

The FrameNet Constructicon

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1 Introduction

The Berkeley FrameNet Project¹ has been engaged since 1997 in discovering and describing the semantic and distributional properties of words in the general vocabulary of English.² Notions from FRAME SEMANTICS (see Fillmore and Baker 2009 and references therein) provide the basis of the semantic description of the lexical units in the database, and sentences extracted from the FrameNet (FN) text corpora³ serve as material for analysis and annotation. The goal is to describe the combinatorial properties of each word, both semantically and syntactically, as these properties are revealed in the corpora.

The present chapter reviews some of the principles and displays some of the results of FrameNet's lexical research but focuses on an appended project for recognizing and cataloguing GRAMMATICAL CONSTRUCTIONS in English. The registry of English constructions to be created by this secondary project—the Constructicon—will describe the grammatical characteristics and semantic import of each construction, and will link to each a collection of sample sentences that have been annotated to exhibit these characteristics, using tools developed for the earlier lexical work.

While building a Constructicon has different goals from those of designing a construction-based grammar of the language, the intention is that each construction will be represented in a way compatible with the development of full grammar of the language of the sort presented elsewhere in this volume (see especially Sag this volume). In some cases we offer precise proposals for the treatment of a construction as it would appear in the grammar; in other cases the descriptions we present should be seen at least as organized observations about individual constructions, observations that need to be accounted for in a future complete grammar. In all cases we expect that the constructicon will contain useful information for advanced language pedagogy and that it will suggest new levels of expectation for parsing and other NLP activities.

The main body of the finished Constructicon will display the properties of constructional phenomena in an abbreviated format, alongside of a representative sample of English sentences annotated to display the properties claimed for each construction. The annotation procedure follows a method of identifying and labeling phrases originally developed for FN's lexicographic activities but adapted to indicate (1) the stretches of language that count as instances of given constructions (e.g. the phrase bracketed in { } in *They*

¹FrameNet has been supported by a series of grants from the National Science Foundation: first under grant IRI #9618838, March 1997–February 2000, 'Tools for lexicon-building'; then under grant ITR/HCI #0086132, September 2000–August 2003, entitled 'FrameNet++: An On-Line Lexical Semantic Resource and its Application to Speech and Language Technology.' Since 2004 it has continued under a number of subcontracts, through NSF and other agencies of the U.S. government, among them a subcontract from grant IIS-0325646 (Dan Jurafsky, PI) entitled Domain-Independent Semantic Interpretation for providing full-text FrameNet-style annotation of a number of texts that had also been annotated in the PropBank project.

²The authors are deeply indebted to Hans Boas and Ivan Sag, and three anonymous reviewers, for corrections and suggestions on an earlier version of this chapter.

³The main corpus used in the lexicographic work has been the British National Corpus. Information at <http://www.natcorp.ox.ac.uk/>.

hired me at {four dollars an hour}), (2) the segments of those stretches that are dictated by the requirements of the construction (e.g. the phrases bracketed in [] in *They hired me at {[four dollars] [an hour]}*), and (3) elements of the context whose properties require, or are selected by, the given construction instance (e.g. the preposition, outside of the { } bracketing, in *They hired me [at] {[four dollars] [an hour]}*).

This last annotational practice – that of recognizing and categorizing linguistically relevant parts of the governing context of an item under analysis – needs to be a feature of both lexical and constructional annotations. Until now FN has been careful to identify the requirements lexical units might impose on their dependents – constituting their VALENCE – but except for an attention to support verbs (Fillmore et al. 2003), by which, for example, *advice*, *comfort*, and *disagreement* appear in collocations like *give advice*, *take comfort*, and *have a disagreement*, there has been no consistent way to indicate the kinds of features seen in the preference for a ‘negative-ability’ context⁴ for verbs like *stand* in the meaning ‘tolerate’, as in *I can’t stand listening to this stuff*, a context needed not only for simple lexical items, but also for some complex or idiomatic expressions like *I can’t quite put my finger on it*.

1.1 FN’s Move from Words to Sentences

In their lexicographic work, FN researchers have concentrated on the semantic and syntactic properties of lexical items, covering in particular their meanings, their syntactic and semantic combinatorial affordances, and their relation to the semantic frames which inform their meanings.

Each lexical description in FN links a LEXICAL UNIT (LU) to the particular SEMANTIC FRAME that it EVOKES in the mind of the user, roughly in the way that *buy* brings to mind a *commerce* scenario, *eyebrow* evokes a *face* frame, *hot* finds its place in a *temperature* scale, and so on: the word FRAME covers any kind of experience-based conceptual structure or relation that constitutes the experiential background for understanding particular lexical meanings.

An LU is a pairing of a word and its meaning, usually a single word as it functions in a given frame. The analyses are based on annotators’ examination of corpus instances of each word; sentences are selected to exemplify the LU’s most typical COMBINATORY AFFORDANCES, as they have been observed in the corpus; the example sentences are annotated – manually but with computer assistance – in a way that identifies the frame being illustrated and displays the syntactic manner in which information about the frame is expressed in the sentence. The database created in this way includes information about individual frames (a single frame can provide the background for a large group of meaning-related LUs); each frame is associated with descriptions of the roles of the entities that participate in them (individuals, props, setting features), known as FRAME ELEMENTS (FEs); and each frame description includes a list of lexical units that belong to the frame. A *Commerce* scenario includes alongside of *buy* a number of other words including *purchase* (noun and verb), *sell*, *pay*, and a dozen or so others; the *Face* frame includes features and parts of faces beyond *eyebrow*; the *Temperature* scale includes the full range of vocabulary relating to temperature – *hot*, *cold*, *warm*, *cool*, *tepid*, *freezing*, and many others.

The FN annotations that have been created purely for lexicographic purposes illustrate one lexical unit each, and contain no information about parts of the sentence outside the scope of the selected LU. The purpose of such annotations is to show clear examples of the basic combinatorial possibilities for a single targeted LU, and the selection of material to be annotated is to cover the main varieties of combinatorial patterns observed in the corpus. The annotation is provided in a multi-layered, stand-off system with different kinds of information, linked to particular words or phrases associated with the TARGET LU, shown on sepa-

⁴*Can+not* is the most direct way to express the intended context here, but the ‘not’ part can be realized as any of the various ways of creating a negative polarity context, the ‘can’ part can be expressed with paraphrases like *be able* (*Are you able to stand living there?*), and a context with *too* can serve both meanings. That is, *I’m too short to reach it* = *I’m so short that I can+not reach it*.

rate dedicated layers, somewhat along the lines of a musical staff in which a chord extends across individual phrases, and the individual notes in the chord represent (1) the SEMANTIC ROLE or frame element (FE) assigned to the phrase, (2) the GRAMMATICAL FUNCTION of the phrase, and (3) the lexico-syntactic form or PHRASE TYPE. Reports based on such annotations, the FN LEXICAL ENTRIES, summarize the various ways in which, say, information about BUYER, SELLER, PRICE, and GOODS, are realized in the grammatical neighborhood of words like *buy*, *sell*, *cost*, *pay*, and *charge*, in respect to such functional notions as subject, object, oblique, etc., and in terms of the mandatory or optional choice of prepositions like *to*, *from*, and *for*, and the like.

The kinds of grammatical structures needed to exemplify these basic structural properties are more or less limited to relations of predication, modification, and complementation. Given the original purely lexicographic purpose of the project, this limitation was not seen as a problem: FN's goals were to characterize the main distributional properties of verbs, nouns, adjectives, and contentful prepositions, following valence-theoretic traditions,⁵ and for the most part we were able to achieve that. When the same words occur in syntactically more complex contexts, their ability to do so usually depends on just those basic properties. But there remain many sentences whose semantic and syntactic organization cannot be fully explained in terms of the kinds of structures recognized in FN's annotation database, or simple conjoinings or embeddings of these, and that is where the new research on grammatical constructions comes in.

A simple example of a sentence that demands more than simple lexical analysis is (1):

- (1) The skeptical are reluctant to believe that the unbelievable has happened.

This sentence contains two headless NPs, each containing only the definite determiner and an adjective. These are instances of distinct constructions, recognizable by the fact that the first NP *the skeptical* shows plural agreement (*are reluctant*) and stands for a generic class of human beings, while the second, *the unbelievable*, shows singular agreement (*has happened*) and refers to an abstractly characterized situation (See (73)). Neither phrase can be interpreted from its lexical material alone, and neither phrase can be regarded as a conventional multiword expression.

Although a great many of the entries in the current FN database are monolexemic verbs, nouns, or adjectives, in the course of this work the notion of LEXICAL UNIT as the target of analysis necessarily expanded to include linguistic objects that contained more than one word – such as phrasal verbs, like *take off* in the aeronautical sense, and preposition+noun patterns like *under arrest*, which semantically function as predicate adjectives. We also recognize the existence of verb+noun patterns, like *give advice*, which belongs more clearly to the concept of ‘advising’ than to ‘giving’. In these last two examples it is the noun (*advice* or *arrest*) that evokes the frame, and the accompanying verb or preposition serves a secondary function: these are the so-called SUPPORT WORDS.⁶

In addition the project has had to recognize IDIOMS and NOUN COMPOUNDS.⁷ While various makeshift devices were developed early in the project's history for including such structures within the limitations of a lexicography project, it soon became clear that a very large number of linguistic objects, including noun compounds, that function *as units* while at the same time having a describable internal structure could not be formally recognized within the technical limitations of the project as it existed.

Since FN is capable of describing the semantic and combinatory properties of individual words one at a time, the question came up of the possibility of analyzing entire sentences or texts by doing FN-style

⁵Especially in the work that followed Tesnière 1959, such as Allerton 1982, Emons 1974, 1978, Helbig and Schenkel 1973, Herbst 1983, 1987, Herbst et al. 2004; cf. Fillmore 2007, Fillmore 2009.

⁶Neither of these collocations is explicitly listed in the FN lexicon, but they are derivable from our annotation of *give* and *under* as support words for *advice* and *arrest* respectively.

⁷Lexical units that select PP complements with particular prepositions are simply treated as such, and not as phrasal in nature: *depend (on)*, *defer (to)*; *fond (of)*, *complicit (in)*; *appendage (to)*, *member (of)*, etc.

annotations for each (frame-bearing⁸) word in it. Any attempt to do that, however, requires being prepared for *all* contexts of words, not just exemplary ones, and recognizing a vast number of grammatical structures that go beyond those needed for elucidating the basic properties of ordinary verbs, nouns, and adjectives. It quickly became clear that a FN designed for valence-tracking lacked the requisite technology for many aspects of full text analysis.

With the help of a Small Grant for Exploratory Research from the National Science Foundation⁹, FN programmers introduced some changes to the structure of the database and created a number of adaptations to the annotation software that made it possible to locate and annotate sentences in the FN corpora in terms of the grammatical rules that licensed the structures found in them. These modifications to the FN toolbox have enabled the recognition and description of many kinds of listable linguistic structures beyond the ones that were earlier included in the FN lexicon.

The next two sections, which draw from discussions in Fillmore 2006, illustrate basic aspects (and limitations) of a purely lexicographic or word-based analysis of a sentence, first with an invented simple sentence in which all or most of the noteworthy characteristics are located in words and their syntactic/semantic valences, and second with an attested passage for which a lexicographic analysis falls well short of a full understanding of the sentence's meaning.

1.2 Case 1: The Apparent Sufficiency of Lexical Analysis

The major unit of description for a frame-bearing lexical unit is its valence,¹⁰ beginning with a list of the semantic roles (if any) of each of its syntactic dependents, identifying these as corresponding elements of the frame the word evokes. Since the phrases that constitute the syntactic dependents of a predicator can themselves include frame-bearing predicators, it seemed that the tools available in FN should make it possible to characterize the basic semantic-syntactic structures of whole sentences by doing complete FN analyses of each word in the sentence – technically by adding separate annotation layer sets for each LU. The possibilities of clause embedding allowed for information from one frame to serve as an element of a higher frame, and the possibilities of ARGUMENT SHARING (through ‘control’ relations) allowed detailed cross-clause articulation of the syntactico-semantic structures in a sentence.¹¹

To see how this works out, consider sentence (2):

- (2) The Secretary ordered the Committee to consider selling its holdings to the members.
- The highest predicate in this sentence is the `Communication`¹² verb *order*. By appropriately labeling the phrases that are in the grammatical construction with this word we can show who gave the order (realized as the subject – *the Secretary*) and who received the order (the direct object – *the*

⁸Not, strictly speaking, each word: many lexical items do not require the kind of treatment FN can provide. For example, in non-specialist texts there is no need to provide for names of insect species, carbon compounds, Hindu gods, numerals, etc., and grammatical markers and other function words appear only in the description of their lexical or grammatical hosts.

⁹NSF #0739426 SGER: ‘Beyond the Core: A Pilot Project on Cataloging Grammatical Constructions and Multiword Expressions in English,’ 2007–2008. Contributors to the work have been Dr. Collin F. Baker, Chris Oei, Jisup Hong, Michael Ellsworth, and the present authors.

¹⁰While this usage conforms with the use of ‘valence’ (or ‘valency’) in the tradition of valency dictionaries, it is narrower than the use introduced in SBCG work, where VAL stands for the list of arguments a given linguistic entity ‘needs’ at a particular level of representation.

¹¹This articulation is showable in the annotations only when there is a direct or indirect structural relation between predicates and their arguments: relations of anaphora are not a part of FN annotation.

¹²For this initial discussion the frames will be given very general names. FN makes more fine-grained distinctions than Communication, Cognition, and Commerce as presented in this paragraph. Throughout the chapter we use a fixed-width font for frame names.

Committee), as well as the content of the order (expressed as the infinitive complement that begins with *to consider*).

- By recognizing the constituents that are directly or indirectly grammatically linked to the *Cognition* verb *consider*, the highest predicate of *order*'s complement, we show that it is the *Committee* that is ordered to think about something (given the control requirements of *order*), namely selling the *Committee*'s holdings.
- From the phrases that are in a grammatical relation with the *Commerce* verb *sell* we learn what is to be sold (the direct object of *selling*, namely *its holdings*), and who the potential buyers are (represented by the prepositional phrase at the end of the sentence, *to the members*). The sellers are identified as *the Committee* due to the control properties specified by *consider*.
- The fact that in this context the words *Secretary*, *Committee*, and *members* all fail to be accompanied by their potential *of*-complements indicates, by grammatical convention,¹³ that the organization to which the secretary, the committee, and the members belong is known in the context of the ongoing discourse. This sentence cannot be used in a conversation whose participants do not already have in mind all of the information behind the speaker's use of the definite article.

We thus approach an understanding of an entire sentence – that part of the ‘understanding’ of a sentence that is explainable in terms of its linguistic structure alone – by integrating all of the parts into a single representation. The basic semantic organization of this simple sentence has it that A gave an order to B; B's assignment is to consider performing the action C; C involves selling D to E; D is property owned by B; A, B, and E belong to an organization that is not identified in the sentence but must be known to the communicators.¹⁴

1.3 Case 2: The Inadequacy of Simple Lexical Analysis

Of course not every English sentence is so cooperative, with simple complement-taking verbs, simple noun phrases, and orderly markers of grammatical structure. A sample of the kinds of linguistic observations that require information that goes beyond single words and their contributions to sentence meaning can be found in the first three sentences of a leader in the *Economist* magazine of May 10, 2007, on the resignation of Tony Blair:

- (3) For all the disappointments, posterity will look more kindly on Tony Blair than Britons do today. Few Britons, it seems, will shed a tear when Tony Blair leaves the stage on June 17th after a decade as prime minister, as he finally announced this week he would do. Opinion polls have long suggested that he is unpopular.

Here are some observations about this sentence:

- *for all the disappointments*: *for all X*, unexplained through simple construals of *for* and *all*, is a concessive structure with a meaning like ‘in spite of’. X is limited to either a definite NP with or without *of* (**for all of several disasters in his first term*, **for all events during his term*) or

¹³Actually, in the case of *Secretary* and *Committee*, the explanation involves the use of the definite article, since these words can otherwise be used without the relatum being contextually given; for *member*, however, even if the word occurs without a definite article – as in *Are you a member?* – the unmentioned club or organization is taken as pragmatically known.

¹⁴Not explained by FN representations alone are the assumption that the *its* refers back to the mentioned committee and the parsimonious assumption that the unnamed background organization is the same for all three words *Secretary*, *Committee*, and *members*.

- a *that*-clause. In the latter case, the interpretation is ‘in spite of the fact that . . .’. A related construction involves a relative clause-like structure: *for all he’s done, for all that has changed*.
- *look kindly on X*: a verb-headed collocation meaning ‘judge positively’¹⁵
 - *posterity will look more kindly on Tony Blair than Britons do today*: a comparison involving different degrees of ‘looking kindly on Tony Blair’
 - *than Britons do today* is a double-focus comparand: [*Britons*] [*today*], if each is accented, seems to presuppose an analysis of *posterity* as something like [*the world*] [*in the future*]
 - *Britons do today*: an elliptical clause in which the *do* is to be reconstructed as ‘look [degree] kindly on Tony Blair’, where the nature of [degree] is unspecified here but it will be exceeded in the case of ‘posterity’
 - *few Britons*: unlike *a few Britons*, not a vague indication of cardinality, but a negator (= ‘not many’), creating a negative polarity context in the predicate phrase
 - *it seems*: epistemic parenthetical, applying to the surrounding clause, bearing no structural relation to anything else in the sentence
 - *shed a tear*: a collocation (*shed tears*), but also a potential ‘minimizer’ expression fitting negative polarity contexts, e.g. *drink a drop, lift a finger, give a damn* (Israel 2002, Horn 1989: 400)
 - *leave the stage*: metaphor referring here to resigning from the PM-ship
 - *on June 17th*: use of *on* with day references (compare with months, day parts, day-anchored day parts, time points, etc.: *in March, in the morning, on the morning of the next day, on the weekend, at noon*)
 - *June 17th*: one of the several ways to associate a month-day number with a month name in English (cf. *June the 17th, the 17th of June*)
 - *as he announced he would do*: anaphoric or relativizing use of *as* (consider replacing *as* with *which*).
 - *this week*: an expression from a system with the three-way contrast *this/next/last* for deictically-anchored calendric expressions, occurring with *week/month/year*, etc., as well as weekday names and seasons, but not *day*
 - *have long suggested*: this use of *long* seems to be limited to the position between the auxiliary *have* and the verbal participle, and the verbal meaning seems to be limited in ways yet to be explored: compare *I have long known that . . .* with the unacceptable simple past tense **I long knew that . . .* and with inappropriate verb meaning **I have long lived in California*; in many other uses *long* as a time-duration adverb is limited to negative polarity contexts: *I won’t be long*, etc.

This short passage illustrates the density of complex structures that can be found in ordinary texts. There are binary patterns with specific kinds of fillers in two adjacent positions: *this week, last year, next month*, etc.; *June 17th, March 4th*, etc. There are lexical items with very specific functions and positional possibilities: *as, long, on, do*. There are phrasings with conventional collocations or non-predictable meanings: *for all, shed a tear, leave the stage*. And there are words that participate in larger constructions that they syntactically mark: *few, more*.

The Construction that is being produced is designed to handle most if not all of the linguistic features relevant for the constructions identified or alluded to in the *Economist* passage.

¹⁵Other fixed expressions with adverbial *kindly* include the negative polarity item (NPI) *take kindly to* and the usually parenthetical phrase *to put it kindly*.

2 Annotation

Since FN annotations were presented in tiers or layers, one set of layers for each LU and the phrases that count as its frame elements, it seemed that an adaptation of the tool for creating such annotations should be possible for showing the corresponding kinds of information for grammatical structures. For each construction instantiated in a sentence, it should be possible to assign a separate set of layers corresponding to the construction: one layer to identify the expression licensed by the construction, and another layer to identify the constituent components of that expression. Together these layers identify the CONSTRUCT described by the construction (on which see below). Other layers may identify construct-external elements, e.g., ‘co-textual’ requirements on uses of the construction.

2.1 FrameNet Annotation

FN, as described above, uses the notion of semantic frame as a basic unit of description: frames are schematic understandings of relations among frame elements in a state of affairs. Frame elements are the participants, props, situation determinants, etc. that are understood as present in any instance of a given frame. Particular lexical units are described as belonging to specific frames (polysemous words can belong to different frames), and sentences containing them are annotated in a way that identifies the frame, marks the phrases that are in a grammatical relation to the relevant LU. Those phrases are labeled with respect to their grammatical relation to the LU (GF, or grammatical function), to their syntactic form or phrase type (PT), and the frame element which they express (FE). Since the resulting valence descriptions that make up the core of each LEXICAL ENTRY are derived from the annotation, the annotators seek to include a representative sample of sentences for each LU in each frame, to show the variety of lexical and phrasal realizations of the FEs.

The annotations are presented in sets of layers, each layer dedicated to one kind of information (FE, GF, the target LU, and so on). The FE is assigned manually by the annotator, who is generally working one frame at a time; the GF and PT labels are assigned automatically but manually checked by the annotator. The annotator uses a number of principles for determining the boundaries of the constituents blocked off for labeling, as well as for dealing with LUs or FE-realizing phrases that are discontinuous. Since the annotations are to show the linking between syntactic and semantic-role objects, the labeled phrases include prepositions, complementizers, and other markers of syntactic role. Further, FEs that are interpreted in ‘higher’ predicates rather than in the structure immediately surrounding the target LU are also labeled, and information about FEs that are core parts of the frame but which are unexpressed in the current sentence are described within a taxonomy of implicit arguments.

An example of such annotation is given as Figure 1, which shows the annotation tool set up for what is called the `Compliance` frame for an analysis of sentence (4):

- (4) We complied fully with the instructions and resubmitted the paper in January 1992.

The bottom panel contains the labels available to the annotator for selecting the FEs.¹⁶ In the case of this frame, the core FEs include the `NORM` and the mutually exclusive trio `PROTAGONIST`, `ACT`, and `STATE_OF_AFFAIRS`. (FE names are indicated with small capitals.) The list of peripheral FEs includes `DEGREE`, which is illustrated in this sentence. The `NORM` is the regulation, principle, doctrine, or law that

¹⁶Other views of the workspace for the same sentence provide, in the bottom panel, the annotators’ choices for grammatical function (GF) and phrase type (PT). Automatic chunking software supplies the labels on these levels, and the annotator uses the relevant annotation panels only to make corrections.

Layer	W	e	c	o	m	p	i	e	d	f	u	l	l	y	w	i	t	h	t	e	i	n	s	t	r	u	c	t	i	o	n	s	a	n	d
FE	P	r								D	e	g	r	e	N	o	r	m																	
GF	E	x								D	e	p			D	e	p																		
PT	N	P								A	V	P			P	P																			
Other																																			
Verb																																			
Sent																																			

	Compliance.comply.v - FE	Compliance.comply.v - GF	Compliance.comply.v - PT	Compliance.comply.v
● Act <F2>			○ Manner <M>	
● Norm <F7>			○ Means <F12>	
● Protagonist <F...>			○ Reason <F5>	
● State_of_Affair...			○ Time <T>	
○ Degree <G>			✦ Depictive <F1...>	
○ Judge <>			✦ Result <R>	

Figure 1: Lexicographic annotation with *comply* as the target

governs some kind of action. The PROTAGONIST is a person whose behavior is judged in respect to compliance with the NORM, i.e. by honoring it or violating it, as in the subject of (5a); the ACT stands for an act which is evaluated as appropriate or not by reference to the NORM, as in the subject of (5b); and the FE STATE_OF_AFFAIRS is illustrated by the subject of (5c):

- (5) a. You broke the law.
 b. The removal of the child was in breach of my right of custody.
 c. The wiring in this room is in violation of the county building code.

The NORM can appear, depending on the lexical requirements, as direct object (*broke the law*), in an *of*-phrase (*violation of the law*), in a *with*-phrase, as in Figure 1 *complied with the instructions*, and in a number of other ways.

Thus, the FN database includes:

1. A list of frames, with informal frame descriptions, definitions of named frame elements, a partition among the frame elements between those that are essential to an understanding of the frame (the CORE frame elements) and those that are more generally applicable across frames (the PERIPHERAL frame elements),¹⁷ and lists of lexical units that have (so far) been assigned to the frame. As noted, the words that belong in a single frame do not have to be of the same part of speech: *comply*, *compliant*, and *compliance* are in the same frame. And since many frames cover an area across which contrasts and oppositions are defined (*hot* and *cold* are in the same frame, as are *comply* and *flout*, *ascend* and

¹⁷Roughly, core elements are essential to the concept underlying a frame, and peripheral elements more or less correspond to what valency theory writers refer to as ‘circumstantial’ (Fillmore 2003, Lyons 1977: 496–7, Tesnière 1959: 102f, 125f). Since one of our annotational goals was to have something to say about each constituent that occurred within the grammatical scope of a target LU, we needed a way of describing clausal elements that provided information not directly related to the current frame, and we referred to these as EXTRATHEMATIC. Such elements often introduce frames of their own, possibly frames that take the content of the main clause as a semantic component: for example, to describe the last PP in *I set fire to my brother’s house in retaliation* as extrathematic is to say that the concept of ‘revenge’ is not a necessary component of the Ignition frame.

descend, praise and criticize, etc.), the members of a single frame are not limited to synonyms or near-synonyms.

2. A body of annotated sentences, with each sentence annotated for the individual LU it has been chosen to illustrate. The annotators' assignment is to survey the uses of the LU in the hope of offering samples of each of its significant syntactic combinatory possibilities (e.g. both active and passive for passivizable transitive verbs, varieties of path-indicating expressions for motion verbs, examples of words in all parts of speech both with and without omissible arguments, and so on), and to prefer examples with lexical material that reflects frame-relevant conditions.¹⁸ The annotator selects and labels the phrases that express given FEs and then checks the results of the parsing-based automatic assignment of grammatical functions and phrase types, selecting from a collection of categories deemed to be 'lexicographically relevant' (Atkins et al. 2003).
3. Lexical entries containing a dictionary-style definition of each LU, tables showing the syntactic realization possibilities for each FE, and tables showing the range of valence possibilities, each of these linked to sentences from the annotation set. These tables are generated automatically from the annotations.
4. A network of semantic relations among the frames and FEs, covering various kinds of frame-to-frame relations, including Inheritance, Subframe (a part-whole relation), Using, Causative_of, Inchoative_of, Perspective_on, Precedes, etc. Related frames have related FEs, but the realization of these FEs may differ greatly across frames (indeed, within-frame differences in FE realization is not uncommon, cf. *Giving*, with *give, bestow*, and noun *donor*).
5. The following kinds of information are derivable from the database, but not presented in it directly: weak paraphrasability relations (*complied with X* paraphrases *did not violate X*); interpretation of unexpressed core arguments (according to whether the omission (1) is dictated by a particular construction, (2) is permitted under existential interpretation, or (3) is permitted under anaphoric interpretation). In the existing FN entries it is possible, for nouns that participate as semantic heads in support structures, to know which support verbs or support prepositions have been observed to occur with them, and, by examining the assignment of FEs in annotations, to know what LEXICAL FUNCTIONS they serve (in the sense of Mel'čuk 1996).
6. In addition to the material just described, which is limited to FN's lexicographic research, FN has accumulated a body of texts that have been annotated for (more or less) all of the frame-bearing words they contain. In the layered representation (Figure 1) each frame-bearing LU token is given its own set of annotation layers.

2.2 Constructional Annotation

Constructions are the rules that license 'new' linguistic signs based on other linguistic signs. The structures licensed by one or more constructions are called CONSTRUCTS, following the terminology of Sign-based Construction Grammar. A construction can be described formally, in Attribute-Value Matrix form, or informally in prose, but annotation must be of constructs: each annotation captures the properties of a particular construct with respect to a particular construction that licenses it. To give a brief example, a

¹⁸For these reasons FN annotation data cannot be relied on to show frequency information. In many cases the most frequent uses of a verb will have only pronominal arguments: having representative examples of *I didn't like it* or *I think so*, among the annotations for *like* and *think* would not be useful.

Month-plus-Date construction licenses expressions like *June 14th*, *May 2nd*, and *April 1st*.¹⁹ If we are momentarily interested in the *Month-plus-Date* construction, we identify *June* and *14th* as the two necessary parts of the phrase *June 14th*, and indicate their relation to the meaning of the phrase; annotation of this phrase for *Month-plus-Date* requires identifying the categories month-name and ordinal-number but ignores any other constructions which may be involved in the licensing of the complete phrase, such as whatever apparatus may be needed for the creation of English ordinal numbers. By the same token, a single stretch may be licensed by multiple constructions (e.g. a phrase which is simultaneously a VP and an imperative), and so is annotated separately with respect to each construction.

Given these assumptions, two segmentations are needed for constructional annotation, one inside the other: first, we need to block off the stretch of a passage that is accounted for by the construction, and second, we need to identify the linguistic entities within that stretch which represent its constituent elements. Together these layers indicate the CONSTRUCT described by the construction. The entire stretch corresponds to the construct's MOTHER sign. The components are the DAUGHTERS; paralleling FN terminology we also refer to these as CONSTRUCT ELEMENT (CEs). Mnemonic labels will be associated with each of these segmentations, but their interpretation will be provided by the associated construction description.

The identification and labeling of constructs and CEs are only partial grammatical descriptions. The construction description – prose, just as frame descriptions are – fills in other information: in the case of the construct *July 14th*, the construction description will point to the relevant frames regarding dates, months, years, etc., and will assign to this construct the information that it designates a ‘day’-size unit (rather than week, month, year, etc.). This information is relevant in several structures, accounting for the selection of the preposition *on* (rather than *in* or *at*). The description also specifies that the outputs of this construction are assigned to the same calendric frame as those produced by the more complex construction that yields *the 14th of July*.

Two final layers (or sets of layers) may be needed in individual cases, one for showing the valence realizations of valence-bearing constructs, and one for relevant elements of the governing context. For constructs that are frame-evoking elements in their own right, the annotators are encouraged to demonstrate this by showing the realization of the valents of such expressions. Thus, the construction that gives us *make one's way*, illustrated by (6), licenses the combination of a certain class of verbs (on which see Goldberg 1995) with a possessed *way*-headed NP to create what functions as a multiword verb evoking the MOTION frame:

- (6) a. [_{Theme}They] hacked their way [_{Source}out] [_{Goal}into the open].
 b. [_{Theme}We] sang our way [_{Path}across Europe].
 c. Hopefully [_{Theme}he]’ll make his way [_{Goal}to our location].

By assigning the products of this construction to MOTION, our constructional annotation allows for noting the MOTION FEs that are present in any sentence containing the construction, in a manner entirely consistent with FN annotation of regular verbs of motion: with labels indicating the spans of THEME, SOURCE, GOAL, etc., along with GF and PT information.²⁰

For constructs of particular types, a layer may be needed to indicate needed or preferred GOVERNING CONTEXTS. One such context is provided by support verbs or prepositions. The *Rate.speed* construction, which licenses such expressions as *thirty miles an hour* and *five km per day*, additionally evokes a

¹⁹Construction names are given in italicized fixed-width font.

²⁰For temporary technical reasons we called these constituents ‘construct elements’ rather than frame elements in our annotation; but conceptually these are frame element labels.

Speed frame which has an ENTITY FE (i.e. something must potentially move to have a speed). The construction allows for expression of this FE, among other ways, by means of a support verb *do*: *he's doing over a hundred miles an hour*. Annotation of this proceeds exactly as it does for lexical annotation (with some kinks, described below): *he* is labeled ENTITY, *do* is labeled Support, and the stretch *a hundred miles an hour* is labeled as the construct which brings along this FE and support verb.

The parallels described above between LUs and constructions mean that the software needed for the one should be adaptable to the other. Identification and labeling of FEs and support words is essentially identical. Constructional annotation differs from FN lexicographic annotation primarily in that the frame-bearing units are themselves complex. Annotation of constructs and their associated CEs is done in two parts. In place of a TARGET LU (i.e. a frame-evoking element), we have a potentially multiword construct. The construct's span of text is delimited by a ConstructPT (CstrPT) label, whose name indicates the PT of the construct (technically this is the phrase type of the sign that is the mother of the construct). Then, the construct-internal constituents are identified as instantiating construct elements. The *Rate . speed* construction licenses an NP construct (*at [two miles per hour], a speed of [two miles per hour]*) with two construct-internal CEs, TIME and SPEED. The *Month-plus-Date* construction briefly outlined above specifies a construct of type noun (or \bar{N} /nominal), and two CEs – MONTH and DATE – with semantic and syntactic constraints on each. CE names are mostly mnemonic and do not, for instance, imply a hierarchy of syntactic or semantic types (though they may correspond to such; if so, this is described in prose in the definition of these CEs or the construction to which they belong). Like other CEs (and FEs), these construct-internal CEs are assigned PT labels: both are NP, in the case of *Rate . speed*. No GF is necessarily assigned however, as within the construct there is no necessary grammatical relation between the CEs: is *thirty miles* a dependent of *an hour*? Or is it the head? In such cases the traditional categories are not always appropriate, or at least it does not seem crucial to the annotation of the construction that a GF be chosen. The notion of GF is still sometimes needed, as in *make one's way*. A crucial property of this construction is that *one's way* takes the place of any object the verb might have had (whether it is itself a direct object depends on how such a relation interacts with other parts of the grammar, e.g. passivization or case assignment).

An example of a constructional annotation illustrating most of these properties is given as Figure 2. Moving from bottom to top: the construct comprises the stretch *squeezed her way*, and is a finite verb, as indicated by the label on the CstrPT layer.²¹ The phrase *her way* is identified as the CEE, the Construction Evoking Element, which indicates any lexically-limited material (if any). The two constituents within the construct are identified as a verb and an NP. They are assigned no GF, as discussed above. Skipping to the top line, we see that *squeezed* is labeled TRANSITIVE_MEANS_VERB – ‘transitive’ to indicate that the verb normally has a valent (the thing squeezed) which is unexpressible in the construction (compare the CE INTRANSITIVE_MEANS_VERB).²² The *way*-NP is identified as the WAY_EXPRESSION. Outside the construct are found two FEs: THEME and PATH, which are assigned GFs (External and Dependent, respectively) and PTs (NP and PP). Finally note the THEME label under *her*. This is located on a secondary layer of CE annotation, available for additional indications of FE (or CE) fillers which do not strictly adhere to the phrase structure of the sentence. On the assumption of FE-uniqueness per LU, this is an awkward way of indicating that the possessive pronoun in this construction is identified with (and has to agree with) the external argument. The *verb-way* construction is one of many which have such a subject-possessor FE identification requirement, including expressions of body movement (*crane one's neck*), and many other multiword verbal expressions, e.g. *change one's mind*, *eat one's fill*.

²¹Purely technical considerations led us to label this a finite VP rather than simply a verb.

²²The verb slot in this construction is also a site for certain kinds of linguistic creativity: frequently words that are not verbs elsewhere behave like verbs in *one's way* constructs: examples in the database include *nose*, *elbow*, and *acrobat*.

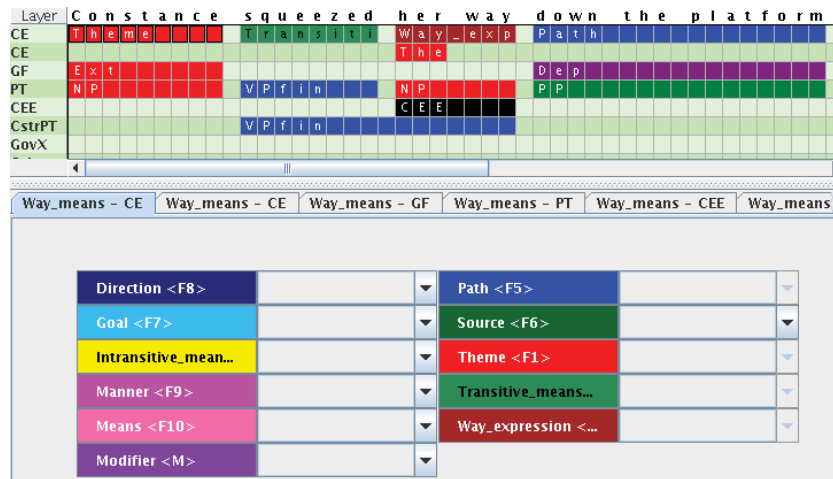


Figure 2: Annotation of an instance of the *verb-way* construction

3 Varieties of Constructions

We can classify constructions according to the kinds of constructs they create. The classes listed here are not intended to be complete, nor are they mutually exclusive. In this section we survey a number of constructional properties that need to be accounted for in a grammar and need to be explained in a construction. Following this brief survey, we exemplify and analyze a number of constructions examined by the FN team, bearing in mind this classification.

Frame-bearing constructions The expressions licensed by some constructions are frame-bearing entities, analogous to words that evoke frames. The resulting sign specifies expected (obligatory or optional) frame elements.

Several constructions have this property, including *verb-way*, which evokes the *Motion* frame and appears with FEs relevant for motion. The *Rate* construction evokes the *Ratio* frame with FEs *NUMERATOR* and *DENOMINATOR*. A subtler example is the construction that licenses *brothers* in *He was brothers with the class president*. As we discuss in the following section, the construction evokes a frame of *Reciprocity*, such that the relationship of brotherhood is understood as holding symmetrically even though that is not lexically entailed by *brother*.

Valence-augmenting constructions Some constructions may be described as augmenting the valence of an independently-licensed sign. One such construction is the comparative *-er*, which affixes to certain adjectives or adverbs and adds to its base's valence a phrase that indicates the standard against which some item is compared: *taller [than that one]*. This phrase is optionally omitted with definite interpretation. Where the modified adjective or adverb has complements of its own, the two sets are pooled and the valents may appear in any order. Other such degree-modification constructions (*so...that*, for instance) require the added valent to appear after all other arguments (see also Kay and Sag this volume, which offers a less heavy-handed way of treating the 'added' FEs).

- (7) a. Her job is tougher than yours.
 b. Her job is tougher.
 c. The second layer of rock is richer in valuable minerals than the surrounding layers.
 d. The second layer of rock is richer than surrounding layers in valuable minerals.

Constructions without Meanings While construction grammars originated in the recognition of conventional pairings between specific formal patterns and the meanings they contribute to the expressions that contain them – against a contrasting view that syntactic principles should be stated independently of questions of meaning and use – there remains the question of whether *all* constructions should be seen as meaning-bearing. The case for the necessity of semantics in every construction is made in Goldberg 2006: 166–182, in connection with SAI (Subject Auxiliary Inversion, here referred to as *Aux-initial*), in response to several writers who had characterized it as a clear case of semantic-free syntax (Green 1985, Newmeyer 2000: 46–9, Fillmore 1999). Goldberg examines a wide range of types of finite clauses containing the *Aux-initial* form, examines the separate functions of the types, and formulates a generalization intended to cover all of them. While a ‘metagrammar’ of English might find some motivating concept that underlies uses of this pattern, the actual work of building the FrameNet Constructicon is proceeding under an assumption of the legitimacy of semantically null constructions.

There are three situations for which it is unnecessary to associate meanings with syntactic structures. First, there are syntactic patterns with precise formal features whose interpretation depends on combining information from their constituents in a completely regular way. Since construction grammars cover all of the grammar, they include such basic structures as complementation (*Head-Complement*), modification (*Modifier-Head*), and predication (*Subject-Predicate*). These constructions provide for realization of the arguments of predicates and modifiers by specifying among other things the relative order of head and dependent, and the syntactic category of the phrases produced (e.g. VP from V and NP). Aside from phrase-building and argument linking, these constructions as such do not contribute meanings of their own. Their function is to provide the contexts in which the syntactic and semantic expectations of their constituents are satisfied. More specific constructions are necessary to accommodate the variety of semantic and pragmatic meanings associated with instances of the abstract construction. For instance, specific modifiers can assign different kinds of interpretations to their heads (compare the combinatory consequences of confronting a noun with such modifiers as *green*, *alleged*, *mere*, *former*, *so-called*, *economic*, etc.), though the means of syntactic combination and argument linking in general is constant. Similarly with the subject-predicate relation. The simple idea that the subject establishes something to talk about and the predicate establishes some property or relation of that thing (on the image that the left hand holds a thing and the right hand decorates it) does not fit expletive-subject sentences like *It’s raining* or *There’s a problem*, or sentences in which the subject’s relation to the verb is what provides the new information, as in *A magnificent oak tree developed out of that acorn that my father planted when he was a boy*.

Second, there are constructions that determine syntactic patterns to which separate interpretations can be given under differing variations. These include the abstract *Aux-Initial* construction and the *Filler-Gap* construction. *Aux-Initial* creates signs that can serve as components of a large variety of specific constructions, treated in greater detail below, including the ability to produce expressions like those in (8), with meanings like question, wish, condition, exclamation, etc. (Fillmore 1999):

- (8) a. Has Dr. Padgett gone?
 b. May my enemies live here in summer!

- c. Should that unthinkable thing happen, . . .
- d. Was I mad!

Filler-Gap (Sag 2010) supports constructions that produce expressions like those in (9), with meanings like interrogation, contrastive focus, conditionality, and so on (Kay and Fillmore (1999) called this construction *Left isolation*):

- (9) a. What are you writing?
- b. That much, I can agree to.

Each of these more elaborated constructions specifies its own semantic and pragmatic features, but their common syntax is succinctly captured by a general (abstract) construction. If there is a common meaning discoverable in the many specific constructions, as suggested by Goldberg (2006) for *Aux-Initial*, this may be associated with the general construction. However, because the specific subtypes of *Aux-Initial* will need to fully specify their meaning in any case, the value of stating a potentially vague generalization at a higher level is of dubious value unless independently motivated (psycholinguistically or sociolinguistically).

In section 4 we discuss three constructions which license an NP composed of *the* and an adjective phrase, as in *the very rich* or *the unexplainable*. As with *Aux-initial*, it is in principle possible to posit an abstract construction upon which the other three are elaborations.

Third, there are constructions that allow the omission of position-specific constituents that would otherwise be repetitions. The interpretation of the constructs produced by such constructions involves cognitively restoring and restructuring the missing elements into the remaining structure. These include *Gapping*, *Shared-Completion* (a.k.a. Right-node Raising), and *Stripping*. Examples of such patterns can be seen in (10):

- (10) a. Some would take them to the top half of the dale, and others the bottom half.
- b. He is clearly familiar with and fond of that cat.
- c. I come to the office quite a bit, but not on Friday.

They have interpretation principles involving the reconstruction process, to be sure, but if they have ‘meanings’ as such, they are at the level of information structure and focus.

There are, to be sure, patterns that are shared by numerous constructions to which we do indeed wish to assign a general meaning. This is true, for example, of the *Rate* construction. That is, we feel it worthwhile to assign a general meaning to the construction as a whole, captured in the concept of ‘rate’ or ‘ratio’, where the first NP provides the numerator and the second the denominator. The constructions that are elaborations of this construction can have special external properties and identify constraints on these two components: measures of distance vs. time give speed; instances vs. time give frequency; dollars vs. hours give wages; miles vs. time give mileage, and so on. In the case of the constructions we regard as non-meaning-bearing, it is not possible to find a clear meaning structure in the general form of the construction that is exploited in precise ways by the more specific constructions.

Contextually bound constructs Some constructions create expressions that have contextual requirements that are not determined by their meaning. Certain measurement expressions using adjectives (*tall*, *long*, *high*, *wide*, *deep*, *old*, and a few others) have variants restricted to use as predicates (*six years old*, *8 inches thick*) or as prenominal modifiers (*six-year-old*, *8-inch-thick*). Special to the attribute version is the fact that

the measurement unit noun (here, *year* and *inch*) is singular even if the associated number is greater than one: *a six-year-old child*, *an 8-inch-thick wall*, but not **a six-years-old child* or **an 8-inches-thick wall*. In the predicate version the number value on the noun matches the number: *The child is six years old*, or *the wall is 8 inches thick*.²³ The same distinction characterizes classes of adjectives, discussed, e.g. in Bolinger 1967, such as attributive-only *main* or predicate-only *asleep*²⁴.

Less obvious examples of bound constructs are those licensed by the *Uniqueness* construction, e.g. *my first Russian*, *his favorite color*, *your first cigarette*. The nominals created by such modifiers denote relations, completed by some indication of a ‘possessor’. Without the modifier the possession relation cannot be readily interpreted, or has a different meaning: *my Russian*, *his color*, *your cigarette*. Further context dependencies can be seen when pronominally possessed expressions occur as arguments of a verb: *I’ve just met my first Russian*; *when did you smoke your first cigarette?* where the interpretation is that I met a Russian for the first time, and you smoked a cigarette for the first time.

Exocentric and headless Constructions A construction may license structures with syntactic properties unpredictable from the properties of their parts. Such constructs may be described as ‘exocentric’ (the category of the whole is not the category of the apparent head), or as not having a well-defined syntactic head. Among such constructions are those licensing rate expressions (NPs from a juxtaposition of NPs), expressions of generic humans with specific properties (NPs from *the* and an AP), the so-called ‘Big Mess’ construction (predeterminer modification of a noun by a degree-modified AP, dubbed ‘exceptional degree marking’ by Zwicky (1995)), and time adverbials with *last*, *this*, or *next* and a calendric unit or subunit (CU or CSU: *next month*, *this Wednesday*). These are briefly illustrated below, and some are given fuller treatments in the following section (see Fillmore 2002 for details on calendric expressions).

- (11) a. [NP/adverbial [NP] [NP_{an} hour]]
 b. [NP the [AP_{very} rich]]
 c. [NP [AP_{how} big] (of) [NP_a box]]
 d. [NP/adverbial [last/this/next] [C(S)U Tuesday]]

Pumping Constructions A number of constructions describe constructs with a single daughter sign, possibly a single word, and a mother sign with a form related or identical to the daughter, and a meaning which incorporates the meaning of the daughter sign. The valence-modifying constructions discussed at length in the literature on Argument Structure Constructions (Goldberg 1995, Boas 2003, Kay 2005) fall into this category, as do general meaning-changing ‘zero derivation’ constructions that make use of the count-noncount distinction in nouns (sometimes giving specific meanings and contexts to the result; see the discussion of the meat-grinding construction in the following section). Several other phenomena, including those sometimes

²³Exceptions are attested in both directions: predicative *she’s six foot tall*, attributive *a three-inches-thick wall*, and even, with number agreement reversed, *our firm is today one years old*. We describe the expressions that match the number-specifications stated here and willingly leave the non-matching expressions unexplained.

²⁴The distinction is different from that between descriptive and relational adjectives; descriptive adjectives can occur in both positions, whereas relational adjectives tend to be attributive-only. The latter function in a way similar to that of the modifying noun in a nominal compound, and are also known as pertainyms – having definitions of the type ‘of or pertaining to X’. They are exemplified in *criminal lawyer*, *nervous breakdown*, *favorite flower*, *economic policy*, etc. Sometimes the same word may also occur as either a descriptive or relational adjective (*criminal lawyer* is ambiguous), but with the relational meaning it is always pronominal. See Cop-pock 2008: Chapter 5 for a recent discussion of the semantic and morphosyntactic features that distinguish these and other categories of adjectives

given the name COERCION may also be understood as unary, pumping constructs (Michaelis 2005, forthcoming, Pustejovsky 1995). Other constructions which could be handled as unary constructs (but which are not, or not often, discussed in the coercion literature), are the English imperative (which pumps a VP to an ‘S’ (Ginzburg and Sag 2000: Chapter 2)), and ellipsis constructions such as sluicing and stripping, which allow sub-clausal phrases to stand as clauses with clause-like interpretations (Ginzburg and Sag 2000: ch. 8). In our SBCG analysis, constructions of this type are handled no differently than other constructions, except that there is only one daughter sign called for by the construction rather than two or more. We avoid the name ‘coercion’ as it seems to imply a process by which some external distribution of the item in question forces an interpretation not normally licensed. While this may be important for historical development of various pumping constructions, or for online comprehension, the grammar treats the phenomenon no differently from other sorts of constructions.

Among the other constructions in this category we can consider the use of plural nominals as predicates, where they function as a familiar kind of reciprocal predicate (see Section 4.9), and the derivation of count-noun ‘fractions’ from ordinal numbers. For example, the ordinal number *third* occurs as a pluralizable noun in *two thirds*. The fraction vocabulary has one word that belongs independently to the fraction frame, *half*, where the corresponding ordinal is *second*; and the ordinal *first*, of course, has no corresponding fraction.²⁵

Clause-defining constructions Constructions account for constructs at all levels of grammatical description: for lexical units, maximal and non-maximal phrases, and clauses. Clausal constructs function as declaratives, commands, questions, challenges, blessings, curses, etc, and these are realized linguistically by a variety of patterns. Among these are *Subject-Predicate*, *Imperative*, and *Aux-Initial Question*. *Non-subject_wh-Questions* are complexes made up of both *Filler-Gap* and *Aux-Initial* components. Existential clauses (*there’s a fire*) are analyzed not a fixed clause type, but rather a special syntactic valence possibility (especially with *be*) that can participate in *Subject-Predicate*, *Aux-Initial*, *Raising*, and several other constructions.

4 Building the constructicon

This section introduces some notational conventions for presenting our analyses. In general, we will want a way to indicate that a particular sign is built from one or more other signs: in other words, a construct. A schematic representation of each construct will be given in the form of labeled bracketing, with outer brackets ‘{ }’ enclosing the expressions produced by the construction, and inner brackets ‘[]’ enclosing the individual construct elements. The constructs will be annotated in the same way, with mnemonic labels on the brackets chosen for ease of recognition. For example, in the case of a construct with two daughters, the general description will look like this:

$$(12) \{^M [^{D1} \text{sign}_1][^{D2} \text{sign}_2] \}$$

In the simplest cases the phonological and morphological value of the mother is the juxtaposition of the forms of sign_1 and sign_2 ²⁶. Taking *Rate* as an example, we notate the whole (the Mother) and parts (Daughters) as in (13b). Linguistic expressions annotated for a given construction will have wavy braces

²⁵Although the single words *first* and *second* are not usable as fractions, complex numerals containing them are – e.g. *thirty first*, *sixty second*. There is probably little need to attribute this pattern to the synchronic grammar of English.

²⁶The non-simple cases will include the pacing and other prosodic indicators of segment boundaries in constructs that instantiate *Gapping* or *Shared_completion*, as in section 4.2.

surrounding the whole construct, square brackets around the components, with labels the same as those specified for the construction itself. In cases where blocks of examples are presented to illustrate the same construction, we simply write, e.g. { [twenty dollars] [a day] }, without the labels, after the first example. We also use this notation as in (13a) for abstractions of particular constructions:

- (13) a. {Rate [Numerator sign₁] [Denominator sign₂] }
 b. {Rate [Numerator twenty dollars] [Denominator [a day]] }

For each construction, the entry in the constructicon will include the following:

1. a bracketing formula offering mnemonic names for the mother and daughter constituents;
2. a mnemonic name for the construction;
3. an informal description of the properties of the mother constituent;
4. informal descriptions of each of the daughter constituents;
5. an interpretation of the manner in which properties of the daughters participate in the detailed properties of the resulting sign, in terms of syntax, semantics, pragmatics, and context.

For each construction examined, a formula of the above type is provided, along with example phrases or sentences, an accompanying legend, and discussion. A simplified legend for *Rate* is shown in (14):

- (14) {Rate [numerator] [denominator] }

Name	<i>Rate</i>
M	NP
D1	Numerator. A Quantified NP.
D2	Denominator. An indefinite singular NP.
Interpretation	A ratio is built from numerator/denominator.

- (15) a. They earn {^M[^{D1} 20 dollars] [^{D2} an hour]}.
 b. The new hybrid gets {[sixty miles] [a gallon]}.

The legend states that: (1) the Mother (M) of the *Rate* construction will be an NP, (2) the first daughter (D1), the Numerator, will be a quantified NP representing a quantity of units of one type, (3) the second daughter (D2), the Denominator, will be an indefinite NP referring to a unit of another type, (4) the semantic type represented by the mother will specify the concept created by a *Ratio* formed by the semantic representations of the two constituent NPs. In labeled brackets we make reference either to D1, D2, etc, or to the mnemonic given in the description of the daughter constituents, for ease of exposition.

Following this, we include, if relevant, further discussion of the details of the construction, including in some cases a proposal for integrating the analysis into a complete SBCG grammar.

4.1 Lexical Idiom

Some constructions license idiomatic or partially idiomatic phrases that are assigned semantic roles not predictable from their component parts. Take for instance the prepositional phrase *in the distance* ((16)–(17)), which appear in descriptions of distant perception (and location), indicating where the percept is located, namely, at a distance far from the person whose perception is being represented:

(16) {^{Loc_of_percept} [^{D1} in][^{D2} the distance]}

Name	<i>In_the_distance</i>
M	PP, realizes the LOCATION_OF_PERCEPT FE in distant perception frame: sight, hearing, and possibly smell.
D1	<i>In</i> . Takes <i>the distance</i> as complement.
D2	<i>The distance</i> . An NP with <i>distance</i> as the lexical head and <i>the</i> as the marker.
Interpretation	A phrase that indicates where a percept is located; it may integrate into a PERCEPTION frame (or a subtype of PERCEPTION) already evoked in the context, or may evoke it itself.

(17) a. And then two human torsos appeared {^M [^{D1} in][^{D2} the distance]}.

b. As I gazed out of the window I could see several groups of red deer {[in] [the distance]}, and in the foreground the brown ferns with clumps of heather here and there; it was a wonderful sight.

c. Away {[in] [the distance]}, tucked between a fold in the surrounding hills, was home.

In FN terms, *in the distance* fills the FE LOCATION_OF_PERCEPT which occurs in perception-related frames.

Frames of ‘distant perceptions’, i.e. vision and hearing, but not taste, touch or smell, allow the separation in location phrases between (i) the location of the perceiver, (ii) the location of the whole event, and (iii) the location of the thing perceived. In a sentence like *Mrs. Grimshaw saw somebody on the neighbor’s roof* it is likely that the neighbor’s roof was not Mrs. Grimshaw’s location at the time of the event, nor the location of the complete event; it is the location of what Mrs. Grimshaw saw. A phrase of the form *in the distance*, with exactly these words (as opposed to freely generated phrases like *from a considerable distance*, *at a distance of several yards*), always occurs as expressing the location of the object of perception.

We could say, then, that this phrase indicates the location of the perceived entity in expressions that specifically evoke perception frames, but also that on its own, in a verbless sentence, it implies a perception state-of-affairs, as in (17c) and (18):

(18) {[In] [the distance]} the rumble of tanks.

As noted above, the formulae and specifications for constructions in this format are built to be compatible with a grammatical formalism such as that of SBCG. A full-fledged grammar will also make fine-grained distinctions between degrees of fixed expression. In this case, *in the distance* is fixed except for a possible modifier of *distance*. The AVM in Figure 3, a proposed SBCG analysis, shows this partially. The two

daughters are the word *in* and the phrase *the distance*.²⁷ This is a slight simplification, as *distance* accepts limited modification (e.g. *in the far distance*). It does not, however, license any complements: *in the distance from here to there* is not described by this construction. The mother contributes the meaning that some entity evoked by the phrase or clause it modifies is far away. Part of the contextual background of using this construction is a scene of perception, in which the same entity which is located at a distance is understood as perceived (indicated by coindexation of the fillers of the FAR_ENTITY and LOCATION_OF_PERCEPT FEs). We leave unresolved the question of whether there is a principled reason for why *the distance* cannot be left-isolated (**it was the distance that we saw them in*).

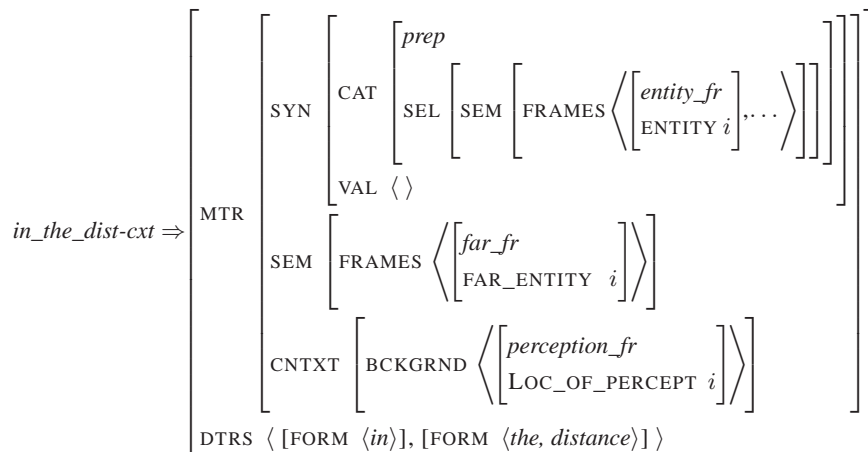


Figure 3: The *in-the-distance* construction

Other lexically-fixed or mostly-fixed idioms which would benefit from a constructional analysis include *in one's own right*, in which the only variable is the pronoun in the place of *one's*, which covaries with the subject of the phrase modified by *in one's own right* (*she was a renowned scholar in her own right*). Other candidate lexical idioms involve the noun word *hurry* as in *in a hurry*, *what's the hurry?*, *what's your hurry?* (but not *in my hurry*, cf. *in my haste*).

4.2 Constructions with gaps

Several constructions are not associated with frames of their own, but rather specify arrangements of parts of sentences in ways not normally licensed by the core clause-building constructions. *Shared_completion* (commonly called right-node raising), *Gapping*, *Aux-Initial* clauses, and several others are of this type. While many or most such constructions assign information-structural roles (topic, focus, etc) to their constituent parts, such notions are distinct from ordinary semantic import.

We illustrate our coverage of this variety of construction with *Gapping* in (20d):

- (19) { Gapping [Before] [Middle] [After] ([conj]) [Before] [After] }

²⁷The value of the FORM attribute is a list of morphological objects or formatives which are phonologically realized (Sag this volume). It serves here to identify particular lexical units.

Name	Gapping
M	A coordinate structure, whose non-initial conjuncts are missing some linguistic material present in the first conjunct.
D1	Before. In each conjunct, the material before the Middle.
D2	Middle. A string in the first conjunct which contains at least a verb, and which is omitted from subsequent conjuncts.
D3	After. In each conjunct, the material after the Middle.
D4	Conjunction. A conjunction, if present. The construction here relies on (or is a kind of) coordination construction. Must be <i>nor</i> if Middle contains clausal negation.
Interpretation	Each non-initial conjunct is missing some material which is present in the initial conjunct, and each conjunct is interpreted and parsed as though that missing material were present (in the simple case, D2 is interpolated between D1 and D3).

- (20) a. {[^{Before} He] [^{Middle} adores] [^{After} Mama], [^{conjunction}and] [^{Before} she], [^{After} him]}
- b. Again, {[Targets] [were] [set], [times] [carefully recorded], [and] [fitness] [improved].}
- c. {[A couple of bedrooms] [overlook] [Loch Ness], [and] [others] [the village and the Caledonian Canal].}
- d. {[He] [made no attempt to flirt] [with her] [nor] [she] [with him].}

Gapping licenses a coordination structure in which some verbal element in the first conjunct is omitted from subsequent conjuncts, which are parsed and interpreted exactly as though the middle part of the first conjunct were between its BEFORE and AFTER elements (with some modifications required for anaphora, negation, etc., as in *she had hardly enamoured herself with the locals, nor had they enamoured themselves with her*). We additionally note the conjunction as an optional CE. Though not strictly required by the construction, when present it is a lexical indicator of the coordination structure that is required by *Gapping*.

The difference between our analysis of this variety of construction and other, frame-bearing constructions, highlights the distinction between construct annotation and description, on the one hand, and writing a full-fledged construction grammar on the other. A grammar must account for all aspects of every construction and their relations to each other. The goal in building a resource like the construction is to specify the syntactic and semantic constraints on the components of the expressions that can realize each construction, to characterize the sort of object resulting from their assembly (the resulting sign), and to explain the grammatical context in which that object finds itself.

This means that annotation of these semantically inert constructions is to a degree independent of any particular constructional analysis. Shared completion (e.g. *integral to and dependent on the system*) may be analyzed in a grammar as a complex sort of syntactic valence manipulation, or as phonological deletion. To the construction builder and annotator, however, all that is available to analyze is what appears in the

sentence. The relevant units of the construct may be identified, and instructions as to how to interpret them may be carried out regardless of the particular way the grammar might do so.

This contrasts with our lexical annotation, and also with annotation of semantically-valued constructions, in that the labels applied to the various construct elements are not automatically informative as to how they contribute to the meaning of a sentence. While Frame Elements identify event participants, are arranged in a hierarchy, and may be connected to an external ontology, the labels applied to the subparts of a *Gapping* construct must be looked up in a prose description which explains what to do with these constituents.

We include some level of detail for these constructions (e.g. the phrase type of the mother, and of the subparts [if they are indeed constituents]) not because they are a crucial aspect of the construction, but in the hopes that this sort of detail will aid the learning of these categories by an automatic parser or similar tool, thus preventing misparsing of these often-occurring structures.

The ellipsis constructions illustrated in (21) are somewhat different in that the missing material is retrieved anaphorically or deictically:

- (21) a. A: Do you swim? B: On the weekends.
 b. I'm interested in astronomy, and my sister is too.
 c. (while gesturing) A doggie!

Annotation of these constructions involves noting the segments which have material omitted and recognizing that these represent phrases 'larger' than they might otherwise appear to (e.g. clauses, or 'utterances'). As before, the exact analysis of such constructions (as phonological deletion, valence manipulation, anaphora, etc) is in large part independent of the analysis and annotation a construction can provide.

4.3 Clause-level constructions

In this section we consider two groups of constructions that license signs at the level of complete clauses: *Absolute* constructions and *Aux-initial* clauses. The category also includes *Conditionals*, *Comparative_correlative*, and many others.

4.3.1 Absolute constructions

There is a family of constructions consisting centrally of a subject NP and a nonfinite predicate, as in *the kids off to school*. Such expressions are in many ways interpretable as the complements of one of the uses of *have* (*having the kids off to school*) and it needs to be appended to a clause that provides the 'subject' of that *have*. The first part of (22a) is basically synonymous with *Naipaul had these events in mind*. The paraphrase is not always possible, however. The absolute clauses in (22b) are not (easily) paraphrasable with *have* (**he had his hands shaking*):

- (22) a. These events in mind, Naipaul wrote a novel.
 b. He sits there, his hands shaking, his movements robotic.

The construction also hosts a number of fixed expressions with bare nouns (*arms akimbo*, *head held high*, *hat in hand*).

- (23) { *Secondary_predicate* [^{D1} sign₁] [^{D2} sign₂] }

Name	<i>Absolute:Plain</i>
M	Secondary Predicate, modifies a main clause.
D1	a definite NP; external argument of D2.
D2	a nonfinite predicate (verbal or nonverbal).
Interpretation	main clause's subject 'has' D1 in state D2.
Related constructions	<i>Absolute:having</i> ; <i>Absolute:with</i> ; <i>Absolute:what_with</i>

- (24) a. He entered the room, {*Secondary_predicate* [^{D1} his head] [^{D2} held high]}
- b. {[the team] [already up in arms]}
- c. {[tax day] [approaching]}

A separate construction, *Absolute:with*, places *with* before D1 and D2, and yet another construction (*Absolute:what*) licenses *what* before an *Absolute:with* phrase. The whole expression may also have appended to it *and all*.

- (25) a. {[with] [the house] [to herself]}
- b. {[what] [with [everyone] [gone]]}
- c. {[what] [with [everyone] [gone]] [and all]}

There is a distinction between depictive uses of these phrases (*with his arms akimbo*, *with his hands in his pockets*) that merely describe some state of the subject of the main clause, and those uses that express preconditions for the situation expressed in the main clause (*what with the kids off to school*, *I have a lot more time on my hands*), which is what FN calls the CIRCUMSTANCES extrathematic FE (Ruppenhofer et al. 2006: Appendix A). *Absolute* clauses with only D1 and D2, or with initial *with* are compatible with both uses, but *what with* can only hold the preconditions function:

- (26) a. With his arms ready for a fight, he entered the room and looked around.
- b.**What with his arms ready for a fight, he entered the room and looked around.*

Given this we must consider *Absolute:what_with* to be a separate construction. We assumed that the version with only *with* required a separate construction, but it may be possible to treat *with* as an 'optional' CE. We leave this question for further investigation. Another, related, difficulty is determining the constituency of these constructs, especially when all the possible elements are present. The table above analyzes *with* as taking two arguments, the first of which is specified as the external argument of the second (similar to the 'raising-to-object' constructions described in Sag et al. 2003). The bracketing for versions with *what* shows *what* as taking *with* plus its arguments as a single valent.

4.3.2 Aux-initial

Aux-initial constructions have a particular arrangement of subject, auxiliary, and predicate (Fillmore 1999). Like *Subject-Predicate*, *Aux-initial* does not introduce its own frame-semantic meaning, and rather serves an organizational function. *Aux-initial* clauses consist of, in order, a finite auxiliary

verb, its subject, and a non-finite predicate complement of the auxiliary. This general *Aux-initial* construction does not itself license any main clauses, but several more specific constructions instantiate the general *Aux-initial* type while adding their own lexical or syntactic restrictions and semantic specifications. The general type may be understood as involved in larger main-clause constructions such as non-subject *wh*-interrogatives:

(27) {^{Aux-initial} [^{D1} sign₁] [^{D2} sign₂] [^{D3} sign₃] }

One type of *Aux-initial* construction, with initial *had*, *should*, or *were*, is assigned a conditional interpretation:

(28) {^{Aux-initial:cond} [^{Aux} sign₁] [^{Subj} sign₂] [^{Pred} sign₃] }

Name	<i>Aux-initial:conditional</i>
M	Inverted finite clause.
D1	Auxiliary verb, either <i>had</i> , <i>should</i> , or <i>were</i> .
D2	NP, the subject of D1.
D3	Predicate (verbal or otherwise), selected by D1, shares subject with D1.
Interpretation	A conditional clause, with interpretation varying with the identity of D1.

(29) a. {^{Aux-initial:cond} [^{Aux} had] [^{Subj} I] [^{Pred} known you were coming] }

b. {[had] [you] [arrived on time]} (past counterfactual)

c. {[should] [you] [encounter problems]} (present hypothetical)

d. {[were] [there] [any solution]} (present counterfactual)

Because the predicate, D3, is selected by D1, its form covaries with the identity of the auxiliary. That is, with *had*, the predicate is a perfect participle, with *should* it is a bare infinitive, and with *were* any variety of copular predicate including NP, PP, AP, and so on.

An *Aux-initial* clause with *may* as the auxiliary expresses a special pragmatic meaning, which one may call ‘magic,’ or the expression of blessings, curses, wishes, and the like:

(30) {^{Aux-initial:magic} [^{Aux} may] [^{Subj} sign₂] [^{Pred} sign₃] }

(31) a. {^{Aux-initial:magic} [^{Aux} May] [^{Subj} you] [^{Pred} roast in hell]}!

b. {[May] [you] [live a long life]}!

c. {[May] [his hair] [fall out]}!

Aux-initial is the base construction upon which a number of elaborations are formed, among them the construction that licenses polar (*yes/no*) interrogatives, as in *did you see it?* and *won't it be dangerous?* This construction places no restrictions on the auxiliary, which can be either positive or negative. The choice of polarity has some pragmatic consequences with respect to presuppositions of the speaker and expected responses to the question.

(32) {^{Aux-initial:polar} [^{Aux} Have] [^{Subj} you] [^{Pred} fed the cat?] }

Note that the polar interrogative construction is not implicated in non-subject *wh*-interrogatives (*where did you see it?*), as those have quite different semantics, pragmatics, and intonation. Rather, the *wh*-interrogative construction can simply be said to require of its non-*wh*-phrase daughter that it be an *Aux-initial* clause of the most general type.

This does not exhaust the appearances of *Aux-initial*. As illustrated below, it also figures optionally in the second part of the *the x-er the y-er* construction (Fillmore et al. 1988), and in comparative clauses. Huddleston and Pullum (2002) argue that in comparatives, this is not quite the same construction, but rather involves subject postposing. Note in particular that *Aux-initial* sentences in comparative clauses must be accompanied by VP ellipsis:

- (33) a. The faster the current flows in the channel, the more rapidly {[will] [the changes] [take place]}.
 b. She interpreted it far more broadly than {[had] [her predecessors] [*interpreted it]}.

4.4 Co-text specifications

The simplest kind of lexical representation for complement-taking verbs regards the verb as the center and the complements as annotated externally to the center as its semantic dependents. In the case of the verb *explain* we find the associated argument structure of the verb specified in the verb's lexical entry (Figure 4), and annotated in-place in annotations of sentences containing the verb.

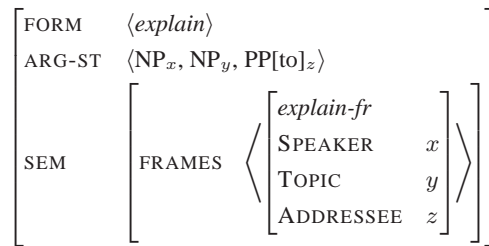


Figure 4: Lexical entry for *explain*

In the annotation of instances of this verb, the fillers of the argument structure requirements (i.e. the frame elements) are indicated by bracketing independently of their syntactic position in the sentence. Thus, for *She explained her solution to her classmates*, the frame elements SPEAKER, TOPIC, and ADDRESSEE are indicated as follows:

(34) [^{Speaker} She] EXPLAINED [^{Topic} her solution] [^{Addressee} to her classmates].

Most verbs, like *explain*, form with their valence dependents self-standing structures that impose no requirements on their environment. But for certain verbs it is necessary to recognize both valence elements (elements of the ‘governed’ context) and co-textual requirements (elements of the ‘governing’ context). The verb *bother*, and the verb *stand*, in two of its uses, require the recognition of both complementation and governing contexts: the latter is represented with italicization in the following annotations:

(35) a. [She] didn't BOTHER [to tell me how to get out].

- b. [I] *can't* STAND [to listen to his kind of music].
- c. [I] *won't* STAND [for this kind of nonsense].

The requirement for negation of some sort is well known (and not most accurately captured by the term ‘negation’), but in the case of *stand*, a statement of governing modals (*can*, etc) is also necessary. The best way to accomplish this sort of restriction in formal grammar is left open.²⁸ In cases where a particular construction specifies requirements of a governing context, we indicate those requirements with an X element. While this may not always strictly correspond to a feature or bundle of features in an SBCG analysis, it is a necessary part of understanding the distribution of particular classes of constructs and is at least useful to gather such information under a single header. We do this for various of the measurement constructions (section 4.13), for which the notion of support is relevant, and for a particular use of *long* meaning *a long time*.

Phrases headed by *long* can occur as time-duration expressions in (at least) two separate contexts, meaning something like ‘for a long time’. This is described not directly as a property of *long* itself but of *long* as an adjectival or adverbial head. We treat *long* as an adjective here, rather than an adverb, but nothing crucial rests on this decision.

The first context is in negative environments, as the argument of a head that requires a time-span (*won't spend long* or *don't take too long*).

(36) {^{long.NPI} [long] }

Name	<i>long.NPI</i>
M	NP, time duration expression.
D1	AP, headed by <i>long</i> .
X	A ‘trigger’, the contextual element that licenses <i>long</i> as an NPI, either lexical (e.g. negation) or constructional (e.g. <i>yes-no</i> question).
Interpretation	‘for a long time’, plus any modification of <i>long</i> .

The construction describes an AP headed by the adjective *long*, which is interpreted as ‘a (degree) long time’, has time-adverbial function, and requires a negative polarity context. The mother is understood syntactically as an NP which may nonetheless be used in some slots usually reserved for adverbs (see also Huddleston and Pullum 2002: 569). Note the parallel between *stay very long* and *stay a month*, and also *stay for very long*, all of which indicate that *long* is treated as an NP. Examples of verbs which take *long*-phrases or NPs as complements are *be*, *spend*, *stay*, *take*, and *wait*. The verb *be* in this list can be used without a locative complement if the location has anaphoric zero interpretation: *I won't be (there) long*.

Post-verbal *long*, as described by this construction, generally requires a negative polarity context, indicated by the X constituent above. In our more informal constructional descriptions the X constituent indicates some contextual feature called for by the construction, including negative and modal contexts. We also use it to indicate possibilities for optional or required support words, e.g. *be*, *stand*, or *measure* for the construct *five feet tall*. In the former case we also use the term *trigger* to designate the contextual element that licenses the construct:

(37) a. Will you be {^{long.NPI} [D1 long]}? (Aux-Initial question)

²⁸We follow the BNC tokenization, which separates negation from the modal in ‘contractions’ such as *can't*, while recognizing that a more linguistically sophisticated understanding of negated auxiliaries is possible, and compatible with our overall methods (e.g. Zwicky and Pullum 1983).

- b. Have you been waiting {[long]}? (Aux-Initial question)
- c. I ca [^{Trigger}n't] stay {[very long]}. (negation with *not*)
- d. This wo[n't] take {[long]}. (negation with *not*)
- e. I hope we do[n't] have to spend {[quite so long]} this time. (negation with *not*)
- f. [If] you're going to be {[long]}, maybe I'll just go ahead. (conditional-clause)

Immediately before a verb, *long* also indicates 'a long time', as in (38):

- (38) a. I have long known that this is the case.
- b. They have long suspected there might be problems.

Long in this use prefers to accompany a VP with perfective *have*, though some other contexts, e.g. passive, are well attested. Plain past tense seems rather awkward:

- (39) She ?(has) long claimed that she was the rightful heir.

The collocation *long since* has a similar preference for perfective contexts, but indicates a past change-of-state rather than a continuing state of affairs, paraphrasable as *long ago*:

- (40) They have long since given up.

4.5 Degree modification

There are many ways of modifying the degree of a scalar adjective (or adverb; here we consider just adjectives), including modifiers like *very* and *quite*, but there is a special set of modifiers that figure importantly in other constructions. These include the words *as*, *so*, *that*, *this*, *how*, *too*, and *enough*. Following Kay and Sag (this volume) we classify these words as belonging to a particular lexical class of degree modifiers (accomplishable in HPSG/SBCG, by having the feature specification *degree* for the MARKING feature (Van Eynde 2007)):

- (41) { deg.mod.adj [deg.modifer sign₁] [adjective sign₂] }

Name	<i>Degree Modification</i>
M	AP with combined valences of D1 and D2.
D1	degree word, which may have its own valence (e.g. <i>so</i> takes a <i>that</i> -clause).
D2	adjective without degree modification.
Interpretation	A value on a scale is located with respect to a reference value, in ways specified by the particular degree marker.

The constructs in question have two construct elements, the degree-marker and the adjective. In the case of *enough* the degree marker follows what it modifies; elsewhere it precedes. The mother sign is a complex adjective, and when the adjective itself has complements, its complements are combined with those of the degree marker and must be distributed separately. Kay and Sag (this volume) provide a mechanism

for accomplishing this, by specifying the complement of a degree marker as being on an EXTRA list of arguments which are potentially linearly ordered after any complements of the head adjective.

Some examples in which the degree-marker's complement is alone are shown in (42):

- (42) a. I was so angry that I could hardly speak.
 b. I was too angry to speak.
 c. She is more intelligent than you are.
 d. She reacted so quickly that I was taken aback.
 e. He acted meekly enough to avoid arousing suspicion.
 f. I was so eager to win that I could hardly speak.
- (43) a. I was too eager to win to speak.
 b. This piece is easy enough to understand to assign to the class.
 c. We were more interested in girls than in homework.
 d.*We were more interested than in homework in girls.
 e. You were more interested than I was in linguistics.
 f. You were more interested in linguistics than I was.

(43a–f) are examples in which the degree-marker's complements combine with the adjective's own complements. Regarding ordering, in comparative cases (*-er*, *more*, *less*, and *as*) where the standard is compared with the subject, the complement can occur before or after the adjective's complement ((43c)–(43f)); in all other cases the degree modifier's complement must come at the end.

Degree-marked adjectives indicate a degree (or range of degrees) on a scale identified with the meaning of the adjective, with respect to an implicit or explicit reference value. Comparatives (*more*, *less*, *as*) indicate a degree higher than, lower than, or equal to a reference value that can be directly or indirectly expressed with a *than*-clause or an *as*-clause. *So* and *enough* express sufficiency, and *too* expresses excess, a degree which surpasses a level under which some event or situation is possible. Each is associated with specific patterns of complementation. While *enough* and *so* both involve sufficiency, *enough* patterns syntactically with *too* in licensing an infinitival complement and participating in control constructions. The complement indicates the state-of-affairs that is made possible (in the case of *enough*) or impossible (*too*). The unexpressed subject of the infinitival may be identified with the external argument of the AP (as in (44b)–(44c)), or may be interpreted generically or from the speech or discourse context (as in (44a) and (44e)):

- (44) a. It's {^{deg.mod.adj}[^{deg.mod} too] [^{adj} old]} to eat. (= It's so old that one shouldn't eat it.)
 b. I'm {[too] [old]} to eat spicy foods. (= I'm so old that I shouldn't eat spicy foods.)
 c. He's {[^{adj}old] [^{deg.mod}enough]} to understand this. (= He can understand it)
 d. He's {[old] [enough]} to take to adult movies. (= Someone can take him)

- e. Is it {[warm] [enough]} to eat outside tonight?
- f. It's {[too] [hot]} outside for a picnic.

THIS NEEDS TO BE CORRECTED - THE CONNECTION BETWEEN THE PRECEDING EXAMPLES AND THE FOLLOWING PARAGRAPH.

These infinitivals are may also be ‘hollow,’ that is, missing a non-subject NP (cf. Huddleston and Pullum 2002: 1245) which is identified with the AP’s external argument or modified NP (as in (44a) and (44d)). An alternate valence, with a PP[*for*], has no unexpressed subject, but nevertheless the expression indicates directly or metonymically an event which is enabled or made impossible (see (44f)). The complement of *too* (but not *enough*) is a negative polarity context (*too tired to do anything*) because exceeding the relevant limit implies that the state-of-affairs is not possible: someone who is *too tired to eat* is *so tired that he cannot eat*.

The degree word *so* licenses a degree *that*-clause which expresses a state-of-affairs which holds by virtue of reaching a particular threshold on the relevant scale:

- (45) a. It was so hot that we couldn’t eat outdoors.
- b. We were so tired that we decided to go straight home.

Compared adjectives constitute a subclass of degree-modified scalar adjectives. Several constructions license constructs of this grammatical category: with the premodifiers *more*, *less*, and *as*), or by suffixation of *-er*. The category is also assigned to two specific lexical items, *better* and *worse*. Any word or construct of this category acquires the combinatory possibilities common to all expressions of the compared-adjective type. The valence requirements of these phrases include:

- the primary entity of the comparison
- the ‘standard’ of comparison

The standard of comparison is introduced with the word *as* in the case of the Comparison-of-equality version, but with *than* elsewhere. If compared adjectives have complement structures of their own, these are combined with the valence of the comparative with the possibility of extraposition in a manner similar but not identical to that for other degree expressions (on which see Kay and Sag this volume).

Some degree markers combine with their adjectives to create negative polarity items: *that*, *so*, *too*, as seen in the following sentences (with the addition of an external TRIGGER constituent, the same sort of element seen for *long* above):

- (46) a. It’s [^{Trigger} not] {[that] [expensive]}.
- b. He’s [not] {[so] [smart]}.
- c. He’s [not] {[too] [smart]}.

The NPI degree modifiers here have different meanings from non-NPI versions. *That* as an NPI in (46a) is not understood as a response to a question about the exact cost of an item. *So* in (46b) is neither the gushy modifier (*It was so cute!*) nor the modifier that expects a *that*-clause completion (45); as an NPI it is unstressed). The *too* in (46c) similarly is not the modifier that expects an infinitival completion (*It was too hot to touch*), and is again unstressed. Finally, we note that constructs produced by this construction are of a type that permits their participation in the exceptional degree marking construction(see section 4.7, Zwicky 1995, Van Eynde 2007, and Kay and Sag this volume).

4.6 Degree qualifier realization

The ‘complements’ of complement-bearing degree markers, the infinitival VPs, *that*-clauses or *than*- or *as*-phrases, require a separate construction for their realization, because the lexical constituent to which the degree marker is formally appended is not necessarily the constituent to which the degree qualification applies, or in other words, is not by itself the ‘scope’ of degree modification. The needed mechanism, permitted by SBCG, allows the degree marker itself, together with the degree qualifier, to be ‘percolated’ to a higher phrase, and provides a construction that juxtaposes the relevant degree-modified phrase with the qualifier phrase. The constructional specification and examples can be seen below; the bracketing shows the intended parse:

(47) {^{XP} [^{scope} sign₁] [^{deg.qual} sign₂]}

Name	<i>Degree_qualifier_realization</i>
M	XP (identified with that of D1).
D1	XP containing a degree marker (<i>more, less, as, so, too, enough, etc.</i>). Provides the scope of degree modification introduced by the degree marker.
D2	Degree qualifier. With comparatives, a <i>than</i> -phrase; with <i>too</i> and <i>enough</i> , an infinitival VP; with <i>so</i> , a <i>that</i> -clause.
Interpretation	The scope of the degree modification, provided by Degree-qualifier, includes the entire meaning of D1.

- (48) a. He is {[^{scope} heavier] [^{deg.qual} than 200 pounds]}.
- b. {[He is heavier] [than my mother]}.
- c. a man {[heavier] [than 200 pounds]}
- d. a man {[heavier] [than my mother]}
- e.*a {[heavier man] [than 200 pounds]}
- f. a {[heavier man] [than him]}
- g.*a {[heavier man] [than my mother]}
- h. He {[is so old] [that he remembers FDR’s inauguration]}.
- i.*He {[looks so old] [that he remembers FDR’s inauguration]}.
- j. She {[looks so young] [that the bartender refused to serve her]}.
- k.*She looks as if she {[is so young] [that the bartender refused to serve her]}.
- l. You {[make too many mistakes] [to deserve this job]}.
- m. {[You need a bigger car] [than I do]}.

- n. Do you think I {[read big enough books] [to impress the librarian]}?
- o. {[I have richer friends] [than you do]}.

The claim is that the formulation of the degree qualifier is sensitive to the contents of the scope. Compare (48f) and (48g) where we see that gender must be consistent between the scope and the degree qualifier. Similarly for (48e), which illustrates that if the scope indicates comparison of the weight of individuals, then the degree qualifier cannot simply indicate a measurement expression.²⁹ This requirement allows us to see that in sentences like (48h) the scope is larger than the morphologically modified adjective – *so old* here. The oddness of (48i) (contrasted with the lack of oddness of (48h)) shows that the scope must additionally include the verb, since the choice of verb affects the acceptability of the sentence.

4.7 Exceptional degree markers

Degree-modified adjectives licensed by the constructions described in the previous two sections may not directly precede nouns. In this they contrast with *very hot*, which appears wherever *hot* does. Rather, they attributively modify only indefinite singular NPs, coming before the *a*. A variant of the construction inserts *of* between the AP and the indefinite NP:

4.7.1 Exceptional degree markers.Plain

- (49) {^{NP} [^{deg.AP} sign₁] [^{indef.NP} sign₂]}

Name	<i>Attributive Degree Modification</i>
M	NP
D1	Degree-modified AP
D2	Indefinite singular NP, determiner: <i>a</i>
Interpretation	An NP, with D1 modifying D2

- (50) a. {^{NP}[^{deg.AP}too big] [^{indef.NP}a box]}
- b. {[so old] [a building]}
 - c. {that big} [a problem]}
 - d. {[how serious] [a problem]}
 - e. {[more interesting] [a job]} than I thought

The degree-modified adjective includes those modified with *so*, *too*, *that*, as well as all comparatives. This construction presupposes a type, namely degree-marked adjectives, and, following Kay and Sag this volume, juxtaposes such adjectives before singular indefinite NPs. Adjectives with other manner of degree modification, e.g. *very serious*, modify nouns NP-internally: *a very serious problem*.

²⁹The treatment suggested here matches Bresnan's (1973) analysis of Chomsky's (1965: 180) example with the entailments of *more successful lawyers than Bill*, discussed in McCawley 1988: 694–5 as 'circumnominal comparatives': the \bar{N} expresses not 'a degree of success' but 'a degree of being a successful lawyer'.

4.7.2 Exceptional degree markers with *of*

A version of the exceptional degree-marking construction has an intervening *of* before the indefinite NP. We have not examined the possibilities carefully, but it does seem that some degree modifiers welcome *of* more readily than others; the construction shows similarities with a pattern in which the NP's modifier is headed by *much*. Zwicky (1995) presents an analysis in which the headedness of the *of* phrase is shared by the preposition and the noun, thus both prepositional features and nominal features appear at the 'PP' level. This allows the construction to select a PP with a particular preposition, which in turn selects an NP with a particular determiner—i.e. a local account of what to all appearances is niece selection, a violation of most notions of locality, accomplished by careful distribution of the relevant features across the syntactic structure. The relevant structures are illustrated below.³⁰

- (51) a. {[too big] [of a problem]}
- b. {[much bigger] [of a problem]} than we imagined
- c. {[serious enough] [of a problem]}
- d. [not] {[much] [of a problem]}
- e. [not] {[that much] [of a problem]}
- f. {[how much] [of a problem]}

4.8 Nominal Pumping

Some constructions do not license a mother sign from a combination of daughter signs, but rather from a single daughter sign. These constructions license interpretations and contextual constraints not present in the daughter sign but do not alter the morphophonology of the item in question. These are sometimes called PUMPING constructions (for more details see section 3).³¹

By default nouns are either count or non-count, and this restricts their syntactic behavior (e.g. combination with determiners, pluralization) and construal (as denoting (a class of) individuals, or a substance, etc.). Constructions exist which change nouns from one type to another, however, as in *hand me a beer* (= a serving of beer) or *give me some pillow* (= some unbounded portion of the pillow).

4.8.1 Count-to-Mass: substance interpretation

- (52) {^{N.mass,Substance} [^{N.count,Entity}] }

³⁰One exhibits some puzzling behavior in this construction. Although *a one* is normally ruled out, it is possible with this construction: *The menu is as good a one as I have every seen, Use as large of a one as you can.* It also seems marginally possible for the modified NP to simply be *one* as long as *of* is present: *It was a problem, but thankfully not so serious *(of) one that we had to stop everything.* We leave the analysis of *how* best to characterize this for future work.

³¹It may turn out that some of the pumping constructions we describe here, including the well-studied cases of verb argument structure constructions (caused motion, resultative, ditransitive, etc.) are best described not as fully-productive constructions but as patterns of coining: a set of lexically-specified expressions which exhibit a pattern available for the creation of novel expressions (e.g. by analogy), but the established members of which are not derivable from anything else in the language (Boas 2003, Kay 2005, to appear). Pumping constructions seem to be central in the debate over productivity and the status of 'coercion' in synchronic grammar (Ziegeler 2007), but the construction/pattern of coining distinction is independent of the 'size' of the pattern. In any case, all these patterns, regardless of their degree of productivity, are expressions which we believe can and should be included in a construction.

Name	<i>Count-to-Mass.general</i>
M	Mass noun, interpreted as a substance.
D	Count noun.
Interpretation	The meaning of the noun construed as a substance, or an unbounded region.

- (53) a. Could you hand me some {^{NP.substance} [^{N.count} pillow]}?
 b. Now there's {[apple]} all over the floor.

4.8.2 Meat-grinding

- (54) {^{N.mass,Meat} [^{N.count,Animal}] }

Name	<i>Count-to-Mass.meat</i>
M	Mass noun, the meat of the animal.
D	Count noun, animal name.
Interpretation	For human consumption only.

- (55) a. We always eat {[frog]} on Sundays.
 b. Would anyone care for some {[mallard duck]}?

A particular variety of count-to-mass constructions concerns animals as food. Some meat names are not the names of the animals from which the meat is taken: *pork, beef, mutton, venison*, etc. Other meat names are derived from the names of the animals that provide the meat: *chicken, lamb, turkey, fish*, and so on. New meat names can be generated from animal names, and of course animal names can be more than just single nouns: *beaver, pigeon*, but also *golden eagle* or *Welsh terrier*. The nouns derived by this construction – as well as the underived meat names (*pork*, etc.) – are specifically interpreted as dedicated for human cuisine. This is shown by the fact that the pattern is not used (except playfully) for the food of carnivorous animals:

- (56) a. ?flies like venison
 b. ?the wolf who lives near our ranch likes lamb

Though this construction should in principle license phrases like *cook cow, eat sheep, braise deer*, the existence of separate lexical items (*beef*, etc.) makes its use much rarer (or impossible).

Important to note is that as an appropriate construction is available to change the class of noun, the process may be repeated. An animal name has the properties of a count noun, e.g. the possibility of occurrence with the indefinite article *a(n)* or in plural number (*a beaver, some beavers*, while the same word as licensed by the *Count-to-Mass.meat* construction can occur with quantifiers like *much* and *some* and is limited to singular number. *A lamb* refers to an animal, *some lamb* refers to meat, but since both kinds of nouns can occur in the singular with the definite article *the lamb* is ambiguous between the two possibilities.³²

³²The output of the *Count-to-Mass.meat* construction may be the daughter of a non-count-to-count construction in the context of food orders: *they ordered two lambs*, i.e. two dishes with lamb. For this and similar reasons, we prefer the constructional analysis of these cases over 'coercion,' in which the noun class is determined based on the syntactic environment it finds itself in. Such an account has difficulty with the ambiguity of *the lamb*, while an account with all the constructionally-specified constraints spelled out handily captures the possibility.

4.8.3 Mass to Count: Portions and Varieties

Two constructions allow nouns that denote substances, such as *beer*, to denote instead (i) a portion of the substance, or (ii) a particular variety of the substance. In each case, the size of the portion – cup, mug, pitcher – or nature of variety – producer, brewing style, etc. – is determined by the linguistic and extralinguistic context:

- (57) a. {^{N.count,portion} [^{N.mass,substance} sign₁] }
 b. {^{N.count,variety} [^{N.mass,substance} sign₁] }
- (58) a. Would you care for another {^{N.count,portion} [^{N.mass,substance} beer]}? (glass, mug, ..)
 b. Here's another {^{N.count,variety} [^{N.mass,substance} beer]} you might like. (brew, . . .)

4.8.4 Proper to common

Proper nouns do not normally appear with determiners or pluralization, yet constructions exist which place them in these contexts. Here we simply indicate the various interpretations of these constructions with bracketing:

- (59) a. There were three {[Michael]}s and a {[Robert]} in the class. (people with the name)
 b. You're no {[Julia Child]}. (person having salient properties of the individual bearing the name)
 c. They are a modern-day {[Romeo and Juliet]}. (with modification)

Exactly how many constructions are necessary (we do not necessarily assume that even the above three examples involve three separate constructions) is a topic we cannot address here, but the general idea is similar to the constructions outlined above.

4.9 Reciprocal Relations

Not only single nouns, but nominal phrases may be the daughter sign of a pumping construction. One interesting case of this is exemplified in (61). A plural nominal (i.e., a non-maximal noun-headed structure, possibly consisting of only a noun) headed by a noun with a certain class of meanings can, by this construction, work like a reciprocal predicate, in which the two sides of a relation may be expressed jointly, as plural or coordinated external argument, or separately, where one is foregrounded (as external argument) and one is backgrounded (as a PP):

- (60) {^{Reciprocal_pred} [^{Plural} nominal] }

Name	<i>Reciprocal_predicate_pumping</i>
M	Symmetric predicate with either distributed or collective valence.
D	Plural nominal, headed by a noun evoking a reciprocal relation frame.

- (61) a. I am {^{Recip.pred} [^{Interpersonal.reln} best friends]} with the president of Finland.

- b. The president of Finland and I are {[best friends]}.

Numerous lexical items have this pattern of valence alternation, including those below and also *meet*, *collide*, and *collaboate* among many others:

- (62) a. Diagrams A and B are similar. Diagram A is similar to diagram B.
b. Bill and Joe fought all day. Bill fought with Joe all day.

Nouns participating in this construction evoke frames inheriting from *Personal_relations*, either social or kin-related: *friend* is the most common (perhaps also historically prior), but also in the list are *buddy*, *pal*, *enemy*, *roommate*, *coworker*, *partner*, *neighbor*, *sibling*, and *cousin*. Modification of the noun is also possible (*she is close friends with the producer*), which indicates that the construct daughter is potentially phrasal. Only modification which characterizes the nature of the relationship is allowed. Among the permitted modifiers are *close*, *best*, *old*, *bitter* (e.g. *rivals*), and *college*, *army*; modifiers such as *rich*, *tall*, and *young* are prohibited.

The mother sign additionally evokes *Reciprocity*, with the relation picked out by the daughter specified as reciprocal (or symmetrical). This is often already the case, as with *cousin*, but need not be, as with *brother*. The result is that a predicate like *brothers* incorporates the meaning of the lexical entry and the construction: *brother* calls for two individuals such that (at least) one is the brother of the other, and the construction guarantees that each is the brother of the other, while also constraining the syntactic means of expressing who those individuals are.

The constructed sign is morphologically plural, but does not denote a (plural) individual in a personal relationship. It is simply a predicate of that relationship. Because the resulting sign is neither a noun, nor does it have (nominal) plural meaning, a singular external argument is possible (*I am friends with them*). The mother sign does not itself have a valence specification, but its classification as a symmetric predicate allows it to combine with either of two valence constructions compatible with symmetric predicates, by which either one party of the relationship is the subject and the other is in a PP-*with*, or both parties are realized by the subject.

In SBCG terms, the construction may be represented as in Figure 5. The type of the mother sign, *symmetrical-expression*, is that class of predicates which may combine with valence constructions mentioned above, so it is unnecessary to state those valence possibilities in this construction. Unlike the earlier examples of noun pumping, the mother sign in this case is not identified as a noun, or as any other part of speech, but simply as a nonverbal predicate, which must be supported by *be* (or a separate construction that accomplishes predication, e.g. *Him, friends with the president?*). Familiar constructions involving nouns, such as determination, are correctly ruled out: **I am the best friends with the coach*. The daughter of this construction is specified as a plural nominal, but because the resulting predicate is not semantically ‘plural,’ that frame does not become part of the mother’s *FRAMES* list. The daughter designates an interpersonal relation, while the mother sign adds the additional constraint that the relation be *reciprocal*.

The construction does not recognize the FE realization preferences of the daughter; independent of this construction, the lexical head normally provides its own way of marking the second party of the relationship: *friend of his*, *friend to the rich*, *her cousin*. These are superseded by the valence constructions which combine with symmetric predicates. Realizations not superseded by the construction include FEs like *SOURCE_OF_RELATIONSHIP* (*high school friends*), which normally are pre-nominal modifiers. The construction must also be able to articulate with the construction(s) licensing *third cousin twice removed* (*my barber is third cousins twice removed with my high school principal*).

reciprocal_plural_predicate-cxt ⇒

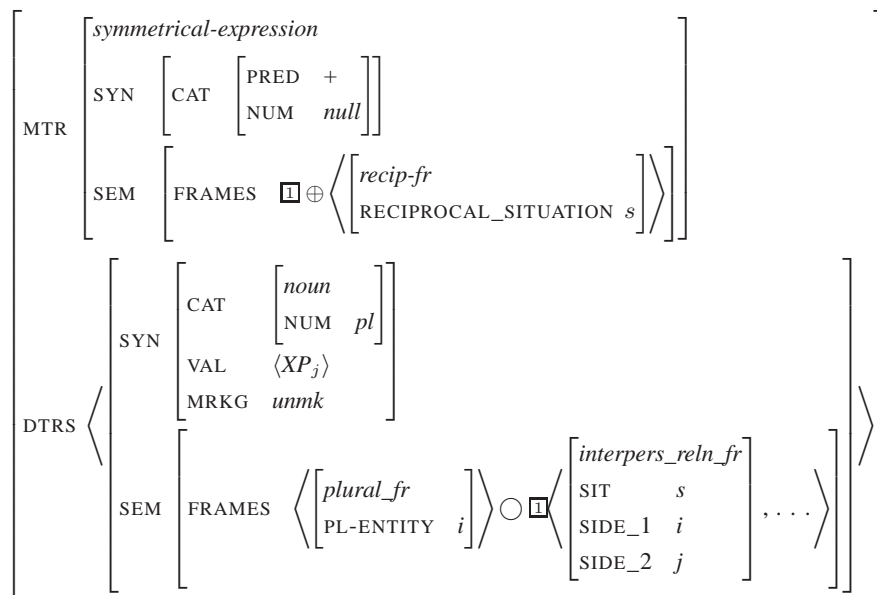


Figure 5: Plural nominal as predicative reciprocal relation

4.10 Verb Pumping

Much work in recent construction grammatical literature has been devoted to ARGUMENT STRUCTURE constructions, whereby a valence pattern associated with one class of verbs will welcome verbs with quite different meanings; the descriptions have shown the ways in which the semantic requirements of the ‘guest’ word are bound to the semantic expectations of the ‘host’ context (Goldberg 1995, Boas 2003, see also: Fillmore and Atkins 1992, Kay 2005).

The notion of a guest word in a host syntactic context is perhaps best illustrated by the valence patterns associable with a particular set of verbs. There are some verbs that allow in their own right a valence of two noun phrases indicating a transfer of possession or location: *give*, *send*, etc. This pattern serves as a host in expressions such as *I slid her the note* or *I kicked her the ball*, in which the verb *slide* or *kick* indicates the means (roughly) by which one gives someone something (Goldberg 1995). Similarly, a causative verb like *make* takes in its normal complementation pattern an NP and a state-denoting predicate; placing other verbs in place of *make* (*wipe your face clean*) results in one of a variety of so-called resultative constructions (Goldberg 1995, Boas 2003).

A variant of this construction involves non-expression of the original verb’s direct object: *shake the seeds onto the ground*, *wring water from the towel*, *stir the milk into the batter*. In this case the external arguments of the original and ‘pumped’ verbs are coindexed, but the direct object is not obligatorily coidentified with any valent of the original verb (the item which is shaken, wrung, or stirred, e.g. a container, a towel, a combination of the milk and batter). This is what in FN would be called constructionally-licensed null instantiation (CNI), and in particular CNI with indefinite interpretation. A sentence like *I saw her shake seeds onto the ground* does not require a context in which the item being shaken has been established (and it could simply be her hand). In some instances, the ‘original’ theme may be mentioned: *shake the seeds*

out of *the container*. We still analyze the downstairs verb’s direct object as unexpressed: so far as the constructionally-licensed verb is concerned, no mention need be made of it.

Rough sketches of these two constructions are shown below. These constructions call for a constituent that expresses the source, path, or goal of motion of the THEME, indicated by the ‘SPG’ (Source/Path/Goal) valent:

(63) {^{verb} [^{verb} sign₁] }

Name	<i>Resultative_with_original_object</i>
M	a verb with valence: <Agent-NP _i , Theme-NP _j , SPG>. The indicated action is performed on the Theme, resulting in the Theme traveling as indicated by the SPG(s).
D1	a transitive verb, valence: < Agent-NP _i , Theme-NP _j >

(64) He {[mashed]} potatoes through a ricer.

(65) {^{verb} [^{verb} sign₁] }

Name	<i>Resultative_without_original_object</i>
M	a verb with valence: <Agent-NP _i , Theme-NP _j , SPG>. The indicated action is performed some item (NP _k), which is unmentioned and has indefinite reference, resulting in the Theme traveling as indicated by the SPG(s).
D1	a transitive verb, valence: <Agent-NP _i , Theme-NP _k >

(66) She {[shook]} seeds onto the ground

4.11 The *verb-way* construction

The *verb-way* construction is similar to a pumping construction such as Caused-motion, but it operates on units larger than single words. The construction is characterized by the presence of the noun phrase with a possessive pronoun and the head *way*, which serves as direct object to a verb. The verb-plus-DO created is a multiword verb of MOTION. The selection of the type of verb distinguishes three kinds of constructions: the most common has a verb that expresses an activity that enables the mover to make progress (*squirm, push, blast*) as in *She wriggled her way through the crack*. Another option is for the verb to indicate an activity roughly coterminous with motion (*whistle, sing*), as in *He belched his way into the room*. A separate option, covered by a similar but distinct construction, is for the verb to serve mainly a support function with only minimal (or no) semantics of its own, as in *She made/wended her way to through the crowd*. Nevertheless the construction may play host to a number of verbs that are not canonically such, and often do not permit easy classification into one of the three classes: *George acrobated his way across* involves a verb that may well appear mostly or exclusively in this construction, at least for a period of time for a particular speaker.

As with other verb-pumping constructions, the guest LU loses its syntactic valence (except for the external argument), but its core semantic valence is retained, with any missing arguments are understood indefinitely: we know that you’re pushing against something if you *push your way into a room*, and if someone

elbowed her way to the front she pushed her elbow(s) into people.³³ Unlike inherently MOTION-evoking LUs, signs licensed by this construction require a SOURCE, PATH, or GOAL expression: *she moved quickly* is fine, but **she elbowed her way* is not.

The *way*-headed NP is peculiar in that it may be modified by an expression which semantically takes as its argument either the Theme/Actor or the Path taken: *walked his weary way back*, *weaved his precarious way back*. We state this in prose here, though the fact awaits a more precise description:

(67) { Motion verb [Verb] [PossNP] }

Name	<i>verb-way</i>
M	Verb, evokes the MOTION frame. Requires at least one SOURCE, PATH, or GOAL-related argument.
D1	A verb with at least an ACTOR argument; any other arguments are suppressed and existentially interpreted.
D2	An NP, headed by <i>way</i> and with a possessive pronoun coindexed to D1's external argument; able to be modified by ACTOR-modifying or PATH-modifying expressions.
Interpretation	the meaning of D1 (the verb) is incorporated into the MOTION frame as a MANNER or MEANS of motion. This is clear in many cases but the distinction is not always clear.

We find that such a structure as [poss + N], where the possessive pronoun is coreferential with the subject of the clause containing the NP, is a component of a great many idioms and other constructions that make use of (1) an anaphoric possessive pronoun with a (2) lexically specific head noun. These are parts of expressions that are typically represented with *one's* in idiom dictionaries: *to have one's way* ('to be able to do what one wants'), *to blow one's horn* ('to advertise one's virtues'), *to take one's time* ('to be slow at accomplishing something'), etc. Verbs such as *blow* and *crane* as in *blow one's nose* and *crane one's neck* also call for NPs with a possessor coindexed with another of its arguments.

We can capture the properties common to all these idioms with an *Anaphoric possessed noun* (APN) construction, which specifies an NP that consists of a head nominal with an anaphoric possessor, making it available for participation in certain idioms, or as arguments of certain verbs. The construction must also allow information about the required antecedent (person, number, gender) available at NP level for coindexation with the appropriate argument. In most cases, the antecedent of the pronominal constituent most is the subject of the predicate in which the NP occurs. For instance, the *one* in *one's nose* must have as antecedent the subject of [*verb*] *one's nose* where [*verb*] may be *blow*, *wriggle*, and so on. There are some idioms in which the antecedent is a non-subject, e.g. *give him his due* and *put him in his place*. The identity of the head noun is determined by the context (construction, predicator) in which it finds itself. *Crane* in *crane one's neck* specifies that its first complement is licensed by APN and that the head noun is *neck*; *verb-way* specifies *way* as the head.

³³The interpretation of the unmentioned direct object is very similar to the indefinite null instantiation (or 'complementation,') of Fillmore 1986, which accounts for the interpretation of *I saw someone reading on the train*, in which there is an understood text which is read, but it need never be mentioned. At the same time, it seems at best uncooperative to use a transitive verb like *elbow* or *push* in the *verb-way* construction with *no* prior notion that there exist items to be pushed, elbowed, etc. Detailed corpus work should reveal whether the anaphoric properties of *verb-way* line up with those of other INI lexical items or constructions, or if a separate category is called for.

Not all possessed NPs are licensed by this construction. The expressions in (68) involve only the familiar possession and NP constructions, even when by coincidence the possessor is anaphoric to a core argument of the verb:

- (68) a. She found his book.
b. She found her book.
c. He put the book on its shelf.

There are many expressions (covered by the *Experience_bodily_harm* frame in FN) which are ambiguous between canonical situations of possession and idiomatic uses of APN. (69) illustrates two sentences which may be understood as non-intentional injury, in which case the body-part possessor must agree with the subject:

- (69) a. I broke my finger.
b. I bit my cheek.

Some idioms allow the noun itself to be modified (see (70a)) and the reflexive possessive to have the emphatic extension in (70b):

- (70) a. take your sweet time
b. toot his own horn

These may require specification of separate construct types which specifically allow or prohibit such flexibility.

Individual constructions also specify the variety of modification permitted, as in (71):

- (71) a. plodded his weary way
b. edged his precarious way
c. *took his weary time

See additional examples of constructions that make use of APN in (72):

- (72) bear one's cross, blink one's eyes, put one's mind to it, keep one's fingers crossed, mind one's own business, have one's way (sg.), have one's ways (pl.)

4.12 Adjectives as Nominals

We recognize three different constructional processes by which NPs are created by joining the definite article to an adjectival expression. We refer to these as *Adjective-as-Nominal.Human* [shown in (73a)], *Adjective-as-Nominal.Anaphoric* [(73b)], and *Adjective-as-Nominal.Abstract* [(73c)]:

- (73) a. Examine the plight of the very poor.
b. Their outfits range from the flamboyant to the functional.

c. The unimaginable happened.

Each subconstruction has its own semantic and morphosyntactic specification. The Human version licenses a plural mother which denotes generically people with the given property. The Anaphoric version semantically resembles ellipsis of a head noun, and nearly always appears in contrast/comparison contexts. The Abstract version (73c) is morphologically singular and denotes an unspecified entity with the adjective's property, or such entities in general (so far as we can ascertain, the interpretation as a specific entity is largely limited to descriptions of event-occurrence, e.g., with *happen, occur*). This construction commonly participates in constructions that juxtapose and contrast properties: *we must separate the linguistic from the paralinguistic, the practical includes the technological*.

4.12.1 AdjectiveAsNom.Human

(74) {^{NP.plural} [the] [^{AP}] }

Name	<i>Adjective-as-nominal.Human</i>
M	NP, plural, generic reference.
D1	the word <i>the</i> .
D2	an AP describing a property of people.

(75) a. She is a friend to {^{NP} [^{the} the] [^{AP} poor]}.

b. {[The] [hard of hearing]} are sure to appreciate this new device.

Although it is frequently said that the word *poor* in *we need to provide housing for the poor* is really being 'used as a noun' the fact that the adjectives in such constructions may be themselves modified suggests that the combination really needs to be analyzed as an NP with the form *the* followed by an AP (76). The construction is affiliated with generic plural human NPs built from conjunctions of adjectives: *rich and poor (alike)*. For now we analyze only the construction with *the*. The construction specification is given below.

(76)

The elderly and {[the] [extremely young]} are most at risk.

The AP in each construct is licensed by the expected set of adjective-related constructions. The first element is simply the definite determiner, semantically inert (which means that its only role is to be formally a part of this construction: since it is an obligatory element, it has no way of contributing its own meaning). There are uses of this word in generic expressions, but in those other uses, the resulting phrase could also be an instance of an ordinary – singular or plural – function of definite determiners in NPs.

Adjectives denoting nationalities can participate in this construction, but only if the nationality adjective ends in a sibilant consonant. That is, we cannot speak of members of the nationalities in general with the phrases *the German* or *the Italian* (we have to say *Germans* or *Italians*), but the generic plural human interpretation is freely given in the case of *the French, the Chinese, the Irish, the Senegalese*. This might be one of the rare phenomena in grammar where a phonological feature constrains a grammatical pattern.

It is quite possible that this pattern is only one option in a more general construction that also describes NPs composed of a genitive NP and an AP: *England's poor, the state's persistently unemployed*. Other

the_AP_human-cxt ⇒

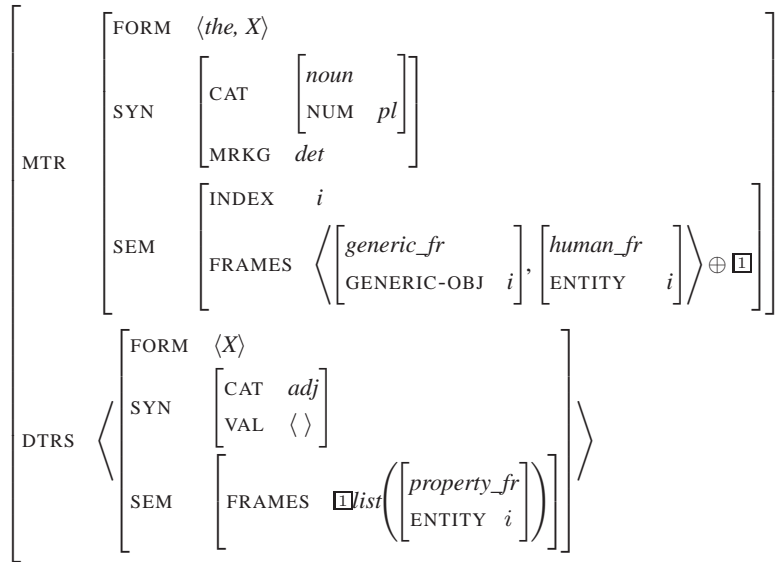


Figure 6: A *the*+AP construction for plural, generic, human-denoting NPs

definite determiners (*this/these, that/those*) are impossible in this pattern, so the more general construction must find a common feature of both *the* and possession.

4.12.2 Adjective-as-nominal.Anaphoric

Noun-head deletion is familiar with number and superlative expressions – *we pick the best, I'll take two* – but it is also possible with *the* and a plain adjective phrase. This is a type of identity-of-sense anaphora: the ‘missing’ nominal is always recoverable in the preceding context (or rarely in the non-linguistic context), and the AP is commonly in contrast with another AP modifying the antecedent noun:

(77) {^{NP} [^{the}] [^{AP}] }

Name	<i>Adjective-as-nominal.Anaphoric</i>
M	NP, meaning is the result of D2 modifying an available-from-context nominal, often in contrast with the NP that provides that nominal. Singular/plural is determined by the antecedent noun.
D1	<i>the</i>
D2	AP
Context	Contains something construable as a binary operator (commonly a conjunction) comparing two kinds of things describable with the same noun.

(78) a. I prefer the short word to {^{NP} [^{the}] [^{AP}long]}.

- b. For all you can tell, the new situation is no better than {[the] [old]}.

Though we cannot explore the issue fully, this construction seems distinct from the types of nominal deletion illustrated in (79). Though semantically close, the pattern with *the* is much narrower in use. It prefers to find its antecedent very close by (and always from the linguistic, rather than extra-linguistic, context), and is most comfortable in a non-colloquial register.

- (79) a. I like Kim's.
 b. I'll take three.
 c. I bought the cheapest.

4.12.3 AdjAsNom.Abstract

The third subconstruction licenses NPs, composed of *the* plus an AP, which refer either to an unspecified entity with the properties associated with the adjective, or to such entities in general: *we have to face the inevitable, distinguish the abstract and the concrete, they were witness to the supernatural*.

- (80) {^{NP} [^{the}] [^{AP}] }

Name	<i>Adjective-as-nominal.Abstract</i>
M	NP, singular. Refers to an unspecified or generic entity with the properties of D2.
D1	<i>the</i>
D2	AP

- (81) a. {^{NP} [^{the}The] [^{AP}seemingly impossible]} was somehow accomplished.
 b. The artist shows us {[the] [familiar]} as if it were new.

4.13 Measurement Expressions

4.13.1 Measurement_with_adjective.Predicate

The combination of a measurement expression (a quantified unit, e.g. *three feet*) with a limited set of adjectives may be used as a predicate to indicate the value of some item's height, weight, etc. The adjectives that participate in this pattern are *tall*, *wide*, *high*, *thick*, *long*, and *deep*, taking measurements of linear extent, and *old*, taking measurements of age:

- (82) {^{Predicate} [^{meas.expr} sign₁] [^{adj} sign₂] }

Name	<i>Measurement_with_adjective.Predicate</i>
M	AP, used predicatively (or in places where such constructs go, e.g. clause-initial modifier). Indicates a particular value (D1) on a scale given by D2. Possible scales are linear measurement (and extensions to temporal extent) and age.
D1	An expression built of a number and a unit, with appropriate number agreement.
D2	One of a restricted list of adjectives: <i>high, tall, thick, wide, deep, long, old</i> .
X	A supporting item. <i>Be</i> is possible for all adjectives. <i>Stand, measure, extend</i> , etc. are specific to particular scales. In the absence of a lexical supporter a support construction is possible (e.g. <i>Twenty miles long, it is the longest such trail in the state</i>).

- (83) a. It was six feet long.
 b. The structure is two hundred years old.

X indicates the construct-external contextual element that the construction calls for. In this case, the construct appears with a support verb, or a support construction that specifies predication of the expression over an NP without an overt lexical item like *be*, e.g. *over seven feet tall, he stood well above his companions*.

4.13.2 Measurement_with_adjective.Modifier

Examples with modified noun heads are found in (84). The construct in question is the measurement phrase. Like the predicative version, it contains a measured unit and adjective, but shows different agreement properties (singular units only), and shows up differently in written text, namely with hyphenation:

- (84) a. 62-year-old man
 b. twelve-inch-thick wall
 c. two-foot-long pole

(85) { Modifier [meas.expr sign₁] [adj sign₂] }

Name	<i>Measurement_with_adjective.Modifier</i>
M	AP, used attributively. Indicates a particular value (D1) on a scale given by D2. Possible scales are linear measurement (and extensions to temporal extent) and age. All word boundaries are generally indicated with a hyphen.
D1	An expression built of a number and a singular unit.
D2	One of a list of adjectives: <i>high, tall, thick, wide, deep, long, old</i> .
X	A head noun which is modified by the measurement construct.

- (86) a. a six-foot-long rope
 b. that two-year-old building

The fact that the unit in D1 is singular is probably best understood as an instance of the singularity of the modifier noun in compounds (*bookstore, pantleg, scissor-sharpener*). A similar construction, which does not include the scale-denoting adjective, is more properly considered a part of a compound: *three-yard rope, four-hour play*. In this case the scale is left to interpretation based on the context or world knowledge. We do not engage in a complete analysis, but point out that this adjective-less construction cannot simply be the construction above with the adjective left out, as attested by the grammaticality of *twenty-dollar haircut* and *fifteen-pound turkey* as opposed to **twenty-dollar-expensive haircut* and **fifteen-pound-heavy turkey*. Conversely, although we can speak of a *three-year-old child*, there is no **three-year child*.

Finally, we admit that these constructions present the most common case: a singular unit in attributive position, and a plural unit in predicative position. Nevertheless, exceptions to this pattern are not hard to find, even in the BNC:

- (87) a. The first uses large, *two metres tall puppets* which can be easily seen by large audiences.
 b. Within minutes of being trapped behind a *20-feet thick wall* of coal, steel, and rubble completely filling *the 12-feet high and 16-feet wide tunnel*, they were in contact with colleagues on the opposite side using the undamaged Tannoy system which runs along the wall of the roadway.
 c. He *was about six foot tall* and well-built.
 d. Her replica *was six foot high*, made of spun meringue and sponge cake.

Given the above observations, some analysts might prefer to propose a single measurement-with-adjective construction and add the comment that the choice of grammatical number exhibits certain tendencies distinguishing its use in attributive vs. predicative contexts. We prefer to claim that there are the two well-defined and thoroughly productive constructions just described, while recognizing that speakers are able to express their semantics by other means.

4.14 Rate phrases

The *Rate* construction and its several subconstructions provide means to express ratios. Here we consider only those expressions with *a(n)* in the second NP:

- (88) { *Rate* [_{numerator} sign₁] [_{denominator} sign₂] }

Name	<i>Rate</i>
M	NP
D1	The ‘numerator.’ Typically a quantified NP, head: measurement unit; but also multiplicatives like <i>once, several times</i> , etc.
D2	The ‘denominator.’ Typically an indefinite singular NP head: measurement unit; but also certain dedicated words like <i>each, apiece</i>
Interpretation	A ratio is built from num/denom; certain combinations of units are recognized as their own type of measure (e.g. frequency, mileage, cost, speed)

- (89) a. {[^{numerator} Two hundred pounds] [^{denominator} a week]}, some of them can earn.
 b. Milk was delivered {[twice] [a day]}, and bread daily.

This construction licenses a sign that denotes a ratio, with a particular internal syntax not seen elsewhere in the grammar. The Mother of the *Rate* construction is an NP, as are both of the daughter signs. The first daughter, the ‘Numerator’, is a quantified NP and the second daughter, the ‘Denominator’, is an indefinite NP. Each NP refers to certain units, and the meaning of the mother is a *Ratio* formed by the semantic representations of the two constituent NPs. In some cases these are already-recognized concepts: if the units are recurrences vs. time, the interpretation of the whole is ‘frequency’; if they are distance in miles vs. gallon of fuel, the mother’s category is ‘mileage’; if the two constituents represent monetary value vs. unit of weight, the mother’s category is ‘cost per unit weight’. In this way it is possible to build up, from a single abstract construction, interpretations of *twenty times a day*, *twenty miles a gallon*, and *twenty dollars an ounce*. The construction also provides the basis for interpreting ad hoc ratios like *four cookies a student*.

Some expressions that convey a ratio concept are not instances of the construction as stated here: in *I earn twenty dollars every day* (instead of *a day*) is a formation based on regular syntax, as shown by the fact that the ‘denominator’ phrase would serve the same function if it had been *every three or four days*, and it can be placed in clause-initial position (*Every day I earn twenty dollars*). The meaning of these expressions differs from *Rate*-licensed ones: a car that traveled *fifty miles every hour* traveled for at least one hour, but a car going *fifty miles an hour* may have only moved for a minute. These facts all lead to the conclusion that formulations with { [twenty dollars] [a day] } need to be licensed separately.

It seems likely that the formation of the denominator with *per* rather than *a* is a separate but related construction (90):

- (90) a. Thus the athlete’s heart will beat 13 million fewer times per year.
 b. That creature must have been travelling at 60 miles per hour.

Here, a few points of divergence may be mentioned. First, *per* is much more easily repeated than *a*, and while the two variants may be combined, *a* must appear first, as in (91):

- (91) a. one per customer per day
 b. ??one a customer a day
 c. one a customer per day
 d. *one per customer a day

Second, *a* seems more suited to more familiar types of ratio, as in (92):

- (92) After you hand out all the food, there should be three cookies per/??a child.

The same expression may fit both familiar and less familiar contexts. Both *two dollars an inch* and *two dollars per inch* may appear in a context where the dollar amount is spent, as in the cost of printing a poster, but the former is more awkward if the dollar amount represents additional costs incurred as a result of parking one’s vehicle successively farther from the sidewalk (*beyond one foot, tickets go up by an additional two dollars per/??an inch*). Third, constructs with *per* are syntactically more flexible, both in phrase-internal syntax as well as external distribution. The denominator may be more easily modified (as in (93a)–(93b)),

and because *per* does not specify number, more complex ratios are permitted (as shown by (93d)). The judgments on complex denominators depend on the precise nature of the complex NP, and seem to be quite variable between speakers.

- (93) a. two dollars per/?an inch purchased
b. twenty dollars per/?an hour of labor
c. twenty dollars per/?*a piece of furniture
d. twenty dollars per/*a three hours

Per-phrases are also potential nominal modifiers, not a possibility for the indefinite determiner, as illustrated in (94).

(94)

I want to know the vehicle's mileage per/*a gallon.

Further constructions are necessary to license expressions only used to express particular ratios, as with *to the* for mileage and perhaps other sorts of ratios: *My aeroplane, which also comes from the States, only does eight miles to the gallon.* It should also be noted that the characterization of the numerator and denominator as expressions of some sort of measurement unit is not specified by the *Rate* construction, and rather must be provided by the interpretation component of the constructions by which they themselves are licensed.

An SBCG representation of the construction should capture at least the facts that the sign licensed is a Ratio-denoting NP, made up of two NPs with particular shapes (quantified, with *a*). This is represented in Figure 7. A *Rate* constructs two daughters correspond to the numerator and denominator. The first is a quantified unit, and the second is an indefinite singular NP with *a/an*. The current formulation leaves open the possibility that the two units are identical, e.g. *twenty miles per mile*.

A more complete formulation would include a way to understand that certain instances of ratios are familiar (speed, frequency, and so on), or the semantics of the grammar should provide for recognition of compositionally-built (constructional) meanings that coincide with already-established (often lexical) ones.

4.15 Magnitude Qualifying Predeterminers

In this section we compare two syntactic patterns, one of the form {[X] [of Y]}, the other {[X][Y]}. The former is the *Partitive* Construction, not dealt with in the current Constructicon, and the latter is what we are calling the *Magnitude-Qualifying Predeterminer* Construction (MQP). Of interest is the way in which the sets of expressions that can occur in the X and Y positions in these two patterns overlap. In some cases, in other words, the only difference is in the presence of the preposition *of*, heading the so-called *oblique partitive* (in Huddleston and Pullum 2002: 333) in the case of the *Partitive*.

Examples of the former pattern are *a third of the members, all of the beer, 50% of the population, one tenth of his salary*; examples of the latter are *half the number, twice the size, two thirds the distance, one tenth his salary*. In the partitive expressions, the meaning of the whole is taken to be a portion (up to totality) of the substance or set of things indicated in the Y phrase; in the magnitude case, the meaning of the whole is a quantity computed from the quantity represented by the Y phrase. In all cases the NP heading the Y expression is definite and explicitly or implicitly includes the understanding of something being quantified.

rate-cxt ⇒

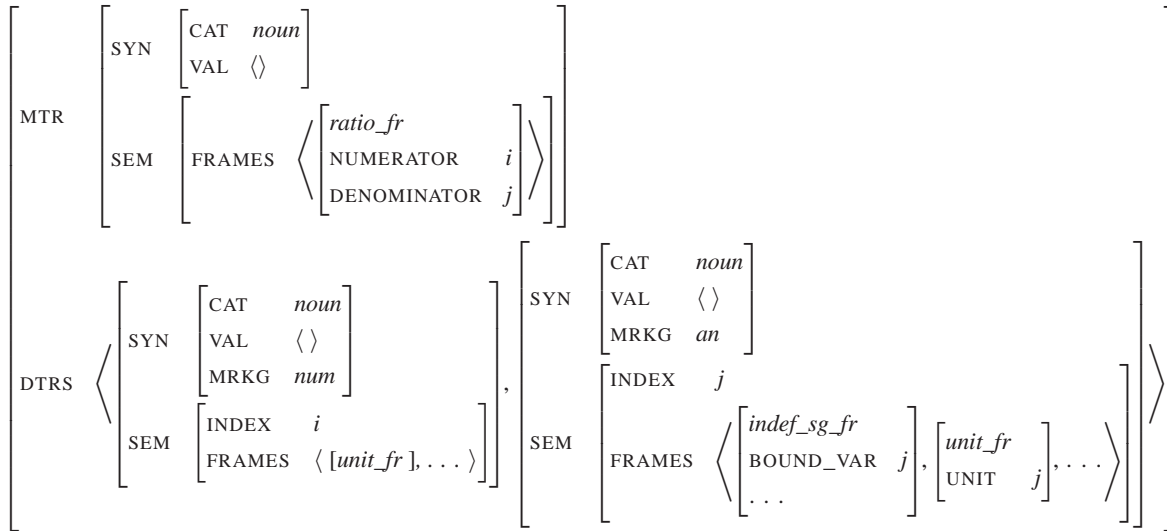


Figure 7: SBCG representation of *Rate*

Thus, *50% of the population* is understood as referring to the population of some specific area or community, explicitly expressible as, say, *50% of the population of Guam*.

A number of pairings of X-expressions and Y-expressions fit only one of these constructions. In (95a), for example, only the partitive interpretation is possible:

(95) a. 50% of the members resigned in protest. (*50% the members)

b. That's twice the number we had the first time. (*twice of the number).

While ordinary fraction phrases can occur in the MQP construction, the equivalents expressed as percentages cannot; and the plural noun *members* (as opposed to the noun *membership*) cannot designate the number of members of an organization (cf. *We now have twice the membership*). In (95b), only the MQP construction is represented: the word *twice* is a multiple, and therefore cannot represent a portion, and the word *number* expresses a quantity but not directly the number of any set of measurables.

The partitive construction selects, in NPs designating the wholes, mass nouns like *beer* (*half of the beer*), or plural nouns like *members* (*two thirds of the members*); the MQP construction, however, selects NPs which indicate some measure or attribute that can be expressed quantitatively. Examples of nouns that have this as their main sense are *size*, *rate*, *frequency*, *height*, *age*, *cost*, and many others.

Overlaps are possible because fraction phrases meet the conditions of both constructions (phrases expressing multiples obviously do not), and because some nouns incorporate both the concept of quantity and an understanding of what it is that is being measured. Nouns that incorporate both the notion of magnitude and information about the nature of the set or substance being measured include *population* (the number of people living in a place), *salary* (the amount of money one earns per time unit), and others.

Similarly, the (a) examples in (96) and (97) refer to portions of some entity or set, while the (b) examples refer to the quantities involved:

- (96) a. Half of his salary goes to rent.
 b. At the peak of my career I only earned half his salary.
- (97) a. Two thirds of the population of Malawi live in poverty.
 b. Hungary has two thirds the population of Malawi.

The correct understanding of these two constructions might not require the notion of selecting lexical types in the Y position, but of imposing one or the other interpretation on it, in cases where the lexical classes seem different from what is expected. Thus, instances of MQP sometimes seem to ‘coerce’ a magnitude meaning onto a noun which, independently of the construction, refers to a substance. In (98a) the reference is to an already determined supply of water, whereas in (98b) the reference is to a measurable quantity of water:

- (98) a. A third of the water leaked out.
 b. My garden now needs only a third the water.

In the other direction, sometimes parameter-naming nouns can be coerced to refer to a substance, as in (99a) and (99b):

- (99) a. Half of the distance to the cottage is a muddy mess.
 b. About a third of his weight is sheer muscle.

(100) displays the schematic representation and constructional specification of MQP:

(100) { Magnitude [Multiple sign₁] [def.NP sign₂] }

Name	<i>Magnitude-qualified entity</i>
M	A magnitude (as opposed to a portion).
D1	A multiplier (<i>twice, four times</i>) or fraction (<i>two thirds, half</i>).
D2	A definite NP (superficially) denoting a measured or measurable substance or (abstract) entity.
Interpretation	A measured or measurable quantity of an entity.

5 Conclusion

This chapter has reported on the results of a year-long project to start a database of construction descriptions and constructionally annotated sentences, built on the principles, and using the tools, of an ongoing lexicography project, FrameNet. There were numerous reasons for trying to articulate a lexicon with a construction: serious work in lexical description was unable to escape the need to appeal to features of grammar that go beyond the basic structures that define ordinary valence satisfaction; and the semantic notions that were the central motivation for building a frame-based lexicon figure independently in accounting for the meaning contributions of many of the constructions.

The new project set out to analyze and exemplify a selection of English grammatical constructions in a way that could contribute to the development of any full-fledged grammar of English, while having specifically in mind the demands and formalisms of SBCG. Our descriptions of the selected constructions and annotations of expressions licensed by them, in this paper and on the FN website, represent this effort. In some cases we have presented tentative SBCG analyses to highlight the compatibility with formalisms represented elsewhere in this volume; but in many cases we felt that describing and illustrating the properties of individual constructions could be useful even when the level of analysis that would allow their incorporation into a complete grammar was not yet achieved.

One difficulty any such project faces is the order in which to tackle the constructions of a language. Proceeding from the most frequent (or ‘important’ in some sense) constructions is not practical. That would mean figuring out in advance which constructions are most frequent or most important, and that also is not easy. There is no preexisting list of constructions which could be ordered by frequency, and many constructions are largely covert and cannot be easily recognized in running text or counted. Alternatively, choosing a representative text and annotating the constructions in it as they appear would require devoting time both to many constructions which are theoretically uninteresting (*Head-complement*, *Modification*, and so on) in the sense that nothing the FN team could discover would be a genuine advance in grammatical knowledge, and to constructions that are so rare that their properties could be difficult to explore, or so subtle that their properties would be difficult to discover. If this effort was to be limited to selected interesting (and findable) constructions, there is no advantage in staying with particular texts rather than taking on the language as a whole.

Our cherry-picking approach had several advantages. The constructions we selected were by and large relatively easy to locate in tagged, unparsed corpora, and that allowed us to focus less on search methods and more on analytic and representational issues. We also selected several constructions treated prominently in the literature.³⁴ Furthermore, we hoped that our annotation methods would be able to capture the key features of constructions without necessarily committing us to difficult decisions that would have to be made in writing a full grammar. At the same time we feel it is flexible enough to handle constructions of any level of complexity.

The move from lexical to constructional analysis, in the history of the FN project did not happen merely because some members of the team were interested in both lexicon and grammar; it was necessitated by the fact that we had begun to use FN analyses to represent the meaning structures of full texts, and it became increasingly obvious that lexical analysis alone is not sufficient for such a task. The work of extending the software tools originally designed for lexicon building to an analysis of syntactic constructions was facilitated by certain deep commonalities between lexical and grammatical structures in a theory of construction grammar committed to a locality principle. Just as it had already become necessary in the course of lexical analysis to look for the means of describing the inner structure of lexical units (e.g., with compounding and other word-forming processes) in order to account for regularities between the components and the semantic and combinatory properties of the resulting whole, so too has it been necessary to characterize both the component parts and the semantics and combinatorics of given types of constructs. It is our hope that the continuing development of the FN lexicon and construction will both inform and be informed by grammatical and semantic theory, resulting in a unified resource of benefit to any endeavor to understand the meanings of sentences and texts, and the linguistic structures that constitute them.

³⁴Some constructions, such as the calendar expressions detailed in Fillmore 2002 and *let alone* (Fillmore et al. 1988), we do not mention here because it would be in large part a repetition of those works.

References

- Allerton, D. J. 1982. *Valency and the English Verb*.
- Atkins, S., Fillmore, C. J. and Johnson, C. R. 2003. Lexicographic relevance: selecting information from corpus evidence. *International Journal of Lexicography* 16.3, 251–280.
- Boas, H. C. 2003. *A constructional approach to resultatives*. Stanford: CSLI Publications.
- Bolinger, D. 1967. Adjectives in English: Attribution and predication. *Lingua* 18, 1–34.
- Bresnan, J. 1973. Syntax of the Comparative Clause Construction in English. *Linguistic Inquiry* IV(3), 275–343.
- Chomsky, N. 1965. *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- Coppock, E. 2008. *The Logical and Empirical Foundations of Baker's Paradox*. Ph. D. thesis, Stanford University.
- Emons, R. 1974. *Valenzen englischer Prädikatsverben*. Tübingen: Niemeyer.
- Emons, R. 1978. *Valenzgrammatik für das Englische. Eine Einführung.* Tübingen: Niemeyer.
- Fillmore, C. J. 1986. Pragmatically controlled zero anaphora. In *Proceedings of the 12th annual meeting of the Berkeley Linguistics Society*.
- Fillmore, C. J. 1999. Inversion and constructional inheritance. In G. Webelhuth, J.-P. Koenig and A. Kathol (eds.), *Lexical and constructional aspects of linguistic explanation*, Stanford: CSLI.
- Fillmore, C. J. 2002. Mini-grammars of some time-when expressions in English. In *Complex Sentences in Grammar and Discourse. Essays in Honor of Sandra A. Thompson*, Amsterdam/Philadelphia: John Benjamins Publishing Company.
- Fillmore, C. J. 2003. Valency and Semantic Roles: the Concept of Deep Structure Case. In V. Agel, L. M. Eichinger, H.-W. Eroms, P. Hellwig, H. J. Heringer and H. Lobin (eds.), *Dependency and Valency: An International Handbook of Contemporary Research*, pp 457–75, Walter de Gruyter.
- Fillmore, C. J. 2006. Articulating Lexicon and Constructicon. Presentation at the Fourth International Conference on Construction Grammar, Tokyo, Japan.
- Fillmore, C. J. 2007. Valency Issues in FrameNet. In T. Herbst and K. Götz-Votteler (eds.), *Valency: Theoretical, Descriptive and Cognitive Issues*, pp 129–160, Mouton de Gruyter, Berlin and New York.
- Fillmore, C. J. 2009. A Valency Dictionary of English. *International Journal of Lexicography* 22(1), 55–85.
- Fillmore, C. J. and Atkins, B. 1992. Towards a frame-based lexicon: The semantics of RISK and its neighbors. In A. Lehrer and E. Kittay (eds.), *Frames, Fields and Contrasts: New Essays in Semantics and Lexical Organization*, pp 75–102, Hillsdale: Lawrence Erlbaum Associates.
- Fillmore, C. J. and Baker, C. F. 2009. A Frames Approach to Semantic Description. In B. Heine and H. Narrog (eds.), *The Oxford Handbook of Linguistic Analysis*, Oxford: Oxford University Press.
- Fillmore, C. J., Johnson, C. R. and Petruck, M. R. 2003. Background to FrameNet. *International Journal of Lexicography* 16.3, 235–250.
- Fillmore, C. J., Kay, P. and O'Connor, M. C. 1988. Regularity and Idiomaticity in Grammatical Constructions: The Case of 'Let Alone'. *Language* 64, 501–538.
- Ginzburg, J. and Sag, I. A. 2000. *Interrogative Investigations: the Form, Meaning, and Use of English Interrogatives*. Stanford: CSLI Publications.
- Goldberg, A. E. 1995. *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: Chicago University Press.
- Goldberg, A. E. 2006. *Constructions at Work: The Nature of Generalization in Language*. Oxford: Oxford University Press.
- Green, G. M. 1985. The description of inversions in generalized phrase structure grammar. In *Proceedings of the 11th Annual Meeting of the Berkeley Linguistics Society*.

- Helbig, G. and Schenkel, W. 1973. *Wörterbuch zur Valenz und Distribution deutscher Verben*. Tübingen: Max Niemeyer Verlag.
- Herbst, T. 1983. *Untersuchungen zur Valenz englischer Adjektive und ihrer Nominalisierungen*. Tübingen: Gunter Narr.
- Herbst, T. 1987. A Proposal for a Valency Dictionary of English. In R. F. Ilson (ed.), *A Spectrum of Lexicography*, Amsterdam and Philadelphia: Benjamins.
- Herbst, T., Heath, D., Roe, I. F. and Götz, D. (eds.). 2004. *A Valency Dictionary of English: A Corpus-Based Analysis of the Complementation Patterns of English Verbs, Nouns and Adjectives*. Berlin/New York: Mouton de Gruyter.
- Horn, L. 1989. *A Natural History of Negation*. Chicago: Chicago University Press.
- Huddleston, R. and Pullum, G. K. (eds.). 2002. *The Cambridge Grammar of the English Language*. Cambridge: Cambridge University Press.
- Israel, M. 2002. Minimizers, Maximizers, and the Rhetoric of Scalar Reasoning. *Journal of Semantics* 18(4), 297–331.
- Kay, P. 2005. Argument Structure Constructions and the Argument-Adjunct Distinction. In M. Fried and H. C. Boas (eds.), *Grammatical Constructions: Back to the Roots*, Amsterdam: John Benjamins Publishing Company.
- Kay, P. to appear. The Limits of Construction Grammar. In G. Trousdale and T. Hoffmann (eds.), *The Oxford Handbook of Construction Grammar*, Oxford: Oxford University Press.
- Kay, P. and Fillmore, C. J. 1999. Grammatical Constructions and Linguistic Generalizations: *The What's X Doing Y? Construction*. *Language* 75, 1–33.
- Kay, P. and Sag, I. A. this volume. Discontinuous Dependencies and Complex Determiners. In *Sign-based Construction Grammar*, Stanford: CSLI Publications.
- Lyons, J. 1977. *Semantics*. London and New York: Cambridge University Press.
- McCawley, J. D. 1988. *The Syntactic Phenomena of English, vols I and II*. Chicago: The University of Chicago Press.
- Mel'čuk, I. 1996. *Lexical Functions in Lexicography and Natural Language Processing*, Chapter Lexical Functions: A Tool for the Description of Lexical Relations in the Lexicon, pp 37–102. Amsterdam/Philadelphia: Benjamins.
- Michaelis, L. 2005. Entity and Event Coercion in a Symbolic Theory of Syntax. In J.-O. Östman and M. Fried (eds.), *Construction Grammars: Cognitive grounding and theoretical extensions*, Chapter 2, Amsterdam/Philadelphia: John Benjamins Publishing Company.
- Michaelis, L. A. forthcoming. Complementation by Construction. In *The Proceedings of the Thirty-second Annual Meeting of the Berkeley Linguistics Society: Parasession on Theoretical Approaches to Argument Structure*.
- Newmeyer, F. J. 2000. *Language Form and Language Function*. Cambridge: MIT Press.
- Pustejovsky, J. 1995. *The Generative Lexicon*. Cambridge, MA: The MIT Press.
- Ruppenhofer, J. K., Ellsworth, M., Petruck, M. R. L. and Johnson, C. R. 2006. FrameNet: Theory and Practice. Retrieved February 22th, 2006 from <http://framenet.icsi.berkeley.edu/>.
- Sag, I. A. 2010. English Filler-Gap Constructions. *Language* 86.
- Sag, I. A. this volume. Sign-Based Construction Grammar: An informal synopsis. In H. C. Boas and I. A. Sag (eds.), *Sign-based Construction Grammar*, Stanford: CSLI Publications.
- Sag, I. A., Wasow, T. and Bender, E. M. 2003. *Syntactic Theory: a Formal Introduction*. Stanford: CSLI Publications, second edition.
- Tesnière, L. 1959. *Éléments de syntaxe structurale*. Paris: Éditions Klincksieck.
- Van Eynde, F. 2007. The Big Mess Construction. In S. Müller (ed.), *Proceedings of the HPSG07 Conference*.

- Ziegeler, D. 2007. A word of caution on coercion. *Journal of Pragmatics* 39(5), 990–1028.
- Zwicky, A. M. 1995. Exceptional degree markers: a puzzle in internal and external syntax. In *OSU Working Papers in Linguistics*, pp 111–123.
- Zwicky, A. M. and Pullum, G. K. 1983. Cliticization vs. Inflection: English N'T. *Language* 59(3), 502–512.