

# Argument Structure Constructions versus Lexical Rules or Derivational Verb Templates

ADELE E. GOLDBERG

---

**Abstract:** The idea that correspondences relating grammatical relations and semantics (*argument structure constructions*) are needed to account for simple sentence types is reviewed, clarified, updated and compared with two lexicalist alternatives. Traditional lexical rules take one verb as 'input' and create (or relate) a different verb as 'output'. More recently, invisible derivational verb templates have been proposed, which treat argument structure patterns as zero derivational affixes that combine with a root verb to yield a new verb. While the derivational template perspective can address several problems that arise for traditional lexical rules, it still faces problems in accounting for idioms, which often contain specifications that are not appropriately assigned to individual verbs or derivational affixes (regarding adjuncts, modification, and inflection). At the same time, it is clear that verbs play a central role in determining their distribution. The balance between verbs and phrasal argument structure constructions is addressed via the Principles of Semantic Coherence and Correspondence together with a usage-based hierarchy of constructions that contains entries which can include particular verbs and other lexical material.

## 1. Introduction

In order to interpret language, speakers need to assign semantic interpretations to the overtly expressed formal patterns that they witness; conversely, in order to produce language, speakers need to choose formal patterns to express the meanings they want to convey. In this way, correlations between surface form and interpretation constitute the basis of our knowledge of language. Learned correspondences between form and function, at varying levels of complexity and abstraction, are *constructions* (e.g. Fillmore Kay and O'Connor, 1988; Goldberg, 1995, 2006). Examples of various types of constructions are provided in Table 1.

For any linguistic theory to be descriptively adequate, subtle facts about semantics and *use* of particular constructions need to be accounted for. For example, restrictions on register, genre and intonation can be part of our knowledge of individual words, idioms and productive phrasal patterns as the examples in Table 2 illustrate. Frequency information is also assigned to constructions, since it is well known to play a role in acquisition, processing and historical change.

---

I thank Sam Guttenplan, Ray Jackendoff, Paul Kay, and Stefan Müller for comments on an earlier draft. They are of course not responsible for the perspective described here. I am grateful for funding from the Einstein Foundation in Berlin and Freie Universität for supporting this work.

**Address for correspondence:** Council of the Humanities, 2-C-17 Green Hall, Princeton University, Princeton, NJ 08540, USA.

**Email:** [adele@princeton.edu](mailto:adele@princeton.edu)

Word	e.g. <i>jacuzzi, tattoo, behoove</i>
Word (partially filled) <sup>1</sup>	e.g. <i>anti-N, V-ing</i>
Idiom (filled)	e.g. <i>long story short, give the Devil his due</i>
Idiom (partially filled)	e.g. <i>Jog &lt;someone's&gt; memory, &lt;someone's&gt; for the asking</i>
(minimally filled)	e.g. <i>The longer you think about it, the less you understand</i>
Correlative construction	
The Xer the Yer (unfilled)	
Ditransitive construction: Subj, V, Obj1, Obj2	e.g. <i>He gave her a life-saver; He baked her a three-layer cake.</i>

**Table 1** Example constructions at varying levels of complexity and abstraction.

	REGISTER RESTRICTIONS	GENRE RESTRICTION	INTONATION
WORD:	<i>Hey</i>	<i>Amen</i>	<i>Uh-oh</i>
PHRASAL IDIOM:	<i>How do you do?</i>	<i>Once upon a time</i>	<i>On guard!</i>
PHRASAL CONSTRUCTION WITH OPEN SLOTS:	<i>is-to construction (e.g. He is to report at midnight)<sup>†</sup></i>	<i>limericks (e.g. there once was a &lt;person&gt; from &lt;place&gt;)</i>	<i>'Mad Magazine' construction (e.g. Him, a doctor?!)<sup>++</sup></i>

**Table 2** Constructions at varying levels of complexity that specify characteristic register, genre, or intonation (<sup>†</sup> Goldberg and van der Auwera, 2012; <sup>++</sup> Lambrecht, 1990).

This article takes the *constructionist viewpoint* as its starting point and explains what this view entails about the relationship between words and larger phrasal patterns, with a specific focus on the domain of argument structure. In particular, the idea that *argument structure constructions* are needed to account for simple sentence types is reviewed, clarified, updated and compared with two lexicalist alternatives: traditional lexical rules and the more recently proposed derivational lexical templates. Purely syntactic alternatives are not discussed here, but see Goldberg (2006, chapter 10) for a critique.

<sup>1</sup> Since Saussure (1916), linguists have acknowledged that roots (or lemmas) and affixes are conventional pairings of form and function. The constructionist perspective supports a growing consensus among morphologists that morphemes are emergent generalizations over existing words in the form of partially filled templates (Ackerman and Nikolaeva, 2004; Blevins, 2001; Aronoff, 1983; Booij, 2010). In fact, phonologists are coming to a parallel conclusion as well, namely that phonetic, phonological, and phonotactic constraints arise as generalizations over word tokens together with constraints imposed by our auditory and production capacities (e.g. Pierrehumbert, 2001).

## 2. Argument Structure Constructions

Much of our knowledge of language is quite general and this knowledge is captured within a network of constructions. That is, constructions such as relative clauses, various exclamatives, questions, topicalization and so on, form a network of interrelated knowledge, with more specific constructions inheriting from those that are more general (Fillmore, Kay and O'Connor, 1988; Goldberg, 1995; Lakoff, 1987; Michaelis and Lambrecht, 1996).

Argument structure constructions are form-function pairings that relate abstract meanings with arrays of grammatical relations (Goldberg, 1995, 2002, 2006; Jackendoff, 2002). As an example of an argument structure construction, consider the *ditransitive* construction, which has two object complements (without preposition). The example in (1) instantiates this construction:

1. 'She gave him the apple'  
www.facebook.com/pages/Adam

The ditransitive construction is reliably associated with the meaning of actual or potential transfer (Goldberg, 1992; Goldberg *et al.*, 2005; Green, 1974; Levin and Rappaport Hovav, 2005; Oehrle, 1975; Pinker, 1989). Evidence comes from the interpretation of nonsense verbs. When people are asked what the nonsense verb *moop* means in (2), a full 60% of people respond with 'give', and the rest offer meanings that preserve the meaning of literal or metaphorical transfer (e.g. 'tell') (Ahrens, 1995; Goldberg, 1995):

2. She mooped him something.

Additional evidence comes from the interpretation of certain familiar verbs in the ditransitive construction. Examples 3a and 3b differ slightly in meaning in that only 3a, which involves the ditransitive construction, requires that Sam *intends to give* Pat the cake. Example 3b can be used if Pat is, for example, a baker-in-training and Sam bakes the cake for a third party on Pat's behalf (Green, 1974).

3. a. Sam baked Pat a cake.  
b. Sam baked a cake for Pat.

We can account for these facts by recognizing an abstract construction, defined by a set of grammatical relations that includes a verb ( $\{\text{Subj}_x, V, \text{Obj1}_y, \text{Obj2}_z\}$ ), corresponding semantics ('x intends to cause y to receive z') and information structure constraints, if relevant (in this case, Obj1 must be more topical than Obj2). This construction licenses ditransitive expressions such as those in (1), (2) and (3a).<sup>2</sup>

<sup>2</sup> The example in (3b) is licensed by a transitive construction together with a benefactive adjunct (see Goldberg, 2002).

Recognizing a different, *caused-motion* construction allows us to account for the fact that a verb such as *sneeze*, that does not itself entail caused-motion, can play a role in a clause that does entail caused-motion as in (4):

4. 'While waiting for doctors, he sneezed the bullet out of his right nostril' ([www.msnbc.msn.com/id/41026427/ns/world\\_news-weird\\_news/](http://www.msnbc.msn.com/id/41026427/ns/world_news-weird_news/)).

The caused-motion construction is defined by a different set of grammatical relations ( $\{\text{Subj}_x, V, \text{Obj}_y, \text{Oblique-path}_z\}$ ) and corresponding semantics ('x causes y to move (to/from) z'). In this way, we can identify more general correspondences between form and function that are not naturally captured at the level of individual verbs. These are *argument structure constructions* (Goldberg, 1995).

There is also ample experimental evidence that argument structure constructions are associated with meanings, independently of the verbs used in them. For example, researchers have demonstrated that people rely on constructional meaning when they encounter nouns used as verbs in novel ways (e.g. *to crutch*) (Kaschak and Glenberg, 2000; Goldwater and Markman, 2009). Kako (2006) has shown that speakers also use constructional meaning when asked to interpret Jabberwocky-type sentences containing no meaningful open-class words.

A recent experiment in our lab demonstrates in fact that these types of Jabberwocky sentences automatically prime words that are semantically related to the argument structure construction of the sentence (Johnson and Goldberg, 2012). In particular, in a speeded lexical decision task (participants had to decide whether individual words were real or nonsense words), words were preceded by one of four abstract skeletal constructions containing only nonsense open-class words. For instance, an example of the ditransitive construction was *He daxed her the norp*. Target words were either congruent with the hypothesized meaning of the construction (i.e. a congruent word for the English ditransitive would be *give*, *handed*, or *transferred*) or were not (e.g. *put*). Results showed significant priming for congruent over incongruent target words, both for associated primes (which occur regularly within the construction) and to a lesser extent, for primes that are semantically related to the construction but which rarely occur in the construction (e.g. *transfer* for the ditransitive). Thus Jabberwocky-type instances of argument structure patterns prime verbs related to their abstract meanings or functions.

In another recent experiment using Multi Voxel Pattern Analysis, we have found neural evidence that the ditransitive and caused motion constructions can be distinguished in areas of the brain known to be involved in semantic combination, particularly BA 47 and anterior BA 22, even when propositional content, open class words, complexity and frequency are controlled for (Allen *et al.*, 2012). A separate sorting study has also found that people judge argument structure constructions to be just as important to overall sentence meaning as the morphological form of the main verb (Bencini and Goldberg, 2000).

These studies demonstrate that argument structure is associated with meaning even when a) the main verb involved is not stored as a verb but as a noun (Kaschak

and Glenberg, 2000; Goldwater and Markman, 2009); b) the main verb involved is a nonsense word and thus not stored at all (Kako, 2006; Johnson and Goldberg, 2012); or c) the morphological form of the main verbs involved are controlled for (Bencini and Goldberg, 2000; Allen *et al.*, 2012). A partial list of argument structure constructions and their corresponding prototypical semantics is provided in Table 3:

LABEL	FORM <i>Examples</i>	MEANING
Ditransitive construction	Subj, V, Obj, Obj <sub>2</sub> <i>She gave him something.</i> <i>She daxed him something.</i>	X causes Y to receive Z
<i>Way</i> construction	Subj <sub>i</sub> , V, <poss <sub>i</sub> > way, Oblique <sub>path</sub> <i>She made her way into the room.</i> <i>'Heather handstands her way out of the bathroom'.</i>	X creates a path (Z) and moves through it.
Intransitive motion construction	Subj, V, Oblique <sub>path</sub> <i>She went down the street 'skiers whooshed down the pristine slopes'</i>	X moves (to/from) Y
Caused motion construction	Subj, V, Obj, Oblique <sub>path</sub> <i>She put the ball in the box.</i> <i>'he sneezed the bullet right out of his right nostril'.</i>	X causes Y to move (to/from) Z
Resultative construction	Subj, V, Obj, Predicate <sub>AP</sub> <i>He made her crazy.</i> <i>She kissed him unconscious.</i>	X causes Y to become Z

**Table 3** *Incomplete list of English Argument Structure constructions. Each is defined by a set of grammatical relations, semantics and associated information structure properties (not shown). Quoted examples were cited from the Internet.*

Abstract, phrasal *argument structure constructions* have been proposed and refined by many researchers as a way to capture relationships between the form and function of simple sentences that are not naturally attributed exclusively to the main verb (e.g. Bergen and Chang, 2005; Booij, 2002; Croft, 2003; Goldberg, 1995, 1999, 2002, 2006; Jackendoff, 1997, 2002; Stefanowitsch and Gries, 2009; Tomasello, 2003).

## 2.1 Verb Specificity

At the same time that argument structure constructions increase language's creative potential, verbs clearly restrict which argument structure patterns they occur in.

In fact verbs can be quite particular, resisting some patterns that other verbs with similar general semantics and phonology readily appear in. For example, each of the expressions in (5)–(7) sounds odd in the given argument structure pattern, even though other verbs are fully acceptable in the same argument structure pattern (examples in parentheses):

5. ??The magician vanished the rabbit. (cf. The king banished the rabbit.)
6. ??She explained him the story. (cf. She told/guaranteed him the story.)
7. ??She considered to tell him. (cf. She wanted to tell him.)

(cf. also e.g. Boas, 2000; Faulhaber, 2011; Herbst, 2011). That is, while many causative verbs can appear both intransitively and transitively (e.g. *melt*, *break*, *redde*n, etc.), *vanish* can only appear intransitively (and *banish* can only appear transitively). *Explain* is semantically related to *tell* and has Latinate phonology like *guarantee* and yet it cannot appear in the ditransitive construction while both *tell* and *guarantee* can. Finally, *consider* does not allow an infinitival verb phrase complement, while *want* and the majority of English verbs do. These facts do not follow automatically from general principles; they need to be accounted for in ways that make reference to the specific verbs involved.

Moreover, verbs that freely occur in more than one argument structure pattern are often statistically biased to favor one over the other(s). For example *give* is much more likely to occur in the ditransitive (as in 8a) than the ‘caused motion’ construction (as in 8b), whereas *sell* is more likely to occur in the caused-motion than the ditransitive (Wasow, 2002, p. 87).

8. a. She gave him the apple.
- b. She gave the apple to him.

Speakers make use of these biases in on-line comprehension (e.g. Garnsey *et al.*, 1997; MacDonald *et al.*, 1994). These types of facts are verb-specific and need to be accounted for by any theory. We return to this issue in Section 6.

But before we further explore the constructionist approach to argument structure in Sections 4–6, let us first examine two alternative approaches: lexical rules (Section 3.1) and derivational verb templates (Section 3.2). These two types of analyses are often viewed interchangeably (as in Müller, 2002, 2006; Briscoe and Copestake, 1999 and other HPSG work), but they are distinguished below on the basis of whether a verb is *changed* into or *related* to a distinct verb (by lexical rule), on the one hand, or whether it is instead *combined* with a derivational lexical template to form a distinct verb. It is argued that the former perspective leads to several problems (also discussed in Goldberg, 1995, 2002), and the latter perspective also shares one critical problem, discussed in Section 3.2.

### 3. Alternatives to the Constructionist Approach to Argument Structure

As the *head* of the verb phrase, the main verb of the sentence is widely assumed to play the pivotal role in interpretation by specifying the way that overt arguments

are related to one another. Almost any traditional grammar book, or introductory logic or linguistic class will likely begin with a discussion of sentence types with a classification of verbs according to how many arguments they ‘take’. It is generally assumed, for example that *sneeze* is intransitive, *kick* is transitive and *put* requires an agent, a theme and location arguments. In this way, basic sentence patterns of a language are assumed to be determined by syntactic and semantic information of the main verb alone. For example, the sentence pattern in (9) does seem to be due to the lexical specifications of *put*:

9. Pat put the ball on the table.

Thus the traditional alternative to positing argument structure constructions such as those in Table 3 is to posit lexical valences (Tesnière, 1959) or subcategorization frames (Chomsky, 1965), which allow each verb to specify which complements it co-occurs with.

### 3.1 Lexical Rules

Despite the fact that verbs often appear to determine their argument structure, they typically can occur in more than one argument structure pattern. Traditionally, researchers have focused on pairwise alternations including the ‘dative alternation’ (10a-b) and the ‘locative alternation’ (11a-b):

10. a. She gave him a book.  
 b. She gave a book to him.
11. a. She loaded the truck with hay.  
 b. She loaded hay onto the truck.

In order to account for such alternations, researchers have posited *lexical rules*, which either take as input a verb with a particular valence and yield a verb with a distinct valence as output, or which simply serve to relate two static lexical entries (Jackendoff, 1975). An individual clause, then, involves either one verb or the other but not both. In particular, neither verb is contained in the other; each is independent, although the relationship is captured by the ‘rule’. Various approaches have adopted some version of lexical rules in order to account for systematic alternations (Bresnan, 1982; Fillmore, 1990; Foley and Van Valin, 1984; Grimshaw, 1990; Pollard and Sag, 1994; Pinker, 1989; Levin and Rappaport Hovav, 1994).

Although it does not involve a traditional alternation, in order to account for a novel example like (4), lexical rule approaches posit a rule that transforms intransitive *sneeze* into a verb that requires a direct object and an oblique path phrase. That is, instead of combining *sneeze* with an argument structure construction as discussed above, the lexical rule approach would posit a new verb, *sneeze*<sub>2</sub>, that itself means roughly ‘x causes y to move (to) z by sneezing’. This is in fact what Müller (2006, p. 23) seems to suggest: ‘Lexical rule-based approaches assume a lexical rule that

takes an intransitive (version of a) verb as input and licenses a special lexical item that selects for an additional object and a secondary predicate.'

At the same time, changes in argument structure have long been recognized to involve subtle, or not so subtle, changes in meaning. For example, while example (11b) only requires that some hay is caused to move onto the truck, (11a) requires an interpretation in which the truck is loaded full, or is affected in some way by the hay being loaded onto it (Anderson, 1971). In order to capture the differences in semantics, lexical rules are widely regarded as changing verbs' meaning (Pinker, 1989). Overt complements are then assumed to be 'projected' from the main verb's meaning by way of general *linking rules* (Bresnan and Kanerva, 1989; Dowty, 1991; Grimshaw, 1990; Gleitman, 1994; Jackendoff, 1983; Pinker, 1989). In this way, for example, the *with*-variant of *load* can be derived by lexical rule from the *onto*-variant (see the rule in (12)) or vice versa. Likewise the caused-motion use of *sneeze* in (4) is accounted for by a semantic lexical rule that changes the meaning of *sneeze* from a sense that takes a single agent argument, to a new sense that essentially means 'someone causes something to move along a path by sneezing' as represented schematically in (13):

12. load < agent, location, instrument-theme> → load <agent, theme, location>

13. sneeze <agent> → sneeze < agent, theme, path>

The general linking rules are then claimed to project the agent to subject, the theme to object and the path phrase to an oblique complement.

Unfortunately, the lexical rule approach suffers several drawbacks. These include the following, explained below. First, the lexical rule approach requires implausible, ad hoc verb senses. Secondly, it obscures broader surface generalizations. Thirdly, since it does not distinguish the verb from the argument structure in the output of the rule, the lexical rule approach does not account for constraints that hold only of the verb or only of the construction. I have touched on many of these points and a few others previously, although several of the examples used here are new (Goldberg, 1995, 2006).

In addition, there is another drawback that I have not discussed in previous work. This final drawback holds equally of more recent *derivational verb template* approaches to argument structure as well as lexical rule approaches (Rappaport Hovav and Levin, 1998; Koenig and Davis, 2001; Sag, 2012). Both derivational verb templates and lexical rules require verbs with implausibly specific arguments, particularly in the case of VP idioms. This last point is discussed in Section 3.2.

**3.1.1 Lexical Rules Require Implausible Verb Senses.** As just discussed, lexical rules generally take a basic sense of a verb and derive an extended, distinct sense and in this way attribute differences in clausal semantics directly to the main verb involved. While capturing differences in semantics is clearly essential, attributing the semantics to the main verb often requires quite implausible and ad hoc verb senses. If argument structure were projected exclusively from a verb's



semantics, we would need special verb senses for each of the verbs in the expressions in (14) (e.g. Goldberg, 1992, 1995, 2006; Jackendoff, 1990, 1997, 2002):

14. a. 'he was drinking the heart right out of a fine spring afternoon' (James Crumley, *The Last Good Kiss* [1978]).
- b. 'The people of this small town [...] have been unable to pray Mrs. Smith's two little boys home again' (Mark Turner, personal communication).
- c. 'his thousands of travelling fans [...] had roared him into the Thomas and Mack Center ring' (www.topix.net/wire/world-soccer/manchester-united).
- d. 'She tried to avoid blinking the tears onto her cheeks' (Anne Tyler, *Dinner at the Homesick Restaurant* [1992]).
- e. 'Demi Moore thinks this will Halle Berry her back to the B List' (personal communication 2007).
- g. 'I actually had a moth go up my nose once. I [...] coughed him out of my mouth' (bikeforums.net/archive/index.php/t-292132).

That is, we would need a sense of *drink* that meant roughly 'to spend time by drinking'; a special sense of *pray* 'to cause to move by praying,' a special sense of *roar* that entails motion and so on. These senses are implausible in that one doesn't find languages that devote unique stems to these meanings. For example, it is unlikely that one would find a word *kamo*, meaning 'to cause to move by coughing' (cf. 14g), because this is not a situation that is likely to occur regularly enough to warrant a lexical meaning (Goldberg, 2010).

We would, in fact, require not only one additional verb sense, but also commonly half a dozen senses. Taking *cough*, in (15) as an example, we find it occurs with at least seven different argument structure constructions:

- |   |                              |
|---|------------------------------|
| 15. a. Pat coughed.                           | Intransitive                 |
| b. She coughed the milk out of her nose.      | Caused motion                |
| c. She coughed a very deep cough.             | Cognate object (Transitive)  |
| d. She coughed herself hoarse.                | Resultative                  |
| e. She coughed onto the table.                | Implicit object construction |
| f. She coughed her way to the emergency room. | Way construction             |
| g. She coughed her head off.                  | 'head' off construction      |

Positing additional verb senses implies that it should be possible to find languages that have unique verb stems, perhaps *doz*, *kbitz*, *craz*, *ziff* and *burr* for the requisite meanings, but all such senses are quite unlikely. And *cough* is not unusual, as most verbs, particularly frequent verbs, appear in several distinct argument structure patterns.

Positing additional senses for each new argument structure pattern is an ad hoc way to defend the idea that verbs determine their complement configurations. When faced with a new complement configuration, one is always free to posit an additional verb sense.

**3.1.2 Lexical Rules Obscure Broader Surface Generalizations.** Lexical rules, which relate ‘input’ and ‘output,’ are *process*-oriented generalizations in the terminology of Bybee (1985). However, in both phonology and morphology, it has become clear that surface or *product*-oriented generalizations (which emphasize the ‘output’) are typically broader, and they are obscured by an over-emphasis on the ‘input’ (Bybee, 1985; Bybee and Slobin, 1982; cf. also Hayes, 2009). As Kapatsinski (2008) emphasizes, citing Nessel (2008), it is not that generalizations about phonetic and morphological alternations do not exist, they clearly do, but they are *second-order* generalizations over product-oriented constructions.

The same is true in the domain of syntax: product-oriented generalizations are broader and more robust (Goldberg, 2002; Michaelis and Ruppenhofer, 2001). That is, it is profitable to look beyond alternations and consider each argument structure construction on its own terms. For example, although only (16a–b) can be paraphrased by a ditransitive expression (given in parentheses), they pattern together with (16c–e) both syntactically and semantically; the examples in (16) all involve subjects, objects and oblique path phrases and they all express caused-motion. As Baker notes, ‘it seems artificial to say that the PP in [examples like 16a] is not a locational path as well’ (Baker, 1997; cf. also Marantz, 1997). The caused-motion construction captures the generalization across all of the examples in 16(a–e) (Goldberg, 1995; Pinker, 1989):

- f. 16. a. Aliza gave a book to Zach. (≈ Aliza gave Zach a book.)  
 b. Aliza threw a book to Zach. (≈ Aliza threw Zach a book.)  
 c. Aliza threw a book to the ground.  
 d. Aliza threw a book toward the front of the room.  
 e. Aliza threw a book over the hedge.

Moreover, the following example is also strikingly like those in 16 and can be accounted for by the same caused-motion construction in combination with the verb *load*:

17. Aliza loaded the hay onto the wagon.

This generalization is missed when there is too much focus on alternations and the supposed ‘input’, as there is on lexical rule accounts. A focus on lexical rules could easily lead one to posit at least three different rules: one for *give* type verbs, one for *motion* type verbs such as *throw* and one for *load* type verbs (see Sag, 2012 for such an analysis). Instead, differences in meaning and choice of prepositions that are required are more naturally attributable to the verbs and prepositions involved. Only a single caused-motion construction is needed.

Turning our attention to the ditransitive construction (as in (10a)), we see that it too allows for a broad generalization if we attend to surface structure instead of attending to possible paraphrases. Although many linguists continue to treat (regular) ditransitives and ‘benefactive’ ditransitives (such as *Aliza baked Zach*

*cupcakes*) as distinct constructions because of their different paraphrases (*Aliza sent a book to Zach/Aliza baked cupcakes for Zach*), both types of ditransitive examples pattern alike both semantically and syntactically (Goldberg, 2002).

The constructionist approach captures these surface generalizations very naturally. When different verbs appear in the same construction, similarities are most naturally attributed to the construction. When faced with pairs of sentences that share words and involve different constructions, similarities are most naturally attributed to the words and differences to the constructions. Paraphrase relationships are captured by explicit reference to words and/or argument structure constructions that have related meanings.

**3.1.3 Lexical Rules Incorrectly Predict Verb Meaning ↔ Constructional Meaning.** The lexical rule approach predicts that a verb meaning and the meaning of the construction are isomorphic because *they are not distinguished*. The ‘input’ is not carried within the ‘output’ on the traditional understanding of lexical rules. Rather, the output of a lexical rule is a verb meaning and that meaning is understood to determine the overall event interpretation of the clause. There is *no* separate constructional meaning that is combined with a verb’s meaning.

In point of fact, when a verb *lexically* codes a particular meaning, it generally carries that meaning with it when it appears in other constructions. For example, the verbs *inch* and *worm* lexically encode the meaning of real or metaphorical motion despite difficulties, meanings that are very close to the meaning of the *way*-construction (Goldberg, 1995). As expected, they readily occur in this construction:

18. a. Snowy inched her way along the roof of the train.
- b. He can’t worm his way out of this one.

Yet because *inch* and *worm* lexically encode this meaning, they retain the meaning even when used in the intransitive construction:

19. a. ‘Snowy inched along the roof of the train’ ([fanfiction.net/s/8069910/1/Tintin\\_the\\_Tunnel\\_and\\_Too\\_Much\\_TNT](http://fanfiction.net/s/8069910/1/Tintin_the_Tunnel_and_Too_Much_TNT)).
- b. ‘Rodman can’t worm out of this one’ ([twitter.com/terrymeiners/statuses/185042376262299648](https://twitter.com/terrymeiners/statuses/185042376262299648)).

Similarly, *give* means ‘give’ when it appears in the ditransitive *and* in the ‘caused-motion’ construction. In the latter case, *give*’s recipient participant role unifies with the path role of the caused-motion construction. This is permitted because recipients can be metaphorically construed as a type of metaphorical goal via a general Transfer as Goal-directed motion metaphor (e.g. ‘He *grabbed* the house *away from* her. She handed it *over to* him. He passed it *on to/down to* his daughter.’) The fact that *give* lexically constrains its argument to be an animate recipient explains why this argument cannot be questioned with *where* (Rappaport Hovav and Levin, 2008):

20. ??Where did she give the flowers to?

In this way, a verbs' meaning and the meaning of the argument structure construction it occurs in are not necessarily in a biunique correspondence. In particular, the same verb meaning can appear in more than one argument structure construction, even though each argument structure construction has its own distinct semantics. A Semantic Coherence Principle only requires that in order for a verbs' roles to unify with the constructions' roles, the former be construable as instances of the latter (see Section 4). Additional roles may be contributed by the construction.

A closely related problem for lexical rule approaches, which conflate the meaning of the verb and the meaning of the construction, is that some constraints hold only of the lexical verb; others hold only of the construction. An example of a constraint that holds of the construction, not the lexical verb, comes from Zaenen (1991; cited in Goldberg, 1995). The Dutch impersonal passive construction requires an atelic situation; see Zaenen, 1991:

21. ??*Er werd opgestegen.*

There was taken off.

22. *Van Schiphol wordt er de hele dag opgestegen.*

From Schiphol, there is taking off the whole day.

In (22) the adjunct phrase insures that event is construed iteratively and is therefore atelic. The simple act of 'taking off' designated by the verb alone, remains telic. One might argue that there are two verbs *opgestegen*, one telic, one atelic. However, evidence against this idea is that the verb always takes the auxiliary *zijn*, which requires telic verbs:

23. *Hij is (dagelijks) opgestegen.*

It has taken off (daily).

An example of a constraint that holds of the lexical verb and not the construction, comes from the English prefix *re-*. This prefix seems to occur only with verbs that are *lexically* causative. The prefix is markedly less acceptable with verbs that are not themselves causative, even when these verbs appear in causative constructions (see Table 4):

<sup>3</sup> Paul Kay (personal communication 13 March 2012) suggested the following examples as possible counterexamples to the generalization:

i. ??She repushed him into the closet.

ii. ??She rewhisked more foam off the cappuccino.

But *push* is not causative (*She pushed the wall but it didn't move*). *Whisk* is causative, but due to its meaning, once something is *whisked*, it cannot normally change state in the same way again. When it can, *rewhisk* is fine as in the following attested example: 'rewhisk the [oil and vinegar], then pour it over the vegetables' <http://www.liposonix-info.com/>

LEXICALLY CAUSATIVE (IN CAUSATIVE CONSTRUCTIONS)	LEXICALLY NON-CAUSATIVE VERBS IN CAUSATIVE CONSTRUCTIONS
John repositioned the book on the table. John refilled the tub with water. John resprayed paint on the wall. John resold him the car.	??She reate herself sick. ??She recried herself to sleep. ??The dog rebarked them awake. ??She resneezed the foam off the cappuccino.

**Table 4** *Re-* prefix occurs with (subset of) verbs that are lexically causative. <sup>3</sup>

Since the lexical rule approach fails to distinguish the lexical verb from its argument structure properties, these phenomena, which make reference to only the argument structure pattern or only the verb, are quite difficult to account for.

The arguments provided so far against lexical rules arise directly or indirectly from the fact that the lexical rule approach makes it impossible to distinguish the lexical contribution of the verb from the contribution of the construction. There is an alternative to lexical rules that can, in principle, avoid this particular problem: the derivational verb template approach.

### 3.2 Derivational Verb Templates

Derivational verb templates have been proposed more recently as an alternative to lexical rules. These templates embed a lexical verb and yield a complex verb that specifies the formal and semantic properties of what we have been calling argument structure constructions (Briscoe and Copestake, 1999; Koenig and Davis, 2001; Meurers, 2001; Müller, 2002, 2006; Müller and Wechsler, forthcoming; Rappaport Hovav and Levin, 1998; Sag, 2012). This approach essentially treats the argument structure pattern as an invisible derivational affix that combines with the root verb to yield a derived verb.

The approach can potentially capture many of the same insights as the constructionist approach since the embedded verb root and the invisible derivational template are, at least in principle, distinguishable. To the extent that this distinction is emphasized, the derivational lexical template and the phrasal construction approach are close cousins and I have therefore not attempted to distinguish them previously.<sup>4</sup> They both specify a simple verb, as well as an argument structure defined by an array of grammatical relations, associated semantics and information structure. Relevant facts about frequencies, genre, or register can, in principle, be assigned to the simple verb and/or to the argument structure construction.

The problems with lexical rules discussed above need not hold of the derivational template approach. In particular, implausible verb senses are not necessarily a

<sup>4</sup> Müller (2007, p. 375) also notes, 'the difference between the two approaches is rather small.'

problem because the new senses are assumed to be complex combinations of verb root plus derivational template and can be created on the fly. We do in fact find languages with productive derivational morphology that allows quite novel verb meanings to be created (e.g. Croft, 2003). Broader surface generalizations can be captured by the derivational verb template approach, since the template itself corresponds to the argument structure construction, regardless of which verbs it combines with. Finally, the derivational verb template approach need not assume an isomorphic relationship between verb meaning and what we have been calling the constructional meaning; instead, constraints can in principle be assigned to either the verb root or the derivational verb template (see in fact Müller and Wechsler, forthcoming). Thus the derivational verb template approach avoids many of the problems with lexical rules. The main difference between the constructionist and the template approaches is that latter assumes that the combination of verb and template creates a new verb: a V0. This leads to certain difficulties described below.

### 3.2.1 Lexical Rules and Derivational Templates Require Verbs with Implausibly Specific Requirements.

Like the lexical rule approach, the derivational template approach assumes that a verb always determines the number and specific types of complements of the clause. Therefore, both approaches need to posit verbs that constrain their arguments in quite specific and ultimately implausibly ways. That is, in order to account for the example in (24), these approaches need to posit a verb, *laugh* (whether simple, on the lexical rule approach; or derived on the derivational template approach) that can only appear with a possessive determiner + the particular noun, *way* and a path phrase.

24. She laughed her way across town.

Notice that examples are unacceptable if any of these features is missing or altered.

- 25. a. ??She laughed him.
- b. ??She laughed her path across town.
- c. ?? She laughed a way across town.

But we do not generally find verbs *or* verbs + derivational affixes that involve such specific constraints cross linguistically. While verbs often semantically constrain the type of object they can occur with, we do not find unique verbs or overt derivational verbal morphemes that specify a bound direct object with one particular lexical noun.<sup>5</sup> This problem is magnified in the case of verb phrase idioms.

<sup>5</sup> Moreover, the requirement of both a possessive determiner and the specific noun *way* appears to violate *locality*, a principle that has been strongly defended by those who have argued in favor of derivational verb templates (e.g. Sag, 2007, 2012). A constraint is local if and only if it can be stated as a constraint on a head and the head's sisters. The head daughter of a sister node may also be constrained insofar as the features of the head are shared by its mother node, the sister. However, if a constraint on V is local, it can't constrain both the determiner and head noun of a sister, since only one or the other can be the head of the sister.

**3.2.2 Derivational Templates Do Not Extend Naturally to Idioms.** The complex, full syntactic information associated with many VP idioms is far richer than that associated with individual verbs (again, whether derived with an overt morpheme or not). For example, idioms often require adjuncts, modifiers, or conjunction (Fellbaum, 2007):

26. modifier:

*look on the bright side* =/= ? *look on the side*

27. adjunct:

*taking candy from a baby* =/= ? *Taking candy.*

28. conjunction

*eat <someone> out of house and home.* =/= ? *eat <someone> out of house.*

In order to account for (26), verb-based approaches would need a verb *look* that specifies not only that it takes a PP phrase headed by *on* but also that this phrase must have the modification *bright* in the NP within the PP. To account for (27), the lexical rule *and* derivational template approaches are both forced to say that there is a verb *take* that specifies that it must occur with what is normally an adjunct and thus optional: the phrase *from a baby*. The simple or complex verb *eat* (in 28) must specify that it requires a prepositional phrase that contains a particular conjunction.

Moreover, the lexical approach must admit inflectional properties inside of lexical derivations, since idioms often specify inflectional properties of their complements. For example, *pull strings* must involve *strings* in the plural (29a-b),

29. a. She pulled strings to get him admitted.

b. ?? She pulled a string to get him admitted.

Importantly, the distinction between argument structure constructions and idiomatic phrases is hard to detect in many particular instances. Table 5 provides semi-idiosyncratic examples of some of the argument structure constructions provided earlier in Table 3. It is therefore theoretically desirable to treat idioms and argument structure constructions such as those in Table 3 alike, which means treating either both phrasally or both lexically. The argument from implausibly constrained verbs argues in favor of a phrasal approach.

As far as I can tell, the derivational template approach has been proposed in response to the evidence in favor of constructional meaning, as a way to retain the traditional assumption that the main verb ‘projects’ the argument array of the clause (Chomsky, 1982). This allows it to account for passives and long-distance dependency relations as has been done in decades past. For example, passive is assumed to be a lexical rule that takes a V0 as input and yields a passive V0 as output (Bresnan, 1982). The auxiliary verb is then assumed to select for the passive participle and the adjunct *by* phrase. A verb’s arguments can be realized distantly, by transformation, or by a ‘subcat’ or ‘valence’ feature that keeps track of which arguments are accounted for (Pollard and Sag, 1994;

---

 ditransitive

give < someone > a kiss  
 give < someone > a piece of < one's > mind.

way construction:

work < one's > way through (< type of >) school.  
 sleep < one's > way to the top.

caused-motion:

make < one's > hair stand on end.

resultative:

eat < oneself > sick  
 make < oneself > scarce

---

**Table 5** *Semi-idiomatic instances of argument structure constructions.*

Sag, 2012). But these mechanisms have clear correlates on the phrasal argument structure approach. Let us examine the constructionist approach in more detail.

#### 4. Constraints on the Combination of Verb and Construction

Generalizations about how verbs and argument structure constructions combine are discussed at some length in Goldberg (1995, especially chapters 2 and 5; 2002). Slots in the argument structure constructions are *argument roles* of the construction. These often correspond roughly to traditional semantic roles such as *agent*, *patient*, *instrument*, *source*, *theme*, *location*, etc. At the same time, because they are defined in terms of the semantic requirements of particular constructions, argument roles in this framework are more specific and numerous than traditional thematic roles (see also Jackendoff, 1990, 2002).

Argument roles capture generalizations over individual verbs' *participant roles*. That is, each distinct sense of a verb is conventionally associated with rich frame semantic meaning that in part specifies the number and type of slots that are associated with a given sense of a verb. A subset of those roles, namely those roles which are lexically *profiled*, are obligatorily expressed, or, if unexpressed, must receive a definite interpretation.<sup>6</sup> Lexical profiling, following the general spirit of Langacker (1987), is designed to indicate which participant roles associated with a verb's meaning are obligatorily accessed, functioning as focal points within the scene, achieving a special degree of prominence. Fillmore (1977) similarly notes

---

<sup>6</sup> This generalization is true for English. In many other languages profiled arguments are omissible as long as they are given and non-focal in the context. Typically in these languages, however, lexically profiled roles are also expressed by a small set of core grammatical relations, when they are expressed.



that certain participant roles are obligatorily 'brought into perspective' achieving a certain degree of 'salience'. The notion of lexical profiling is intended to be a semantic one: it is a stable aspect of a word sense and can differentiate the meaning difference between words—cf. *buy* versus *sell* (Fillmore, 1977) or *rob* versus *steal* (Goldberg, 1995, p. 47). Participant roles may be highly specific and are often unique to a particular verb's meaning; they therefore naturally capture traditional selectional restrictions.

Two general principles constrain the ways in which the participant roles of a verb and the argument roles of a construction can be put into correspondence, fused, or 'unified': the Semantic Coherence Principle and the Correspondence Principle (Goldberg, 1995, chapter 2; 2002).

The Semantic Coherence Principle ensures that in order to unify, the participant roles of the verb and the argument roles of the construction must be semantically compatible. In particular, the more specific participant role of the verb must be construable as an instance of the more general argument role, if the two roles are to unify. General categorization processes are responsible for this categorization task and it is always operative. This principle follows from the idea that argument structure constructions are learned by generalizing over the semantics of instances of the pattern used with particular verbs (e.g. Tomasello, 1992, 2000, 2003; Cameron-Faulkner *et al.*, 2003; Goldberg *et al.*, 2004; Goldberg, 2006).

As is the case with lexical items, only certain argument roles are profiled. In particular the subject, direct object and the second object in ditransitives are considered profiled. These are the same grammatical relations that receive a special status in most theories as the set of 'terms' which correspond to 'core,' 'nuclear' or 'direct' arguments. These grammatical relations afford a high degree of discourse prominence, being either topical or focal (see Keenan and Comrie, 1977; Fillmore, 1977; Langacker, 1987 for arguments to this effect.). Specifically, the Correspondence Principle states that profiled participant roles of the verb must be encoded by profiled argument roles of the construction, with the exception that if a verb has three profiled roles, one can be represented by an unprofiled argument role (and realized as an oblique argument). The Correspondence Principle is a default principle.

The intuition behind the Correspondence Principle is that lexical semantics and discourse pragmatics are in general aligned. That is, the participants that are highly relevant to a verb's meaning (the profiled participant roles) are likely to be the ones that are relevant or important to the discourse, since this particular verb was chosen from among other lexical alternatives. In particular, the Correspondence Principle requires that the semantically salient profiled participant roles are encoded by grammatical relations that provide them a sufficient degree of discourse prominence: i.e. by profiled argument roles. The Correspondence Principle is a default principle and is therefore overridden by particular constructions that specify that a particular argument should be deemphasized and expressed by an oblique or not at all. Passive, for example is a construction that overrides the Correspondence Principle and insures that a normally profiled role (e.g. the agent) be optionally expressed in an oblique *by* phrase.

Constructions may add certain roles that are not lexically specified by the verb. These roles are indicated by a smaller vertical line in the examples below (dashed line in Goldberg, 1995).

The Semantic Coherence and Correspondence principles may be clarified with a couple of examples. The participant roles of *load* are the verb-specific roles: loader, loaded-theme and container. These roles combine with the argument roles in the caused motion construction and causative + *with* constructions as follows:

30. Caused-motion (e.g. *Pat loaded hay onto the truck*)

CAUSE-MOVE (**cause**            **theme**            path/location)

*Load*                            |                            |                            |  
(**loader**    **loaded-theme**    **container**)

31. Causative construction + *with* construction (e.g. *Pat loaded the truck with hay*)

CAUSE                    (**cause**            **patient**) + INTERMEDIARY(instrument)

*Load*                            |                            |                            |  
(**loader**    **container**            **loaded-theme**)

All three of *load*'s roles are profiled. (Profiling is indicated with boldface). This includes the loaded-theme role even though that role is optional. When omitted, it receives a definite interpretation as indicated by the strangeness of the following mini-conversation (see Fillmore, 1986 for tests to distinguish definite from indefinite omission):

32. She loaded the trucks. #I wonder what she loaded onto the trucks.

Because all three roles are profiled, one of the roles may be expressed as an oblique argument, in accordance with the Correspondence Principle. The Semantic Coherence Principle insures that only semantically compatible roles may be fused. As indicated above, the loaded-theme role of *load* may either be construed to be a type of theme as in (30) or an intermediary as in (31). The container role can either be construed to be a path/location as in (30) or a patient role as in (31); the patient role is what results in the interpretation that the container is somehow affected by the loading.

This example illustrates how argument structure constructions address semantic similarities and subtle differences between paraphrases. Construing the verb's roles as instances of distinct argument roles leads to differences in semantic construals. The fact that the meanings are related is attributable directly to the shared verb involved. That is, the verb evokes the same frame semantic scene and the same profiled participant roles.<sup>7</sup>

<sup>7</sup> On this view, there is no need to say that the *with* phrase itself designates a theme relation (cf. e.g. Jackendoff, 1990). Instead, the fact that the hay is interpreted to be loaded onto the truck even in the *with* variant is attributed, not to the argument structure construction, but to the specifications of the verb *load*.



properties not shown) accounts for the fact that English does not generally allow adverbs between the verb and direct object (cf. (36)):

35. English: [Adjunct\* V (Obj) Adjunct\* (PP\* Adjunct\*)\*]<sub>VP</sub>  
 36. ??She threw hard the book to Joe.

Topicalization and cleft constructions allow for various ‘displaced’ arguments. These types of long distance dependency constructions generally require that grammatical relations be satisfied non-locally (but see Sag, 2007). For example in (37), *what* bears the grammatical relation Obj<sub>2</sub> of the ditransitive.

37. What did he think she gave Pat?

In this way, actual expression typically includes the combination of at least half a dozen different constructions. For example, the expression in (38) involves the list of constructions given in (39a–f).

38. What did Aliza give Zach?  
 39. a. Ditransitive construction  
     b. Non-subject question construction  
     c. Subject–Auxiliary inversion construction  
     d. VP construction  
     e. NP construction  
     f. *Aliza, give, Zach, what, do* lexical constructions

Thus, the recipient argument is an Object whether or not it appears directly after the verb or as a distantly instantiated question word. The same ditransitive construction is involved in the active declarative form as well as in topicalized, clefted, or questioned forms. The ‘valence’ or ‘subcat’ feature innovation in Pollard and Sag, 1994 or Sag, 2012, is intended to keep track of how arguments are expressed; on the constructionist approach, this feature can be associated with the phrasal construction instead of lexical verb.

Clearly we don’t compute all possible combinations of constructions in advance. Instead, constructions unify on the fly to form utterances as long as they don’t conflict (Fillmore, 1990; Culicover and Jackendoff, 2005; Ambridge and Goldberg, 2008). Conflicts can arise in semantics (e.g. if a participant role cannot be construed as an instance of an argument role), information structure (e.g. in the case of many syntactic islands; cf. Ambridge and Goldberg, 2008), or in syntactic specifications of particular constructions (e.g. a verb must be classified as an ‘auxiliary’ in order to occur in subject-auxiliary inversion). In addition, domain general processes of induction and preemption further constrain which combinations are judged acceptable, as discussed in Section 6.

The phrasal approach allows us to avoid positing invisible derivational verb templates, which, from a learning and comprehension point of view are problematic. That is, since they are invisible, the learner and the comprehender more generally, can only discern their existence by observing the phrasal array of grammatical relations. From this point of view, the array of grammatical relations must be

primary (cf. also Fisher *et al.*, 1994). In addition, the constructionist approach generally tries to avoid positing invisible elements (cf. also Carlson, 2006), favoring a what-you-see-is-what-you-get to syntax. Therefore, phrasal approach is, *ceteris paribus*, preferable to the lexical approach, since the complement array is overt, as is the verb.

The variable expression of deformable idioms can be captured by appealing to an *underspecified* phrasal form (Jackendoff, 1997, section 7.3, 2009). For example ‘to pull strings’ can be captured by the combination of *pull* and noun *strings* that is constrained to bear the semantic role of ‘patient.’

40. *pull*, *strings*<sub>N-patient</sub> ‘to manipulate or control’ (*pull*) by using connections (*strings*)’

This approach is distinct from the lexical approach primarily in the fact that it does not assume that *pull* selects *strings* (or that *strings* selects *pull*). It is instead the combination of the two words that gives rise to the idiomatic reading. In this way, we do not need to stipulate that a word (*pull*) specifies the inflectional properties (i.e. plurality) of its argument. And we only need to state the meaning of the construction once.

Note that the form of the phrasal construction is underspecified so that it allows *strings* to occur as a direct object, as a subject of a passive, or as a topicalized phrase. That is, as is the case with argument structure constructions, idioms combine with other constructions as long as the constraints on the constructions being combined do not conflict. For example, *Strings* can be topicalized if and only if ‘strings’ (the connections) can be construed as topical. This predicts that only relevantly ‘compositional’ idioms are deformable (Nunberg, Wasow and Sag, 1994; Fellbaum, 2011).

### 5.1 Allostructions for Passives and Middles

Argument structure constructions (and derivational verb templates) specify an array of grammatical relations that can be associated with semantics. Since the array of grammatical relations is not the same for actives, passives and middles, separate but related *allostructions* are required (Bergen and Chang, 2005; cf. also Cappelle, 2006; Pike, 1962; Lambrecht, 1994 for use of this term in slightly different contexts). That is, for example, we need to posit a passive-ditransitive as well as an active-ditransitive.

Referring to the passive-ditransitive and the active ditransitive as allostructions is intended to evoke the relationship among allophones of a given phoneme. For example, both the partially devoiced word final /d/ and the intervocalic flap are allophones of the English voiced /d/ phoneme. These allophones are motivated by articulatory and auditory factors and recur cross-linguistically, but their specifics differ. For example, British English does not use the flap intervocalically and German devoices word final stops including /d/ more than English does.

Similarly, the actual form of the passive–ditransitive is not strictly predictable. The passive–ditransitive didn't arise until around 1375, almost two centuries after case marking on the recipient disappeared (Allen, 2001). Moreover, in some languages, both the recipient and patient arguments can passivize (Alsina and Mchombo, 1990), where as in English only the recipient argument can be passivized. The fact that there is something non-predictable about the passive–ditransitive entails that a construction must be posited.

Müller argued against the phrasal account of argument structure constructions by citing examples from Yucatec Maya (2006, p. 21, ex 35d). He pointed out that it is possible to causativize the passive verb 'learn' in (41) and suggested that the causativized form can be passivized again as in (42):

41. K=u            ka'an -s    -ik    le teoria-o'  
 Incompl=3.erg    learn.PASS-cause-impf    det theory-D1  
 'He is teaching the theory' (He causes that the theory is being learned)

42. K=u            ka'an-s -a'al                            le teoria-o  
 Incompl=3.erg learn.PASS-cause-PASS.impf    det theory-D1  
 'The theory is being taught.' (that the theory is being learned is caused by somebody)

This would seem to imply that we need not only a causative–passive construction, but also a passive–causative–passive construction. However, passive–causative–passive forms are extremely rare cross-linguistically. For example, (43c) is impossible in English:

43. a. He hit the dog. (active)  
 b. The dog was hit. (passive)  
 c. ??The dog was hit the cat. (causative of passive)

Note that the Yucatec Maya causative example intended to mean 'cause to learn' is glossed as 'teach,' which is a verb meaning that is very often lexicalized. In fact, the causative of passive pattern is not actually productive in Yucatec Maya (Müller, 2007). Thus it seems there simply exist two verbs, 'to learn' and 'to teach', both of which can be passivized. No general passive–causative–passive construction is warranted.

## 5.2 Capturing Generalizations Across Argument Structure Constructions

Do we miss generalizations by appealing to constructions instead of to linking rules? Not at all. For example, the often-cited linking generalizations of Dowty (1991) can be summed up as follows: in simple active clauses, *if* there is a subject and an object and *if* there is an agent and a patient, then the agent role will be expressed by the subject and the undergoer role as direct object (cf. also Foley and

Van Valin, 1984).<sup>8</sup> When stated thus it is clear that this generalization concerns the transitive construction. The fact that several constructions inherit from the transitive construction, including the caused-motion and resultative constructions, is naturally captured via an inheritance hierarchy (cf. Goldberg, 1995, chapter 4).

Beyond the transitive construction, many rules linking semantic roles to grammatical relations are actually construction-specific. Examples are provided below in Table 6:

theme → direct object She kicked the ball	(in the transitive construction)
theme → subject The ball rolled.	(in intransitive construction)
theme → second object She kicked him the ball.	(in ditransitive)
recipient → subject She received it.	(in the transitive construction)
recipient → first object He gave her a letter.	(in ditransitive)
recipient → prepositional phrase She gave the letter to her.	(in 'dative' construction)

**Table 6** *Semantic roles that predict grammatical relations only for particular constructions.*

By recognizing that linking between grammatical and semantic relations is done at the level of constructions, which are in turn related in an inheritance hierarchy, both generalizations and construction-specific aspects of linking are naturally accounted for.

<sup>8</sup> This is a modest proposal that has been taken by some to express an innate linguistic universal. In fact, the facts are even more modest: there are syntactically ergative languages in which agents are not generally expressed as subjects, there are many languages that do not have canonical subjects, and there are many constructions within a given language that violate the generalizations (e.g. passives which express the agent argument as an oblique). But again, there is something to the generalization. The facts can be restated as follows: semantic actors and undergoers tend to be expressed in formally prominent slots. Prominent syntactic positions can be defined as those positions that license agreement and/or lack overt case and/or may be obligatory. Once stated this way, the generalization is much less mysterious: actor and undergoer arguments are generally expressed in prominent slots cross-linguistically because human beings' attention is naturally drawn to the actors and undergoers in events (Goldberg, 2006).

## 6. Lexical Specificity

Returning to the important issue of lexical specificity raised in Section 2.2, we can now see that it is an equivalent issue for lexical rule, derivational verb template, or constructionist approaches. For example, if lexical rules are assumed to be productive, they will overgeneralize and incorrectly produce ill-formed examples such as those in (5)–(7). If lexical rules are assumed to be non-productive, then each of all *possible* distinct verb senses will need to be listed in advance for each verb. Neither solution is attractive because in fact argument structure patterns are partially, but not fully productive. That is, argument structure patterns are used productively with certain verbs while being constrained so as not to apply to all verbs. The derivational verb template and the phrasal constructionist approach face exactly the same issue.

The solution requires recognizing that speakers have a usage-based model of linguistic knowledge (Langacker, 1988). We record which verbs we've heard used in which constructions previously and generalize over that knowledge (Tomasello, 2003). Thus we need verb-specific argument structure constructions: that is, phrasal constructions that specify which verbs have been used with the construction. These verb-specific constructions need to be phrasal even though they *include* a lexical verb (cf. also Croft, 2003), in order to account for the issues discussed in Section 3. Idiomatic cases must contain other lexical material in addition to a verb. The collection of phrasal constructions that have a verb (or other material) specified are related in an inheritance network as daughters of the more general argument structure constructions such as those in Table 3.

This perspective interfaces naturally with language learning. Each general argument structure construction is learned inductively from witnessing various verbs used in the construction (e.g. Abbot-Smith, Dittmar and Tomasello, 2007; Bates and MacWhinney, 1987; Goldberg, 1999, 2006; Tomasello, 1992, 2003). It is not an accident that the verbs that occur most frequently in each argument structure construction tend to encode the general meaning of that construction. For example, *give* is the most frequent verb in the ditransitive. If learners record various verbs used in particular constructions and generalize over those tokens to induce more abstract constructions, it makes sense that the ditransitive construction comes to be associated with 'giving' even when *give* is not used in the pattern (Goldberg *et al.*, 2004).

Several factors that are known to be related to induction more generally determine how productive a construction is. These include type frequency, variability of attested instances, similarity of the coinage to attested tokens and statistical pre-emption (Ambridge *et al.*, 2012; Barðdal, 2008; Boyd and Goldberg, 2011; Suttle and Goldberg, 2011; Wonnacott *et al.*, 2008). Thus productivity depends on how the witnessed instances are distributed and how related the potential coinage is to those instances. Also relevant is whether there exists a prepackaged alternative that statistically preempts it (Boyd and Goldberg, 2011; Brooks and Tomasello, 1999; Goldberg, 1995, 2006, 2011).



## 7. Conclusion

This paper has argued that phrasal correspondences relating grammatical relations and semantics (*argument structure constructions*) are needed to account for simple sentence types. Traditional lexical rules fall prey to problems due to their failure to distinguish the main verb from the argument structure it occurs in. In particular, lexical rules create implausible verb senses, miss broader generalizations due to an emphasis on the 'input' of the rule and fail to account for constraints that hold only of the verb, or the construction, but not both. A newer suggestion of invisible derivational verb templates addresses these drawbacks, but nonetheless treats argument structure as a verb-level phenomenon. We saw that this leads to difficulties in accounting for idioms, which often contain specifications about adjuncts, modification and inflection; these specifications are not appropriately specified by individual verbs.

At the same time, it was acknowledged that verbs do play an important role in argument structure patterns, as verbs can be quite finicky about which patterns they occur in and there is much evidence that we record information about which verbs are used in which constructions. The fact that argument structure patterns are partially but not fully productive is an issue that must be addressed by any approach. The phrasal argument structure (constructionist) approach that is argued for here adopts a usage-based hierarchy of phrasal instances and generalizations. New coinages are acceptable to the extent that they are similar to an existing similarly cluster of cases and are not preempted by an alternative formulation.

The constructionist approach to argument structure was clarified in certain respects. It was observed that word order and adjunct placement are contributed by independent constructions that combine with argument structure constructions. Both argument structure constructions and idioms can underspecify aspects of their syntactic expression, allowing them to combine with other constructions that specify linear order and grammatical categories. It has been argued that verb-specific properties, idioms and general argument structure constructions can all be treated as the same type of entity: phrasal patterns whose overt syntax is often underspecified and which contain more or less lexically specified material. Correlations between form and function at the level of argument structure are most naturally assigned to phrasal argument structure constructions.

*Council of the Humanities  
Princeton University*

## References

- Abbot-Smith, K., Dittmar, M. and Tomasello, M. 2007: Graded representations in the acquisition of English and German transitive constructions. *Cognitive Development*, 23, 48–66.

- Ackerman, F. and Nikolaeva, I. 2004: *Comparative Grammar and Grammatical Theory: A Construction-Based Study of Morphosyntax*. Stanford, CA: CSLI Publications.
- Ahrens, K. 1995: The mental representation of verbs. UCSD Dissertation.
- Allen, C. 2001: The development of a new passive in English. In M. Butt and T. H. King (eds), *Time Over Matter: Diachronic Perspectives on Morphosyntax*. Stanford, CA: CSLI Publications, 43–72.
- Allen, K., Pereira, F., Botvinick, M. and Goldberg, A. E. 2012: Distinguishing grammatical constructions with fMRI pattern analysis. *Brain and Language*, 123, 174–82.
- Alsina, A. and Mchombo, S. A. 1990: The syntax of applicatives in Chichewa: problems for a theta theoretic asymmetry. *Natural Language and Linguistic Theory*, 8, 493–506.
- Ambridge, B., Pine, J. M., Rowland, C. F. and Chang, F. 2012: The roles of verb semantics, entrenchment and morphophonology in the retreat from dative argument structure overgeneralization errors. *Language*, 88, 45–81.
- Ambridge, B. and Goldberg A. E. 2008: The island status of clausal complements: evidence in favor of an information structure explanation. *Cognitive Linguistics*, 19, 357–89.
- Anderson, S. R. 1971: On the role of deep structure in semantic interpretation. *Foundations of Language*, 6, 197–219.
- Aronoff, M. 1983: Potential words, actual words, productivity and frequency. Paper presented to the Proceedings of the 13th International Congress of Linguists., Oslo.
- Baker, M. 1997: Thematic roles and syntactic structure. In L. Haegeman (ed.), *Elements of Grammar*. Dordrecht: Kluwer, 73–137.
- Barðdal, J. 2008: *Productivity: Evidence from Case and Argument Structure in Icelandic*. Amsterdam: John Benjamins.
- Bates, E. and MacWhinney, B. 1987: Competition, variation and language learning. In B. MacWhinney (ed.), *Mechanisms of Language Acquisition*. Hillsdale, NJ: Lawrence Erlbaum Associates, 157–93.
- Bencini, G. M. L. and Goldberg, A. E. 2000: The contribution of argument structure constructions to sentence meaning. *Journal of Memory and Language*, 43, 640–51.
- Bergen, B. and Chang, N. (2005). Embodied construction grammar in simulation-based language understanding. In J.-O. Ostman and M. Fried (eds), *Construction Grammar(s): Cognitive and Cross-Language Dimensions*. Philadelphia, PA: John Benjamins.
- Blevins, J. P. 2001: Realisation-based lexicalism. *Journal of Linguistics*, 37, 355–65.
- Boas, H. 2000: Resultatives at the crossroads between the lexicon and syntax: where are they formed? *Proceedings of the 1999 Western Conference on Linguistics*, 11, 38–52.
- Booij, G. 2010: *Construction Morphology*. Oxford: Oxford University Press.
- Boyd, J. K. and Goldberg, A. E. 2011: Learning what not to say: categorization and statistical preemption in the production of a-adjectives. *Language*, 87, 1–29.

- Bresnan, J. 1982: *The Mental Representation of Grammatical Relations*. Cambridge, MA: MIT Press.
- Bresnan, J. and Kanerva, J. 1989: Locative inversion in Chichewa: a case study in the factorization of grammar. *Linguistic Inquiry*, 20, 1-50.
- Briscoe, T. and Copestake, A. 1999. Lexical rules in constraint-based grammars. *Computational Linguistics*, 25(4), 487-526.
- Brooks, P. J. and Tomasello, M. 1999: How children constrain their argument structure constructions. *Language*, 75(4), 720-38.
- Bybee, J. 1985: *Morphology: A Study of the Relation between Meaning and Form*. Amsterdam: John Benjamins.
- Bybee, J. and Slobin, D. I. 1982: Rules and schemas in the development and use of the English past tense. *Language*, 58(2), 265-89.
- Cameron-Faulkner, T., Lieven, E. and Tomasello, M. 2003: A construction based analysis of child directed speech. *Cognitive Science*, 27, 843-73.
- Cappelle, B. 2006: Particle placement and the case for 'allostructions'. *Constructions*, SV 1-7.
- Carlson, G. 2006: When morphology ... disappears. In C. O. Orgun and P. Sells (eds), *Morphology and the Web of Grammar: Essays in Memory of Steven G. Lapointe*. Stanford, CA: CSLI Publications.
- Chomsky, N. 1965: *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- Chomsky, N. 1982: *Lectures on Government and Binding*. Dordrecht: Forst.
- Croft, W. 2003: Lexical rules vs. constructions: a false dichotomy. In H. Cuyckens, T. Berg, R. Dirven and K-U. Panther (eds), *Motivation in Language*. Philadelphia, PA: John Benjamins, 49-68.
- Culicover, P. W. and Jackendoff, R. 2005: *Simpler Syntax*. Oxford: Oxford University Press.
- Dowty, D. 1991: Thematic proto-roles and argument selection. *Language*, 67, 547-619.
- Faulhaber, S. 2011: Idiosyncrasy in verb valency patterns. *ZAA*, 4(4), 331-46.
- Fellbaum, C. 2007: The ontological loneliness of idioms. In A. Schalley and D. Zaefferer (eds), *Ontolinguistics*. Berlin: Mouton de Gruyter, 419-34.
- Fellbaum, C. J. 2011: Idioms and collocations. In C. Maienborn, K. von Heusinger and P. Portner (eds), *Handbook of Semantics*. Berlin: Mouton de Gruyter, 441-56.
- Fillmore, C. J. 1977: Topics in lexical semantics. In R. Cole (ed.), *Current Issues in Linguistic Theory*: Bloomington, IN: Indiana University Press, 76-138.
- Fillmore, C. J. 1986: Pragmatically controlled zero anaphora. *Berkeley Linguistics Society*. 12, 95-107.
- Fillmore, C. J. 1990: Construction grammar. Course reader for Linguistics 120A, University of California, Berkeley.

- Fillmore, C. J., Kay, P. and O'Connor, M. C. 1988: Regularity and idiomaticity in grammatical constructions: the case of let alone. *Language*, 64, 501–38.
- Fisher, C., Hall, D. S., Rakowitz S. and Gleitman, L. 1994: When it is better to receive than to give: syntactic and conceptual constraints on vocabulary growth. *Lingua*, 92, 333–75.
- Foley, W. A. and Van Valin, R. 1984: *Functional Syntax and University Grammar*. Cambridge: Cambridge University Press.
- Garnsey, S. M., Pearlmutter, N. J., Myers, E. and Lotocky, M. 1997: The contributions of verb bias and plausibility to the comprehension of temporarily ambiguous sentences. *Journal of Memory and Language*, 37, 58–93.
- Gleitman, L. 1994: The structural sources of verb meanings. In P. Bloom (ed.), *Language Acquisition: Core Readings*. Cambridge, MA: MIT Press.
- Goldberg, A. E. 1992: The inherent semantics of argument structure: the case of the English ditransitive construction. *Cognitive Linguistics*, 3, 37–74.
- Goldberg, A. E. 1995: *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago, IL: Chicago University Press.
- Goldberg, A. E. 1999: The emergence of argument structure semantics. In B. MacWhinney (ed.), *The Emergence of Language*. Hillsdale, NJ: Lawrence Erlbaum Publications.
- Goldberg, A. E. 2002: Surface generalizations: an alternative to alternations. *Cognitive Linguistics*, 13, 327–56.
- Goldberg, A. E. 2006: *Constructions at Work: The Nature of Generalization in Language*. Oxford: Oxford University Press.
- Goldberg, A. E. 2010: Verbs, frames and constructions. In M. R. Hovav, E. Doron and I. Sichel (eds), *Syntax, Lexical Semantics and Event Structure*. Oxford: Oxford University Press.
- Goldberg, A. E. 2011: Corpus evidence of the viability of statistical preemption. *Cognitive Linguistics*, 22, 131–53.
- Goldberg, A. E., Casenhiser, D. M. and Sethuraman, N. 2004: Learning argument structure generalizations. *Cognitive Linguistics*, 14(3), 289–316.
- Goldberg, A. E., Casenhiser, D. and Sethuraman, N. 2005: The role of prediction in construction-learning. *Journal of Child Language*, 32(2), 407–26.
- Goldberg, A. E. and van der Auwera, J. 2012: This is to count as a construction. *Folia Linguistica*, 46, 1–24.
- Goldwater, M. B. and Markman, A. B. 2009: Constructional sources of implicit agents in sentence comprehension. *Cognitive Linguistics*, 20, 675–702.
- Green, G. M. 1974: *Semantics and Syntactic Regularity*. Bloomington, IN: Indiana University Press.
- Grimshaw, J. 1990: *Argument Structure*. Cambridge, MA: MIT Press.
- Hayes, B. 2009: *Introduction to Phonology*. Oxford: Wiley-Blackwell.

- Herbst, T. 2011: The status of generalizations: valency and argument structure constructions. *ZAA*, 4(4), 347-68.
- Jackendoff, R. 1975: Morphological and semantic regularities in the lexicon. *Language*, 51, 639-71.
- Jackendoff, R. 1983: *Semantics and Cognition*. Cambridge, MA: MIT Press.
- Jackendoff, R. 1990: *Semantic Structures*. Cambridge, MA: MIT Press.
- Jackendoff, R. 1997: *The Architecture of the Language Faculty*. Cambridge, MA: MIT Press.
- Jackendoff, R. 2002: *Foundations of Language*. Oxford: Oxford University Press.
- Jackendoff, R. 2009: *Meaning and the Lexicon: The Parallel Architecture, 1975-2010*. Oxford: Oxford University Press, 227.
- Johnson, M. A. and Goldberg, A. E. 2012: Evidence that Constructional Meaning is accessed automatically: Jabberwocky sentences prime associated verbs. *Language and Cognitive Processes*, 1-14.
- Kako, E. 2006: Thematic role properties of subjects and objects. *Cognition*, 101, 1-42.
- Kapatsinski, V. 2008: When and why we (fail to) extend morphophonological alternations: towards a usage-based harmonic grammar. Ms. University of Oregon, 1-46.
- Kaschak, M. P. and Glenberg, A. M. 2000: Constructing meaning: the role of affordances and grammatical constructions in sentence comprehension. *Journal of Memory and Language*, 43(3), 508-29.
- Kay, P. and Fillmore, C. J. 1999: Grammatical constructions and linguistic generalizations: the what's X doing Y? construction. *Language*, 75, 1-34.
- Keenan, E. and Comrie, B. 1977: Noun phrase accessibility and universal grammar. *Linguistic Inquiry*, 8, 63-99.
- Koenig, J-P. and Davis, A. 2001: Sublexical modality and the structure of lexical semantic representations. *Linguistics and Philosophy*, 24, 71-124.
- Lakoff, G. 1987: *Women, Fire and Dangerous Things: What Categories Reveal About the Mind*. Chicago, IL: University of Chicago Press.
- Lambrecht, K. 1990: 'What, me worry?' Mad Magazine sentences revisited. In *Proceedings of the 16th Annual Meeting of the Berkeley Linguistics Society*. Berkeley, CA: BLS, 215-228.
- Lambrecht, K. 1994: *Information Structure and Sentence Form*. Cambridge: Cambridge University Press.
- Langacker, R. W. 1987: *Foundations of Cognitive Grammar Volume I*. Stanford, CA: Stanford University Press.
- Langacker, R. W. 1988: A usage-based model. In B. Rudzka-Ostyn (ed.), *Topics in Cognitive Linguistics*. Amsterdam: John Benjamins.
- Levin, B. and Rappaport Hovav, M. 1994: A preliminary analysis of causative verbs in English. *Lingua*, 92, 35-77.

- Levin, B. and Rappaport Hovav, M. 2005: Argument realization. *Research Surveys in Linguistics Series*. Cambridge: Cambridge University Press.
- MacDonald, M. C., Pearlmuter, N. J. and Seidenberg, M. S. 1994: The lexical nature of syntactic ambiguity resolution. *Psychological Review*, 101(4), 676-703.
- Marantz, A. 1997: No escape from syntax: don't try morphological analysis in the privacy of your own lexicon. In A. Dimitriadis and L. Siegel (eds), *University of Pennsylvania Working Papers in Linguistics*, Vol. 4.2, Proceedings of the 21st Annual Penn Linguistics Colloquium, 1997, 201-25.
- Meurers, W. D. 2001: On expressing lexical generalizations in HPSG Vertical generalizations. *Nordic Journal of Linguistics*, 24(2), 161-217.
- Michaelis, L. A. and Lambrecht, K. 1996: Toward a Construction-based model of language function: the case of nominal extraposition. *Language*, 72, 215-47.
- Michaelis, L. A. and Ruppenhofer, J. 2001: *Beyond Alternations: A Constructional Account of the Applicative Pattern in German*. Stanford, CA: CSLI Publications.
- Müller, S. 2002: Syntax or morphology: German particle verbs revisited, In N. Dehé, R. Jackendoff, A. McIntyre and S. Urban (eds), *Verb Particle Explorations, Interface Exploration*, 1. Berlin: Mouton de Gruyter, 119-39.
- Müller, S. 2006: Phrasal or lexical constructions? *Language*, 82(4), 850-83.
- Müller, S. 2007: Phrasal or lexical constructions?: some comments on underspecification of constituent order, compositionality and control. In S. Müller (ed.), *Proceedings of the HPSG07 Conference*. Stanford, CA: CSLI Publications, 373-93.
- Müller, S. and Wechsler, S. (forthcoming). Lexical approaches to argument structure.
- Nesset, T. 2008: *Abstract Phonology in a Concrete Model. Cognitive Linguistics and the Morphology- Phonology Interface*. Berlin: Mouton de Gruyter.
- Nunberg, G., Wasow, T. and Sag, I. 1994: Idioms. *Language*, 70(3), 491-538.
- Oehrle, R. 1975: The grammatical status of the English dative alternation. Doctoral dissertation, MIT.
- Osborne, T. and Gross, T. 2012: Constructions are catenae: construction grammar meets dependency grammar. *Cognitive Linguistics*, 23, 165-216.
- Pierrehumbert, J. 2001: Exemplar dynamics: word frequency, lenition and contrast. *Typological Studies in Language*, 45, 137-58.
- Pike, K. 1962: Dimensions of grammatical constructions. *Language*, 38(3), 221-45.
- Pollard, C. J. and Sag, I. A. 1994: *Head-driven phrase structure grammar*. Stanford, CA: CSLI Publications.
- Pinker, S. 1989: *Learnability and Cognition: The Acquisition of Argument Structure*. Cambridge, MA: MIT Press/Bradford Books.
- Rappaport Hovav, M. and Levin, B. 1998: Building verb meanings. In M. Butt and W. Geuder (eds), *The Projection of Arguments: Lexical and Compositional Factors*. Stanford, CA: CSLI Publications, 97-134.

- Rappaport Hovav, M. and Levin, B. 2008. The English dative alternation: the case for verb sensitivity. *Journal of Linguistics*, 44, 129–67.
- Sag, I. A. 2007: Remarks on locality. In S. Müller (ed.), *HPSG07 Conference*. Stanford, CA: CSLI Publications.
- Sag, I. A. 2012: Sign-based construction grammar: an informal synopsis. In H. Boas and I. Sag (eds) *Sign-Based Construction Grammar*. Stanford, CA: CSLI Publications, 69–202.
- Saussure, F. de. 1916: *Course in General Linguistics*. New York: Philosophical Library.
- Stefanowitsch, A. and Gries, S. T. 2009. Corpora and grammar. In A. Lüdeling and M. Kytö (eds), *Corpus Linguistics*. Berlin: Mouton de Gruyter, 933–52.
- Suttle, L. and Goldberg, A. E. 2011: The partial productivity of constructions as induction. *Linguistics*, 6, 1237–70.
- Tesnière, L. 1959. *Éléments de syntaxe structurale*. Paris: Klincksieck.
- Tomasello, M. 1992: *First Verbs: A Case Study of Early Grammatical Development*. Cambridge: Cambridge University Press.
- Tomasello, M. 2000: Do young children have adult syntactic competence? *Cognition*, 74, 209–53.
- Tomasello, M. 2003: *Constructing a Language: A Usage-Based Theory of Language Acquisition*. Cambridge, MA: Harvard University Press.
- Wonnacott, E., Newport, E. L. and Tanenhaus, M. K. 2008: Acquiring and processing verb argument structure: distributional learning in a miniature language. *Cognitive Psychology*, 56(3), 165–209.
- Wasow, T. 2002: *Postverbal Behavior*. Stanford, CA: CSLI Publications.
- Zaenen, A. 1991: Subcategorization and pragmatics. Presentation at the Center for the Study of Language and Information, Stanford University.

Copyright of Mind & Language is the property of Wiley-Blackwell and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.