouse hay log mushroom nest nut oyster pearl prawn rabbit seal shark shrimp snail snipe sponge whale whelk

Signature #185 (1 Patterns – 1 Positive) uniquely identifies semantic class 13.7

1-[np,v,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 14 semantic classes:

13.7 35.1 40.2 40.3.1 43.2 45.6 46 47.1 47.2 47.4 47.5.1 47.5.2 50 53.1

Semantic class 14 – Learn Verbs
7 Verbs

acquire cram glean learn memorize read study

Signature #178 (2 Patterns – 2 Positive) uniquely identifies semantic class 14

1-[np,v,np,pp(from)]
1-[np,v,pp(from)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 4 semantic classes:

10.3 14 23.1 26.2

Semantic class 15.1 – Hold and Keep Verbs: Hold Verbs
7 Verbs

clasp clutch grasp grip handle hold wield

Signature #112 (6 Patterns – 3 Positive) uniquely identifies semantic class 15.1

0-[np,v,np,pp(from)]
0-[np,v,adv(easily)]
0-[np,v,pp(at)]
1-[np,v,np]
1-[np,v,np,pp(by)]
1-[np,v,poss,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 15.2 – Hold and Keep Verbs: Keep Verbs
4 Verbs

hoard keep leave store

Signature #142 (5 Patterns – 4 Positive) uniquely identifies semantic class 15.2

0-[np,v,np,pp(with)]
1-[np,v,np,pp(behind)]
1-[np,v,np,pp(in)]
1-[np,v,np,pp(over)]
1-[np,v,np,pp(under)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 16 – Verbs of Concealment
11 Verbs

block cloister conceal curtain hide isolate quarantine screen seclude sequester shelter

Signature #128 (4 Patterns – 3 Positive) uniquely identifies semantic class 16

0-[np,v,np,pp(of)]
1-[np,v,np,pp(behind)]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 17.1 – Verbs of Throwing: Throw Verbs
30 Verbs

bash bat bunt cast catapult chuck fire flick fling flip hit hurl kick knock lob loft nudge pass pitch punt shoot shove slam slap sling smash tap throw tip toss ...

Signature #27 (12 Patterns – 8 Positive) uniquely identifies semantic class 17.1

0-[np,v]
0-[np,v,np,pp(with)]
0-[np,v,adv(easily)]
0-[np,v,pp(at)]
1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,pp(against)]
1-[np,v,np,pp(at)]
1-[np,v,np,pp(into)]
1-[np,v,np,pp(over)]
1-[np,v,np,pp(to)]
1-[np,v,pp(from),pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 17.2 – Verbs of Throwing: Pelt Verbs
5 Verbs

bombard buffet pelt shower stone

Signature #88 (10 Patterns – 2 Positive) uniquely identifies semantic class 17.2

0-[np,v,np,np]
0-[np,v,np,pp(against)]
0-[np,v,np,pp(at)]
0-[np,v,np,pp(over)]
0-[np,v,np,pp(to)]
0-[np,v,adv(easily),pp(with)]
0-[np,v,pp(at)]
0-[np,v,pp(at),pp(with)]
1-[np,v,np]
1-[np,v,np,pp(with)]

The positive portion of this signature identifies these 4 semantic classes in the positive signature suite:

17.2 25.3 44 9.9

Also, the positive portion of this signature is a subset of the signatures of these 23 semantic classes:

11.1 11.4 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 24 25.1 25.3 31.1 39.1 42.1 44 45.1 45.2 45.4 9.8 9.9

Semantic class 18.2 – Verbs of Contact by Impact: Swat Verbs
11 Verbs

bite claw paw peck punch scratch shoot slug stab swat swipe

Signature #4 (12 Patterns – 5 Positive) uniquely identifies semantic class 18.2

0-[np,v]
0-[np,v,np]
0-[np,v,np,pp(against)]
0-[np,v,np,pp(into)]
0-[np,v,np,pp(on)]
0-[np,v,np,pp(through)]
0-[np,v,adv(easily)]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(with)]
1-[np,v,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

18.1 18.2

Semantic class 18.1 – Verbs of Contact by Impact: Hit Verbs
24 Verbs

bang bash batter beat bump butt dash drum hammer hit kick knock lash pound rap slap smack smash strike tamp tap thump thwack whack

Signature #8 (15 Patterns – 9 Positive) uniquely identifies semantic class 18.1

0-[np,v]
0-[np,v,np]
0-[np,v,np,pp(into)]
0-[np,v,np,pp(through)]
0-[np,v,adv(easily)]
0-[np,v,pp(with)]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,adv(together)]
1-[np,v,np,pp(against)]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(with)]
1-[np,v,self,pp(on)]
1-[np,v,pp(at)]
1-[np,v,pp(at),pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 18.3 – Verbs of Contact by Impact: Spank Verbs
25 Verbs

belt birch bludgeon bonk brain cane clobber club conk cosh cudgel cuff flog knife paddle paddywhack pummel sock spank strap thrash truncheon wallop whip whisk

Signature #5 (11 Patterns – 4 Positive) uniquely identifies semantic class 18.3

0-[np,v]
0-[np,v,np]
0-[np,v,np,pp(against)]
0-[np,v,np,pp(into)]
0-[np,v,np,pp(through)]
0-[np,v,adv(easily)]
0-[np,v,pp(at)]
1-[np,v,np]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 18.4 – Verbs of Contact by Impact: Non-Agentive Verbs of Impact by Contact
10 Verbs

bang brush bump crash hit knock ram slam smash thud

Signature #156 (4 Patterns – 2 Positive) uniquely identifies semantic class 18.4

0-[np,v,pp(with)]
0-[np(and),v]
1-[np,v,pp(against)]
1-[np(and),v,adv(together)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 20 – Verbs of Contact: Touch Verbs
13 Verbs

caress graze kiss lick nudge pat peck pinch prod sting stroke tickle touch

Signature #1 (13 Patterns – 5 Positive) uniquely identifies semantic class 20

0-[np,v]
0-[np,v,np]
0-[np,v,np,adjective]
0-[np,v,np,pp(against)]
0-[np,v,np,pp(into)]
0-[np,v,np,pp(through)]
0-[np,v,adv(easily)]
0-[np,v,pp(at)]
1-[np,v,np]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(with)]
1-[np,v,poss,np]
1-[np,v,self]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 19 – Poke Verbs
6 Verbs

dig jab pierce poke prick stick

Signature #16 (11 Patterns – 6 Positive) uniquely identifies semantic class 19

0-[np,v]
0-[np,v,np,pp(against)]
0-[np,v,adv(easily)]
0-[np,v,adv(easily),pp(through)]
0-[np,v,pp(through)]
1-[np,v,np]
1-[np,v,np,pp(in)]
1-[np,v,np,pp(into)]
1-[np,v,np,pp(through)]
1-[np,v,np,pp(with)]
1-[np,v,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 21.1 – Verbs of Cutting: Cut Verbs
10 Verbs

chip clip cut hack hew saw scrape scratch slash snip

Signature #38 (11 Patterns – 10 Positive) uniquely identifies semantic class 21.1

0-[np,v]
1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]
1-[np,v,poss,np]
1-[np,v,self,pp(on)]
1-[np,v,adv(easily)]
1-[np,v,pp(at)]
1-[np,v,pp(from),pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 21.2 – Verbs of Cutting: Carve Verbs
33 Verbs

bore bruise carve chip chop crop crush cube dent dice drill file fillet gash gouge grate grind mangle mash mince mow nick notch perforate prune pulverize punch shred slice slit ...

Signature #25 (6 Patterns – 3 Positive) uniquely identifies semantic class 21.2

0-[np,v]
0-[np,v,np,pp(on)]
0-[np,v,pp(at)]
1-[np,v,np]
1-[np,v,np,pp(with)]
1-[np,v,adv(easily)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 7 semantic classes:

21.1 21.2 22.2 31.1 45.1 45.2 45.4

Semantic class 22.2 – Verbs of Combining and Attaching: Amalgamate Verbs
42 Verbs

affiliate alternate amalgamate associate coalesce coincide compare confederate confuse conjoin consolidate contrast correlate criss_cross engage entangle entwine harmonize incorporate integrate interchange interconnect interlace interlink interlock intermingle interrelate intersperse intertwine interweave ...

Signature #148 (9 Patterns – 7 Positive) uniquely identifies semantic class 22.2

0-[np,v,np(and),adv(together)]
0-[np(and),v,adv(together)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,pp(with)]
1-[np,v,adv(easily)]
1-[np,v,np(and)]
1-[np,v,pp(with)]
1-[np(and),v]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 22.1 – Verbs of Combining and Attaching: Mix Verbs
15 Verbs

add blend combine commingle concatenate connect cream fuse join link merge mingle mix network pool

Signature #179 (8 Patterns – 8 Positive) uniquely identifies semantic class 22.1

1-[np,v,np,pp(into)]
1-[np,v,np,pp(with)]
1-[np,v,np(and)]
1-[np,v,np(and),adv(together)]
1-[np,v,pp(into)]
1-[np,v,pp(with)]
1-[np(and),v]
1-[np(and),v,adv(together)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 22.3 – Verbs of Combining and Attaching: Shake Verbs
36 Verbs

append attach band baste beat bind bond bundle cluster collate collect fasten fuse gather glom graft group herd jumble lump mass moor package pair roll scramble sew shake shuffle splice ...

Signature #146 (8 Patterns – 5 Positive) uniquely identifies semantic class 22.3

0-[np,v,np(and)]
0-[np,v,pp(into)]
0-[np(and),v,adv(together)]
1-[np,v,np]
1-[np,v,np,pp(into)]
1-[np,v,adv(easily),pp(into)]
1-[np,v,np(and),adv(together)]
1-[np(and),v,adv(easily),adv(together)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 22.4 – Verbs of Combining and Attaching: Tape Verbs
59 Verbs

anchor band belt bolt bracket buckle button cement chain clamp clasp clip epoxy fetter glue gum handcuff harness hinge hitch hook knot lace lash lasso latch leash link lock loop ...

Signature #137 (13 Patterns – 8 Positive) uniquely identifies semantic class 22.4

0-[np,v,np,pp(with)]
0-[np,v,np(and)]
0-[np,v,pp(to)]
0-[np(and),v,adv(together)]
1-[np,v,np,adjective]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(onto)]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]
1-[np,v,adv(easily),pp(to)]
1-[np,v,np(and),adv(together)]
1-[np(and),v,adv(easily),adv(together)]
2-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 22.5 – Verbs of Combining and Attaching: Cling Verbs
3 Verbs

adhere cleave cling

Signature #74 (4 Patterns – 2 Positive) uniquely identifies semantic class 22.5

0-[np,v,np]
0-[np(and),v]
1-[np,v,pp(to)]
1-[np(and),v,adv(together)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

22.5 37.5

Semantic class 23.1 – Verbs of Separating and Disassembling: Separate Verbs
12 Verbs

decouple differentiate disconnect disentangle dissociate distinguish divide divorce part segregate separate sever

Signature #127 (9 Patterns – 6 Positive) uniquely identifies semantic class 23.1

0-[np,v,np,pp(of)]
0-[np(and),v,adv(apart)]
1-[np,v,np,pp(from)]
1-[np,v,adv(easily),pp(from)]
1-[np,v,np(and)]
1-[np,v,pp(from)]
1-[np(and),v]
1-[np(and),v,adv(easily)]
3-[np,v,np(and),adv(apart)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 23.2 – Verbs of Separating and Disassembling: Split Verbs
20 Verbs

blow break cut draw hack hew kick knock pry pull push rip roll saw shove slip split tear tug yank

Signature #147 (10 Patterns – 8 Positive) uniquely identifies semantic class 23.2

0-[np,v,np(and)]
0-[np(and),v]
1-[np,v,np,pp(off)]
1-[np,v,np,pp([off,of])]
1-[np,v,adv(easily),pp([off,of])]
1-[np,v,np(and),adv(apart)]
1-[np,v,pp(off)]
1-[np,v,pp([off,of])]
1-[np(and),v,adv(apart)]
1-[np(and),v,adv(easily),adv(apart)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 23.3 – Verbs of Separating and Disassembling: Disassemble Verbs
30 Verbs

detach disassemble disconnect partition sift sunder unbolt unbuckle unbutton unchain unclamp unclasp unclip unfasten unglue unhinge unhitch unhook unlace unlatch unleash unlock unpeg unpin unscrew unshackle unstaple unstitch untie unzip ...

Signature #145 (7 Patterns – 3 Positive) uniquely identifies semantic class 23.3

0-[np,v,adv(easily),pp(from)]
0-[np,v,np(and)]
0-[np,v,np(and),adv(apart)]
0-[np,v,pp(from)]
1-[np,v,np]
1-[np,v,np,pp(from)]
1-[np,v,adv(easily)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 23.4 – Verbs of Separating and Disassembling: Differ Verbs
2 Verbs

differ diverge

Signature #113 (4 Patterns – 2 Positive) uniquely identifies semantic class 23.4

0-[np,v,np,pp(from)]
0-[np(and),v,adv(apart)]
1-[np,v,pp(from)]
1-[np(and),v]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

23.1 23.4

Semantic class 24 – Verbs of Coloring
13 Verbs

color distemper dye enamel glaze japan lacquer paint shellac spraypaint stain tint varnish

Signature #173 (4 Patterns – 4 Positive) uniquely identifies semantic class 24

1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,np]
1-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 25.1 – Image Creation Verbs: Verbs of Image Impression
14 Verbs

applique emboss embroider engrave etch imprint incise inscribe mark paint set sign stamp tattoo

Signature #169 (6 Patterns – 6 Positive) uniquely identifies semantic class 25.1

1-[np,v]
1-[np,v,np]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(over)]
1-[np,v,np,pp(under)]
1-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 25.2 – Image Creation Verbs: Scribble Verbs
22 Verbs

carve chalk charcoal copy crayon doodle draw forge ink paint pencil plot print scratch scrawl scribble sketch spraypaint stencil trace type write

Signature #140 (7 Patterns – 6 Positive) uniquely identifies semantic class 25.2

0-[np,v,np,pp(with)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(onto)]
1-[np,v,np,pp(over)]
1-[np,v,np,pp(under)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 25.3 – Image Creation Verbs: Illustrate Verbs
16 Verbs

address adorn autograph brand date decorate embellish endorse illuminate illustrate initial label letter monogram ornament tag

Signature #129 (3 Patterns – 2 Positive) uniquely identifies semantic class 25.3

0-[np,v,np,pp(on)]
1-[np,v,np]
1-[np,v,np,pp(with)]

The positive portion of this signature identifies these 4 semantic classes in the positive signature suite:

17.2 25.3 44 9.9

Also, the positive portion of this signature is a subset of the signatures of these 23 semantic classes:

11.1 11.4 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 24 25.1 25.3 31.1 39.1 42.1 44 45.1 45.2 45.4 9.8 9.9

Semantic class 26.1 – Verbs of Creation and Transformation: Build Verbs
35 Verbs

arrange assemble bake blow build carve cast chisel churn compile cook crochet cut develop embroider fashion fold forge grind grow hack hammer hatch knit make mold pound roll sculpt sew ...

Signature #91 (13 Patterns – 8 Positive) uniquely identifies semantic class 26.1

0-[np,v,np,np]
0-[np,v,np,pp(from),pp(into)]
0-[np,v,np,pp(into)]
0-[np,v,pp(into)]
0-[np,v,pp([out,of])]
1-[np,v]
1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(into)]
1-[np,v,np,pp(into),pp(for)]
1-[np,v,np,pp([out,of])]
1-[np,v,np,pp([out,of]),pp(for)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 25.4 – Image Creation Verbs: Transcribe Verbs
11 Verbs

copy film forge microfilm photocopy photograph record tape televise transcribe type

Signature #141 (3 Patterns – 2 Positive) uniquely identifies semantic class 25.4

0-[np,v,np,pp(with)]
1-[np,v,np]
1-[np,v,np,pp(into)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 8 semantic classes:

17.1 19 22.3 25.4 26.1 26.5 45.2 51.3.2

Semantic class 26.2 – Verbs of Creation and Transformation: Grow Verbs
5 Verbs

develop evolve grow hatch mature

Signature #154 (5 Patterns – 4 Positive) uniquely identifies semantic class 26.2

0-[np,v,pp(from),pp(into)]
1-[np,v,np,pp(from)]
1-[np,v,np,pp(into)]
1-[np,v,pp(from)]
1-[np,v,pp(into)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 26.3 – Verbs of Creation and Transformation: Verbs of Preparing
26 Verbs

bake blend boil brew clean clear cook fix fry grill hardboil iron light mix poach pour prepare roast roll run scramble set softboil toast toss wash

Signature #20 (6 Patterns – 3 Positive) uniquely identifies semantic class 26.3

0-[np,v]
0-[np,v,np,pp(into)]
1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,pp(for)]
2-[np,v,np,pp(from)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 4 semantic classes:

13.5.1 26.1 26.3 26.7

Semantic class 26.4 – Verbs of Creation and Transformation: Create Verbs
20 Verbs

coin compose compute concoct construct create derive design dig fabricate form invent manufacture mint model organize produce recreate style synthesize

Signature #3 (9 Patterns – 4 Positive) uniquely identifies semantic class 26.4

0-[np,v]
0-[np,v,np]
0-[np,v,np,np]
0-[np,v,np,pp(from)]
0-[np,v,np,pp(into)]
1-[np,v,np]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(from)]
1-[np,v,np,pp([out,of])]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 26.5 – Verbs of Creation and Transformation: Knead Verbs
19 Verbs

beat bend coil collect compress fold freeze knead melt shake squash squeeze squish twirl twist wad whip wind work

Signature #6 (11 Patterns – 3 Positive) uniquely identifies semantic class 26.5

0-[np,v]
0-[np,v,np]
0-[np,v,np,pp(from)]
0-[np,v,np,pp(from),pp(into)]
0-[np,v,np,pp(into)]
0-[np,v,pp(from)]
0-[np,v,pp(from),pp(into)]
0-[np,v,pp(into)]
1-[np,v,np]
1-[np,v,np,pp(into)]
1-[np,v,pp(into)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

26.5 51.3.2

Semantic class 26.6 – Verbs of Creation and Transformation: Turn Verbs
7 Verbs

alter change convert metamorphose transform transmute turn

Signature #56 (7 Patterns – 4 Positive) uniquely identifies semantic class 26.6

0-[np,v,np]
0-[np,v,np,pp(from)]
0-[np,v,pp(from)]
1-[np,v,np,pp(from),pp(into)]
1-[np,v,np,pp(into)]
1-[np,v,pp(from),pp(into)]
1-[np,v,pp(into)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 26.7 – Verbs of Creation and Transformation: Performance Verbs
19 Verbs

chant choreograph compose dance direct draw hum intone paint perform play produce recite silkscreen sing spin take whistle write

Signature #39 (6 Patterns – 5 Positive) uniquely identifies semantic class 26.7

0-[np,v]
1-[np,v]
1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 27 – Engender Verbs
7 Verbs

beget cause create engender generate shape spawn

Signature #41 (2 Patterns – 1 Positive) identifies semantic classes: 27 55.2

0-[np,v]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 28 – Calve Verbs
10 Verbs

calve cub fawn foal kitten lamb litter pup spawn whelp

Signature #164 (1 Patterns – 1 Positive) uniquely identifies semantic class 28

1-[np,v]

The positive portion of this signature identifies these 5 semantic classes in the positive signature suite:

28 40.1.1 40.1.3 40.4 45.5

Also, the positive portion of this signature is a subset of the signatures of these 64 semantic classes:

10.3 10.4.1 10.4.2 21.1 22.2 25.1 25.2 26.1 26.7 28 35.1 36.1 36.3 37.3 37.4 37.5 37.6 37.8 37.9 38 39.1 39.2 39.5 40.1.1 40.1.2 40.1.3 40.2 40.3.1 40.3.3 40.4 40.5 40.6 40.7 40.8.1 40.8.2 40.8.4 41.1.1 41.2.1 43.1 43.2 43.3 43.4 45.1 45.2 45.3 45.4 45.5 45.6 47.1 47.2 47.3 47.4 47.5.2 47.5.3 48.1.1 48.2 48.3 49 51.1 51.3.1 51.4.1 51.4.2 51.5 53.2

Semantic class 29.1 – Verbs with Predicative Complements: Appoint Verbs
18 Verbs

acknowledge adopt appoint consider crown deem designate elect esteem imagine mark nominate ordain proclaim rate reckon report want

Signature #133 (4 Patterns – 3 Positive) uniquely identifies semantic class 29.1

0-[np,v,np,pp(to)]
1-[np,v,np,infinitive]
1-[np,v,np,np]
1-[np,v,np,pp(as)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 29.2 – Verbs with Predicative Complements: Characterize Verbs
62 Verbs

accept address appreciate bill cast certify characterize choose cite class classify confirm count define describe diagnose disguise employ engage enlist enroll enter envisage establish esteem hail herald hire honor identify ...

Signature #101 (4 Patterns – 2 Positive) uniquely identifies semantic class 29.2

0-[np,v,np,np]
1-[np,v,np,infinitive]
1-[np,v,np,pp(as)]
3-[np,v,np,infinitive]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

29.1 29.2

Semantic class 29.3 – Verbs with Predicative Complements: Dub Verbs
19 Verbs

anoint baptize brand call christen consecrate crown decree dub label make name nickname pronounce rule stamp style term vote

Signature #87 (4 Patterns – 1 Positive) uniquely identifies semantic class 29.3

0-[np,v,np,infinitive]
0-[np,v,np,pp(as)]
0-[np,v,np,pp(to)]
1-[np,v,np,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 20 semantic classes:

11.1 11.2 11.3 13.1 13.3 13.5.1 17.1 24 26.1 26.3 26.7 29.1 29.3 29.4 29.8 37.1 37.2 37.4 39.7 54.5

Semantic class 29.4 – Verbs with Predicative Complements: Declare Verbs
16 Verbs

adjudge adjudicate assume avow believe confess declare fancy find judge presume profess prove suppose think warrant

Signature #102 (5 Patterns – 3 Positive) uniquely identifies semantic class 29.4

0-[np,v,np,pp(as)]
0-[np,v,np,pp(to)]
1-[np,v,np,infinitive]
1-[np,v,np,np]
1-[np,v,s_comp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

29.4 37.4

Semantic class 29.5 – Verbs with Predicative Complements: Conjecture Verbs
20 Verbs

admit allow assert conjecture deny discover feel figure grant guarantee guess hold know maintain mean observe recognize repute show suspect

Signature #89 (4 Patterns – 2 Positive) uniquely identifies semantic class 29.5

0-[np,v,np,np]
0-[np,v,np,pp(as)]
1-[np,v,np,infinitive]
1-[np,v,s_comp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 4 semantic classes:

29.4 29.5 37.4 37.9

Semantic class 29.6 – Verbs with Predicative Complements: Masquerade Verbs
11 Verbs

act behave camouflage count masquerade officiate pose qualify rank rate serve

Signature #84 (2 Patterns – 1 Positive) uniquely identifies semantic class 29.6

0-[np,v,np]
1-[np,v,pp(as)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 29.7 – Verbs with Predicative Complements: Orphan Verbs
11 Verbs

apprentice canonize cripple cuckold knight martyr orphan outlaw pauper recruit widow

Signature #175 (3 Patterns – 3 Positive) uniquely identifies semantic class 29.7

1-[np,v,np]
1-[np,aux(be),v]
1-[np,aux(be),v,pp(by)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 29.8 – Verbs with Predicative Complements: Captain Verbs
38 Verbs

boss bully butcher butler caddy captain champion chaperone chauffeur clerk coach cox crew doctor emcee escort guard host model mother nurse partner pilot pioneer police referee shepherd skipper sponsor star ...

Signature #176 (2 Patterns – 2 Positive) uniquely identifies semantic class 29.8

1-[np,v,np,np]
1-[np,v,pp(for)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 30.1 – Verbs of Perception: See Verbs
9 Verbs

detect discern feel hear notice see sense smell taste

Signature #108 (12 Patterns – 7 Positive) uniquely identifies semantic class 30.1

0-[np,v,np,pp(for)]
0-[np,v,adv(easily)]
0-[np,v,pp(at)]
0-[np,aux(be),v,vp]
1-[np,v,np]
1-[np,v,np,vp]
1-[np,v,np,pp(in)]
1-[np,v,poss,np]
1-[np,v,s_comp]
1-[np,v,vp]
1-[np,aux(be),v,vp]
2-[np,v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 30.2 – Verbs of Perception: Sight Verbs
26 Verbs

descry discover espy examine eye glimpse inspect investigate note observe overhear perceive recognize regard savor scan scent scrutinize sight spot spy study survey view watch witness

Signature #63 (6 Patterns – 2 Positive) uniquely identifies semantic class 30.2

0-[np,v,np]
0-[np,v,s_comp]
0-[np,v,adv(easily)]
0-[np,v,pp(at)]
1-[np,v,np]
1-[np,v,np,vp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

30.1 30.2

Semantic class 30.3 – Verbs of Perception: Peer Verbs
18 Verbs

check gape gawk gaze glance glare goggle leer listen look ogle peek peep peer sniff snoop squint stare

Signature #64 (10 Patterns – 7 Positive) uniquely identifies semantic class 30.3

0-[np,v,np]
0-[np,v,s_comp]
0-[np,v,pp(at),vp]
1-[np,v,pp(around)]
1-[np,v,pp(at)]
1-[np,v,pp(at),vp]
1-[np,v,pp(into)]
1-[np,v,pp(on)]
1-[np,v,pp(through)]
1-[np,v,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 30.4 – Verbs of Perception: Stimulus Subject Perception Verbs
5 Verbs

feel look smell sound taste

Signature #159 (4 Patterns – 2 Positive) uniquely identifies semantic class 30.4

0-[np,aux(be),v]
0-[np,aux(be),v,pp(by)]
1-[np,v,adjective]
1-[np,v,adjective,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 31.1 – Verbs of Psychological State: Amuse Verbs
220 Verbs

abash affect afflict affront aggravate agitate agonize alarm alienate amaze amuse anger annoy antagonize appall appease arouse assuage astonish astound awe baffle beguile bewilder bewitch boggle bore bother bug calm ...

Signature #35 (15 Patterns – 13 Positive) uniquely identifies semantic class 31.1

0-[np,v]
0-[np,v,pp(at)]
1-[infinitive,v,np]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]
1-[np,v,adv(easily)]
1-[np,v,pp(to)]
1-[np,aux(be),v,pp(at)]
1-[np,aux(be),v,pp(by)]
1-[np,aux(be),v,pp(with)]
1-[s_comp,v,np]
1-[expl(it),v,np,infinitive]
1-[expl(it),v,np,s_comp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 31.2 – Verbs of Psychological State: Admire Verbs
45 Verbs

abhor admire adore appreciate cherish deplore despise detest disdain dislike distrust dread enjoy envy esteem exalt execrate fancy favor fear hate idolize lament like loathe love miss mourn pity prize ...

Signature #97 (10 Patterns – 8 Positive) uniquely identifies semantic class 31.2

0-[np,v,np,np]
0-[np,v,adv(easily)]
1-[np,v,np]
1-[np,v,np,pp(as)]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(in)]
1-[np,v,poss,np]
1-[np,v,s_comp]
1-[np,v,expl(it),s_comp]
1-[np,v,expl(it),w_comp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 31.3 – Verbs of Psychological State: Marvel Verbs
58 Verbs

ache anger anguish approve bask beware bleed bother care cheer cringe cry delight despair disapprove enthuse exult fear feel fret fume gladden gloat glory grieve groove gush hunger hurt luxuriate ...

Signature #182 (2 Patterns – 2 Positive) uniquely identifies semantic class 31.3

1-[np,v,pp(at)]
1-[np,aux(be),v,pp(by)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 31.4 – Verbs of Psychological State: Appeal Verbs
5 Verbs

appeal grate jar matter niggle

Signature #160 (3 Patterns – 1 Positive) uniquely identifies semantic class 31.4

0-[np,aux(be),v]
0-[np,aux(be),v,pp(by)]
1-[np,v,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 10 semantic classes:

22.5 30.3 31.1 31.4 37.3 37.4 37.5 37.8 40.3.3 40.7

Semantic class 32.1 – Verbs of Desire: Want Verbs
6 Verbs

covet crave desire fancy need want

Signature #52 (7 Patterns – 3 Positive) uniquely identifies semantic class 32.1

0-[np,v,np]
0-[np,v,np,np]
0-[np,v,np,pp(in)]
1-[np,v,np]
1-[np,v,np,pp(as)]
1-[np,v,np,pp(for)]
2-[np,aux(be),v,pp(by)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

32.1 33

Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

31.2 32.1 33

Semantic class 33 – Judgment Verbs
68 Verbs

abuse acclaim applaud backbite bless calumniate castigate celebrate censure chasten chastise chide commend compensate compliment condemn congratulate criticize decry defame denigrate denounce deprecate deride disparage eulogize excuse extol fault felicitate ...

Signature #92 (6 Patterns – 3 Positive) uniquely identifies semantic class 33

0-[np,v,np,np]
0-[np,v,np,pp(in)]
0-[np,v,adv(easily)]
1-[np,v,np]
1-[np,v,np,pp(as)]
1-[np,v,np,pp(for)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

32.1 33

Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

31.2 32.1 33

Semantic class 32.2 – Verbs of Desire: Long Verbs
15 Verbs

ache crave dangle fall hanker hope hunger itch long lust pine pray thirst wish yearn

Signature #183 (2 Patterns – 1 Positive) uniquely identifies semantic class 32.2

1-[np,v,pp(for)]
2-[np,aux(be),v]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

29.8 32.2

Semantic class 34 – Verbs of Assessment
7 Verbs

analyze assess audit evaluate review scrutinize study

Signature #121 (3 Patterns – 2 Positive) uniquely identifies semantic class 34

0-[np,v,np,pp(in)]
1-[np,v,np]
1-[np,v,np,pp(for)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 11 semantic classes:

13.5.1 13.5.2 26.1 26.3 26.4 26.7 31.2 32.1 33 34 35.1

Semantic class 35.1 – Verbs of Searching: Hunt Verbs
7 Verbs

dig feel fish hunt mine poach scrounge

Signature #168 (7 Patterns – 7 Positive) uniquely identifies semantic class 35.1

1-[np,v]
1-[np,v,np]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(in)]
1-[np,v,pp(for),pp(in)]
1-[np,v,pp(in)]
1-[np,v,pp(in),pp(for)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 35.2 – Verbs of Searching: Search Verbs
24 Verbs

advertise check comb dive drag dredge excavate patrol plumb probe prospect prowl quarry rake rifle scavenge scour scout search shop sift trawl troll watch

Signature #122 (4 Patterns – 3 Positive) uniquely identifies semantic class 35.2

0-[np,v,np,pp(in)]
1-[np,v,np,pp(for)]
1-[np,v,pp(for),pp(in)]
1-[np,v,pp(in),pp(for)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

35.1 35.2

Semantic class 35.3 – Verbs of Searching: Stalk Verbs
4 Verbs

smell stalk taste track

Signature #152 (4 Patterns – 2 Positive) uniquely identifies semantic class 35.3

0-[np,v,pp(for),pp(in)]
0-[np,v,pp(in),pp(for)]
1-[np,v,np,pp(for)]
1-[np,v,np,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

31.2 35.1 35.3

Semantic class 35.4 – Verbs of Searching: Investigate Verbs
15 Verbs

canvass examine explore frisk inspect investigate observe quiz raid ransack riffle scan scrutinize survey tap

Signature #118 (4 Patterns – 1 Positive) uniquely identifies semantic class 35.4

0-[np,v,np,pp(in)]
0-[np,v,pp(for),pp(in)]
0-[np,v,pp(in),pp(for)]
1-[np,v,np,pp(for)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

13.6 35.4

Also, the positive portion of this signature is a subset of the signatures of these 17 semantic classes:

10.5 13.5.1 13.5.2 13.6 26.1 26.3 26.4 26.7 31.2 32.1 33 34 35.1 35.2 35.3 35.4 54.5

Semantic class 35.5 – Verbs of Searching: Rummage Verbs
20 Verbs

bore burrow delve forage fumble grope leaf listen look page paw poke rifle root rummage scrabble scratch snoop thumb tunnel

Signature #107 (4 Patterns – 1 Positive) uniquely identifies semantic class 35.5

0-[np,v,np,pp(for)]
0-[np,v,np,pp(in)]
1-[np,v,pp(in),pp(for)]
2-[np,v,pp(for),pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

35.1 35.2 35.5

Semantic class 35.6 – Verbs of Searching: Ferret Verbs
4 Verbs

ferret nose seek tease

Signature #109 (3 Patterns – 1 Positive) uniquely identifies semantic class 35.6

0-[np,v,np,pp(for)]
0-[np,v,pp(for),pp(in)]
1-[np,v,np,pp([out,of])]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 6 semantic classes:

10.6 26.1 26.4 35.6 9.4 9.5

Semantic class 36.1 – Verbs of Social Interaction: Correspond Verbs
57 Verbs

agree argue banter bargain bicker brawl clash coexist collaborate collide combat commiserate communicate compete concur confabulate conflict consort cooperate correspond dicker differ disagree dispute dissent duel elope feud flirt haggle ...

Signature #13 (6 Patterns – 4 Positive) uniquely identifies semantic class 36.1

0-[np,v]
0-[np,v,np]
1-[np,v]
1-[np,v,pp(with)]
1-[np(and),v]
1-[np(and),v,pp(about)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 36.2 – Verbs of Social Interaction: Marry Verbs
11 Verbs

court cuddle date divorce embrace hug kiss marry nuzzle pass pet

Signature #158 (3 Patterns – 2 Positive) uniquely identifies semantic class 36.2

0-[np,v,pp(with)]
1-[np,v,np]
1-[np(and),v]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 4 semantic classes:

22.2 36.2 36.3 47.8

Semantic class 36.3 – Verbs of Social Interaction: Meet Verbs
8 Verbs

battle box consult debate fight meet play visit

Signature #40 (5 Patterns – 4 Positive) uniquely identifies semantic class 36.3

0-[np,v]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(with)]
1-[np(and),v]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

22.2 36.3

Semantic class 37.1 – Verbs of Communication: Verbs of Transfer of a Message
17 Verbs

ask cite demonstrate dictate explain explicate narrate pose preach quote read recite relay show teach tell write

Signature #174 (4 Patterns – 4 Positive) uniquely identifies semantic class 37.1

1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,s_comp]
1-[np,v,np,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

37.1 37.2

Semantic class 37.2 – Verbs of Communication: Tell
1 Verbs

tell

Signature #49 (19 Patterns – 9 Positive) uniquely identifies semantic class 37.2

0-[np,v,infinitive]
0-[np,v,np,pp(at)]
0-[np,v,s_comp]
0-[np,v,w_comp]
0-[np,v,pp(for),infinitive]
0-[np,v,pp(to)]
0-[np,v,pp(to),infinitive]
0-[np,v,pp(to),quotation]
0-[np,v,pp(to),s_comp]
0-[expl(it),aux(be),v,s_comp]
1-[np,v,np]
1-[np,v,np,infinitive]
1-[np,v,np,np]
1-[np,v,np,quotation]
1-[np,v,np,s_comp]
1-[np,v,np,pp(about)]
1-[np,v,np,pp(to)]
1-[np,v,w_comp]
1-[np,aux(be),v,s_comp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 37.3 – Verbs of Communication: Verbs of Manner of Speaking
77 Verbs

babble bark bawl bellow bleat boom bray burble cackle call carol chant chatter chirp cluck coo croak croon crow cry drawl drone gabble gibber groan growl grumble grunt hiss holler ...

Signature #100 (20 Patterns – 17 Positive) uniquely identifies semantic class 37.3

0-[np,v,np,np]
0-[expl(it),aux(be),v,s_comp]
1-[np,v]
1-[np,v,infinitive]
1-[np,v,np]
1-[np,v,np,pp(to)]
1-[np,v,poss,np]
1-[np,v,quotation]
1-[np,v,quotation,pp(at)]
1-[np,v,s_comp]
1-[np,v,w_comp]
1-[np,v,pp(about)]
1-[np,v,pp(at)]
1-[np,v,pp(for),infinitive]
1-[np,v,pp(to)]
1-[np,v,pp(to),infinitive]
1-[np,v,pp(to),quotation]
1-[np,v,pp(to),s_comp]
1-[np,v,pp(to),w_comp]
2-[np,v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 37.4 – Verbs of Communication: Verbs of Instrument of Communication
18 Verbs

cable e_mail fax modem netmail phone radio relay satellite semaphore sign signal telecast telegraph telephone telex wire wireless

Signature #105 (20 Patterns – 18 Positive) uniquely identifies semantic class 37.4

0-[np,v,np,pp(at)]
0-[np,v,pp(to)]
1-[np,v]
1-[np,v,infinitive]
1-[np,v,np]
1-[np,v,np,infinitive]
1-[np,v,np,np]
1-[np,v,np,quotation]
1-[np,v,np,w_comp]
1-[np,v,np,pp(about)]
1-[np,v,np,pp(to)]
1-[np,v,quotation]
1-[np,v,s_comp]
1-[np,v,w_comp]
1-[np,v,pp(for),infinitive]
1-[np,v,pp(to)]
1-[np,v,pp(to),infinitive]
1-[np,v,pp(to),quotation]
1-[np,v,pp(to),s_comp]
1-[np,v,pp(to),w_comp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 37.6 – Verbs of Communication: Chitchat Verbs
11 Verbs

argue chat chatter chitchat confer converse gab gossip rap schmooze yak

Signature #47 (12 Patterns – 4 Positive) uniquely identifies semantic class 37.6

0-[np,v,infinitive]
0-[np,v,np]
0-[np,v,s_comp]
0-[np,v,w_comp]
0-[np,v,pp(for),infinitive]
0-[np,v,pp(to)]
0-[np,v,pp(to),pp(about)]
0-[np(and),v,adv(together)]
1-[np,v]
1-[np,v,pp(with)]
1-[np,v,pp(with),pp(about)]
1-[np(and),v]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

37.5 37.6

Semantic class 37.5 – Verbs of Communication: Talk Verbs
2 Verbs

speak talk

Signature #48 (14 Patterns – 7 Positive) uniquely identifies semantic class 37.5

0-[np,v,infinitive]
0-[np,v,np]
0-[np,v,s_comp]
0-[np,v,w_comp]
0-[np,v,pp(for),infinitive]
0-[np,v,pp(to),infinitive]
0-[np,v,pp(to),s_comp]
1-[np,v]
1-[np,v,pp(to)]
1-[np,v,pp(to),pp(about)]
1-[np,v,pp(with)]
1-[np,v,pp(with),pp(about)]
1-[np(and),v]
1-[np(and),v,adv(together)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 37.7 – Verbs of Communication: Say Verbs
24 Verbs

announce articulate blab blurt claim confess confide convey declare mention note observe proclaim propose recount reiterate relate remark repeat report reveal say state suggest

Signature #98 (6 Patterns – 3 Positive) uniquely identifies semantic class 37.7

0-[np,v,np,np]
0-[np,v,pp(about)]
0-[np,v,pp(to)]
1-[np,v,np,pp(to)]
1-[np,v,s_comp]
1-[np,v,pp(to),s_comp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

37.3 37.4 37.7

Semantic class 37.8 – Verbs of Communication: Complain Verbs
10 Verbs

boast brag complain crab gripe grouch grouse grumble kvetch object

Signature #46 (17 Patterns – 9 Positive) uniquely identifies semantic class 37.8

0-[np,v,infinitive]
0-[np,v,np]
0-[np,v,np,pp(to)]
0-[np,v,w_comp]
0-[np,v,pp(at)]
0-[np,v,pp(for),infinitive]
0-[np,v,pp(to),infinitive]
0-[np,v,pp(to),w_comp]
1-[np,v]
1-[np,v,quotation]
1-[np,v,s_comp]
1-[np,v,pp(about)]
1-[np,v,pp(about),pp(to)]
1-[np,v,pp(at)]
1-[np,v,pp(to)]
1-[np,v,pp(to),quotation]
1-[np,v,pp(to),s_comp]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 37.9 – Verbs of Communication: Advise Verbs
7 Verbs

admonish advise alert caution counsel instruct warn

Signature #151 (16 Patterns – 14 Positive) uniquely identifies semantic class 37.9

0-[np,v,pp(for),infinitive]
0-[np,v,pp(to)]
1-[np,v]
1-[np,v,infinitive]
1-[np,v,np]
1-[np,v,np,infinitive]
1-[np,v,np,quotation]
1-[np,v,np,s_comp]
1-[np,v,np,w_comp]
1-[np,v,np,pp(about)]
1-[np,v,np,pp(against)]
1-[np,v,quotation]
1-[np,v,s_comp]
1-[np,v,w_comp]
1-[np,v,pp(about)]
1-[np,v,pp(against)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 38 – Verbs of Sounds Made by Animals
67 Verbs

baa bark bay bellow blat bleat bray buzz cackle call caw chatter cheep chirp chirrup chitter cluck coo croak crow cuckoo drone gobble growl grunt hee_haw hiss honk hoot howl ...

Signature #150 (5 Patterns – 4 Positive) uniquely identifies semantic class 38

0-[np,v,pp(down)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

10.4.1 21.1 38

Semantic class 39.1 – Verbs of Ingesting: Eat Verbs
2 Verbs

drink eat

Signature #70 (7 Patterns – 5 Positive) uniquely identifies semantic class 39.1

0-[np,v,np]
0-[np,v,pp(on)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,pp(with)]
1-[np,v,self,adjective]
1-[np,v,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 39.2 – Verbs of Ingesting: Chew Verbs
12 Verbs

chew chomp crunch gnaw lick munch nibble peck pick sip slurp suck

Signature #171 (4 Patterns – 4 Positive) uniquely identifies semantic class 39.2

1-[np,v]
1-[np,v,np]
1-[np,v,pp(at)]
1-[np,v,pp(on)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 39.3 – Verbs of Ingesting: Gobble Verbs
8 Verbs

bolt gobble gulp guzzle quaff swallow swig wolf

Signature #34 (5 Patterns – 2 Positive) uniquely identifies semantic class 39.3

0-[np,v]
0-[np,v,pp(at)]
0-[np,v,pp(on)]
1-[np,v,np]
1-[np,v,np,adjective]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 16 semantic classes:

10.4.1 10.4.2 12 18.1 18.2 21.1 24 31.1 38 39.3 42.1 45.1 45.2 45.3 51.4.1 51.4.2

Semantic class 39.4 – Verbs of Ingesting: Devour Verbs
5 Verbs

consume devour imbibe ingest swill

Signature #33 (4 Patterns – 1 Positive) uniquely identifies semantic class 39.4

0-[np,v]
0-[np,v,pp(at)]
0-[np,v,pp(on)]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 39.5 – Verbs of Ingesting: Dine Verbs
12 Verbs

banquet breakfast brunch dine feast graze lunch luncheon nosh picnic snack sup

Signature #67 (4 Patterns – 2 Positive) uniquely identifies semantic class 39.5

0-[np,v,np]
0-[np,v,pp(at)]
1-[np,v]
1-[np,v,pp(on)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 7 semantic classes:

39.2 39.5 40.1.2 43.1 45.4 47.1 48.1.1

Semantic class 39.6 – Verbs of Ingesting: Gorge Verbs
8 Verbs

exist feed flourish gorge live prosper survive thrive

Signature #12 (4 Patterns – 1 Positive) uniquely identifies semantic class 39.6

0-[np,v]
0-[np,v,np]
0-[np,v,pp(at)]
1-[np,v,pp(on)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 13 semantic classes:

12 30.3 39.2 39.5 39.6 40.1.2 43.1 45.4 47.1 47.6 48.1.1 9.2 9.7

Semantic class 39.7 – Verbs of Ingesting: Verbs of Feeding
6 Verbs

bottlefeed breastfeed feed forcefeed handfeed spoonfeed

Signature #83 (6 Patterns – 3 Positive) uniquely identifies semantic class 39.7

0-[np,v,np]
1-[np,v,np]
1-[np,v,np,np]
1-[np,v,np,pp(to)]
2-[np,v,np,pp(on)]
2-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 8 semantic classes:

11.1 11.2 17.1 26.7 37.1 37.2 37.4 39.7

Semantic class 40.1.2 – Verbs Involving the Body: Verbs of Bodily Processes: Breathe Verbs
11 Verbs

bleed breathe cough cry dribble drool puke spit sweat vomit weep

Signature #51 (6 Patterns – 3 Positive) uniquely identifies semantic class 40.1.2

0-[np,v,np]
0-[np,v,np,adjective]
0-[np,v,pp(at)]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(on)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 4 semantic classes:

39.2 40.1.2 43.1 45.4

Semantic class 40.1.1 – Verbs Involving the Body: Verbs of Bodily Processes: Hiccup Verbs
13 Verbs

belch blush burp flush hiccup pant sneeze sniffle snore snuffle swallow wheeze yawn

Signature #149 (5 Patterns – 1 Positive) uniquely identifies semantic class 40.1.1

0-[np,v,pp(at)]
0-[np,v,pp(on)]
1-[np,v]
2-[np,v,np]
3-[np,v,self,adjective]

The positive portion of this signature identifies these 5 semantic classes in the positive signature suite:

28 40.1.1 40.1.3 40.4 45.5

Also, the positive portion of this signature is a subset of the signatures of these 64 semantic classes:

10.3 10.4.1 10.4.2 21.1 22.2 25.1 25.2 26.1 26.7 28 35.1 36.1 36.3 37.3 37.4 37.5 37.6 37.8 37.9 38 39.1 39.2 39.5 40.1.1 40.1.2 40.1.3 40.2 40.3.1 40.3.3 40.4 40.5 40.6 40.7 40.8.1 40.8.2 40.8.4 41.1.1 41.2.1 43.1 43.2 43.3 43.4 45.1 45.2 45.3 45.4 45.5 45.6 47.1 47.2 47.3 47.4 47.5.2 47.5.3 48.1.1 48.2 48.3 49 51.1 51.3.1 51.4.1 51.4.2 51.5 53.2

Semantic class 40.1.3 – Verbs Involving the Body: Verbs of Bodily Processes: Exhale Verbs
3 Verbs

exhale inhale perspire

Signature #65 (4 Patterns – 1 Positive) uniquely identifies semantic class 40.1.3

0-[np,v,np]
0-[np,v,pp(at)]
0-[np,v,pp(on)]
1-[np,v]

The positive portion of this signature identifies these 5 semantic classes in the positive signature suite:

28 40.1.1 40.1.3 40.4 45.5

Also, the positive portion of this signature is a subset of the signatures of these 64 semantic classes:

10.3 10.4.1 10.4.2 21.1 22.2 25.1 25.2 26.1 26.7 28 35.1 36.1 36.3 37.3 37.4 37.5 37.6 37.8 37.9 38 39.1 39.2 39.5 40.1.1 40.1.2 40.1.3 40.2 40.3.1 40.3.3 40.4 40.5 40.6 40.7 40.8.1 40.8.2 40.8.4 41.1.1 41.2.1 43.1 43.2 43.3 43.4 45.1 45.2 45.3 45.4 45.5 45.6 47.1 47.2 47.3 47.4 47.5.2 47.5.3 48.1.1 48.2 48.3 49 51.1 51.3.1 51.4.1 51.4.2 51.5 53.2

Semantic class 40.2 – Verbs Involving the Body: Verbs of Nonverbal Expression
41 Verbs

beam cackle chortle chuckle cough cry frown gape gasp gawk giggle glare glower goggle grimace grin groan growl guffaw howl jeer laugh moan pout scowl sigh simper smile smirk sneeze ...

Signature #170 (7 Patterns – 7 Positive) uniquely identifies semantic class 40.2

1-[np,v]
1-[np,v,np]
1-[np,v,poss,np]
1-[np,v,self,adjective]
1-[np,v,pp(at)]
1-[np,v,pp(from)]
1-[np,v,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 40.3.2 – Verbs Involving the Body: Verbs of Gestures/Signs Involving Body Parts: Crane Verbs
47 Verbs

arch bare bat beat blow clench click close cock crane crook cross drum flap flash flex flick flutter fold gnash grind hang hunch kick knit open pucker purse raise roll ...

Signature #9 (7 Patterns – 2 Positive) uniquely identifies semantic class 40.3.2

0-[np,v]
0-[np,v,np]
0-[np,v,poss,np]
0-[np,aux(be),v]
0-[np,aux(be),v,pp(by)]
1-[np,v,np,pp(at)]
1-[np,v,poss,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 40.3.1 – Verbs Involving the Body: Verbs of Gestures/Signs Involving Body Parts: Wink Verbs
9 Verbs

blink clap nod point shrug squint wag wave wink

Signature #59 (10 Patterns – 4 Positive) uniquely identifies semantic class 40.3.1

0-[np,v,np]
0-[np,v,poss,np]
0-[np,aux(be),v]
0-[np,aux(be),v,w_comp]
0-[np,aux(be),v,pp(by)]
1-[np,v]
1-[np,v,poss,np]
1-[np,v,pp(at)]
1-[np,v,pp(in)]
2-[np,v,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

40.2 40.3.1

Semantic class 40.3.3 – Verbs Involving the Body: Verbs of Gestures/Signs Involving Body Parts: Curtsey Verbs
7 Verbs

bob bow curtsey genuflect kneel salaam salute

Signature #78 (4 Patterns – 3 Positive) uniquely identifies semantic class 40.3.3

0-[np,v,np]
1-[np,v]
1-[np,v,poss,np]
1-[np,v,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

37.3 40.3.3

Semantic class 40.4 – Verbs Involving the Body: Snooze Verbs
7 Verbs

catnap doze drowse nap sleep slumber snooze

Signature #75 (2 Patterns – 1 Positive) identifies semantic classes: 40.4 45.5

0-[np,v,np]
1-[np,v]

The positive portion of this signature identifies these 5 semantic classes in the positive signature suite:

28 40.1.1 40.1.3 40.4 45.5

Also, the positive portion of this signature is a subset of the signatures of these 64 semantic classes:

10.3 10.4.1 10.4.2 21.1 22.2 25.1 25.2 26.1 26.7 28 35.1 36.1 36.3 37.3 37.4 37.5 37.6 37.8 37.9 38 39.1 39.2 39.5 40.1.1 40.1.2 40.1.3 40.2 40.3.1 40.3.3 40.4 40.5 40.6 40.7 40.8.1 40.8.2 40.8.4 41.1.1 41.2.1 43.1 43.2 43.3 43.4 45.1 45.2 45.3 45.4 45.5 45.6 47.1 47.2 47.3 47.4 47.5.2 47.5.3 48.1.1 48.2 48.3 49 51.1 51.3.1 51.4.1 51.4.2 51.5 53.2

Semantic class 40.6 – Verbs Involving the Body: Verbs of Body-Internal States of Existence
9 Verbs

convulse cower quake quiver shake shiver shudder tremble writhe

Signature #79 (4 Patterns – 3 Positive) identifies semantic classes: 40.6 40.8.4

0-[np,v,np]
1-[np,v]
1-[np,v,pp(at)]
1-[np,v,pp(from)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

40.6 40.8.4

Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

40.2 40.6 40.8.4

Semantic class 40.5 – Verbs Involving the Body: Flinch Verbs
7 Verbs

balk cower cringe flinch recoil shrink wince

Signature #61 (4 Patterns – 2 Positive) uniquely identifies semantic class 40.5

0-[np,v,np]
0-[np,v,poss,np]
1-[np,v]
1-[np,v,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 13 semantic classes:

10.4.1 21.1 37.3 37.8 38 39.1 39.2 40.2 40.3.1 40.5 40.6 40.8.4 48.3

Semantic class 40.7 – Verbs Involving the Body: Suffocate Verbs
5 Verbs

asphyxiate choke drown stifle suffocate

Signature #155 (5 Patterns – 3 Positive) uniquely identifies semantic class 40.7

0-[np,v,pp(to)]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(to)]
2-[np,v,adv(easily)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

37.3 37.4 40.7

Semantic class 40.8.1 – Verbs Involving the Body: Verbs of Bodily State and Damage to the Body: Pain Verbs
5 Verbs

ache bother hurt itch pain

Signature #60 (6 Patterns – 3 Positive) uniquely identifies semantic class 40.8.1

0-[np,v,np]
0-[np,v,poss,np]
0-[np,aux(be),v,pp(by)]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(from)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 5 semantic classes:

10.3 40.2 40.8.1 43.4 51.1

Semantic class 40.8.2 – Verbs Involving the Body: Verbs of Bodily State and Damage to the Body: Tingle Verbs
14 Verbs

burn hum pound prickle pucker reel smart spin split sting swim throb tickle tingle

Signature #62 (4 Patterns – 2 Positive) uniquely identifies semantic class 40.8.2

0-[np,v,np]
0-[np,v,poss,np]
1-[np,v]
1-[np,v,pp(from)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 10 semantic classes:

10.3 40.2 40.6 40.8.1 40.8.2 40.8.4 43.4 48.1.1 48.2 51.1

Semantic class 40.8.3 – Verbs Involving the Body: Verbs of Bodily State and Damage to the Body: Hurt Verbs
24 Verbs

bark bite break bruise bump burn chip cut fracture hurt injure nick prick pull rupture scald scratch skin split sprain strain stub turn twist

Signature #10 (8 Patterns – 2 Positive) uniquely identifies semantic class 40.8.3

0-[np,v]
0-[np,v,np]
0-[np,v,self]
0-[np,aux(be),v]
0-[np,aux(be),v,w_comp]
0-[np,aux(be),v,pp(by)]
1-[np,v,poss,np]
1-[np,v,self]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

20 40.8.3

Semantic class 40.8.4 – Verbs Involving the Body: Verbs of Bodily State and Damage to the Body: Verbs of Change of Bodily State
4 Verbs

blanch faint sicken swoon

Signature #79 (4 Patterns – 3 Positive) identifies semantic classes: 40.6 40.8.4

0-[np,v,np]
1-[np,v]
1-[np,v,pp(at)]
1-[np,v,pp(from)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

40.6 40.8.4

Also, the positive portion of this signature is a subset of the signatures of these 3 semantic classes:

40.2 40.6 40.8.4

Semantic class 41.1.1 – Verbs of Grooming and Bodily Care: Verbs of Caring for the Whole Body: Dress Verbs
12 Verbs

bathe change disrobe dress exercise preen primp shave shower strip undress wash

Signature #143 (4 Patterns – 3 Positive) uniquely identifies semantic class 41.1.1

0-[np,v,poss,np]
1-[np,v]
1-[np,v,np]
1-[np,v,self]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 41.2.1 – Verbs of Grooming and Bodily Care: Verbs of Caring for a Specific Body Part: Floss Verbs
4 Verbs

brush floss shave wash

Signature #144 (3 Patterns – 2 Positive) uniquely identifies semantic class 41.2.1

0-[np,v,self]
1-[np,v]
1-[np,v,poss,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 8 semantic classes:

21.1 37.3 40.2 40.3.1 40.3.3 41.2.1 45.1 53.2

Semantic class 41.1.2 – Verbs of Grooming and Bodily Care: Verbs of Caring for the Whole Body: Groom Verbs
2 Verbs

curry groom

Signature #28 (3 Patterns – 1 Positive) uniquely identifies semantic class 41.1.2

0-[np,v]
0-[np,v,self]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 41.2.2 – Verbs of Grooming and Bodily Care: Verbs of Caring for a Specific Body Part: Braid Verbs
31 Verbs

bob braid brush clip coldcream comb condition crimp crop curl cut dye file henna lather manicure part perm plait pluck powder rinse rouge set shampoo soap talc tease towel trim ...

Signature #29 (4 Patterns – 2 Positive) uniquely identifies semantic class 41.2.2

0-[np,v]
0-[np,v,self]
1-[np,v,np]
1-[np,v,poss,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 9 semantic classes:

15.1 20 21.1 30.1 31.2 37.3 40.2 41.2.2 45.1

Semantic class 41.3.1 – Verbs of Grooming and Bodily Care: Verbs of Dressing: Simple Verbs of Dressing
3 Verbs

doff don wear

Signature #11 (4 Patterns – 1 Positive) uniquely identifies semantic class 41.3.1

0-[np,v]
0-[np,v,np]
0-[np,v,self,pp(in)]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 41.3.2 – Verbs of Grooming and Bodily Care: Verbs of Dressing: Verbs of Dressing Well
4 Verbs

doll dress spruce tog

Signature #30 (5 Patterns – 3 Positive) uniquely identifies semantic class 41.3.2

0-[np,v]
0-[np,v,self]
1-[np,v,self,pp(before)]
1-[np,v,pp(before)]
1-[np,aux(be),v,pp(for)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 41.3.3 – Verbs of Grooming and Bodily Care: Verbs of Dressing: Verbs of Being Dressed
4 Verbs

attire clad garb robe

Signature #117 (4 Patterns – 1 Positive) uniquely identifies semantic class 41.3.3

0-[np,v,np,pp(in)]
0-[np,v,self,pp(in)]
0-[np,v,pp(in)]
1-[np,aux(be),v,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 42.1 – Verbs of Killing: Murder Verbs
12 Verbs

assassinate butcher dispatch eliminate execute immolate kill liquidate massacre murder slaughter slay

Signature #2 (7 Patterns – 3 Positive) uniquely identifies semantic class 42.1

0-[np,v]
0-[np,v,np]
0-[np,v,np,adjective]
0-[np,v,adv(easily)]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 8 semantic classes:

18.1 18.2 21.1 24 31.1 42.1 45.1 45.2

Semantic class 42.2 – Verbs of Killing: Poison Verbs
13 Verbs

asphyxiate crucify drown electrocute garrotte hang knife poison shoot smother stab strangle suffocate

Signature #32 (5 Patterns – 2 Positive) uniquely identifies semantic class 42.2

0-[np,v]
0-[np,v,adv(easily)]
1-[np,v,np]
1-[np,v,np,pp(to)]
3-[np,aux(be),v,pp(to)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

42.2 51.7

Also, the positive portion of this signature is a subset of the signatures of these 19 semantic classes:

11.1 11.2 11.4 11.5 17.1 18.3 21.1 26.7 31.1 37.1 37.2 37.3 37.4 39.7 42.2 45.1 45.3 51.7 9.4

Semantic class 43.2 – Verbs of Emission: Verbs of Sound Emission
119 Verbs

babble bang beat beep bellow blare blast blat boom bubble burble burr buzz chatter chime chink chir chitter chug clack clang clank clap clash clatter click cling clink clomp clump ...

Signature #72 (9 Patterns – 7 Positive) uniquely identifies semantic class 43.2

0-[np,v,np]
0-[np,aux(be),v,pp(by)]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(down)]
1-[np,v,pp(in)]
1-[np,v,pp(with)]
1-[pp(in),v,np]
1-[pp(in),expl(there),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 43.1 – Verbs of Emission: Verbs of Light Emission
21 Verbs

beam blaze blink burn flame flare flash flicker glare gleam glimmer glint glisten glitter glow incandesce scintillate shimmer shine sparkle twinkle

Signature #77 (7 Patterns – 6 Positive) uniquely identifies semantic class 43.1

0-[np,v,np]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(on)]
1-[np,v,pp(with)]
1-[pp(on),v,np]
1-[pp(on),expl(there),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 43.3 – Verbs of Emission: Verbs of Smell Emission
3 Verbs

reek smell stink

Signature #82 (4 Patterns – 2 Positive) uniquely identifies semantic class 43.3

0-[np,v,np]
1-[np,v]
1-[np,v,pp(of)]
3-[np,v,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 43.4 – Verbs of Emission: Verbs of Substance Emission
27 Verbs

belch bleed bubble dribble drip drool emanate exude foam gush leak ooze pour puff radiate seep shed slop spew spill spout sprout spurt squirt steam stream sweat

Signature #76 (9 Patterns – 8 Positive) uniquely identifies semantic class 43.4

0-[np,v,np]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(from)]
1-[np,v,pp(over)]
1-[np,v,pp(through)]
1-[np,v,pp(with)]
1-[pp(over),v,np]
1-[pp(over),expl(there),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 45.1 – Verbs of Change of State: Break Verbs
13 Verbs

break chip crack crash crush fracture rip shatter smash snap splinter split tear

Signature #134 (12 Patterns – 8 Positive) uniquely identifies semantic class 45.1

0-[np,v,np,pp(with)]
0-[np,v,self]
0-[np,v,self,pp(on)]
0-[np,v,pp(at)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(against)]
1-[np,v,np,pp(to)]
1-[np,v,np,pp(with)]
1-[np,v,poss,np]
1-[np,v,adv(easily)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 44 – Destroy Verbs
14 Verbs

annihilate blitz decimate demolish destroy devastate exterminate extirpate obliterate ravage raze ruin waste wreck

Signature #14 (10 Patterns – 2 Positive) uniquely identifies semantic class 44

0-[np,v]
0-[np,v,np,adjective]
0-[np,v,np,pp(from)]
0-[np,v,np,pp(from),pp(into)]
0-[np,v,np,pp(into)]
0-[np,v,np,pp(to)]
0-[np,v,adv(easily)]
0-[np,v,pp(at)]
1-[np,v,np]
1-[np,v,np,pp(with)]

The positive portion of this signature identifies these 4 semantic classes in the positive signature suite:

17.2 25.3 44 9.9

Also, the positive portion of this signature is a subset of the signatures of these 23 semantic classes:

11.1 11.4 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 24 25.1 25.3 31.1 39.1 42.1 44 45.1 45.2 45.4 9.8 9.9

Semantic class 45.2 – Verbs of Change of State: Bend Verbs
7 Verbs

bend crease crinkle crumple fold rumple wrinkle

Signature #115 (10 Patterns – 7 Positive) uniquely identifies semantic class 45.2

0-[np,v,np,pp(in)]
0-[np,v,np,pp(with)]
0-[np,v,pp(at)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(against)]
1-[np,v,np,pp(into)]
1-[np,v,np,pp(with)]
1-[np,v,adv(easily)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 45.3 – Verbs of Change of State: Cooking Verbs
44 Verbs

french_fry bake barbecue blanch boil braise broil brown charbroil charcoal_broil coddle cook crisp deep_fry fry grill hardboil heat microwave oven_fry oven_poach overcook pan_broil pan_fry parboil parch percolate perk plank poach ...

Signature #66 (8 Patterns – 6 Positive) uniquely identifies semantic class 45.3

0-[np,v,np]
0-[np,v,pp(at)]
1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(in)]
1-[np,v,np,pp(to)]
1-[np,v,adv(easily)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 45.5 – Verbs of Change of State: Verbs of Entity-Specific Change of State
21 Verbs

blister bloom blossom burn corrode decay deteriorate erode ferment flower germinate molder molt rot rust sprout stagnate swell tarnish wilt wither

Signature #75 (2 Patterns – 1 Positive) identifies semantic classes: 40.4 45.5

0-[np,v,np]
1-[np,v]

The positive portion of this signature identifies these 5 semantic classes in the positive signature suite:

28 40.1.1 40.1.3 40.4 45.5

Also, the positive portion of this signature is a subset of the signatures of these 64 semantic classes:

10.3 10.4.1 10.4.2 21.1 22.2 25.1 25.2 26.1 26.7 28 35.1 36.1 36.3 37.3 37.4 37.5 37.6 37.8 37.9 38 39.1 39.2 39.5 40.1.1 40.1.2 40.1.3 40.2 40.3.1 40.3.3 40.4 40.5 40.6 40.7 40.8.1 40.8.2 40.8.4 41.1.1 41.2.1 43.1 43.2 43.3 43.4 45.1 45.2 45.3 45.4 45.5 45.6 47.1 47.2 47.3 47.4 47.5.2 47.5.3 48.1.1 48.2 48.3 49 51.1 51.3.1 51.4.1 51.4.2 51.5 53.2

Semantic class 45.4 – Verbs of Change of State: Other Alternating Verbs of Change of State
257 Verbs

abate accelerate acetify acidify advance age agglomerate air alkalify alter ameliorate americanize atrophy attenuate awake awaken balance blacken blast blunt blur brighten broaden brown burn burst calcify capsize caramelize carbonify ...

Signature #57 (13 Patterns – 7 Positive) uniquely identifies semantic class 45.4

0-[np,v,np]
0-[np,v,np,pp(with)]
0-[np,v,pp(at)]
0-[np,v,pp(with)]
0-[pp(on),v,np]
0-[pp(on),expl(there),v,np,pp(of)]
1-[np,v]
1-[np,v,adjective]
1-[np,v,np]
1-[np,v,np,pp(on)]
1-[np,v,np,pp(with)]
1-[np,v,adv(easily)]
1-[np,v,pp(on)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 45.6 – Verbs of Change of State: Verbs of Callibratable Changes of State
25 Verbs

appreciate balloon climb decline decrease depreciate differ diminish drop fall fluctuate gain grow increase jump mushroom plummet plunge rise rocket skyrocket soar surge tumble vary

Signature #73 (5 Patterns – 2 Positive) uniquely identifies semantic class 45.6

0-[np,v,np]
0-[expl(there),v,np,pp(in)]
0-[pp(in),v,np]
1-[np,v]
1-[np,v,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 9 semantic classes:

35.1 40.2 40.3.1 43.2 45.6 47.1 47.2 47.4 47.5.2

Semantic class 46 – Lodge Verbs
11 Verbs

bivouac board camp dwell live lodge reside settle shelter stay stop

Signature #119 (8 Patterns – 4 Positive) uniquely identifies semantic class 46

0-[np,v,np,pp(in)]
0-[np,v,pp(with)]
0-[expl(there),v,np,pp(at)]
0-[pp(at),v,np]
1-[np,v,np,pp(in)]
1-[np,v,pp(at)]
1-[np,v,pp(in)]
1-[np,v,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 47.2 – Verbs of Existence: Verbs of Entity-Specific Modes of Being
42 Verbs

billow bloom blossom blow breathe bristle bulge burn cascade corrode decay decompose effervesce erode ferment fester fizz flow flower foam froth germinate grow molt propagate rage ripple roil rot rust ...

Signature #130 (8 Patterns – 7 Positive) uniquely identifies semantic class 47.2

0-[np,v,np,pp(over)]
1-[np,v]
1-[np,v,pp(in)]
1-[np,v,pp(over)]
1-[np,v,pp(through)]
1-[np,v,pp(with)]
1-[pp(in),expl(there),v,np]
1-[pp(through),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 47.1 – Verbs of Existence: Exist Verbs
26 Verbs

coexist correspond depend dwell endure exist extend flourish languish linger live loom lurk overspread persist predominate prevail prosper remain reside shelter stay survive thrive tower wait

Signature #132 (7 Patterns – 5 Positive) uniquely identifies semantic class 47.1

0-[np,v,np,pp(to)]
0-[np,v,pp(with)]
1-[np,v]
1-[np,v,pp(in)]
1-[np,v,pp(on)]
1-[expl(there),v,np]
1-[pp(in),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 47.3 – Verbs of Existence: Verbs of Modes of Being Involving Motion
35 Verbs

bob bow creep dance drift eddy flap float flutter hover jiggle joggle oscillate pulsate quake quiver revolve rock rotate shake stir sway swirl teeter throb totter tremble undulate vibrate waft ...

Signature #71 (7 Patterns – 5 Positive) uniquely identifies semantic class 47.3

0-[np,v,np]
0-[np,v,pp(with)]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(over)]
1-[pp(over),v,np]
1-[pp(over),expl(there),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

43.4 47.3

Semantic class 47.4 – Verbs of Existence: Verbs of Sound Existence
6 Verbs

din echo resonate resound reverberate sound

Signature #81 (7 Patterns – 6 Positive) uniquely identifies semantic class 47.4

0-[np,v,np]
1-[np,v]
1-[np,v,pp(in)]
1-[np,v,pp(through)]
1-[np,v,pp(with)]
1-[pp(through),v,np]
1-[pp(through),expl(there),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 47.5.1 – Verbs of Existence: Verbs of Group Existence: Swarm Verbs
10 Verbs

abound bustle crawl creep hop run swarm swim teem throng

Signature #116 (6 Patterns – 4 Positive) uniquely identifies semantic class 47.5.1

0-[np,v,np,pp(in)]
0-[np,v,np,pp(with)]
1-[np,v,pp(in)]
1-[np,v,pp(with)]
1-[pp(in),v,np]
1-[pp(in),expl(there),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

43.2 47.5.1

Semantic class 47.5.2 – Verbs of Existence: Verbs of Group Existence: Herd Verbs
14 Verbs

accumulate aggregate amass assemble cluster collect congregate convene flock gather group herd huddle mass

Signature #157 (4 Patterns – 3 Positive) uniquely identifies semantic class 47.5.2

0-[np,v,pp(with)]
1-[np,v]
1-[np,v,np]
1-[np,v,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 4 semantic classes:

35.1 40.2 43.2 47.5.2

Semantic class 47.5.3 – Verbs of Existence: Verbs of Group Existence: Bulge Verbs
3 Verbs

bristle bulge seethe

Signature #58 (5 Patterns – 2 Positive) uniquely identifies semantic class 47.5.3

0-[np,v,np]
0-[np,v,np,pp(with)]
0-[np,v,pp(in)]
1-[np,v]
1-[np,v,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 12 semantic classes:

22.2 36.1 36.3 37.5 37.6 43.1 43.2 43.4 47.2 47.4 47.5.3 53.2

Semantic class 47.6 – Verbs of Existence: Verbs of Spatial Configuration
39 Verbs

balance bend bow crouch dangle flop fly hang hover jut kneel lean lie loll loom lounge nestle open perch plop project protrude recline rest rise roost sag sit slope slouch ...

Signature #180 (5 Patterns – 5 Positive) uniquely identifies semantic class 47.6

1-[np,v,np,pp(on)]
1-[np,v,pp(on)]
1-[np,v,pp([next,to])]
1-[expl(there),v,pp(on),np]
1-[pp(on),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 47.7 – Verbs of Existence: Meander Verbs
18 Verbs

cascade climb crawl cut drop go meander plunge run straggle stretch sweep tumble turn twist wander weave wind

Signature #184 (4 Patterns – 4 Positive) uniquely identifies semantic class 47.7

1-[np,v,pp(from),pp(to)]
1-[np,v,pp(through)]
1-[expl(there),v,pp(through),np]
1-[pp(through),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 47.8 – Verbs of Existence: Verbs of Contiguous Location
40 Verbs

abut adjoin blanket border bound bracket bridge cap contain cover cross dominate edge encircle enclose fence fill flank follow frame head hit hug intersect line meet miss overhang precede rim ...

Signature #161 (5 Patterns – 3 Positive) uniquely identifies semantic class 47.8

0-[np,aux(be),v]
0-[np(and),v]
1-[np,v,np]
1-[np,aux(be),v,pp(by)]
1-[np(and),v]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 48.1.1 – Verbs of Appearance, Disappearance, and Occurrence: Verbs of Appearance: Appear Verbs
36 Verbs

appear arise awake awaken break burst come dawn derive develop emanate emerge erupt evolve exude flow form grow gush issue materialize open plop pop_up result rise show_up spill spread steal ...

Signature #114 (6 Patterns – 5 Positive) uniquely identifies semantic class 48.1.1

0-[np,v,np,pp(from)]
1-[np,v]
1-[np,v,pp(from)]
1-[np,v,pp(on)]
1-[expl(there),v,np,pp(on)]
1-[pp(on),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 48.1.2 – Verbs of Appearance, Disappearance, and Occurrence: Verbs of Appearance: Reflexive Verbs of Appearance
15 Verbs

assert declare define express form intrude manifest offer pose present proffer recommend shape show suggest

Signature #37 (6 Patterns – 3 Positive) uniquely identifies semantic class 48.1.2

0-[np,v]
0-[expl(there),v,self,np]
0-[pp(to),v,self,np]
1-[np,v,np]
1-[np,v,self]
1-[np,v,self,pp(to)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 48.2 – Verbs of Appearance, Disappearance, and Occurrence: Verbs of Disappearance
6 Verbs

die disappear expire lapse perish vanish

Signature #123 (6 Patterns – 3 Positive) uniquely identifies semantic class 48.2

0-[np,v,np,pp(into)]
1-[np,v]
1-[np,v,pp(from)]
1-[np,v,pp(into)]
3-[expl(there),v,pp(from),np]
3-[pp(from),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 48.3 – Verbs of Appearance, Disappearance, and Occurrence: Verbs of Occurrence
6 Verbs

ensue eventuate happen occur recur transpire

Signature #80 (6 Patterns – 5 Positive) uniquely identifies semantic class 48.3

0-[np,v,np]
1-[np,v]
1-[np,v,pp(at)]
1-[np,v,pp([in,front,of])]
1-[expl(there),v,np]
1-[pp([in,front,of]),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 49 – Verbs of Body-Internal Motion
15 Verbs

buck fidget flap gyrate kick rock squirm sway teeter totter twitch waggle wiggle wobble wriggle

Signature #50 (7 Patterns – 4 Positive) uniquely identifies semantic class 49

0-[np,v,np]
0-[np,v,np,adjective]
0-[np,v,poss,np]
1-[np,v]
1-[np,v,self,pp(into)]
1-[np,v,pp(down)]
1-[np,v,pp([out,of])]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 50 – Verbs of Assuming a Position
19 Verbs

bend bow crouch flop hang kneel lean lie perch plop rise sit slouch slump sprawl squat stand stoop straddle

Signature #163 (5 Patterns – 2 Positive) uniquely identifies semantic class 50

0-[expl(there),v,np,pp(in)]
0-[expl(there),v,pp(in),np]
0-[pp(in),v,np]
1-[np,v,pp(in)]
1-[np,v,pp(onto)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 51.1 – Verbs of Motion: Verbs of Inherently Directed Motion
20 Verbs

advance arrive ascend climb come cross depart descend enter escape exit fall flee go leave plunge recede return rise tumble

Signature #45 (6 Patterns – 4 Positive) uniquely identifies semantic class 51.1

0-[np,v,adjective]
0-[np,v,np]
1-[np,v]
1-[np,v,adjective]
1-[np,v,np]
1-[np,v,pp(from)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 51.2 – Verbs of Motion: Leave Verbs
3 Verbs

abandon desert leave

Signature #153 (2 Patterns – 1 Positive) identifies semantic classes: 51.2 52

0-[np,v,pp(from)]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 51.3.1 – Verbs of Motion: Manner of Motion Verbs: Roll Verbs
18 Verbs

bounce coil drift drop float glide move revolve roll rotate slide spin swing turn twirl twist whirl wind

Signature #54 (9 Patterns – 6 Positive) uniquely identifies semantic class 51.3.1

0-[np,v,np]
0-[np,v,np,pp(down)]
0-[np,v,np,pp(off)]
1-[np,v]
1-[np,v,adjective]
1-[np,v,np,pp(down)]
1-[np,v,pp(down)]
1-[np,v,pp(into)]
1-[np,v,pp(over)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 51.3.2 – Verbs of Motion: Manner of Motion Verbs: Run Verbs
124 Verbs

amble backpack bolt bounce bound bowl canter carom cavort charge clamber climb clump coast crawl creep dart dash dodder drift file flit float fly frolic gallop gambol glide goosestep hasten ...

Signature #69 (14 Patterns – 12 Positive) uniquely identifies semantic class 51.3.2

0-[np,v,np]
0-[np,v,pp(into)]
1-[np,v,np]
1-[np,v,np,pp(into)]
1-[np,v,np,pp(off)]
1-[np,v,np,pp(over)]
1-[np,v,np,pp(through)]
1-[np,v,pp(across)]
1-[np,v,pp(into)]
1-[np,v,pp(over)]
1-[np,v,pp(through)]
1-[np,v,pp([out,of])]
1-[expl(there),v,pp([out,of]),np]
1-[pp([out,of]),v,np]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 51.4.1 – Verbs of Motion: Verbs of Motion Using a Vehicle: Verbs That Are Vehicle Names
39 Verbs

balloon bicycle bike boat bobsled bus cab canoe caravan chariot coach cycle dogsled ferry gondola helicopter jeep jet kayak moped motor motorbike motorcycle parachute punt raft rickshaw rocket skate skateboard ...

Signature #166 (7 Patterns – 7 Positive) uniquely identifies semantic class 51.4.1

1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(around)]
1-[np,v,pp(across)]
1-[np,v,pp(along)]
1-[np,v,pp(around)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 51.4.2 – Verbs of Motion: Verbs of Motion Using a Vehicle: Verbs That Are Not Vehicle Names
10 Verbs

cruise drive fly oar paddle pedal ride row sail tack

Signature #165 (6 Patterns – 6 Positive) uniquely identifies semantic class 51.4.2

1-[np,v]
1-[np,v,np]
1-[np,v,np,adjective]
1-[np,v,np,pp(across)]
1-[np,v,pp(across)]
1-[np,v,pp(along)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 51.5 – Verbs of Motion: Waltz Verbs
20 Verbs

boogie bop cancan clog conga dance foxtrot jig jitterbug jive pirouette polka quickstep rumba samba shuffle squaredance tango tapdance waltz

Signature #167 (7 Patterns – 7 Positive) uniquely identifies semantic class 51.5

1-[np,v]
1-[np,v,np]
1-[np,v,np,pp(across)]
1-[np,v,np,pp(off)]
1-[np,v,pp(across)]
1-[np,v,pp(into)]
1-[np,v,pp(through)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 51.6 – Verbs of Motion: Chase Verbs
7 Verbs

chase follow pursue shadow tail track trail

Signature #36 (5 Patterns – 3 Positive) uniquely identifies semantic class 51.6

0-[np,v]
0-[np,v,pp(down)]
1-[np,v,np]
1-[np,v,np,pp(down)]
1-[np,v,pp(after)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 51.7 – Verbs of Motion: Accompany Verbs
6 Verbs

accompany conduct escort guide lead shepherd

Signature #44 (3 Patterns – 2 Positive) uniquely identifies semantic class 51.7

0-[np,v]
1-[np,v,np]
1-[np,v,np,pp(to)]

The positive portion of this signature identifies these 2 semantic classes in the positive signature suite:

42.2 51.7

Also, the positive portion of this signature is a subset of the signatures of these 19 semantic classes:

11.1 11.2 11.4 11.5 17.1 18.3 21.1 26.7 31.1 37.1 37.2 37.3 37.4 39.7 42.2 45.1 45.3 51.7 9.4

Semantic class 52 – Avoid Verbs
8 Verbs

avoid boycott dodge duck elude evade shun sidestep

Signature #153 (2 Patterns – 1 Positive) identifies semantic classes: 51.2 52

0-[np,v,pp(from)]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 53.1 – Verbs of Lingering and Rushing: Verbs of Lingering
8 Verbs

dally dawdle delay dither hesitate linger loiter tarry

Signature #131 (3 Patterns – 2 Positive) uniquely identifies semantic class 53.1

0-[np,v,np,pp(over)]
1-[np,v,pp(in)]
1-[np,v,pp(over)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 2 semantic classes:

47.2 53.1

Semantic class 53.2 – Verbs of Lingering and Rushing: Verbs of Rushing
3 Verbs

hasten hurry rush

Signature #172 (4 Patterns – 4 Positive) uniquely identifies semantic class 53.2

1-[np,v]
1-[np,v,poss,np]
1-[np,v,pp(through)]
1-[np,v,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 54.1 – Measure Verbs: Register Verbs
5 Verbs

measure read register total weigh

Signature #99 (3 Patterns – 1 Positive) uniquely identifies semantic class 54.1

0-[np,v,np,np]
0-[np,aux(be),v,pp(by)]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 54.2 – Measure Verbs: Cost Verbs
4 Verbs

carry cost last take

Signature #53 (5 Patterns – 1 Positive) uniquely identifies semantic class 54.2

0-[np,v,np]
0-[np,v,np,np]
0-[np,aux(be),v]
0-[np,aux(be),v,pp(by)]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 54.3 – Measure Verbs: Fit Verbs
12 Verbs

carry contain feed fit hold house seat serve sleep store take use

Signature #162 (3 Patterns – 2 Positive) uniquely identifies semantic class 54.3

0-[np,aux(be),v,pp(in)]
1-[np,v,np]
1-[np,v,np,pp(in)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 7 semantic classes:

19 30.1 31.2 35.1 45.3 54.3 9.8

Semantic class 54.4 – Measure Verbs: Price Verbs
8 Verbs

appraise assess estimate fix peg price rate value

Signature #68 (4 Patterns – 2 Positive) uniquely identifies semantic class 54.4

0-[np,v,np]
0-[np,v,pp(at)]
1-[np,v,np]
1-[np,v,np,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 4 semantic classes:

13.5.1 13.5.2 17.1 54.4

Semantic class 54.5 – Measure Verbs: Bill Verbs
12 Verbs

bet bill charge fine mulct overcharge save spare tax tip undercharge wager

Signature #103 (4 Patterns – 2 Positive) uniquely identifies semantic class 54.5

0-[np,v,np,pp(as)]
0-[np,v,np,pp(to)]
1-[np,v,np,np]
1-[np,v,np,pp(for)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 5 semantic classes:

13.5.1 26.1 26.3 26.7 54.5

Semantic class 55.1 – Aspectual Verbs: Begin Verbs
14 Verbs

begin cease commence continue end finish halt keep proceed repeat resume start stop terminate

Signature #177 (2 Patterns – 2 Positive) uniquely identifies semantic class 55.1

1-[np,v,np,pp(at)]
1-[np,v,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.

Semantic class 55.2 – Aspectual Verbs: Complete Verbs
4 Verbs

complete discontinue initiate quit

Signature #41 (2 Patterns – 1 Positive) identifies semantic classes: 27 55.2

0-[np,v]
1-[np,v,np]

The positive portion of this signature identifies these 10 semantic classes in the positive signature suite:

27 39.4 41.1.2 41.3.1 51.2 52 54.1 54.2 55.2 9.10

Also, the positive portion of this signature is a subset of the signatures of these 99 semantic classes:

10.3 10.4.1 10.4.2 10.7 10.8 10.9 11.1 11.2 11.4 11.5 12 13.5.1 13.5.2 15.1 17.1 17.2 18.1 18.2 18.3 19 20 21.1 21.2 22.2 22.3 23.3 24 25.1 25.2 25.3 25.4 26.1 26.3 26.4 26.5 26.7 27 29.7 30.1 30.2 31.1 31.2 32.1 33 34 35.1 36.2 36.3 37.1 37.2 37.3 37.4 37.9 38 39.1 39.2 39.3 39.4 39.7 40.1.2 40.2 40.7 40.8.1 41.1.1 41.1.2 41.2.2 41.3.1 42.1 42.2 43.1 43.2 43.4 44 45.1 45.2 45.3 45.4 47.3 47.5.2 47.8 48.1.2 51.1 51.2 51.3.2 51.4.1 51.4.2 51.5 51.6 51.7 52 54.1 54.2 54.3 54.4 55.2 9.10 9.4 9.8 9.9

Semantic class 56 – Weekend Verbs
9 Verbs

december holiday honeymoon overnight sojourn summer vacation weekend winter

Signature #181 (1 Patterns – 1 Positive) uniquely identifies semantic class 56

1-[np,v,pp(at)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite. Also, the positive portion of this signature is a subset of the signatures of these 24 semantic classes:

10.4.1 11.2 11.4 12 18.1 18.2 19 21.1 30.3 31.3 37.3 37.8 38 39.1 39.2 40.2 40.3.1 40.5 40.6 40.8.4 46 48.3 55.1 56

Semantic class 57 – Weather Verbs
27 Verbs

blow clear drizzle fog freeze gust hail howl lightning mist mizzle pelt pour precipitate rain roar shower sleet snow spit spot sprinkle storm swelter teem thaw thunder

Signature #186 (3 Patterns – 3 Positive) uniquely identifies semantic class 57

1-[expl(it),v]
1-[expl(it),v,np]
1-[expl(it),v,pp(with)]

The positive portion of this signature uniquely identifies this semantic class in the positive signature suite.