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Argument Structure: Item-Based or Distributed?

Valency grammars and construction grammars appear to analyze argument structure in fundamentally different ways: the former treat argument structure(s) as a property of individual lexical items, the latter as a set of complex linguistic items existing independently of the specific verbs they occur with. In this paper, I argue that both approaches are good at capturing those aspects of argument structure that are problematic for the other, and that a comprehensive model of argument structure must include both perspectives.

1. Introduction

At first glance, valency grammars and construction grammars seem to be natural opponents rather than natural allies when it comes to modeling argument structure: While the former view argument structure as a property of individual lexical items, the latter, at least in the salient version put forth in Goldberg (1995), views argument structure as a level of representation that is separate from individual lexical items. Essentially, valency grammars are projectionist grammars where lexical items determine the number and nature of their arguments and general syntactic rules determine the general form of clauses in which these verbs occur. Construction grammar, in contrast, posits structurally distributed, meaningful configurations of arguments that combine with individual verbs based on (partially shared) semantic properties.

Any natural model of grammar must be able to account for both item-specific and structurally distributed aspects of grammar: morphological phenomena such as number or tense are viewed as properties of word forms (i.e. as item-specific) in most theories, while properties such as mood or voice are viewed as properties of clauses (i.e. as structurally distributed). The existence of both kinds of representation allows for two approaches to the domain of argument structure: first, it is possible that argument structure is best modeled either as exclusively item-specific (as Jacobs 2009 explicitly argues) or as exclusively structurally-distributed (as a superficial reading of Goldberg 1995 may suggest); second, it is possible that argument structure is best modeled as a mixture of item-specific and structurally-distributed information (as a more careful reading

of Goldberg 1995 and other cognitive linguistic approaches suggest, cf. e.g. Langacker 1987, 1991).

In this paper I will discuss two central aspects of argument-structure, where valency grammars and construction grammars have respective strengths and weaknesses. I will then argue that whatever a comprehensive model of argument structure will ultimately look like, it will have to include both item-projected (i.e. valency-based) and structurally distributed (i.e. construction-based) representations (in this, my aim is similar to that of Herbst (this issue), with a stronger emphasis on the constructional aspect).

2.   Theoretical background

2.1   Defining the notion 'construction'

Before I can usefully discuss the role that construction grammar may play in a model of argument structure, I need to explicate what 'construction grammar' refers to in this context. This label currently designates a rather heterogeneous set of theories whose general views on grammar may overlap to some extent, but who otherwise do not have much in common (cf. Goldberg, to appear, for an attempt to explicate shared assumptions, but cf. Stefanowitsch 2011). One assumption that they all seem to share is the view that grammatical constructions are basic units of natural language grammars, rather than epiphenomena resulting from the application of general rules and interpretation principles (cf. Fillmore, Kay and O'Connor 1988, 501-503); but a closer look reveals that there is little agreement as to what a construction actually is.

The original motivation for the adoption of a constructional view of grammar was, first, a "commitment in principle to account for the entirety of each language", from its highly idiomatic expressions to its "relatively general patterns" (Kay and Fillmore 1999, 1), and second, the recognition that the traditional machinery of mainstream grammatical theories was not up to this task since the "proper units of grammar are more similar to the notion of construction in traditional and pedagogical grammars than to the rules in most versions of generative grammar" (Fillmore, Kay and O'Connor 1988).

Constructions are explicated as being similar to a subtree generated by phrase-structure rules, with three additional properties: first, they "need not be limited to a mother and her daughters, but may span wider ranges of the sentential tree", second, they "may specify, not only syntactic, but also lexical, semantic, and pragmatic information", and third, they "may specify a semantics (and/or pragmatics) that is distinct from what might be calculated from the associated semantics of the set of smaller constructions that could be used to build the same morphosyntactic object" (Fillmore, Kay and O'Connor 1988, 501). Note that this is a very broad notion of *construction*, it includes purely formal structures as well as structures that are associated with particular meanings or lexical items and it includes structures with non-compositional as well as

compositional semantics. It also includes subtrees of any size and complexity (including, as the authors point out, the lexical items that appear in those sub-trees). This encompassing view of grammatical constructions is reflected in Kay and Fillmore's (1999) very general definition:

Definition I

A construction ... is a set of conditions licensing a class of actual constructs of a language (Kay and Fillmore 1999, 2).

This definition essentially argues for a constraint-based model of grammar that allows constraints to be formulated in any domain of linguistic description and at any level of specificity. It does not posit any additional restrictions as to what types of constraints such a model should allow – they can be purely formal, purely semantic, or a mixture of both.

In this, Kay and Fillmore differ radically from Goldberg (1995), whose characterization is frequently cited as the standard definition:

Definition II

C is a construction *iff*$_{def}$ C is a form-meaning pair <F_i, S_i> such that some aspect of F_i or some aspect of S_i is not strictly predictable from C's component parts or from other previously established constructions (Goldberg: 1995, 4; cf. also Lakoff 1987, 467).

This definition famously restricts the notion *construction* to form-meaning pairs, with the consequence that even fairly general structures, such as Subject-Auxiliary-Inversion, must be given a unified semantic characterization, if one wants to avoid postulating unrelated homonymous constructions (cf. Goldberg 2009 and the criticism in Newmeyer and Borsley 2009). Under Kay and Fillmore's characterization, a purely formal account of Subject-Auxiliary-Inversion would be unproblematic (they suggest purely formal characterizations, for example, for the Subject-Predicate construction and the Left-Isolation construction, cf. Kay and Fillmore 1999, 13-16).

Goldberg's definition shares with that of Kay and Fillmore the requirement that either the form or the meaning of a construction must be non-derivable from other constructions. This requirement is not explicitly stated in Kay and Fillmore's characterization, but it follows from an application of the definition according to the law of parsimony, which states that *ceteris paribus* the simplest analysis should always be preferred: it would violate this law to accord construction status to structures that are fully derivable from their components.

However, the law of parsimony only applies within a pre-defined explanatory scope. From a purely theoretical perspective, it would be superfluous to posit constructions whose properties can be derived in their entirety from their components, but if one adopts a psycholinguistic perspective, such constructions should be posited if they are acquired, represented and processed independently of their parts. Goldberg has recently adopted such an explicitly psycholinguistic perspective and has augmented her original definition as follows: "In addition,

patterns are stored as constructions even if they are fully predictable as long as they occur with sufficient frequency" (Goldberg 2006, 5), bringing it in line with usage-based approaches to construction grammar (Croft 2001, Tomasello 2003). A more recent formulation is the following:

> *Definition III*
>
> Constructions are defined to be conventional, learned form-function pairings at varying levels of complexity and abstraction (Goldberg, to appear).

This definition keeps the restriction limiting the notion of construction to form-meaning pairs, but it allows for a number of reasons to accord construction status to a given structure: if a structure is non-compositional or formally non-derivable, it must clearly be learned, since otherwise it could not be used. If it is compositional and derivable, it might be learned anyway, due to frequency, salience, familiarity, etc. Clearly, the definition overlaps with Kay and Fillmore's in that they both cover form-meaning pairs with unpredictable properties at all levels of complexity, but apart from that the two definitions cover very different types of entities.

Recently, Kay (to appear) has reduced the similarity between his and Goldberg's view of constructions even further, introducing a distinction between "constructions proper" and "patterns of coining". He takes up an earlier discussion by Fillmore (1997), who distinguishes productive constructions whose "constraints can themselves be formulated in general ways" from non-productive (and presumably also partially productive) constructions, for which this is not the case. Fillmore explicitly includes the latter in the class of "constructions", as their limited productivity does not preclude them from being used in creating novel expressions and therefore forming part of grammar. Kay (to appear), however, excludes them from the grammar altogether. Although he does not define the term *construction* explicitly, the following definition can be derived by combining the discussion in Kay (to appear) with the definition from Kay and Fillmore (1999):

> *Definition IV*
>
> A set of conditions S licensing a class of actual constructs of a language is a construction *iff* S cannot be derived from other constructions and all conditions of S can be formulated in a general way.

In drawing a distinction between constructions and 'patterns of coinage', Kay's definition is an unambiguous departure from the idea that grammatical knowledge should be modeled in terms of a uniform mechanism. Of course, in a mixed architecture, additional distinctions could be drawn. For example, Jacobs (2008) proposes the following definition:

Definition V

> A construction of L is a direct specification of aspects of the form or meaning of a class of signs of L, which is used in conjunction with other grammatical mechanisms to produce elements of this class of signs (Jacobs 2008, 5, my translation).

This definition follows Goldberg (1995), i.e. definition II above, in two important respects: First, it applies the term to form-meaning pairs (here "signs"), and second, it is based on the criterion of non-predictability ("direct specification"). It differs, in that it allows for "other grammatical mechanisms" where Goldberg's definition assumes that grammar consists entirely of constructions. These "other mechanisms" prominently include what Jacobs refers to as "grammatical laws", which he defines as "general statements about the signs of L, which ... express constraints on the form or meaning of these signs without the precondition that the signs correspond to a particular construction" (Jacobs 2008, 8). His examples (among them phonological reduction in unstressed syllables and the *that*-trace effect) show, that these "laws" roughly correspond to the traditional notion of grammar rules. The point of including this definition, which I will return to below, is to show that constructions in the sense of Goldberg (1995) can easily be accommodated as a theoretical possibility in the kind of projectionist framework Jacobs generally assumes (cf. Jacobs 2008, 2009).

Clearly the five definitions presented here overlap and differ in ways that are too complex to discuss extensively, but even without such a discussion they enable us to identify some central properties of complex grammatical structures that are potentially relevant to any model of grammar that does not limit its scope to the kind of general rules that Jacobs calls "laws".

2.2 Constructions and argument structure

A fruitful discussion of the relative role of verb valency and argument-structure constructions requires a definition of the latter that allows us to make non-trivial statements about the relationship between a verb and the configurations[1] of arguments it occurs with. The definitions above are so varied, that almost any way of analyzing this relationship, including various types of valency-based approaches, could be classified as a "constructional" analysis.

Consider the authentic example in (1) and the potential analyses in (2 a-c):

(1)   *Any editor worth his salt would have laughed the reporter out of his office* and back to do more record-scrubbing ... and less paint sniffing. [http://www.cnsnews.com/node/123378]

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[1]   In the following, I will use the ad hoc labels "configuration of arguments" and "argument configuration" as a way of referring to argument structure in a way that is neutral between a valency-based and a construction-based analysis.

(2)   a. *laugh* [N$_A$ N$_P$ ADV]
      b. *laugh* [NP$_{AGENT}$ NP$_{THEME}$ PP$_{GOAL}$]
      c. i) *laugh* <laughing.person>
          ii) [V$_{CAUSE-MOVE}$ <NP$_{AGENT}$ NP$_{THEME}$ PP$_{GOAL}$>]

The analysis in (2 a) represents a typical valency-based approach at the level of what the Valency Dictionary of English (Herbst et al. 2004) refers to as *valency patterns*. It simply states that the verb *laugh* may appear with two nominal elements and an adverbial, saying nothing about the semantic information that may be associated with these constituents (this is in effect a projectionist approach without semantic roles). The combination of *laugh* with these three constituents could be classified as a construction for example according to definitions I, III and IV above; since at least one element of this construction, the verb *laugh*, has a form and a meaning, we can assume that definitions II and V could also accommodate this analysis.

They could certainly accommodate the analysis in (2 b), which adds semantic information to the constituents (and which thus corresponds to a projectionist approach with semantic roles); thus (2 b) could be classified as a construction according to all five definitions presented above. Put differently, since verbs are indisputably linguistic signs with a form and a meaning, they fall under all of the definitions discussed above. The valency of a verb can be described as part of its form (and potentially its meaning). Thus, a combination of a verb and an argument configuration specified by that verb can always be analyzed as a construction.

The analysis in (2 c) takes a different perspective. Following Goldberg (1995), it states the existence of a lexical element *laugh* that has one verb-specific semantic role associated with it, and the separate existence of a particular configuration of arguments that carries the meaning 'agent causes theme to move to goal'. This analysis, too, would be covered by most of the definitions discussed above, with the possible exception of definition IV (Kay, to appear, treats examples like (1) as resulting from a "pattern of coinage").

If we want to avoid a purely terminological discussion, we need to separate the question whether (recurring) configurations of arguments *can* be dealt with in terms of (lexically-projected) valency or in terms of constructions from the issue, whether (and perhaps in which cases) it is *plausible* to choose one or the other analysis. To do so, we must choose an appropriately constrained definition of *construction*. In particular,

- we need to limit the definition to form-meaning pairs, to exclude purely formal valency patterns;

- we need to limit the definition to such form-meaning pairs that exhibit unpredictable formal or semantic properties, to exclude structures that could be derived from valency patterns and general syntactic/semantic rules;

- we need to treat productivity as a matter of degree rather than an all-or-none property, since argument-structure is known to display a certain extent of idiosyncrasy and thus an insistence on full productivity as a criterion for construction-hood would force us a priori to adopt a valency-based approach;
- we need to limit the definition to phrasal constructions, since otherwise every use of a verb with a particular valency pattern would count as a construction.

Finally, while issues of frequency and entrenchment can (and will) inform our discussion, it is clear that we cannot use them as defining criteria for construction-hood. Entrenchment effects can be found for particular combinations of a verb and an argument-configuration as well as for argument configurations posited to exist independently of specific verbs; thus, entrenchment will not allow us to distinguish between analyses such as those in (2 a-c).

In other words, we need to adopt the definition of argument-structure constructions used by Goldberg (1995), which is, of course, the definition implicitly or explicitly adopted by the vast majority of construction-based research on argument structure. The point of my extensive justification of this choice was to clarify that this definition can be adopted almost independently of one's general theoretical outlook: one can ask the question whether such argument-structure constructions exist and what role they play qualitatively and quantitatively in a given language, regardless of whether one assumes that argument structure must be dealt with uniformly either in terms of lexically-projected valency frames or in terms of phrasal constructions (it is possible, in other words, that valency frames are projected by verbs in some cases and supplied by argument structures in others), and regardless of whether one assumes that other areas of grammar must also be dealt with partially or exclusively in terms of constructions.

Once we have restricted our definition of argument-structure constructions to phrasal form-meaning pairs with unpredictable formal or semantic properties, we can use this definition as a basis on which construction-based and valency-based accounts can be compared.

3.   Valency-based and construction-based accounts of argument structure

Any phenomenon in the domain of argument-structure can theoretically be modeled in terms of verb-specific valency or in terms of verb-independent argument-structure constructions. Which of the resulting models is preferable depends largely on the aims of the modeler. If the aim is theoretical parsimony, for example, the choice depends on which of the two accounts can achieve descriptive adequacy with fewer theoretical constructs and/or which of the two accounts yields the simpler overall model. If the aim is psycholinguistic plausibility, the choice depends on empirical evidence concerning the acquisition, representation and processing of argument structure (cf. in this context the discus-

sion in Stefanowitsch 2011a). In the following, I will ignore such specific aims and focus on a general requirement that any comprehensive model of argument structure should satisfy: it must be able to account naturally and parsimoniously both for conventional and for unconventional combinations of verbs and argument structures.

Construction-based accounts seem to be particularly well suited in modeling the latter, as the following examples show:[2]

(3)   She *lurched the car into another parking lot*, pulling into an empty, well-lighted space directly across from the solid square building ... (John Katzenbach, *State of Mind*, 2004)

(4)   Nick and I wound wires around coils and soldered and glued and *sneezed tiny washers off the table* and cut ourselves and cursed for weeks. (Paul Fleischman, *Seek*, 2001)

(5)   The long, brown animal finished drinking and tensed its legs to leap, and Anthony *thought it into a grave* in the cornfield. (Jerome Bixby, *It's a good life*, 1953)

The verbs *lurch*, *sneeze* and *think* are readily interpretable as expressing caused motion in these examples, although they occur very rarely with this sense and this configuration of arguments. An extensive search of Google Books and the world-wide web turns up no more than a few dozen examples each for the patterns *lurch sth off/into sth* and *sneeze sth off/into sth*. The first pattern is found exclusively in the context of vehicles being moved, the second pattern is mainly used with objects that are located in or near the nose of the sneezer, although a handful of cases analogous to (4) can be found.[3] The pattern *think sth off/into sth* is even rarer, being limited to fictional contexts where people are able to move objects with their thoughts.

An analysis in terms of valency (with or without semantic roles) would require us to posit appropriate verb senses with an appropriate valency:

(6)   a.   *lurch* 'to cause to move jerkily' [N_A N_P ADV]

       b.   *sneeze* 'to cause to move by sneezing' [N_A N_P ADV]

       c.   *think* 'to cause to move with one's thoughts' [N_A N_P ADV]

This strategy has a number of problems. First, as has often been noted, it quickly increases the size of the lexicon beyond a plausible size; given the right context, almost any verb could be used with a caused-motion meaning. Second, many of

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[2]   Examples (4) and (5) are analogous to constructed examples from Goldberg (1995, 152, 158).

[3]   Thus, (a) and (b) are typical examples, while (c) (like (4) above) is very unusual: (a) *Tiger looked up from her feed bowl and sneezed the food off of her whiskers* (William Burr, *Chinchorro Reef*, 2011); (b) *I took Titina's blue bead and stuck it up her left* nostril. ... But Titina Stavridi only smiled, and sneezed the bead into her hand (Patrick White, *The Burnt Ones*, 1964); (c) *The author and artist Douglas Coupland has always sneezed the dust off the tired symbols of Canadian-ness* ... (tmagazine.blogs.nytimes.com).

the verb senses that it forces us to posit are semantically highly implausible, (6 c) being a good example. Third, it fails to capture the correlation between the configurations of arguments that a verb occurs with and the interpretation that it receives; as (6 a-c) are individual lexical entries, there is no reason to expect them to share the same valency pattern simply because they share the same meaning or vice versa, cf. e.g. Goldberg 2002). Finally, it lacks explanatory power, as it would not allow us to make any statements whatsoever about the configuration of arguments that a verb might be expected to occur with; every creative use of a verb would have to be added to the lexicon at the time that it is recorded and it would then have the same status as all other entries in the lexicon, including highly frequent and conventionalized ones.

The construction-based approach does not have any of these problems. It allows us to keep the lexicon small and does not force us to posit implausible verb senses: the uses of *lurch*, *sneeze* and *think* in (3)-(5) result from a creative combination of the verbs in their basic meaning with the caused-motion construction shown in (2 c) above, which provides both the caused-motion meaning and the appropriate argument structure. It also naturally captures the fact that such creative uses (as well as the majority of established, conventionalized uses), shares both semantic and formal properties; this is simply a result of the fact that both the meaning and the configuration of arguments is provided by a construction that exists independently of lexical entries. Finally, it has explanatory power, not in the sense of allowing us to predict which creative uses of verbs will actually occur (this is up to what speakers decide to express and how to express it), but in that it allows us to predict what a creative use would mean if it occurs, and which creative uses are likely to occur if speakers want to express a particular novel meaning. Note that it does allow us to state that some combinations of verbs and argument configurations are highly conventionalized and others are not – conventionality is a property that must always be stated independently from systemic potential.

3.1 The role of analogy

In order so solve the problems that a purely valency-based approach has with accounting for the accommodation of novel verbs and the creative use of existing verbs, authors have appealed to the notion of analogy. They argue in favor of a valency-based approach that represents only the highly conventionalized valency patterns plausibly shared by the entire speech community and that explains creative uses as analogies based on these conventionalized patterns (cf. the "patterns of coinage" analysis suggested by Kay, to appear).

However, such an analogy can work in two different ways, only one of which would really argue in favor of a valency-based approach. Take once again examples (3–5).

In order to account for the caused-motion interpretation of these examples, a valency-based approach must argue that speakers and hearers exploit the anal-

ogy between *lurch/sneeze/think* and a verb (or a set of verbs) that conventionally occur with the valency frame [NP$_{AGENT}$ NP$_{THEME}$ PP$_{GOAL}$]. This assumes that such an analogy can plausibly be drawn in the first place. In order to determine whether this is the case, one needs to know for which verbs in question the pattern is highly conventionalized.

Let us begin by looking at *lurch* in the sentence *She lurched the car into the parking lot* (cf. 3 above). The only conventionalized use of *lurch* is as an intransitive motion verb with the meaning "make an abrupt, unsteady, uncontrolled movement or series of movements", as in *The car lurched forwards* (both the definition and the example are from the New Oxford American Dictionary). If we want to derive a caused-motion reading by analogy while avoiding the postulation of meaningful argument structures, we need to find a specific verb (or set of verbs) that can serve as a basis for such an analogy. Obviously, this must be a verb that conventionally occurs in sentences of the form [NP$_1$ V DET *car into* NP$_2$], where NP$_1$ refers to the driver and NP$_2$ refers to a location. The British National Corpus contains 50 instances of this pattern,[4] which contain the following 18 verbs (in descending order of frequency):

(7)   *drive* (9), *turn* (7), *pull* (7), *take* (6), *swing* (3), *push* (3), *put* (2), *bring* (2), *get* (2), *careen* (1), *edge* (1), *force* (1), *negotiate* (1), *nose* (1), *run* (1), *slow* (1), *smash* (1), *throw* (1)

With the possible exception of *force*, all of these verbs include the semantic feature 'motion' as part of their basic meaning, and many of them (among them the top three) have both an 'intransitive motion' and a 'caused motion' reading. Our first option would be to claim that speakers exploit this fact to form an analogy like the following:

(8)   lurch the car into the lot : lurch into the lot :: drive the car into the lot : drive into the lot

Since speakers know that the difference between the conventionalized uses *drive the car into the lot* and *drive into the lot* is that between caused motion and simple motion, they can deduce that the same difference must hold between the non-conventionalized *lurch the car into the lot* and the conventionalized *lurch into the lot*.

This is not at all an implausible account, but it depends on at least three conditions: first, speakers must be able to identify one or more verbs that frequently occur with the argument structure of the clause that they are trying to

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4   By using fairly specific patterns here and below, including the words *car* and *into*, or *off* and *table* or *into* and *grave*, I do not mean to suggest that the interpretation of the creative uses of *lurch*, *sneeze* and *think* must necessarily be analogous to the pattern or the verbs occurring in it at this level of specificity. The same question could be asked with respect to various more abstract patterns, such as [V NP *into/off* NP] or [V NP P$_{path}$ NP]. However, the very specific patterns chosen are maximally similar to the creative examples discussed here and thus correspond to the most immediate patterns available to speakers for drawing analogies.

interpret; second, at least one of these verbs must additionally have a conventionalized use that corresponds *both formally and semantically* to the conventionalized use of the verb whose non-conventionalized use they are trying to deduce; third, the two uses of the verb that they select as a basis for their analogy must be transparently related in a way that can be transferred to the verb whose non-conventional meaning they are trying to deduce.

As we saw, these conditions hold for the novel use of *lurch* in (3); however, it is less clear whether this is also the case for *sneeze* in *We sneezed the washers off the table* (cf. 4 above). A search for [V NP *off* DET *table*] in the British National Corpus yields 36 hits, containing the following 17 verbs:

(9)   *take* (13), *lift* (5), *knock* (3), *move* (2), *push* (2), *clear* (1), *ease* (1), *get* (1), *heave* (1), *jolt* (1), *pick* (1), *slide* (1), *sweep* (1), *whip* (1), *whisk* (1), *wipe* (1)

Again, the meaning of all of these verbs plausibly includes the semantic feature 'motion'. However, if we attempt to construct an analogy like that in (8) above, we encounter at least two problems. First, most of these verbs (including the top-ranked *take*) do not have the intransitive use that we would need to draw an analogy to the canonical intransitive use of *sneeze*. Second, even if we choose a verb that does have such a use, like *move*, this use is not semantically similar to the canonical use of *sneeze*. Thus, the following analogy simply does not work:[5]

(10)   sneeze washers off the table : sneeze :: move washers off the table : move

One might object that the notion of analogy that I have used here is too strict. One could argue that speakers simply recognize a semantic similarity (however vague) between the verb whose non-conventionalized meaning they are trying to deduce and some other verb that conventionally occurs with the argument structure of the clause they are trying to interpret. Under this account, they would recognize that a typical sentence would be *We took the washers off the table* and that there is a vague similarity between *take* and *sneeze* in that they both include a 'motion' component (this may not be very salient in the case of *move*, but it is present in dictionary definitions: "make a sudden involuntary *expulsion of air* from the nose and mouth due to irritation of one's nostrils" (from the New Oxford American Dictionary, my italics).

Even such a less strict notion of analogy cannot provide a satisfactory explanation for a sentence like *Anthony thought the animal into a grave* (cf. 5 above). There is simply no similarity between the verb *think* ("use one's mind actively to form connected ideas", cf. New Oxford American Dictionary) and the verbs that typically occur in the pattern V NP *into* DET *grave*:

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5   In addition, there is the problem already pointed out by Goldberg (1995, 156f.) that to get from *We sneezed* to a sentence like *We sneezed washers off the table* by any kind of valency-changing rule, there is the intermediate step *We sneezed washers*, which does not have the right semantic interpretation.

(11)   *lower* (7), *throw* (4), *drop* (2), *dump* (1), *force* (1), *pile* (1), *pull* (1)

If one wanted to account for such uses in terms of analogy, this analogy could not be between verbs (for example, *think* and *lower*); instead it would have to be between these verbs and the argument structures they occur in (conventionally or non-conventionally):

(12)   think : V the animal into a grave :: lower : V the animal into a grave

But this is just another way of saying that the pattern V *the animal into a grave* (or, more generally, V (NP$_{AGT}$, NP$_{THM}$, PP$_{GOAL}$)) itself carries the meaning 'caused motion' and is therefore able to confer a motion interpretation onto the verb *think*, which does not carry the feature 'movement' outside of this pattern.

In other words, the issue is not whether analogy is involved in the production or comprehension of a given complex structure, but with reference to which aspect the analogy is made. Specifically, in the case of argument structure, the issue is whether a particular combination of a verb V and a configuration of arguments A has an interpretation that is analogous to other verbs that occur with A (this would be a strictly valency-based account), or whether it is directly analogous to A (this would be a constructional account framed in terms of analogical reasoning). These two types of analogy-based reasoning are not mutually exclusive, but to the extent that the latter plays a necessary role in a model of argument structure, this model is at least partially a construction-based one.

3.2   Limits on productivity

As mentioned above, a construction-based model accounts naturally for sentences like (3-5) above; in fact, its ability to deal with such creative uses of verbs is one of its main advantages over a valency-based account. This does not mean, however, that a construction-based approach to argument structure is without problems, one of which is particularly relevant in the context of the present discussion.

Unless properly constrained, a purely construction-based account would suggest that any combination of a verb and an argument-structure construction should yield a well-formed expression. This suggestion is quite clearly wrong. Consider (13), which shows a construction-based analysis of the verb *give* and the construction necessary to derive its ditransitive use (cf. Goldberg 1995):

(13)   a.   *give* <giver, receiver, thing.given>

         b.   [V$_{CAUSE-MOVE}$ <NP$_{AGENT}$ NP$_{THEME}$ PP$_{GOAL}$>]

The existence of the ditransitive construction in (13 b) would correctly predict that new verbs of giving/sending entering the English language will quite naturally be used ditransitively, as in (14 a-b):

(14)   a.   Get this set up and I will *paypal them a donation!*
             (www.huffingtonpost.com)

    b. A fellow JobAngels member *tweeted her a posting* about a finance position at a local nonprofit (forbes.com)

The verbs *paypal* ("to transfer money using the online payment system *PayPal*") and *tweet* ("to transfer information using the messaging service *Twitter*") semantically specify agents who initiate a transfer of some entity to a recipient (either literally or metaphorically), and this participant structure matches the semantic roles of the construction perfectly.

    The ditransitive construction would also account for creative uses of existing verbs, such as (15 a-b):

(15) a. So Haber (who has also had George *dream him a huge institute*), tells George to dream an end to racism, so George makes everyone gray. (cinemade.startlogic.com)

      b. In January last year, Semaj successfully *lied himself a seat on a flight* operated by Southwest Airlines ... (www.fly.co.uk)

Example (15 a) is from a review of Ursula K. LeGuin's *Lathe of Heaven*, whose main character can bring things into existence by dreaming about them, example (15 b) is from a news report about a boy who sneaked onto a plane by falsely claiming that his mother had already boarded. Although the verbs *dream* and *lie* each only specify a single participant, the context supplies additional participants, and these can be syntactically accommodated by using the verbs in the ditransitive construction, avoiding the postulation of highly idiosyncratic verbs senses such as "to bring into existence by dreaming".

    However, the existence of the ditransitive construction would also predict that, for example, the verbs *donate* and *mention* should occur with ditransitive syntax. After all, they specify the appropriate number and type of semantic roles (*donate* <donor, recipient, thing.donated>, *mention* <speaker, listener, thing.said>). However, these verbs famously do *not* occur ditransitively (16 a, b), even though they occur freely in the semantically very similar dative construction (17 a, b):

(16) a. * I will donate them fifty dollars by PayPal

      b. * A fellow member mentioned her a posting on Twitter.

(17) a. I will donate fifty dollars to them by PayPal

      b. A fellow member mentioned a posting to her on Twitter.

Limits on productivity as such are not a problem for a construction-based account, as long as these limits can be motivated by properties of the construction or the verb/s in question. However, the limits of the ditransitive construction in (16 a, b) are completely unexpected from this perspective, as the verbs in question fit the proposed meaning of the ditransitive perfectly and they occur freely in the semantically closely related dative construction.

    Of course, a number of solutions have been proposed to this problem, but while they can theoretically be integrated into a construction-based account, it must be openly acknowledged that they hinge on properties of the verbs in ques-

tion whose relevance to the ditransitive construction are hard to account for (such as the constraints banning Latinate verbs or speech act verbs, cf. the discussion in Goldberg 1995, ch. 5). In other words, we can easily add a constraint to the ditransitive that prevents Latinate verbs from occurring in it, but we cannot explain why the source language of a lexical item should be relevant for the ditransitive construction (and only for the ditransitive construction).

A valency-based approach can deal with these restrictions quite naturally, simply by not positing lexical entries with a ditransitive valency pattern for *donate, mention* etc. This may seem somewhat inelegant, as it does not offer any explanation as to why these verbs do not occur with this valency pattern, but the construction-based account does not offer such an explanation either, so that this is not a weakness of the valency-based approach.

4. Conclusion and Outlook

Two problems in the modeling of argument-structure were discussed here. The first problem is, how best to capture the productivity of certain argument configurations, second, how to capture limits on this productivity.

With respect to the problem of productivity, I argued that phrasal argument-structure constructions of the kind proposed in Goldberg 1995 are very good at providing a solution. An analogy-based account either fails (if it assumes analogies to individual lexical items) or it is indistinguishable from a construction-based account (if it assumes analogies to the *argument structure* of otherwise non-analogous lexical items).

With respect to the problem of limits on productivity, I argued that theories of phrasal argument-structure constructions do not currently provide a straightforward solution. In contrast, valency-based approaches do not have this problem in the first place, as possible argument configurations are simply listed separately for each individual lexical item (neither of the two approaches currently offers a good explanation as to *why* such limits should exist and where to expect them).[6]

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[6]   It should be pointed out that Goldberg's (1995) version of construction grammar sketches out at least two potential solutions to this problem. First, she argues that constructions be thought of as polysemy networks of more narrowly defined constructional subsenses, which would exclude the extension of the construction to verbs that do not fall into any of the categories defined by these subsenses. This only provides a partial solution, however, as it does not account for the fact that verbs that *do* fall into these categories may also be excluded from occurring in a given construction. Second, she argues that the participants in the frame defining the meaning of a given verb may have different degrees of prominence and that mismatches between these degrees of prominence and the requirements of a given argument-structure construction may explain why that verb cannot occur in that construction. This is a very promising idea, which would also potentially have explanatory value, but it has so far not been worked out in detail or tested empirically (see Stefanowitsch 2011c for a brief discussion). Note that the question of how

It seems that only a combination of the two approaches will be able to provide the machinery necessary to model the domain of argument structure. Note that such a combination would be unproblematic from the perspective of construction grammar; as the discussion of various existing definitions of the notion *construction* has shown, a combination of a specific verb with a specific argument configuration (in other words, a verb and its valency) falls under all these definitions. Such combinations – let us call them lexically-bound argument-structure constructions – naturally co-exist alongside the phrasal argument-structure constructions posited by Goldberg (1995).

In fact, we do not even have to look far to find models of grammar that include both types of construction. One such model is Head-driven Phrase-Structure Grammar, whose lexical entries include information about valency – i.e., they are lexically-bound argument-structure constructions in the terminology suggested here –, and which also includes lexical rules that can change the valency of a verb and add the appropriate meaning at the same time (cf. Müller's 2006 analysis of resultatives) – this type of lexical rule is logically equivalent to the phrasal argument-structure constructions of Goldbergian construction grammar.

But in fact Goldberg's model itself includes the possibility of lexically-bound argument-structure constructions (cf., for example, her discussion of the idiom *drive NP crazy*, Goldberg 1995, 98f.), and the Usage-based Model first proposed by Langacker 1987 and explicitly adopted by Goldberg 2006 provides a natural way of relating the two types of construction. In the Usage-based Model, linguistic knowledge is represented in the form of an inductive hierarchy, in which concrete, fully specified linguistic expressions form the substrate over which speakers generalize to derive schemata of various degrees of abstraction. The fully specified linguistic expressions are not discarded after speakers generalize over them, and crucially, the hierarchy may contain expressions that do not enter into any generalization process.

This model (which has been broadly confirmed by recent research on language acquisition, cf. e.g. Dąbrowska 2000, Tomasello 2003, Lieven and Noble, this issue,) provides the architecture to include both lexically-bound argument-structure constructions (which are simply relatively low-level schemas that have not been abstracted away from a particular verb yet), and phrasal constructions (which are higher-level schemas capturing the commonalities of a group of formally and semantically similar lexically-bound constructions by abstracting away from the verbs they contain). These higher-level schemas may be used productively, both with novel words entering the language and creatively with verbs that are already part of the linguistic system, but they are not (necessarily) used producing conventionalized combinations of verbs and argument configurations (cf. in this context the discussion of historical changes in argument structure in

to explain limits on productivity is different from the question how children may acquire such limits. With regard to the latter question, several proposals exist within construction grammar (see Stefanowitsch 2008, 2011d, Goldberg 2011).

Colleman (this issue). In such a usage-based construction grammar, the lowest level of linguistic representation would include regular lexically-bound argument-structure constructions, i.e. those that share (aspects of) their form and meaning with other verbs and thus conform to higher-level phrasal constructions, and irregular lexically-bound argument-structure constructions, i.e. those that do not share any aspect of form and meaning with other verbs.

Coming back to current models of construction grammar and valency grammar and the relation between them, I would thus argue that a descriptively adequate construction grammar must absorb valency grammar, or vice versa. A combined model, incidentally, would not be dominantly one or the other, but it would be a true hybrid.

Consider Fig. 1, which shows the relationship between verbs and valency patterns (roughly, phrasal argument-structure constructions) in the Erlangen Pattern Bank (Herbst and Uhrig 2009). On the one hand, there are more than seven hundred such patterns in the database, most of which occur only with up to a handful of verbs – these are naturally modeled in terms of lexically-bound constructions. On the other hand, there are more than a dozen patterns that occur with between fifty to five hundred verbs – these are naturally modeled in terms of phrasal constructions.
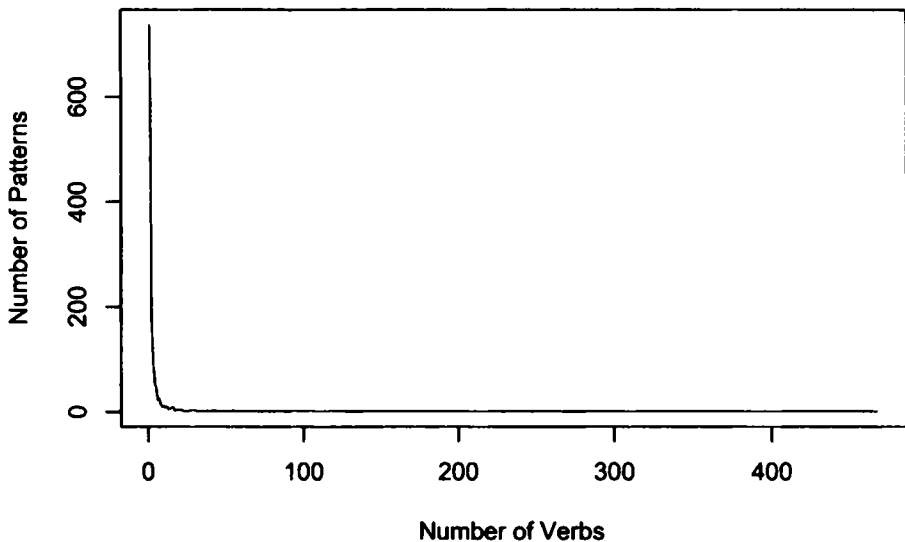

Figure 1

In conclusion, valency grammar and construction grammar have always been two different perspectives on the same set of phenomena. By combining their strengths, we can avoid many of their respective weaknesses. This leaves a vast range of issues to be explored, but these can be explored within a combined

framework that includes verbs with a unique valency pattern and fully productive phrasal constructions as two extremes in a network of argument-structure constructions of varying degrees of lexical specificity.

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