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Construction Grammar

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Introduction

Theories of sentence meaning describe the relationship between the meaning of a sentence and the meanings of the words of that sentence. In compositional theories of sentence meaning, the semantic and syntactic requirements of the word (its argument structure) can be used to predict the semantic and syntactic type of a phrase in which that word is the syntactic head. According to this view, known as the principle of lexical projection, words constrain potential sisterhood relations by specifying the types of complements, adjuncts, and determiners that they either require or welcome (Zwicky, 1995; Jackendoff, 1997: Chap. 3; Sag *et al.*, 2003: Chap. 4). In projection-based models of sentence meaning, concepts – like entities, events, and properties – are expressed exclusively by words (Jackendoff, 1997: 48). Rules of syntactic combination assemble words and their dependent elements into phrases, and the phrases denote complex concepts like predicates and propositions. The rules of combination do not add conceptual content to that contributed by the words and therefore do not alter the combinatory potential of words. Thus, on the projection-based view, sentences have meaning but sentence patterns do not.

The projection-based view of sentence meaning articulates closely with models of syntax based on principles and parameters. In such models:

[a] language [is not] a system of rules, but a set of specifications for parameters in an invariant system

of principles of [universal grammar], and traditional grammatical constructions are perhaps best regarded as taxonomic epiphenomena – collections of structures with properties resulting from the interaction of fixed principles with parameters set one way or another (Chomsky, 1989: 43).

On this view, the syntactic patterns of a language are not licensed by the grammar of that language; they are simply artifacts of the interaction between universal and language-particular constraints. Construction Grammar (CxG) was devised in part to counteract the reductionist views of syntax and semantics described above, but at the same time it represented a return to a traditional, 'taxonomic' mode of grammatical analysis. Proponents of CxG have sought to show that there are constraints on form and interpretation that cannot be explained except as the products of grammatical constructions, form-meaning pairings of varying degrees of productivity and internal complexity. In CxG, grammar is viewed as a structured inventory of such pairings. Extensive discussion of the implications of this view for syntactic theory can be found in Fillmore *et al.*, 1988; Kay and Fillmore, 1999; Kay, 2002; Zwicky and Pullum, 1991; Zwicky, 1994, 1995; Goldberg, 1995, 2002; Michaelis and Lambrecht, 1996; Michaelis and Ruppenhofer, 2001; Goldberg and Jackendoff, 2004; Fillmore *et al.* (in press).

Grammatical constructions have been a fundamental tool of linguistic description since ancient times (Harris and Taylor, 1997), and for most of that history they have been treated no differently from words – forms with specific meanings and functions. It was only with the advent of generative grammar that constructions fell into disrepute. It is easy to understand

why: the idea that patterns of word combination could be intrinsically meaningful simply cannot be accommodated within the logical structure of the projection-based view. If, for example, we change the associations within an arithmetic sequence like $2 \times (3 + 4)$ so as to create the sequence $(2 \times 3) + 4$, we change what the sequence denotes (from 14 to 10), but not what the numbers denote. If we apply the same logic to syntax, we conclude that changing the syntactic associations in a string of words changes only what the word string means, not what the words in that string mean. While this conclusion is well founded, proponents of CxG have argued that it is based on an inappropriate analogy: content words (like nouns and verbs) do not designate in the way that numbers do, because syntactic context determines what kind of event, property, or entity the word denotes and, in turn, what the combinatory behavior of that word is (Goldberg, 1995; Michaelis and Ruppenhofer, 2001; Goldberg and Jackendoff, 2004). We will refer to this effect of syntactic context as *type shifting*.

In the second section, we will look at the treatment of type shifting in a construction-based model of syntax, with particular attention to verbal argument structure and nominal syntax. As we will see, the CxG model of semantic composition is integrative rather than projection-based: like words, constructions denote semantic types (e.g., events and entities) and, like words, constructions license syntactic and semantic dependents; therefore, the interpretation of a phrase involves combining the interpretive and combinatoric constraints of the phrasal pattern with those of the word that is the head of the phrase. In the course of this discussion, we will explore the formal representation of these constraints and the procedure used to combine them.

In the third section, we will discuss additional arguments in favor of construction-based grammar; these arguments involve idiomatic patterns, functional oppositions in grammar, exceptions to ‘transconstructional filters’ and deficiencies of rule-based grammatical generalizations. A concluding section will suggest connections between construction-based grammar and usage-based theories of language acquisition and processing.

Type Shifting as Evidence for Construction-Based Meaning

Argument Structure

Projection-based theories of the syntax–semantics interface, including Lexical Functional Grammar

(Bresnan, 2001), Head-Driven Phrase Structure Grammar (Pollard and Sag, 1994), and Role and Reference Grammar (Van Valin and LaPolla, 1997), tend to focus on verbal argument structure, and for good reason: the relationship between a verb’s semantic requirements and the meaning of the clause built around that verb appears highly transparent. For example, (1) denotes an event of transfer – involving an agent, a ‘gift,’ and a recipient – because the verb *give* denotes a scene of transfer, and likewise requires the presence of these three participants:

(1) We gave the account to her.

Models of sentence meaning based on lexical projection provide a straightforward picture of the syntax–semantics interface: while the verb determines **what** the sentence means, syntactic rules determine **how** it means. For example, in (1) the verb and the two arguments that follow it are grouped together into a verb phrase (the predicate), which then combines with a noun phrase (the subject) to form a sentence. In addition to constituent-building rules, syntacticians have proposed realization rules, called linking rules, that assign each of the verb’s thematic roles (e.g., agent or patient) to a unique grammatical role (e.g., subject or object). Linking rules, which are typically assumed to have crosslinguistic validity (Bresnan, 1994; Van Valin and LaPolla, 1997), are used to represent the fact that there is usually more than one way to express the semantic arguments of a given verb. For example, the verb *give*, in addition to allowing realization of its recipient argument as a prepositional phrase (e.g., *to her*), as in (1), it allows that recipient argument to be realized as a direct object, as in (2):

(2) We gave her the account.

Thus, a given verb may be subject to several (mutually incompatible) linking rules. These linking rules are assumed to add syntactic–realization constraints to verb entries in which “[a]rgument roles are lexically underspecified for the possible surface syntactic functions they can assume” (Bresnan, 1994: 91). These rules do not add to, subtract from, or alter the array of thematic roles associated with the verb. For example, Bresnan (1994) represents locative inversion, a presentational construction found in both English and the Bantu language Chichewa, as one linking possibility for verbs like *stand*, which license both a location argument and a theme argument. Such verbs are subject both to the linking rule that produces the pattern in (3) and to the linking rule that produces the ‘inverted’ pattern in (4):

(3) Two women stood in the plaza.

- (4) In the plaza stood two women.

However, attested examples of locative inversion like that in (5) are difficult to square with the model of argument linking outlined above:

- (5) Down at the harbor there is a teal-green clubhouse for socializing and parties. Beside it **sparkles** the community pool (*Vanity Fair*, August 2001).

Examples like (5) are problematic in Bresnan's framework because the verb *sparkle* does not assign either a locative role or a theme role – it is an intransitive verb of light emission – and yet it is welcomed by the locative-inversion argument-structure pattern. In examples like (5), Bresnan argues (1994: 91), a locative-theme argument structure imposed by the pragmatic requirement of presentational focus is 'overlaid' on the argument structure of the verb. However, if argument structures are merely alternate possibilities for the realization of the semantic roles licensed by the verb, and not independent form-meaning pairings, the source of the 'overlay' is mysterious.

Adherence to the projection principle results not only in *ad hoc* devices such as an 'overlay theme' in cases like (5), but also, as Goldberg points out (1995, 2002), appeal to implausible verb senses. Goldberg's construction-based model of argument structure accords a central place to innovative verb uses like that in (5) and those in (6–8):

- (6) Most likely they were fellow visitors, just **panting** up to the sky-high altar out of curiosity (Lindsey Davis, *Last Act in Palmyra*, p. 28).
- (7) When a visitor passes through the village, young lamas stop picking up trash to mug for the camera. A gruff 'police monk' **barks** them back to work (*Newsweek* 10/13/97).
- (8) Although he professed to like the sweater she **knit** him for his birthday, he wouldn't wear it in public [...] (www.knitty.com/ISSUEwinter02/FEATsweatercurse.html).

Goldberg argues that if argument structure were determined exclusively by the lexical verb of the clause, we would have to posit a special verb sense for each of the usages exemplified in (6–8). Sentence (6) would require a special sense of *pant* in which it means 'move while panting,' (7) would require a special sense of the verb *bark* in which it means 'cause to move by barking,' and (8) would require a sense of the verb *knit* that would be captured by the paraphrase 'knit something in order to give it to

someone.' Such word senses, as Goldberg argues, are not only *ad hoc* and unintuitive, but also entail radical and unconstrained verb polysemy.

In the construction-based model of argument structure proposed by Goldberg, verb meaning is constant across syntactic contexts. No additional lexical entries are created to represent the meanings and projection properties of verbs found in nonce patterns like those in (5–8). Instead, verbs combine with verb-level linking constructions, which denote event types. These linking constructions assign grammatical functions to participant roles contributed by the verb. Because these constructions denote event types, each licenses the array of thematic roles entailed by its particular event type. Take, for example, the ditransitive construction, exemplified in (8). According to Goldberg (1995: Chap. 2), this pattern, which she represents as a sentence type of the form NP V NP NP, denotes an array of closely related event types, including actual transfer, intended transfer, metaphorical transfer, and denial of transfer. Because of the event type it designates, the ditransitive construction licenses three thematic roles: an agent, a theme, and a recipient. The set of thematic roles licensed by the construction may properly include the set of roles licensed by the verb, that is, its valence. In such cases, the construction augments the verb's valence. For example, the verb *knit*, as a verb of creation, licenses two thematic roles, an agent and a theme. In (8), however, *knit* is accompanied by three thematic roles: its valence has been augmented up to that of a verb of transfer because the construction in which it is embedded (the ditransitive) designates an event of transfer. While verbal argument structure cannot vary as a function of syntactic context in projection-based models of argument structure, valence augmentation is a predictable side effect of semantic composition in construction-based models, which assume two sources of thematic structure (the verb and the construction), rather than a single source (the verb).

How are the semantic contributions of verb and construction combined? The mechanism proposed by Goldberg involves fusion: the identification of the verb's participant roles with semantically compatible roles licensed by the construction (Goldberg, 1995: 50–66). Goldberg proposes a limited set of semantic integration relationships that may hold between verb and construction (Goldberg, 1995: 65–66). One such integration relationship is the instance relationship, as exemplified in (2). Here, the event denoted by the verb *give*, and correspondingly the valence of *give*, is identical to that of the ditransitive construction, which similarly designates a transfer event. Other

integration relationships entail valence augmentation. Among these is the manner relationship, as exemplified by (6): the verb *pant* designates an activity that occurs during the course of an event of directed motion, the latter of which is denoted by the construction. In this case, the valence of the single-argument verb *pant* is augmented up to that of a directed-motion event, which entails both an agent and a goal argument (see also Goldberg and Jackendoff, 2004). An additional integration relationship proposed by Goldberg is the means relationship, as exemplified in (7): barking is the means by which the agent causes the theme argument to move. As in the case of *pant* in (6), the valence of the one-argument verb *bark* is augmented up to that of the construction: in (7), the construction, which designates an event of caused motion, has added both a theme argument and a directional argument to the valence of *bark*.

The formal representation of verb-construction combinations in Construction Grammar, as in Head-Driven Phrase Structure Grammar (Sag *et al.*, 2003), is based on typed feature structures, nested lists of attributes and their values, and unification, a procedure for combining feature structures (Fillmore and Kay, 1993; Goldberg, 1995; Michaelis and Ruppenhofer, 2001; Sag *et al.*, 2003). Unification grammar can be described metaphorically as the superimposition of one slide upon another. If we imagine that each slide has some information written on it, the constraint on slide superimposition can be stated as follows: any slide can be placed on top of any other slide as long as all of the information on each slide ‘shows through.’ Conflicting specifications would appear as blurs – that is, they would be illegible, and would therefore create unification failures. In unification-based grammars, grammatical concord (e.g., agreement) and identity of values (as between a head and its daughter) are represented by means of numbered unification indices, e.g., (2).

Figure 1 gives a representation of the ditransitive construction that combines the formalisms developed by Goldberg (1995), Fillmore and Kay (1993) and Sag *et al.* (2003). Figure 1 includes the integration relations posited by Goldberg, as values of the feature ‘integration’ (INTGN), but it differs from Goldberg’s ditransitive construction (1995: 50) in that it is schematic verb entry rather than a sentence type of the form NP V NP NP. As Fillmore and Kay (1993: Chap. 8) point out, the constraints that define the ditransitive construction are operative whether the recipient argument is realized as a postverbal accusative NP, as in an active sentence, or as a preverbal nominative NP, as in a passive sentence, e.g., *We were given the*

book. For this reason, we will assume, as they do, that the ditransitive is a schematic (i.e., nonlexically specified) verb entry, in which the grammatical functions of the agent and recipient arguments are unspecified. In the Fillmore and Kay implementation, verb and argument-structure construction are near copies of one another. The lexical entries of verbs that combine with argument-structure constructions contain theta frames, ordered sets of thematic roles containing one distinguished argument (DA), but these lexical entries do not, under ordinary circumstances, specify which grammatical functions (GFs) are linked to those thematic roles; this is what argument-structure constructions do, and they do it in an incremental fashion: observe in Figure 1 that only one thematic role, the theme, is linked to a grammatical function (oblique) by the ditransitive construction.

Following Fillmore and Kay (1993), we assume here that each linking construction specifies only a single linking constraint. By not specifying the grammatical-function realizations of the agent and theme arguments, we enable the ditransitive construction to unify with both passive and active argument-structure constructions. Let us use the case of a passive ditransitive to describe the way in which multiple linking constructions interact. In this case, the recipient argument will link to the subject grammatical function by default. How does this work? The theme cannot be linked to subject because the ditransitive construction, as shown, links the theme to an oblique grammatical function. Thus, the model correctly predicts the ungrammaticality of the passive sentence **A gift was given Pat*. The linking of agent to subject is similarly preempted: the passive construction links agent to an oblique grammatical function (Fillmore and Kay, 1993: Chap. 8). According to a constraint that Fillmore and Kay refer to as the subject principle, some thematic role must receive the grammatical function subject. Since the goal argument is the only otherwise unlinked thematic role once the ditransitive and passive constructions have been unified, it becomes the subject by default. By assuming subject linking by default, we capture the observation that subject is the least semantically constrained of the three case roles: subject, object, and oblique.

As per Sag *et al.* (2003), Figure 1 contains a valence (VAL) feature, whose two values are also features: specifier (SPR), a category that contains either a subject or a determiner, depending on the projection properties of the lexical head, and complements (COMPS), a category that includes any additional arguments assigned by the lexical head. Following

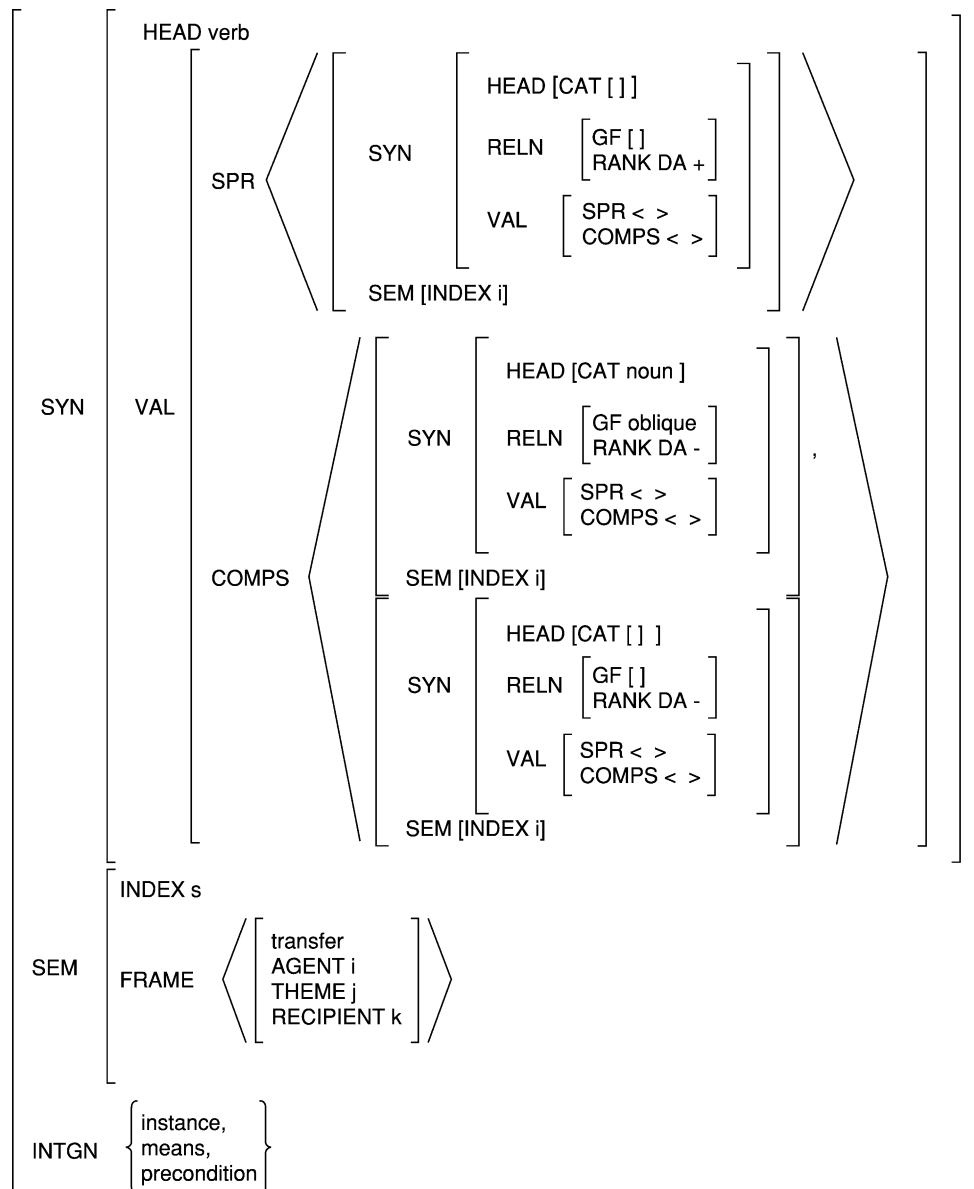


Figure 1 The ditransitive construction.

Sag *et al.* (2003), we assume that members of both the SPR and COMPS lists are ‘canceled out’ to signal the satisfaction of valence requirements represented in the SPR and COMPS sets. The satisfaction of a valence requirement is reflected in the valence set of the construction whose daughters are the valence-taking element and its required valence member(s). Thus, as we see, the ditransitive construction has two NPs (coindexed with the theme and recipient arguments) in its COMPS set. Once combined with those two NPs, the ditransitive verb can be the head of the VP construction, whose COMPS set is empty but whose SPR set contains one member, a subject NP. This SPR

requirement is satisfied once the VP is combined with a subject via the subject–predicate construction, another constituency construction. Thus, valence requirements are passed from daughter to mother until they are canceled via satisfaction, i.e., once the head daughter’s required sister is supplied by a phrase-building construction.

Coercion

The model of argument structure described in ‘Argument Structure’ has been extended to semantic type-shifting, sometimes referred to as coercion. Coercion, according to De Swart (1998: 360) is “syntactically

and morphologically invisible: it is governed by implicit contextual reinterpretation mechanisms triggered by the need to resolve [semantic] conflicts.” Coercion effects have been identified in nominal syntax (De Swart, 1998), verbal aspect (Moens and Steedman, 1988; Michaelis, 2004), and pragmatically specialized sentence types (Michaelis and Lambrecht, 1996). Coercion effects are of essentially two types. The first type, the endocentric type, comes from the violation of selectional restrictions of a lexical head, e.g., a verb. A simple example is that in which a semantic feature of an argument is overridden by the verb semantics, as in the sentence *I bent the rock*. Here, the rock is necessarily construed as a flexible object, as required by verbal semantics. The second type, the exocentric type, is that in which a word that is not a head, e.g., a determiner, does something that usually only a head does – semantically constrain the elements with which it combines (Zwicky, 1985). For example, a mass noun like *tea* receives an individuated construal when it is paired with the indefinite article (9), and a count noun receives a mass construal when paired with unstressed *some*, as in (10):

(9) I had a *tea*.

(10) Give me some *blanket*

Endocentric and exocentric coercion effects have often been treated together, but they have distinct implications for the syntax–semantics interface. The endocentric cases are merely extended cases of lexical licensing: the relevant semantic effects on arguments can be attributed to the imposition of semantic requirements by the lexical head. Exocentric coercion effects cannot be attributed to lexical licensing. Therefore, they present a significant challenge to theories of sentence semantics based upon the projection properties of lexical words. Since word combination in projection-based syntax is tied to phrase building, the drivers of sentence semantics are not simply words but, more particularly, the heads of syntactic projections.

In CxG, a semantic licenser need not be the head of a phrase. In fact, as we have seen, a semantic licenser may be a skeletal syntactic pattern (e.g., an argument–structure construction) rather than a word. In the case of constructions that define phrases like NP, which Zwicky (1994) refers to as constituency constructions, it is mutual invocation of one daughter by the other, rather than unilateral lexical-head licensing that determines what words comprise the phrase. Constructions have heads, in the limited sense that one daughter determines the syntactic category of the mother, but the head does not license its

complement any more than the complement licenses the head. Because syntactic combination is not head-driven in CxG, the framework captures exocentric coercion effects in a straightforward and principled way (Michaelis, 2004). The coercion effects triggered by determiners, as exemplified by (9, 10), need not be taken as evidence that determiners are heads, as assumed in syntactic theories based on functional projections (Longobardi, 1994). Such accounts encounter problems when faced with bare nominals (mass and plural nouns), as in (11a, b):

(11a) She drank *beer*.

(11b) She bought *shoes*.

In such cases, proponents of the DP model must posit phonetically unrealized determiners in order to account for the existential and generic quantification of undetermined nominal expressions in contexts such as (11a, b). The CxG model retains the insight that nouns are the syntactic heads of NPs while also capturing the mutual licensing relationship that holds between noun and determiner in the NP. The NP construction that licenses indefinite determination, given in Figure 2, will be used to exemplify this model of NP syntax.

In Figure 2, which is based on treatment of nominal syntax found in Sag *et al.* (2003: Chap. 4), the nominal daughter corresponds to both N and N' in traditional X'-based approaches: it is simply a noun or noun projection whose specifier requirement is unsatisfied. The mother corresponds to NP, as in traditional X'-based approaches, but unlike those approaches, the current one does not use nonbranching domination to represent nominal expressions like those in (12). Each of these nouns consists of a single noun that either disallows a determiner or does not require one:

(12) *Pat* gave *him* *money*.

In the present approach, proper names, bare mass nouns, plural nouns, and pronouns are represented simply as nouns whose SPR requirements are satisfied inherently, because these nouns denote intrinsically quantified variables (see Sag *et al.*, 2003: Chap. 5 for discussion). A lexical entry for one such noun is shown in Figure 3, which is based on Sag *et al.* (2003) and Fillmore *et al.* (in press).

In this lexical entry, the semantic type of the mass noun is represented by the ontological index *c*, which stands for the cumulative type (masses and groups). In order to represent the fact that bare mass nouns have existentially quantified interpretations (that is, that they refer to instances of the substance in question), the entry contains semantic frames representing

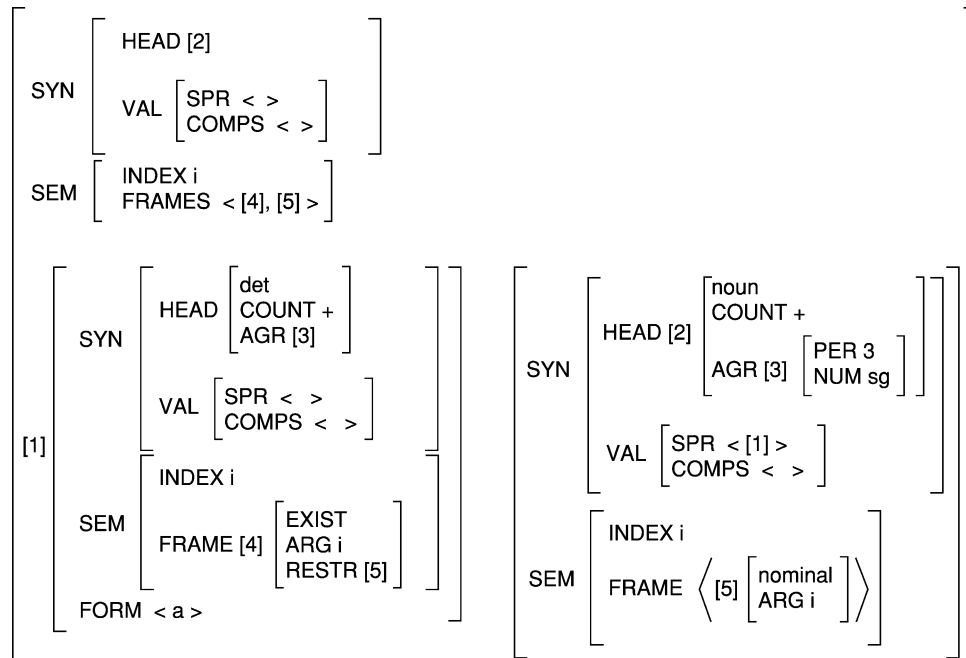


Figure 2 The indefinite determination construction.

both the nominal type and existential quantification. In the latter frame, the ontological index c is the variable bound by the quantifier and the nominal type is the restriction (RESTR) of the quantifier. In other words, bare mass nouns are ‘self-quantifying.’ Since mass nouns can also unify with various determination constructions, Fillmore *et al.* (in press: Chap. 2) propose a derivational rule, called quantifier pumping, which relates the lexical entries of mass nouns that require a specifier – and thereby a quantifier – to the lexical entries of those mass nouns that do not.

Those nouns that have empty SPR sets can unify directly with constituency constructions such as the VP and subject–predicate constructions, which restrict their nominal arguments to those nominal expressions that, at the grammatical level, have satisfied SPR requirements and, at the semantic level, denote bound (quantified) variables. Thus, by assuming both that valence requirements are canceled once satisfied and that certain subclasses of lexical entries have empty SPR lists from inception, we can account for the fact that certain nominal expressions can be arguments without the help of determiners, phonetically unrealized or otherwise.

The foregoing assumptions are crucial to the construction-based model of coercion effects involving nominal types. In order to see how this model works, let us look at the determination construction in [Figure 2](#). In this figure, the left daughter, the indefinite

article, is a specifier of its nominal sister, while it also invokes its nominal sister, as an argument of its semantic frame, the EXIST frame. This frame represents the quantificational force of the indefinite article: it is an existential quantifier, and the variable that it binds is the semantic index of the nominal daughter. The restriction (RESTR) on this quantifier is the semantic type of the nominal daughter. In accordance with Fillmore *et al.* (in press), the index i is used to indicate that the ontological type of the nominal is that of an individual. This semantic type has a parallel grammatical type, the count type; this type appears as a value of the head feature in both of the construction’s daughters, representing the grammatical concord relationship that exists between the indefinite article and its count noun sister within the NP.

Together with principles governing lexical-feature overrides, as discussed in Michaelis (2004), the CxG model of nominal syntax predicts the coercion effects shown in (9, 10). These principles amount to the following: to resolve conflict between lexical and constructional constraints, interpreters shift lexical feature-values that are in conflict with constructional feature-values. Shifting results in the portion or type reading of mass nouns like *tea* in (9) and the mass reading of count nouns like *blanket* in (10). Thus, for example, when a count noun like *blanket* is combined with unstressed *some*, a determiner that seeks the mass type, the lexical representation of the

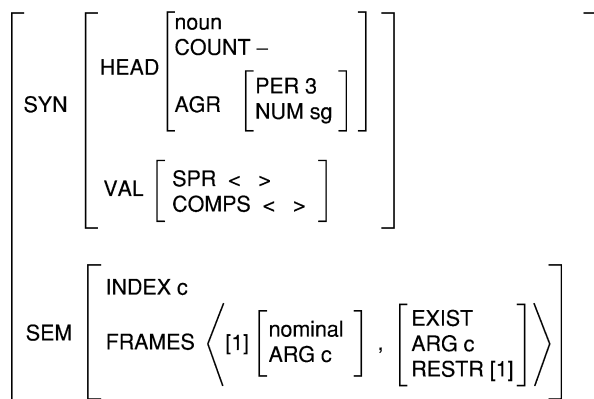


Figure 3 A schematic mass noun lexical entry.

count noun will shift to that of the schematic lexical entry in Figure 3. This shift entails changing the ontological index of the noun from an individual to a cumulative entity. Crucially, the construction-based model of coercion accounts for nominal coercion effects that lack morphological triggers, as in (13):

(13) You have *apple* on your shirt.

In (13), a count noun (*apple*) receives a mass interpretation, but this type shift cannot be attributed to the presence of a determiner that selects for a mass noun, as it can in (10). Nor can the shift be attributed to the selection properties of the verb that takes the bare noun *apple* as an argument: the verb *have* is just as likely to select an individuated entity for its second argument as a mass-denoting entity. However, the type shift in question can be attributed to the VP construction with which the noun *apple* has combined.

Recall that the VP construction, like the subject–predicate construction, requires nominal expressions satisfying its argument roles to have empty SPR sets, or, equivalently, to denote quantified variables. Let us assume that type shifts are conservative, in the sense that they produce lexical entries that (a) replicate existing entries, and (b) are minimally distinct from the input entry. Under this assumption, it makes sense that the type shift triggered by the VP construction in (13) would produce a lexical representation for the word *apple* that has the properties of the mass entry in Figure 3, rather than, say, one with the properties of a plural noun entry or a proper noun entry. Within the taxonomy of nouns, only the shift from count to mass leaves frame and person–number values unchanged (see Sag *et al.*, 2003: 236–240 for a hierarchical representation of nominal types).

Thus far, we have seen that, by admitting ‘top-down’ constructional meaning in addition to ‘bottom-up’ word meaning, CxG provides principled accounts of

both verbal valence augmentation and exocentric coercion. In the next section, we will briefly explore several additional arguments for construction-based grammar that have been advanced by its proponents.

Additional Arguments for Construction-Based Grammar

The arguments that we will consider here are based on: the existence of formal idioms and relations of ‘family resemblance’ among such patterns (Lakoff, 1987; Fillmore *et al.*, 1988; Michaelis and Lambrecht, 1996; Culicover, 1997; Goldberg and Jackendoff, 2004), paradigmatic effects in morphosyntax (Michaelis, 1998; Ackerman, 2003), the inadequacy of parameter settings as a model of typological variation (Pullum and Zwicky, 1991; Van Valin and LaPolla, 1997; Croft, 2002), and the failure of derivational rules to capture generalizations over the putative ‘input’ forms (Goldberg, 1995; Bybee, 2001; Michaelis and Ruppenhofer, 2001; Croft and Cruse, 2004).

Idioms and Inheritance

It has long been observed that complex expressions in a given language can mean what they mean in the same way that words do – by convention rather than composition. Such complex expressions are called *idioms*. Fillmore *et al.* (1988) point out that while a great deal of attention has been paid to substantive, or lexically filled, idioms (e.g., *hit the nail on the head*, *light a fire under x*, *take x to task*), less attention has been paid to formal idioms, syntactic patterns that are grammatically irregular with regard to either their interpretation or their syntactic composition. An example of a syntactically irregular formal idiom that has been discussed in the CxG literature is the correlative conditional, e.g., *The faster we run, the slower they run* (Fillmore, 1986; Michaelis, 1994; Culicover and Jackendoff, 1999). While the construction has conditional semantics, no phrase-structure rules of English allows paired comparative phrases of exactly this type. An example of a syntactically regular but semantically irregular formal idiom is the WXDY construction, e.g., *What’s that fly doing in my soup?* (Kay and Fillmore, 1999). While a naïve speaker might interpret this pattern as questioning the purpose of an activity, it is actually used to ask why a given state exists.

Fillmore *et al.* (1988) and Culicover and Jackendoff (1999) argue that formal idioms are highly productive patterns, and that they therefore constitute aspects of linguistic competence that a generative

grammar must account for. As Zwicky (1995) observes, CxG is uniquely well suited to this task, because it eschews two assumptions common to competing phrase–structure grammars: local licensing and head-driven category determination. Since constructions have daughters, and daughters may have daughters, constructions can be used to represent what Zwicky refers to as niece licensing: a situation in which a construction’s daughter calls for a sister with a daughter of a particular type. The spoken English sentence type referred to by Brenier and Michaelis (2005) as hypotactic apposition illustrates the role played by niece licensing in the representation of formal idioms. An example of this construction is given in (14):

- (14) That’s the real problem is that you never really know.

Hypotactic apposition is a nonstandard presentational pattern that consists of a ‘set up’ clause containing a cataphoric demonstrative pronoun (e.g., *that*) followed by a ‘counterweight’ clause introduced by a finite form of the verb *be*. The pattern qualifies as an idiom because the phrase–structure rules of English do not permit the adjunction of a nonsubordinate finite clause and a finite VP. Representing hypotactic apposition requires appeal to niece licensing because the construction requires not simply a VP daughter but one whose head daughter is, in turn, a finite form of the copula.

Other formal idioms violate head-driven syntactic category determination, according to which the head of the phrase determines the syntactic distribution of the phrase. An example of such a violation is provided by adjective phrases containing the correlative degree word *as*, e.g., *as competent as she was*. While such expressions constitute adjective phrases in contexts like (15a), they have the external distribution of concessive clauses in contexts like (15b):

- (15a) She was *as competent as she was*.
 (15b) *As competent as she was*, she wasn’t able to find work.

In addition to providing representational conventions appropriate to formal idioms, CxG also captures semantic and syntactic relationships between idiomatic patterns and more regular patterns. For example, Fillmore (1986) observes that the English correlative conditional, despite having numerous idiomatic properties, partakes of general syntactic and semantic properties of the conditional sentence type, including having an antecedent clause that is a polarity context. Relationships of this nature are represented in CxG by inheritance networks, in which like constructions have partially overlapping representations (Goldberg,

1995: Chap. 3). Inheritance networks have been used to capture syntactic and semantic commonalities among deictic and existential *there*-constructions (Lakoff, 1987), exclamatory constructions (Michaelis and Lambrecht, 1996), subject–auxiliary constructions (Fillmore, 1999), and resultative constructions (Goldberg and Jackendoff, 2004).

Paradigmatic Effects in Morphosyntax

Inference based on oppositions in a language is central to the Gricean model of conversational logic (Horn, 1984). For example, if a speaker asserts *Leslie caused the train to stop*, the hearer can reason, via Grice’s second maxim of quantity (‘Do not say more than you must’) that since the speaker chose not to use the less prolix formulation *Leslie stopped the train*, the default situation (direct causation) did not apply. In such cases, the interpretation of the periphrastic form depends upon the existence of a synonymous unused form. Proponents of construction-based syntax have also identified paradigm-based inference as a source of morphosyntactic constraints and affordances. For example, Michaelis (1998: Chap. 5) argues that the constraint that prevents past-time adverbial reference in present perfect sentences (e.g., **I have visited Rome in 1999*) is an effect not of semantics but of a discourse-pragmatic opposition between the present perfect and the simple past in English: the present perfect functions to introduce a past-time interval rather than invoking an already established past interval. Paradigmatic effects have also been used to motivate constraints on argument–structure constructions. Goldberg and Jackendoff (2004: 540–541) observe that the constraint barring the intransitive resultative construction (16a) from expressing accompaniment to motion (16b) can be attributed to the existence of a nearly synonymous construction, the *way*-construction (16c), which can:

- (16a) She skipped into the garden.
 (16b) **She whistled into the garden.*
 (16c) She whistled her way into the garden.

Paradigmatic effects of the nature require a model in which the grammar consists of a structured inventory of form–meaning pairings analogous to the lexicon, i.e., a ‘constructicon.’ It is only in such a grammar that constructions may enter into usage-based oppositions. Because CxG is such a model, it appears uniquely equipped to describe paradigm-based constraints in syntax.

The Inadequacy of Transconstructional Filters

In an early paper in the CxG tradition, Pullum and Zwicky (1991) argue that the so-called double-*ing*

constraint cannot be a general morphosyntactic constraint of English. Examples that were used to motivate the constraint include that in (17), but, as Zwicky and Pullum observe, there are systematic exceptions, exemplified in (18, 19):

- (17) Robin was starting going to concerts more frequently.
- (18) Robin was enjoying going to concerts more frequently.
- (19) Robin was not starting, nor did she intend to start, going to concerts.

Pullum and Zwicky propose that the double-*ing* constraint is not therefore a transconstructional filter but instead a constraint on a single constituent-defining rule: “[The VP constituency construction] is inapplicable if its head V and an immediately following head of a complement VP are both in Present Participle form” (Pullum and Zwicky, 1991: 254). The significance of such findings is that they vitiate a model of typological variation based on parameter settings and support one based on constructions. Construction-based typological models include those of Croft (2001), who argues that grammatical-function coding is derivative of constructionally determined semantic relations, and Van Valin and LaPolla (1997), who argue that the pattern of semantic neutralization that characterizes the pivotal syntactic argument in the clause varies not only from language to language but also from construction to construction. For example, while English is widely analyzed as a nominative–accusative language, there are highly productive constructions of English that require other patterns of semantic restriction and neutralization. For example, in English imperatives, the null instantiated element represents an agent rather than a subject. Further, in English resultative sentences the argument of the secondary predicate can be either a subject or an object, as shown by (20, 21), but it must be a patient-type argument, as shown by (22):

- (20) The cake fell flat.
- (21) She hammered the metal flat.
- (22) She ran *(herself) tired.

What this suggests is that the murkily defined ‘ergative undercurrents,’ sometimes identified in nominative–accusative languages, are simply reflections of the fact that different constructions in a given language require different pivotal arguments. By the same token, split-case systems need not be seen as trending in one direction or another (e.g., away from ergative-absolutive organization and toward nominative–accusative organization). That a given

language should use different patterns of semantic neutralization for different syntactic purposes is expected if constructions are the basis of syntax, but not otherwise.

Product-Oriented Generalizations

In Bybee’s (2001) schema-based model of inflection, the rule-rote distinction is replaced by a ‘superpositional memory’ in which like forms overlap, e.g., the irregular past tense forms *sang*, *rang*, and *drank*. Affixes, roots, and stems do not have independent representations; they exist only as similarity relations among words. These relations are captured by product-oriented schemas. Product-oriented schemas represent similarities among forms of a specific category, but do not derive one category from another. In this model, the main determinant of productivity is the type frequency of the schema – the number of different words that represent the schema.

While it might appear that product-oriented schemas would miss source-oriented generalizations, Bybee shows that template can be used to capture similarities among schemas that participate in an opposition. For example, the template [sVN] could be used to capture the phonetic and semantic similarity among the members of the ablaut relation exemplified by the triad *sing-sang-sung*. Further, Bybee shows (2001: 126–127) product-oriented schemas are superior to source-oriented schemas in that the former are not derailed when we cannot find generalizations across the putative source forms. She bases this argument on English past tenses in [Λ] (*string*, *cling*, *fling*). The addition of new members to this class (e.g., *struck*, *stuck*, *dug*, *snuck*), made a source-oriented generalization impossible: the present tense counterparts of the newly added past tense verbs lack a nasal coda and have a variety of vocalic nuclei, among them ([i], [ai], and [ɪ]). However, a product-oriented generalization *is* possible, as captured by the schema $CAC_{[velar]}$.

Construction grammarians (e.g., Goldberg, 1995 and Michaelis and Ruppenhofer, 2001) also use the lack of valid source-oriented generalizations to argue for product-oriented ones. In particular, they argue that verbal linking patterns are produced by constructions rather than by lexical rules. As discussed in ‘Argument Structure,’ lexical-rule-based approaches to verbal argument structure assume that thematic structure is unaffected by the application of a lexical rule, but the word that constitutes the ‘input’ to a putative lexical rule may (a) lack the necessary thematic roles (as do verbs of creation with respect to the ditransitive pattern; see ‘Argument Structure’ above) or (b) lack thematic structure altogether, as do nonce denominal verbs. Example (23), taken from

Michaelis and Ruppenhofer (2001: 4–5), illustrates the latter problem with respect to the German applicative pattern, in which a locative argument is linked to a nonoblique grammatical function (either subject or object) and the inseparable prefix *be-* is attached to the verb:

- (23) Es mag ja lustig sein, zwei hartgekochte Eier wie Clownsköpfe mit angekeimten Sojabohnen zu *behaaren* und sie auf Gurkenscheiben zu stellen [...].
 ‘It might be funny to be-hair two hard-boiled eggs like clowns’ heads with germinating soy beans, to stand them up on cucumber slices [...].’

In (23), an active voice, trivalent applicative predication, the base form is the noun *Haar* (‘hair’). This word is inherently nonrelational, as it has no verbal counterpart outside of this context: German lacks a transfer verb **haaren* (‘hair’). The applicative predication in (22) designates a transfer event of the type denoted by trivalent applicative verbs like *beladen* (‘load’), and yet the thematic roles present in (23) are evidently not licensed by the stem *Haar*, because *Haar* is not a verb, let alone a transfer verb. Instead, as Michaelis and Ruppenhofer (2001) argue, the applicative pattern imposes its own thematic structure, and therefore it is a construction rather than the output of a lexical rule.

In addition, proponents of argument–structure constructions have argued against lexical-rule-based approaches on the grounds that such ‘rules’ may have no uniform ‘product’ (Goldberg, 1995: 31–39). For example, German applicative verbs designate a variety of image- and force-dynamic schemas, including coverage, intensive action, repeated action, and benefaction (Michaelis and Ruppenhofer, 2001). Because constructions, like words, are potentially polysemous (Michaelis, 1994), the construction-based model of verbal argument structure can readily accommodate this semantic variety (Goldberg, 1995). In such accounts, distinct senses of a given argument–structure construction are related via inheritance, as described in ‘Idioms and Inheritance.’

Conclusion

Because constructions, like words, freely combine semantic constraints (like event representations) with pragmatic constraints (like use conditions), describing constructional meaning requires us to combine cognitive and discourse-functional explanation. This integrated approach characterizes much of the current research on language and mind: studies of language acquisition and sentence processing increasingly emphasize the role of usage factors, in

particular the relativity frequencies of words and morphosyntactic patterns. Such studies have shown, for example, that the onset of verb overregularization errors in early child language is triggered by an increase in the proportion of regular to irregular verbs in the child’s vocabulary (Marchman and Bates, 1994) and that the likelihood of a garden-path ‘detour’ during sentence processing is a function of the prior probability of a given constituent structure (e.g., reduced relative vs. main verb) combined with the transitivity bias of the lexical verb (Narayanan and Jurafsky, 1998). Such studies support the view that linguistic knowledge is the knowledge of routines (Langacker, 1987; Bybee, 2001; Tomasello, 2001, 2003; Croft and Cruse, 2004) and that language acquisition is the “mastery of artifacts and conventions” that children “may adapt for creative uses as their mastery progresses” (Tomasello, 2001: 160). If these theorists are correct, knowledge of language is the product of acculturation, and grammatical constructions are the basis of syntax.

See also: Declarative Models of Syntax.

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