

21 Phrasal vs. lexical analyses

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This section deals with a rather crucial aspect when it comes to the comparison of the theories described in this book: valence and the question whether sentence structure, or rather syntactic structure in general, is determined by lexical information or whether syntactic structures have an independent existence (and meaning) and lexical items are just inserted into them. Roughly speaking, frameworks like GB/Minimalism, LFG, CG, HPSG, and DG are lexical, while GPSG and Construction Grammar (Goldberg 1995, 2003a; Tomasello 2003, 2006b; Croft 2001) are phrasal approaches. This categorization reflects tendencies, but there are non-lexical approaches in Minimalism (Borer's exoskeletal approach, 2003) and LFG (Alsina 1996; Asudeh et al. 2008, 2013) and there are lexical approaches in Construction Grammar (Sign-Based Construction Grammar, see Section 10.6.2). The phrasal approach is wide-spread also in frameworks like Cognitive Grammar (Dąbrowska 2001; Langacker 2009: 169) and Simpler Syntax (Culicover & Jackendoff 2005; Jackendoff 2008) that could not be discussed in this book.

The question is whether the meaning of an utterance like (1a) is contributed by the verb *give* and the structure is needed for the NPs around the verb does not contribute any meaning or whether there is a phrasal pattern X Verb Y Z that contributes some 'ditransitive meaning' whatever this may be.¹

- (1) a. Peter gives Mary the book.
- b. Peter fishes the pond empty.

Similarly, there is the question of how the constituents in (1b) are licensed. This sentence is interesting since it has a resultative meaning that is not part of the meaning of the verb *fish*: Peter's fishing causes the pond to become empty. Nor is this additional meaning part of the meaning of any other item in the sentence. On the lexical account, there is a lexical rule that licenses a lexical item that selects for *Peter*, *the pond*, and *empty*. This lexical item also contributes the resultative meaning. On the phrasal approach, it is

¹ Note that the prototypical meaning is a transfer of possession in which Y receives Z from X, but the reverse holds in (i.b):

- (i) a. Er gibt ihr den Ball.
 he.NOM gives her.DAT the.ACC ball
- b. Er stiehlt ihr den Ball.
 he.NOM steals her.DAT the.ACC ball
 'He steals the ball from her.'

assumed that there is a pattern Subj V Obj Obl. This pattern contributes the resultative meaning, while the verb that is inserted into this pattern just contributes its prototypical meaning, e.g. the meaning that *fish* would have in an intransitive construction. I call such phrasal approaches *plugging approaches*, since lexical items are plugged into ready-made structures that do most of the work.

In what follows I will examine these proposals in more detail and argue that the lexical approaches to valence are the correct ones. The discussion will be based on earlier work of mine (Müller 2006, 2007c, 2010b) and work that I did together with Steve Wechsler (Müller & Wechsler 2014a,b). Some of the sections in Müller & Wechsler (2014a) started out as translations of Müller (2013b), but the material was reorganized and refocused due to intensive discussion with Steve Wechsler. So rather than using a translation of Section 11.11 of Müller (2013b), I use parts of Müller & Wechsler (2014a) here and add some subsections that had to be left out of the article due to space restrictions (Subsections 21.3.6 and 21.7.3). Because there have been misunderstandings in the past (e.g. Boas (2014), see Müller & Wechsler (2014b)), a disclaimer is necessary here. This section is not an argument against Construction Grammar. As was mentioned above Sign-Based Construction Grammar is a lexical variant of Construction Grammar and hence compatible with what I believe to be correct. This section is also not against phrasal constructions in general, since there are phenomena that seem to be best captured with phrasal constructions. These are discussed in detail in Subsection 21.10. What I will argue against in the following subsections is a special kind of phrasal construction, namely phrasal argument structure constructions. I believe that all phenomena that have to do with valence and valence alternations should be treated lexically.

21.1 Some putative advantages of phrasal models

In this section we examine certain claims to purported advantages of phrasal versions of Construction Grammar over lexical rules. Then in the following section, we will turn to positive arguments for lexical rules.

21.1.1 Usage-based theories

For many practitioners of Construction Grammar, their approach to syntax is deeply rooted in the ontological strictures of *usage-based* theories of language (Langacker 1987; Goldberg 1995; Croft 2001; Tomasello 2003). Usage-based theorists oppose the notion of ‘linguistic rules conceived of as algebraic procedures for combining symbols that do not themselves contribute to meaning’ (Tomasello 2003: 99). All linguistic entities are symbolic of things in the realm of denotations; ‘all have communicative significance because they all derive directly from language use’ (*ibid*). Although the formatives of language may be rather abstract, they can never be divorced from their functional origin as a tool of communication. The usage-based view of constructions is summed up well in the following quote:

The most important point is that constructions are nothing more or less than patterns of usage, which may therefore become relatively abstract if these patterns include many different kinds of specific linguistic symbols. But never are they empty rules devoid of semantic content or communicative function. (Tomasello 2003: 100)

Thus constructions are said to differ from grammatical rules in two ways: they must carry meaning; and they reflect the actual ‘patterns of usage’ fairly directly.

Consider first the constraint that every element of the grammar must carry meaning, which we call the *semiotic dictum*. Do lexical or phrasal theories hew the most closely to this dictum? Categorical Grammar, the paradigm of a lexical theory (see Chapter 8), is a strong contender: it consists of meaningful words, with only a few very general combinatorial rules such as $X/Y * Y = X$. Given the rule-to-rule assumption, those combinatorial rules specify the meaning of the whole as a function of the parts. Whether such a rule counts as meaningful in itself in Tomasello’s sense is not clear.

What does seem clear is that the combinatorial rules of Construction Grammar, such as Goldberg’s Correspondence Principle for combining a verb with a construction (1995: 50), have the same status as those combinatorial rules:

- (2) The Correspondence Principle: each participant that is lexically profiled and expressed must be fused with a profiled argument role of the construction. If a verb has three profiled participant roles, then one of them may be fused with a non-profiled argument role of a construction. (Goldberg 1995: 50)

Both verbs and constructions are specified for participant roles, some of which are *profiled*. Argument profiling for verbs is ‘lexically determined and highly conventionalized’ (Goldberg 1995: 46). Profiled argument roles of a construction are mapped to direct grammatical functions, i. e., SUBJ, OBJ, or OBJ2. By the Correspondence Principle the lexically profiled argument roles must be direct, unless there are three of them, in which case one may be indirect.² With respect to the semiotic dictum, the Correspondence Principle has the same status as the Categorical Grammar combinatorial rules: a meaningless algebraic rule that specifies the way to combine meaningful items.

Turning now to the lexicalist syntax we favor, some elements abide by the semiotic dictum while others do not. Phrase structure rules for intransitive and transitive VPs (or the respective HPSG ID schema) do not. Lexical valence structures clearly carry meaning since they are associated with particular verbs. In an English ditransitive, the first object expresses the role of ‘intended recipient’ of the referent of the second object. Hence *He carved her a toy* entails that he carved a toy with the intention that she receive it. So the lexical rule that adds a benefactive recipient argument to a verb adds meaning. Alternatively, a phrasal ditransitive construction might contribute that ‘recipient’ meaning.³ Which structures have meaning is an empirical question for us.

² We assume that the second sentence of (2) provides for exceptions to the first sentence.

³ In Section 21.2.1 we argue that the recipient should be added in the lexical argument structure, not through a phrasal construction. See Wechsler (1991: 111–113; 1995: 88–89) for an analysis of English ditransitives with elements of both constructional and lexical approaches. It is based on Kiparsky’s notion of a *thematically restricted positional linker* (1987; 1988).

In Construction Grammar, however, meaning is assumed for all constructions *a priori*. But while the ditransitive construction plausibly contributes meaning, no truth-conditional meaning has yet been discovered for either the intransitive or bi-valent transitive constructions. Clearly the constructionist's evidence for the meaningfulness of *certain* constructions such as the ditransitive does not constitute evidence that *all* phrasal constructions have meaning. So the lexical and phrasal approaches seem to come out the same, as far as the semiotic dictum is concerned.

Now consider the second usage-based dictum, that the elements of the grammar directly reflect patterns of usage, which we call *the transparency dictum*. The Construction Grammar literature often presents their constructions informally in ways that suggest that they represent surface constituent order patterns: the transitive construction is 'X VERB Y' (Tomasello) or 'Subj V Obj' (Goldberg 1995, 2006)⁴; the passive construction is 'X was VERBed by Y' (Tomasello 2003: 100) or 'Subj aux Vpp (PPby)' (Goldberg 2006: 5). But a theory in which constructions consist of surface patterns was considered in detail and rejected by Müller (2006: Section 2), and does not accurately reflect Goldberg's actual theory.⁵ The more detailed discussions present *argument structure constructions*, which are more abstract and rather like the lexicalists' grammatical elements (or perhaps an LFG f-structure): the transitive construction resembles a transitive valence structure (minus the verb itself); the passive construction resembles the passive lexical rule.

With respect to fulfilling the desiderata of usage-based theorists, we do not find any significant difference between the non-lexical and lexical approaches.

21.1.2 Coercion

Researchers working with plugging proposals usually take coercion as an indication of the usefulness of phrasal constructions. For instance, Anatol Stefanowitsch (Lecture in the lecture series *Algorithmen und Muster – Strukturen in der Sprache*, 2009) discussed the example in (3):

- (3) Das Tor zur Welt Hrnglb öffnete sich ohne Vorwarnung und verschlang [sie] ... die Welt Hrnglb wird von Magiern erschaffen, die Träume zu Realität formen können, aber nicht in der Lage sind zu träumen. Haltet aus, Freunde. Und ihr da draußen, bitte träumt ihnen ein Tor.⁶

⁴ Goldberg et al. (2004: 300) report about a language acquisition experiment that involves an SOV pattern. The SOV order is mentioned explicitly and seen as part of the construction.

⁵ This applies to argument structure constructions only. In some of her papers Goldberg assumes that very specific phrase structural configurations are part of the constructions. For instance in her paper on complex predicates in Persian (Goldberg 2003b) she assigns V^0 and \bar{V} categories. See Müller (2010b: Section 4.9) for a critique of that analysis.

⁶ http://www.elbenwaldforum.de/showflat.php?Cat=&Board=Tolkiens_Werke&Number=1457418&page=3&view=collapsed&sb=5&o=&fpart=16. 27.02.2010.

'The gate to the world Hrnglb opened without warning and swallowed them. The world Hrnglb is created by magicians that can form reality from dreams but cannot dream themselves. Hold out, friends! And you out there, please, dream a gate for them.'

The crucial part is *bitte träumt ihnen ein Tor* ‘Dream a gate for them’. In this fantasy context the word *träumen*, which is intransitive, is forced into the ditransitive construction and therefore gets a certain meaning. This forcing of a verb corresponds to overwriting or rather extending properties of the verb by the phrasal construction.

In cases in which the plugging proposals assume that information is over-written or extended, lexical approaches assume mediating lexical rules. Briscoe & Copestake (1999: Section 4) have worked out a lexical approach in detail.⁷ They discuss the ditransitive sentences in (4), which either correspond to the prototypical ditransitive construction (4a) or deviate from it in various ways.

- (4) a. Mary gave Joe a present.
- b. Joe painted Sally a picture.
- c. Mary promised Joe a new car.
- d. He tipped Bill two pounds.
- e. The medicine brought him relief.
- f. The music lent the party a festive air.
- g. Jo gave Bob a punch.
- h. He blew his wife a kiss.
- i. She smiled herself an upgrade.

For the non-canonical examples they assume lexical rules that relate transitive (*paint*) and intransitive (*smile*) verbs to ditransitive ones and contribute the respective semantic information or the respective metaphorical extension. The example in (4i) is rather similar to the *träumen* example discussed above and is also analyzed with a lexical rule (page 509). Briscoe and Copestake note that this lexical rule is much more restricted in its productivity than the other lexical rules they suggest. They take this as motivation for developing a representational format in which lexical items (including those that are derived by lexical rules) are associated with probabilities, so that differences in productivity of various patterns can be captured.

Looking narrowly at such cases, it is hard to see any rational grounds for choosing between the phrasal analysis and the lexical rule. But if we broaden our view, the lexical rule approach can be seen to have a much wider application. Coercion is a very general pragmatic process, occurring in many contexts where no construction seems to be responsible (Nunberg 1995). Nunberg cites many cases such as the restaurant waiter asking *Who is the ham sandwich?* (Nunberg 1995: 115). Copestake & Briscoe (1992: 116) discuss the conversion of terms for animals to mass nouns (see also Copestake & Briscoe (1995: 36–43)). Example (5) is about a substance, not about a cute bunny.

- (5) After several lorries had run over the body, there was rabbit splattered all over the road.

⁷ Kay (2005), working in the framework of CxG, also suggests unary constructions.

The authors suggest a lexical rule that maps a count noun onto a mass noun. This analysis is also assumed by Fillmore (1999: 114–115). Such coercion can occur without any syntactic context: one can answer the question *What's that stuff on the road?* or *What are you eating?* with the one-word utterance *Rabbit*. Some coercion happens to affect the complement structure of a verb, but this is simply a special case of a more general phenomenon that has been analyzed by rules of systematic polysemy.

21.1.3 Aspect as a clause level phenomenon

Alsina (1996), working in the framework of LFG, argues for a phrasal analysis of resultative constructions based on the aspectual properties of sentences, since aspect is normally viewed as a property that is determined by the sentence syntax. Intransitive verbs such as *bark* refer to activities, a resultative construction with the same verb, however, stands for an accomplishment (an extended change of state). Alsina supports this with the following data:

- (6) a. (*) The dog barked in five minutes.
- b. The dog barked the neighbors awake in five minutes.

The latter sentence means that the *barking* event was completed after five minutes. A reading referring to the time span of the event is not available for (6a). If (6a) is grammatical at all, then a claim is being made about the time frame in which the event begun.

If we now consider examples such as (7c), however, we see that Alsina's argumentation is not cogent since the resultative meaning is already present at the word-level in nominalizations. As the examples in (7) show, this contrast can be observed in nominal constructions and is therefore independent of the sentence syntax:

- (7) a. weil sie die Nordsee in fünf Jahren leer fischten
because they the North.Sea in five years empty fished
'because they fished the North Sea (until it was) empty in five years'
- b. # weil sie in fünf Jahren fischten
because they in five years fished
- c. das Leerfischen der Nordsee in fünf Jahren
the empty.fishing of.the North.Sea in five years
- d. # das Fischen in fünf Jahren
the fishing in five years

In a lexical approach there is a verb stem selecting for two NPs and a resultative predicate. This stem has the appropriate meaning and can be inflected or undergo derivation and successive inflection. In both cases we get words that contain the resultative semantics and hence are compatible with respective adverbials.

21.1.4 Simplicity and polysemy

Much of the intuitive appeal of the plugging approach stems from its apparent simplicity relative to the use of lexical rules. But the claim to greater simplicity for Construction Grammar is based on misunderstandings of both lexical rules and Construction Grammar (specifically of Goldberg's (1995; 2006) version). It draws the distinction in the wrong place and misses the real differences between these approaches. This argument from simplicity is often repeated and so it is important to understand why it is incorrect.

Tomasello (2003) presents the argument as follows. Discussing first the lexical rules approach, Tomasello (2003: 160) writes that

One implication of this view is that a verb must have listed in the lexicon a different meaning for virtually every different construction in which it participates [...]. For example, while the prototypical meaning of *cough* involves only one participant, the cougher, we may say such things as *He coughed her his cold*, in which there are three core participants. In the lexical rules approach, in order to produce this utterance the child's lexicon must have as an entry a ditransitive meaning for the verb *cough*. (Tomasello 2003: 160)

Tomasello (2003: 160) then contrasts a Construction Grammar approach, citing Fillmore et al. (1988), Goldberg (1995), and Croft (2001). He concludes as follows:

The main point is that if we grant that constructions may have meaning of their own, in relative independence of the lexical items involved, then we do not need to populate the lexicon with all kinds of implausible meanings for each of the verbs we use in everyday life. The construction grammar approach in which constructions have meanings is therefore both much simpler and much more plausible than the lexical rules approach. (Tomasello 2003: 161)

This reflects a misunderstanding of lexical rules, as they are normally understood. There is no implausible sense populating the lexicon. The lexical rule approach to *He coughed her his cold* states that when the word *coughed* appears with two objects, the whole complex has a certain meaning (see Müller 2006: 876). Furthermore we explicitly distinguish between listed elements (lexical entries) and derived ones. The general term subsuming both is *lexical item*.

The simplicity argument also relies on a misunderstanding of a theory Tomasello advocates, namely the theory due to Goldberg (1995, 2006). For his argument to go through, Tomasello must tacitly assume that verbs can combine freely with constructions, that is, that the grammar does not place extrinsic constraints on such combinations. If it is necessary to also stipulate which verbs can appear in which constructions, then the claim to greater simplicity collapses: each variant lexical item with its "implausible meaning" under the lexical rule approach corresponds to a verb-plus-construction combination under the phrasal approach.

Passages such as the following may suggest that verbs and constructions are assumed to combine freely:⁸

Constructions are combined freely to form actual expressions as long as they can be construed as not being in conflict (invoking the notion of construal is intended to allow for processes of accommodation or coercion). (Goldberg 2006: 22)

Allowing constructions to combine freely as long as there are no conflicts, allows for the infinitely creative potential of language. [...] That is, a speaker is free to creatively combine constructions as long as constructions exist in the language that can be combined suitably to categorize the target message, given that there is no conflict among the constructions. (Goldberg 2006: 22)

But in fact Goldberg does not assume free combination, but rather that a verb is “conventionally associated with a construction” (Goldberg 1995: 50): verbs specify their participant roles and which of those are obligatory direct arguments (*profiled*, in Goldberg’s terminology). In fact, Goldberg herself (2006: 211) argues against Borer’s putative assumption of free combination (2003) on the grounds that Borer is unable to account for the difference between *dine* (intransitive), *eat* (optionally transitive), and *devour* (obligatorily transitive).⁹ Despite Tomasello’s comment above, Construction Grammar is no simpler than the lexical rules.

The resultative construction is often used to illustrate the simplicity argument. For example, Goldberg (1995: Chapter 7) assumes that the same lexical item for the verb *sneeze* is used in (8a) and (8b). It is simply inserted into different constructions:

- (8) a. He sneezed.
- b. He sneezed the napkin off the table.

The meaning of (8a) corresponds more or less to the verb meaning, since the verb is used in the Intransitive Construction. But the Caused-Motion Construction in (8b) contributes additional semantic information concerning the causation and movement: his sneezing caused the napkin to move off the table. *sneeze* is plugged into the Caused Motion Construction, which licenses the subject of *sneeze* and additionally provides two slots: one for the theme (*napkin*) and one for the goal (*off the table*). The lexical approach is essentially parallel, except that the lexical rule can feed further lexical processes like passivization (*The napkin was sneezed off the table*), and conversion to nouns or adjectives (see Sections 21.2.2 and 21.6).

In a nuanced comparison of the two approaches, Goldberg (1995: 139–140) considers again the added recipient argument in *Mary kicked Joe the ball*, where *kick* is lexically a 2-place verb. She notes that on the constructional view, “the composite fused structure involving both verb and construction is stored in memory”. The verb itself retains

⁸ The context of these quotes makes clear that the verb and the argument structure construction are considered constructions. See Goldberg (2006: 21, ex. (2)).

⁹ Goldberg’s critique cites a 2001 presentation by Borer with the same title as Borer (2003). See Section 21.3.4 for more discussion of this issue. As far as we know, the *dine* / *eat* / *devour* minimal triplet originally came from Dowty (1989: 89–90).

its original meaning as a 2-place verb, so that “we avoid implausible verb senses such as ‘to cause to receive by kicking’.” The idea seems to be that the lexical approach, in contrast, must countenance such implausible verb senses since a lexical rule adds a third argument.

But the lexical and constructional approaches are actually indistinguishable on this point. The lexical rule does not produce a verb with the “implausible sense” in (9a). Instead it produces the sense in (9b):

- (9) a. cause-to-receive-by-kicking(x, y, z)
 b. cause(kick(x, y),receive(z, y))

The same sort of “composite fused structure” is assumed under either view. With respect to the semantic structure, the number and plausibility of senses, and the polyadicity of the semantic relations, the two theories are identical. They mainly differ in the way this representation fits into the larger theory of syntax. They also differ in another respect: on the lexical view, the derived three-argument valence structure is associated with the phonological string *kicked*. Next, we present evidence for this claim.

21.2 Evidence for lexical approaches

21.2.1 Valence and coordination

On the lexical account, the verb *paint* in (4b), for example, is lexically a 2-argument verb, while the unary branching node immediately dominating it is effectively a 3-argument verb. On the constructional view there is no such predicate seeking three arguments that dominates only the verb. Coordination provides evidence for the lexical account.

A generalization about coordination is that two constituents which have compatible syntactic properties can be coordinated and that the result of the coordination is an object that has the syntactic properties of each of the conjuncts. This is reflected by the Categorical Grammar analysis which assumes the category $(X \setminus X)/X$ for the conjunction: the conjunction takes an X to the right, an X to the left and the result is an X .

For example, in (10a) we have a case of the coordination of two lexical verbs. The coordination *know and like* behaves like the coordinated simplex verbs: it takes a subject and an object. Similarly, two sentences with a missing object are coordinated in (10b) and the result is a sentence with a missing object.

- (10) a. I know and like this record.
 b. Bagels, I like and Ellison hates.

The German examples in (11) show that the case requirement of the involved verbs has to be respected. In (11b,c) the coordinated verbs require accusative and dative respectively and since the case requirements are incompatible with unambiguously case marked nouns both of these examples are out.

- (11) a. Ich kenne und unterstütze diesen Mann.
 I know and support this man.ACC

- b. * Ich kenne und helfe diesen Mann.
 I know and help this man.ACC
 c. * Ich kenne und helfe diesem Mann.
 I know and help this man.DAT

Interestingly, it is possible to coordinate basic ditransitive verbs with verbs that have additional arguments licensed by the lexical rule. (12) provides examples in English and German ((12b) is quoted from Müller (2013b: 420)):

- (12) a. She then offered and made me a wonderful espresso – nice.¹⁰
 b. ich hab ihr jetzt diese Ladung Muffins mit den Herzchen drauf
 I have her now this load Muffins with the little.heart there.on
 gebacken und gegeben.¹¹
 baked and given
 ‘I have now baked and given her this load of muffins with the little heart on top.’

These sentences show that both verbs are 3-argument verbs at the V^0 level, since they involve V^0 coordination:

- (13) [V^0 offered and made] [_{NP} me] [_{NP} a wonderful espresso]

This is expected under the lexical rule analysis but not the non-lexical constructional one.¹²

Summarizing the coordination argument: coordinated verbs generally must have compatible syntactic properties like valence properties. This means that in (12b), for example, *gebacken* ‘baked’ and *gegeben* ‘given’ have the same valence properties. On the lexical approach the creation verb *gebacken*, together with a lexical rule, licenses a ditransitive verb. It can therefore be coordinated with *gegeben*. On the phrasal approach however, the verb *gebacken* has two argument roles and is not compatible with the verb *gegeben*, which has three argument roles. In the phrasal model, *gebacken* can only realize three arguments when it enters the ditransitive phrasal construction or argument structure construction. But in sentences like (12) it is not *gebacken* alone that enters the phrasal syntax, but rather the combination of *gebacken* and *gegeben*. On this view, the verbs are incompatible as far as the semantic roles are concerned.

¹⁰ <http://www.thespinroom.com.au/?p=102> 07.07.2012

¹¹ <http://www.musiker-board.de/diverses-ot/35977-die-liebe-637-print.html> 08.06.2012

¹² One might wonder whether these sentences could be instances of Right Node Raising (RNR) out of coordinated VPs (Bresnan 1974; Abbott 1976):

- (i) She [offered ____] and [made me ____] a wonderful espresso.

But this cannot be right. Under such an analysis the first verb has been used without a benefactive or recipient object. But *me* is interpreted as the recipient of both the offering and making. Secondly, the second object can be an unstressed pronoun (*She offered and made me it*), which is not possible in RNR. Note that *offered and made* cannot be a pseudo-coordination meaning ‘offered to make’. This is possible only with stem forms of certain verbs such as *try*.

To fix this under the phrasal approach, one could posit a mechanism such that the semantic roles that are required for the coordinate phrase *baked and given* are shared by each of its conjunct verbs and that they are therefore compatible. But this would amount to saying that there are several verb senses for *baked*, something that the anti-lexicalists claim to avoid, as discussed in the next section.

A reviewer of Theoretical Linguistics correctly observes that a version of the ASC approach could work in the exactly same way as our lexical analysis. Our ditransitive lexical rule would simply be rechristened as a ‘ditransitive ASC’. This construction would combine with *baked*, thus adding the third argument, prior to its coordination with *gave*. As long as the ASC approach is a non-distinct notational variant of the lexical rule approach then of course it works in exactly the same way. But the literature on the ASC approach represents it as a radical alternative to lexical rules, in which constructions are combined through inheritance hierarchies, instead of allowing lexical rules to alter the argument structure of a verb prior to its syntactic combination with the other words and phrases.

The reviewer also remarked that examples like (14) show that the benefactive argument has to be introduced on the phrasal level.

- (14) I designed and built him a house.

Both *designed* and *built* are bivalent verbs and *him* is the benefactive that extends both *designed* and *built*. However, we assume that sentences like (14) can be analyzed as coordination of two verbal items that are licensed by the lexical rule that introduces the benefactive argument. That is, the benefactive is introduced before the coordination.

The coordination facts illustrate a more general point. The output of a lexical rule such as the one that would apply in the analysis of *gebacken* in (12b) is just a word (an X^0), so it has the same syntactic distribution as an underived word with the same category and valence feature. This important generalization follows from the lexical account while on the phrasal view, it is mysterious at best. The point can be shown with any of the lexical rules that the anti-lexicalists are so keen to eliminate in favor of phrasal constructions. For example, active and passive verbs can be coordinated, as long as they have the same valence properties, as in this Swedish example:

- (15) Golfklubben begärde och beviljade-s marklov för banbygget efter
golf.club.DEF requested and granted-PASS ground.permit for track.build.DEF after
en hel del förhandlingar och kompromisser med Länsstyrelsen och
a whole part negotiations and compromises with county.board.DEF and
Naturvårdsverket.¹³
nature.protection.agency.DEF

‘The golf club requested and was granted a ground permit for fairlane construction after a lot of negotiations and compromises with the County Board and the Environmental Protection Agency.’

¹³ <http://www.lyckselegolf.se/index.asp?Sida=82>

(English works the same way, as shown by the grammatical translation line.) The passive of the ditransitive verb *bevilja* ‘grant’ retains one object, so it is effectively transitive and can be coordinated with the active transitive *begära* ‘request’.

Moreover, the English passive verb form, being a participle, can feed a second lexical rule deriving adjectives from verbs. All categories of English participles can be converted to adjectives (Bresnan, 1982c, 2001: Chapter 3):

- (16) a. active present participles (cf. The leaf is falling): *the falling leaf*
- b. active past participles (cf. The leaf has fallen): *the fallen leaf*
- c. passive participles (cf. The toy is being broken (by the child).): *the broken toy*

That the derived forms are adjectives, not verbs, is shown by a host of properties, including negative *un-* prefixation: *unbroken* means ‘not broken’, just as *unkind* means ‘not kind’, while the *un-* appearing on verbs indicates, not negation, but action reversal, as in *untie* (Bresnan, 1982c: 21, 2001: Chapter 3). Predicate adjectives preserve the subject of predication of the verb and for prenominal adjectives the rule is simply that the role that would be assigned to the subject goes to the modified noun instead (*The toy remained (un-)broken.*; *the broken toy*). Being an A^0 , such a form can be coordinated with another A^0 , as in the following:

- (17) a. The suspect should be considered [armed and dangerous].
- b. any [old, rotting, or broken] toys

In (17b), three adjectives are coordinated, one underived (*old*), one derived from a present participle (*rotting*), and one from a passive participle (*broken*). Such coordination is completely mundane on a lexical theory. Each A^0 conjunct has a valence feature (in HPSG it would be the *SPR* feature for predicates or the *MOD* feature for the prenominal modifiers), which is shared with the mother node of the coordinate structure. But the point of the phrasal (or ASC) theory is to deny that words have such valence features.

The claim that lexical derivation of valence structure is distinct from phrasal combination is further supported with evidence from deverbal nominalization (Wechsler 2008a). To derive nouns from verbs, *-ing* suffixation productively applies to all declinable verbs (*the shooting of the prisoner*), while morphological productivity is severely limited for various other suffixes such as *-(a)tion* (* *the shootation of the prisoner*). So forms such as *destruction* and *distribution* must be retrieved from memory while *-ing* nouns such as *looting* or *growing* could be (and in the case of rare verbs or neologisms, must be) derived from the verb or the root through the application of a rule (Zucchi 1993). This difference explains why *ing*-nominals always retain the argument structure of the cognate verb, while other forms show some variation. A famous example is the lack of the agent argument for the noun *growth* versus its retention by the noun *growing*: * *John’s growth of tomatoes* versus *John’s growing of tomatoes* (Chomsky 1970).¹⁴

But what sort of rule derives the *-ing* nouns, a lexical rule or a phrasal one? In Marantz’s (1997) phrasal analysis, a phrasal construction (notated as *vP*) is responsible

¹⁴ See Section 21.3.3 for further discussion.

for assigning the agent role of *-ing* nouns such as *growing*. For him, none of the words directly selects an agent via its argument structure. The *-ing* forms are permitted to appear in the *vP* construction, which licenses the possessive agent. Non-*ing* nouns such as *destruction* and *growth* do not appear in *vP*. Whether they allow expression of the agent depends on semantic and pragmatic properties of the word: *destruction* involves external causation so it does allow an agent, while *growth* involves internal causation so it does not allow an agent.

However, a problem for Marantz is that these two types of nouns can coordinate and share dependents (example (18a) is from Wechsler (2008a: Section 7)):

- (18) a. With nothing left after the soldier's [destruction and looting] of their home, they reboarded their coach and set out for the port of Calais.¹⁵
 b. The [cultivation, growing or distribution] of medical marijuana within the County shall at all times occur within a secure, locked, and fully enclosed structure, including a ceiling, roof or top, and shall meet the following requirements.¹⁶

On the phrasal analysis, the nouns *looting* and *growing* occur in one type of syntactic environment (namely *vP*), while forms *destruction*, *cultivation*, and *distribution* occur in a different syntactic environment. This places contradictory demands on the structure of coordinations like those in (18). As far as we know, neither this problem nor the others raised by Wechsler (2008a) have even been addressed by advocates of the phrasal theory of argument structure.

Consider one last example. In an influential phrasal analysis, Hale and Keyser (1993a) derived denominal verbs like *to saddle* through noun incorporation out of a structure akin to [PUT a saddle ON x]. Again, verbs with this putative derivation routinely coordinate and share dependents with verbs of other types:

- (19) Realizing the dire results of such a capture and that he was the only one to prevent it, he quickly [saddled and mounted] his trusted horse and with a grim determination began a journey that would become legendary.¹⁷

As in all of these X^0 coordination cases, under the phrasal analysis the two verbs place contradictory demands on a single phrase structure.

A lexical valence structure is an abstraction or generalization over various occurrences of the verb in syntactic contexts. To be sure, one key use of that valence structure is simply to indicate what sort of phrases the verb must (or can) combine with, and the result of semantic composition; if that were the whole story then the phrasal theory would be viable. But it is not. As it turns out, this lexical valence structure, once abstracted, can alternatively be used in other ways: among other possibilities, the verb (crucially including its valence structure) can be coordinated with other verbs that have a similar

¹⁵ <http://www.amazon.com/review/R3IG4M3Q6YYNFT>, 21.07.2012

¹⁶ <http://www.scribd.com/doc/64013640/Tulare-County-medical-cannabis-cultivation-ordinance#page=1>, 22.10.2012

¹⁷ http://www.jouethouse.org/index.php?option=com_content&view=article&id=56&Itemid=63, 21.07.2012

valence structure; or it can serve as the input to lexical rules specifying a new word bearing a systematic relation to the input word. The coordination and lexical derivation facts follow from the lexical view, while the phrasal theory at best leaves these facts as mysterious and at worst leads to irreconcilable contradictions for the phrase structure.

21.2.2 Valence and derivational morphology

Goldberg & Jackendoff (2004), Alsina (1996), and Asudeh, Dalrymple & Toivonen (2008, 2013) suggest analyzing resultative constructions and/or caused motion constructions as phrasal constructions.¹⁸ As was argued in Müller (2006) this is incompatible with the assumption of lexical integrity, that is, that word formation happens before syntax and that the morphological structure is inaccessible to syntactic processes (Bresnan & Mchombo 1995).¹⁹ Let us consider a concrete example, such as (20):

- (20) a. Er tanzt die Schuhe blutig / in Stücke.
 he dances the shoes bloody into pieces
 b. die in Stücke / blutig getanzten Schuhe
 the into pieces bloody danced shoes
 c. * die getanzten Schuhe
 the danced shoes

The shoes are not a semantic argument of *tanzt*. Nevertheless the referent of the NP that is realized as accusative NP in (20a) is the element the adjectival participle in (20b) predicates over. Adjectival participles like the one in (20b) are derived from a passive participle of a verb that governs an accusative object. If the accusative object is licensed phrasally by configurations like the one in (20a), then it is not possible to explain why the participle *getanzte* can be formed despite the absence of an accusative object in the valence specification of the verb. See Müller (2006: Section 5) for further examples of the interaction of resultatives and morphology. The conclusion drawn by Dowty (1978: 412) and Bresnan (1982c: 21) in the late 70s and early 80s is that phenomena that feed morphology should be treated lexically. The natural analysis in frameworks like HPSG, CG, CxG, and LFG is therefore one that assumes a lexical rule for the licensing of resultative constructions. See Verspoor (1997), Wechsler (1997), Wechsler & Noh (2001), Wunderlich (1992: 45; 1997: 120–126), Kaufmann & Wunderlich (1998), Müller (2002a: Chapter 5), Kay (2005), and Simpson (1983) for lexical proposals in some of these frameworks.

¹⁸ Asudeh & Toivonen (2014: Section 2.3) argue that their account is not constructional. If a construction is a form-meaning pair, their account is constructional, since a certain c-structure is paired with a semantic contribution. Asudeh and Toivonen compare their approach with approaches in Constructional HPSG (Sag 1997) and Sign-Based Construction Grammar (see Section 10.6.2), which they term constructional. The only difference between these approaches and the approach by Asudeh, Dalrymple & Toivonen is that the constructions in the HPSG-based theories are modeled using types and hence have a name.

¹⁹ Asudeh et al. (2013: 14) claim that the Swedish Directed Motion Construction does not interact with derivational morphology. However, the parallel German construction does interact with derivational morphology. The absence of this interaction in Swedish can be explained by other factors of Swedish grammar and given this I believe it to be more appropriate to assume an analysis that captures both the German and the Swedish data in the same way.

This argument is similar to the one that was discussed in connection with the GPSG representation of valence in Section 5.5: morphological processes have to be able to see the valence of the element they attach to. This is not the case if arguments are introduced by phrasal configurations after the level of morphology.

Asudeh, Dalrymple & Toivonen's papers are about the concept of lexical integrity and about constructions. Asudeh & Toivonen (2014) replied to our target article and pointed out (again) that their template approach makes it possible to specify the functional structure of words and phrases alike. In the original paper they discussed the Swedish word *vägen*, which is the definite form of *väg* 'way'. They showed that the f-structure is parallel to the f-structure for the English phrase *the way*. In our reply, (2014b) we gave in too early, I believe. Since the point is not about being able to provide the f-structure of words, the point is about morphology, that is – in LFG terms – about deriving the f-structure by a morphological analysis. More generally speaking, one wants to derive all properties of the involved words, that is, their valence, their meaning, and the linking of this meaning to their dependents. What we used in our argument based on the sentences in (20) was parallel to what Bresnan (1982c: 21; 2001: 31) used in her classical argument for a lexical treatment of passive. So either Bresnan's argument (and ours) is invalid or both arguments are valid and there is a problem for Asudeh, Dalrymple & Toivonen's approach and for phrasal approaches in general. I want to give another example that was already discussed in Müller (2006: 869) but was omitted in Müller & Wechsler (2014a) due to space limitations. I will first point out why this example is problematic for phrasal approaches and then explain why it is not sufficient to be able to assign certain f-structures to words: in (21a), we are dealing with a resultative construction. According to the plugging approach, the resultative meaning is contributed by a phrasal construction into which the verb *fischt* is inserted. There is no lexical item that requires a resultative predicate as its argument. If no such lexical item exists, then it is unclear how the relation between (21a) and (21b) can be established:

- (21) a. [dass] jemand die Nordsee leer fischt
 that somebody the North.Sea empty fishes
 'that somebody fishes the North Sea empty'
 b. wegen der *Leerfischung* der Nordsee²⁰
 because of.the empty.fishing of.the North.Sea
 'because of the fishing that resulted in the North Sea being empty'

As Figure 21.1 on the following page shows, both the arguments selected by the heads and the structures are completely different. In (21b), the element that is the subject of the related construction in (21a) is not realized. As is normally the case in nominalizations, it is possible to realize it in a PP with the preposition *durch* 'by':

- (22) wegen der *Leerfischung* der Nordsee durch die Anrainerstaaten
 because of.the empty.fishing of.the North.Sea by the neighboring.countries
 'because of the fishing by the neighboring countries that resulted in the North

²⁰ taz, 20.06.1996, p. 6.

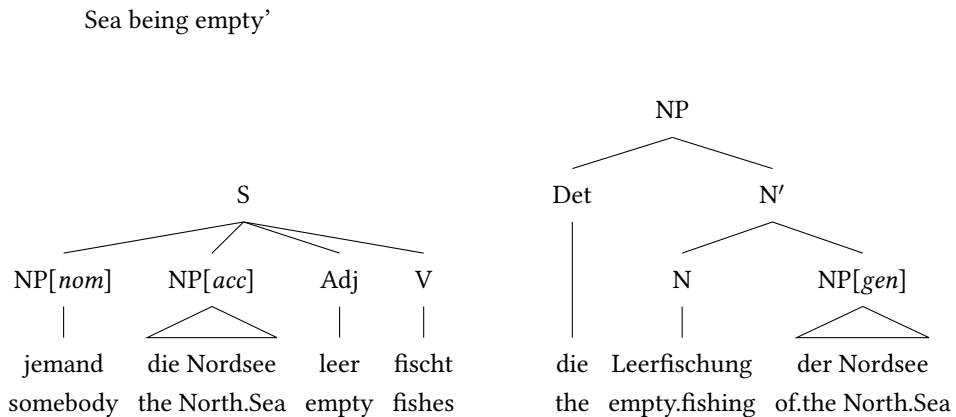


Figure 21.1: Resultative construction and nominalization

If one assumes that the resultative meaning comes from a particular configuration in which a verb is realized, there would be no explanation for (21b) since no verb is involved in the analysis of this example. One could of course assume that a verb stem is inserted into a construction both in (21a) and (21b). The inflectional morpheme *-t* and the derivational morpheme *-ung* as well as an empty nominal inflectional morpheme would then be independent syntactic components of the analysis. However, since Goldberg (2003b: 119) and Asudeh et al. (2013) assume lexical integrity, only entire words can be inserted into syntactic constructions and hence the analysis of the nominalization of resultative constructions sketched here is not an option for them.

One might be tempted to try and account for the similarities between the phrases in (21) using inheritance. One would specify a general resultative construction standing in an inheritance relation to the resultative construction with a verbal head and the nominalization construction. I have discussed this proposal in more detail in Müller (2006: Section 5.3). It does not work as one requires embedding for derivational morphology and this cannot be modeled in inheritance hierarchies (Krieger & Nerbonne (1993), see also Müller (2006) for a detailed discussion).

It would also be possible to assume that both constructions in (23), for which structures such as those in Figure 21.1 would have to be assumed, are connected via metarules.^{21,22}

- (23) a. [Sbj Obj Obl V]
 b. [Det [[Adj V -ung]] NP[gen]]

²¹ Goldberg (p. c. 2007, 2009) suggests connecting certain constructions using GPSG-like metarules. Deppermann (2006: 51), who has a more Croftian view of CxG, rules this out. He argues for active/passive alternations that the passive construction has other information structural properties. Note also that GPSG metarules relate phrase structure rules, that is, local trees. The structure in Figure 21.2, however, is highly complex.

²² The structure in (23b) violates a strict interpretation of lexical integrity as is commonly assumed in LFG. Booi (2005, 2009), working in Construction Grammar, subscribes to a somewhat weaker version, however.

The construction in (23b) corresponds to Figure 21.2.²³ The genitive NP is an argument

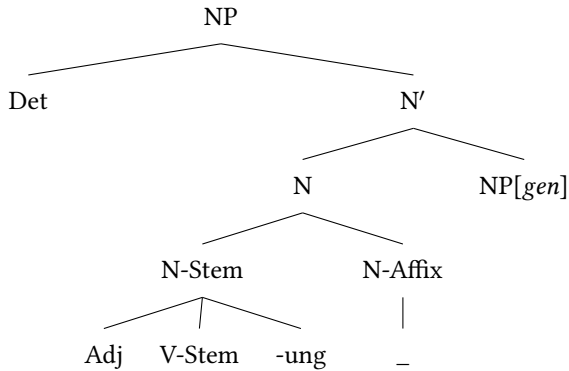


Figure 21.2: Resultative construction and nominalization

of the adjective. It has to be linked semantically to the subject slot of the adjective. Alternatively, one could assume that the construction only has the form [Adj V -ung], that is, that it does not include the genitive NP. But then one could also assume that the verbal variant of the resultative construction has the form [OBL V] and that Sbj and Obj are only represented in the valence lists. This would almost be a lexical analysis, however.

Turning to lexical integrity again, I want to point out that all that Asudeh & Toivonen can do is assign some f-structure to the N in Figure 21.2. What is needed, however, is a principled account of how this f-structure comes about and how it is related to the resultative construction on the sentence level.

Before I turn to approaches with radical underspecification of argument structure in the next section, I want to comment on a more recent paper by Asudeh, Giorgolo & Toivonen (2014). The authors discuss the phrasal introduction of cognate objects and benefactives. (24a) is an example of the latter construction.

- (24) a. The performer sang the children a song.
 b. The children were sung a song.

According to the authors, the noun phrase *the children* is not an argument of *sing* but contributed by the c-structure rule that optionally licenses a benefactive.

- (25) $V' \rightarrow$ $\begin{matrix} V & DP & DP \\ \uparrow = \downarrow & (\uparrow \text{OBJ}) = \downarrow & (\uparrow \text{OBJ}_\theta) = \downarrow \\ (@\text{BENEFACTIVE}) \end{matrix}$

²³ I do not assume zero affixes for inflection. The respective affix in Figure 21.2 is there to show that there is structure. Alternatively one could assume a unary branching rule/construction as is common in HPSG/Construction Morphology.

Whenever this rule is evoked, the template BENEFACTIVE can add a benefactive role and the respective semantics if this is compatible with the verb that is inserted into the structure. The authors show how the mappings for the passive example in (24b) work, but they do not provide the c-structure that licenses such examples. In order to analyze these examples one would need a c-structure rule for passive VPs and this rule has to license a benefactive as well. So it would be:

$$\begin{array}{rcl}
 (26) & V' & \rightarrow \quad V[\text{pass}] \quad \quad \quad \text{DP} \\
 & & \quad \quad \quad \uparrow = \downarrow \quad \quad \quad (\uparrow \text{OBJ}_\theta) = \downarrow \\
 & & \quad \quad \quad (\text{@BENEFACTIVE})
 \end{array}$$

Note that a benefactive cannot be added to any verb: adding a benefactive to an intransitive verb as in (27a) is out and the passive that would correspond to (27a) is ungrammatical as well, as (27b) shows:

- (27) a. * He laughed the children.
 b. * The children were laughed.

So one could not just claim that all c-structure rules optionally introduce a benefactive argument. Therefore there is something special about the two rules in (25) and (26). The problem is that there is no relation between these rules. They are independent statements saying that there can be a benefactive in the active and that there can be one in the passive. This is what Chomsky (1957: 43) criticized in 1957 and this was the reason for the introduction of transformations (see Section 3.1.1 of this book). Bresnan-style LFG captured the generalizations by lexical rules and later by Lexical Mapping Theory. But if elements are added outside the lexical representations, the representations where these elements are added have to be related too. One could say that our knowledge about formal tools has changed since 1957. We now can use inheritance hierarchies to capture generalizations. So one can assume a type (or a template) that is the supertype of all those c-structure rules that introduce a benefactive. But since not all rules allow for the introduction of a benefactive element, this basically amounts to saying: c-structure rule A, B, and C allow for the introduction of a benefactive. In comparison, lexical rule-based approaches have one statement introducing the benefactive. The lexical rule states what verbs are appropriate for adding a benefactive and syntactic rules are not affected.

In Müller & Wechsler (2014a) we argued that the approach to Swedish caused motion constructions in Asudeh et al. (2008, 2013) would not carry over to German since the German construction interacts with derivational morphology. Asudeh & Toivonen (2014) argued that Swedish is different from German and hence there would not be a problem. However, the situation is different with the benefactive constructions. Although English and German do differ in many respects, both languages have similar dative constructions:

- (28) a. He baked her a cake.
 b. Er buk ihr einen Kuchen.
 he baked her.DAT a.ACC cake

Now, the analysis of the free constituent order was explained by assuming binary branching structures in which a VP node is combined with one of its arguments or adjuncts (see Section 7.4). The c-structure rule is repeated in (29):

- (29) $VP \rightarrow \quad \quad \quad NP \quad \quad \quad VP$
 $(\uparrow \text{SUBJ} \mid \text{OBJ} \mid \text{OBJ}_\theta) = \downarrow \quad \uparrow = \downarrow$

The dependent elements contribute to the f-structure of the verb and coherence/completeness ensure that all arguments of the verb are present. One could add the introduction of the benefactive argument to the VP node of the right-hand side of the rule. However, since the verb-final variant of (28b) would have the structure in (30), one would get spurious ambiguities, since the benefactive could be introduced at every node:

- (30) weil $[_{VP} \text{er } [_{VP} \text{ihr } [_{VP} \text{einen Kuchen } [_{VP} [_{V} \text{buk}]]]]]$
 because he her a cake baked

So the only option seems to be to introduce the benefactive at the rule that got the recursion going, namely the rule that projected the lexical verb to the VP level. The rule (39) is repeated as (31) for convenience.

- (31) $VP \rightarrow (V)$
 $\uparrow = \downarrow$

Note also that benefactive datives appear in adjectival environments as in (32):

- (32) a. der seiner Frau einen Kuchen backende Mann
 the his.DAT wife a.ACC cake backing man
 ‘the man who is baking a cake for her’
 b. der einen Kuchen seiner Frau backende Mann
 the a.ACC cake his.DAT wife backing man
 ‘the man who is baking a cake for her’

In order to account for these datives one would have to assume that the adjective to AP rule that would be parallel to (31) introduces the dative. The semantics of the benefactive template would have to somehow make sure that the benefactive argument is not added to intransitive verbs like *lachen* ‘to laugh’ or participles like *lachende* ‘laughing’. While this may be possible, I find the overall approach unattractive. First it does not have anything to do with the original constructional proposal but just states that the benefactive may be introduced at several places in the syntax, secondly the unary branching syntactic rule is applying to a lexical item and hence is very similar to a lexical rule and thirdly the analysis does not capture cross-linguistic commonalities of the construction. In a lexical rule-based approach as the one that was suggested by Briscoe & Copestake (1999: Section 5), a benefactive argument is added to certain verbs and the lexical rule is parallel in all languages that have this phenomenon. The respective languages differ simply in the way the arguments are realized with respect to their heads. In languages that have adjectival participles, these are derived from the respective verbal stems. The morphological rule is the same independent of benefactive arguments and the syntactic rules for adjectival phrases do not have to mention benefactive arguments.

21.3 Radical underspecification: the end of argument structure?

21.3.1 Neo-Davidsonianism

In the last section we examined proposals that assume that verbs come with certain argument roles and are inserted into prespecified structures that may contribute additional arguments. While we showed that this is not without problems, there are even more radical proposals that the construction adds all agent arguments, or even all arguments. The notion that the agent argument should be severed from its verbs is put forth by Marantz (1984, 1997), Kratzer (1996), Embick (2004) and others. Others suggest that no arguments are selected by the verb. Borer (2003) calls such proposals *exoskeletal* since the structure of the clause is not determined by the predicate, that is, the verb does not project an inner “skeleton” of the clause. Counter to such proposals are *endoskeletal* approaches, in which the structure of the clause is determined by the predicate, that is, lexical proposals. The radical exoskeletal approaches are mainly proposed in Mainstream Generative Grammar (Borer 1994, 2003, 2005; Schein 1993; Hale & Keyser 1997; Lohndal 2012) but can also be found in HPSG (Haugereid 2009). We will not discuss these proposals in detail here, but we review the main issues insofar as they relate to the question of lexical argument structure.²⁴ We conclude that the available empirical evidence favors the lexical argument structure approach over such alternatives.

Exoskeletal approaches usually assume some version of Neo-Davidsonianism. Davidson (1967) argued for an event variable in the logical form of action sentences (33a). Dowty (1989) coined the term *neo-Davidsonian* for the variant in (33b), in which the verb translates to a property of events, and the subject and complement dependents are translated as arguments of secondary predicates such as *agent* and *theme*. (Dowty (1989) called the system in (33a) an *ordered argument system*.) Kratzer (1996) further noted the possibility of mixed accounts such as (33c), in which the agent (subject) argument is severed from the *kill'* relation, but the theme (object) remains an argument of the *kill'* relation.²⁵

- | | | |
|------|--|-------------------|
| (33) | a. $kill: \lambda y \lambda x \exists e [kill(e, x, y)]$ | (Davidsonian) |
| | b. $kill: \lambda y \lambda x \exists e [kill(e) \wedge agent(e, x) \wedge theme(e, y)]$ | (neo-Davidsonian) |
| | c. $kill: \lambda y \lambda x \exists e [kill(e, y) \wedge agent(e, x)]$ | (mixed) |

Kratzer (1996) observed that a distinction between Davidsonian, neo-Davidsonian and mixed can be made either “in the syntax” or “in the conceptual structure” (Kratzer 1996: 110–111). For example, on a lexical approach of the sort we advocate here, any of the three alternatives in (33) could be posited as the semantic content of the verb *kill*. A lexical entry for *kill* in the mixed model is given in (34).

²⁴ See Müller (2010a: Section 11.11.3) for a detailed discussion of Haugereid’s approach.

²⁵ The event variable is shown as existentially bound, as in Davidson’s original account. As discussed below, in Kratzer’s version it must be bound by a lambda operator instead.

$$(34) \left[\begin{array}{ll} \text{PHON} & \langle \textit{kill} \rangle \\ \text{ARG-ST} & \langle \text{NP}_x, \text{NP}_y \rangle \\ \text{CONTENT} & \textit{kill}(e, y) \wedge \textit{agent}(e, x) \end{array} \right]$$

In other words, the lexical approach is neutral on the question of the ‘conceptual structure’ of eventualities, as noted already in a different connection in Section 21.1.4. For this reason, certain semantic arguments for the neo-Davidsonian approach, such as those put forth by Schein (1993: Chapter 4) and Lohndal (2012), do not directly bear upon the issue of lexicalism, as far as we can tell.

But Kratzer (1996), among others, has gone further and argued for an account that is neo-Davidsonian (or rather, mixed) “in the syntax”. Kratzer’s claim is that the verb specifies only the internal argument(s), as in (35a) or (35b), while the agent (external argument) role is assigned by the phrasal structure. On the ‘neo-Davidsonian in the syntax’ view, the lexical representation of the verb has no arguments at all, except the event variable, as shown in (35c).

- (35) a. *kill*: $\lambda y \lambda e [\textit{kill}(e, y)]$ (agent is severed)
 b. *kill*: $\lambda y \lambda e [\textit{kill}(e) \wedge \textit{theme}(e, y)]$ (agent is severed)
 c. *kill*: $\lambda e [\textit{kill}(e)]$ (all arguments severed)

On such accounts, the remaining dependents of the verb receive their semantic roles from silent secondary predicates, which are usually assumed to occupy the positions of functional heads in the phrase structure. An Event Identification rule identifies the event variables of the verb and the silent light verb (Kratzer 1996: 22); this is why the existential quantifiers in (33) have been replaced with lambda operators in (35). A standard term for the agent-assigning silent predicate is ‘little *v*’. These extra-lexical dependents are the analogs of the ones contributed by the constructions in Construction Grammar.

In the following subsections we address arguments that have been put forth in favor of the ‘little *v*’ hypothesis, from idiom asymmetries (Section 21.3.2) and deverbal nominals (Section 21.3.3). We argue that the evidence actually favors the lexical view. Then we turn to problems for exoskeletal approaches, from idiosyncratic syntactic selection (Section 21.3.4) and expletives (Section 21.3.5). We conclude with a look at the treatment of idiosyncratic syntactic selection under Borer’s exoskeletal theory (Section 21.3.7), and a summary (Section 21.3.8).

21.3.2 Little *v* and idiom asymmetries

Marantz (1984) and Kratzer (1996) argued for severing the agent from the argument structure as in (35a), on the basis of putative idiom asymmetries. Marantz (1984) observed that while English has many idioms and specialized meanings for verbs in which the internal argument is the fixed part of the idiom and the external argument is free, the reverse situation is considerably rarer. To put it differently, the nature of the role played by the subject argument often depends on the filler of the object position, but not vice versa. To take Kratzer’s examples (Kratzer 1996: 114):

- (36) a. kill a cockroach
 b. kill a conversation
 c. kill an evening watching TV
 d. kill a bottle (i.e. empty it)
 e. kill an audience (i.e., wow them)

On the other hand, one does not often find special meanings of a verb associated with the choice of subject, leaving the object position open (examples from Marantz (1984: 26)):

- (37) a. Harry killed NP.
 b. Everyone is always killing NP.
 c. The drunk refused to kill NP.
 d. Silence certainly can kill NP.

Kratzer observes that a mixed representation of *kill* as in (38a) allows us to specify varying meanings that depend upon its sole NP argument.

- (38) a. *kill*: $\lambda y \lambda e [kill(e, y)]$
 b. If *a* is a time interval, then $kill(e, a) = \text{truth}$ if *e* is an event of wasting *a*
 If *a* is animate, then $kill(e, a) = \text{truth}$ if *e* is an event in which *a* dies
 ... etc.

On the polyadic (Davidsonian) theory, the meaning could similarly be made to depend upon the filler of the agent role. On the polyadic view, ‘there is no technical obstacle’ (Kratzer 1996: 116) to conditions like those in (38b), except reversed, so that it is the filler of the agent role instead of the theme role that affects the meaning. But, she writes, this could not be done if the agent is not an argument of the verb. According to Kratzer, the agent-severed representation (such as (38a)) disallows similar constraints on the meaning that depend upon the agent, thereby capturing the idiom asymmetry.

But as noted by Wechsler (2005), ‘there is no technical obstacle’ to specifying agent-dependent meanings even if the Agent has been severed from the verb as Kratzer proposes. It is true that there is no variable for the agent in (38a). But there is an event variable *e*, and the language user must be able to identify the agent of *e* in order to interpret the sentence. So one could replace the variable *a* with ‘the agent of *e*’ in the expressions in (38b), and thereby create verbs that violate the idiom asymmetry.

While this may seem to be a narrow technical or even pedantic point, it is nonetheless crucial. Suppose we try to repair Kratzer’s argument with an additional assumption: that modulations in the meaning of a polysemous verb can only depend upon arguments of the *relation* denoted by that verb, and not on other participants in the event. Under that additional assumption, it makes no difference whether the agent is severed from the lexical entry or not. For example, consider the following (mixed) neo-Davidsonian representation of the semantic content in the lexical entry of *kill*:

- (39) *kill*: $\lambda y \lambda x \lambda e [kill(e, y) \wedge agent(e, x)]$

Assuming that sense modulations can only be affected by arguments of the *kill*(*e*,*y*) relation, we derive the idiom asymmetry, even if (39) is the lexical entry for *kill*. So suppose that we try to fix Kratzer's argument with a different assumption: that modulations in the meaning of a polysemous verb can only depend upon an argument of the lexically denoted function. Kratzer's 'neo-Davidsonian in the syntax' lexical entry in (35a) lacks the agent argument, while the lexical entry in (39) clearly has one. But Kratzer's entry still fails to predict the asymmetry because, as noted above, it has the *e* argument and so the sense modulation can be conditioned on the 'agent of *e*'. As noted above, that event argument cannot be eliminated (for example through existential quantification) because it is needed in order to undergo event identification with the event argument of the silent light verb that introduces the agent Kratzer (1996: 22).

Moreover, recasting Kratzer's account in lexicalist terms allows for verbs to vary. This is an important advantage, because the putative asymmetry is only a tendency. The following are examples in which the subject is a fixed part of the idiom and there are open slots for non-subjects:

- (40) a. A little bird told X that S.
 'X heard the rumor that S' (Nunberg et al. 1994: 526)
 b. The cat's got x's tongue.
 'X cannot speak.' (Bresnan 1982a: 349–350)
 c. What's eating x?
 'Why is X so galled?' (Bresnan 1982a: 349–350)

Further data and discussion of subject idioms in English and German can be found in Müller (2007b: Section 3.2.1).

The tendency towards a subject-object asymmetry plausibly has an independent explanation. Nunberg, Sag & Wasow (1994) argue that the subject-object asymmetry is a side-effect of an animacy asymmetry. The open positions of idioms tend to be animate while the fixed positions tend to be inanimate. Nunberg et al. (1994) derive these animacy generalizations from the figurative and proverbial nature of the metaphorical transfers that give rise to idioms. If there is an independent explanation for this tendency, then a lexicalist grammar successfully encodes those patterns, perhaps with a mixed neo-Davidsonian lexical decomposition, as explained above (see Wechsler (2005) for such a lexical account of the verbs *buy* and *sell*). But the 'little v' hypothesis rigidly predicts this asymmetry for all agentive verbs, and that prediction is not borne out.

21.3.3 Deverbal nominals

An influential argument against lexical argument structure involves English deverbal nominals and the causative alternation. It originates from a mention in Chomsky (1970), and is developed in detail by Marantz (1997); see also Pesetsky (1996) and Harley & Noyer (2000). The argument is often repeated, but it turns out that the empirical basis of the

argument is incorrect, and the actual facts point in the opposite direction, in favor of lexical argument structure (Wechsler 2008b,a).

Certain English causative alternation verbs allow optional omission of the agent argument (41), while the cognate nominal disallows expression of the agent (42):

- (41) a. that John grows tomatoes
b. that tomatoes grow
- (42) a. *John's growth of tomatoes
b. the tomatoes' growth, the growth of the tomatoes

In contrast, nominals derived from obligatorily transitive verbs such as *destroy* allow expression of the agent, as shown in (44a):

- (43) a. that the army destroyed the city
b. *that the city destroyed
- (44) a. the army's destruction of the city
b. the city's destruction

Following a suggestion by Chomsky (1970), Marantz (1997) argued on the basis of these data that the agent role is lacking from lexical entries. In verbal projections like (41) and (43) the agent role is assigned in the syntax by little *v*. Nominal projections like (42) and (44) lack little *v*. Instead, pragmatics takes over to determine which agents can be expressed by the possessive phrase: the possessive can express 'the sort of agent implied by an event with an external rather than an internal cause' because only the former can 'easily be reconstructed' (quoted from Marantz (1997: 218)). The destruction of a city has a cause external to the city, while the growth of tomatoes is internally caused by the tomatoes themselves (Smith 1970). Marantz points out that this explanation is unavailable if the noun is derived from a verb with an argument structure specifying its agent, since the deverbal nominal would inherit the agent of a causative alternation verb.

The empirical basis for this argument is the putative mismatch between the allowability of agent arguments, across some verb-noun cognate pairs: e.g. *grow* allows the agent but *growth* does not. But it turns out that the *grow/growth* pattern is rare. Most deverbal nominals precisely parallel the cognate verb: if the verb has an agent, so does the noun. Moreover, there is a ready explanation for the exceptional cases that exhibit the *grow/growth* pattern (Wechsler 2008a). First consider non-alternating theme-only intransitives ('unaccusatives'), as in (45) and non-alternating transitives as in (46). The pattern is clear: if the verb is agentless, then so is the noun:

- (45) *arriv(al), disappear(ance), fall* etc.:
a. A letter arrived.
b. the arrival of the letter

- c. * The mailman arrived a letter.
 - d. * the mailman's arrival of the letter
- (46) *destroy/destruction, construct(ion), creat(ion), assign(ment) etc.:*
- a. The army is destroying the city.
 - b. the army's destruction of the city

This favors the view that the noun inherits the lexical argument structure of the verb. For the anti-lexicalist, the badness of (45c) and (45d), respectively, would have to receive independent explanations. For example, on Harley and Noyer's 2000 proposal, (45c) is disallowed because a feature of the root ARRIVE prevents it from appearing in the context of *v*, but (45d) is instead ruled out because the cause of an event of arrival cannot be easily reconstructed from world knowledge. This exact duplication in two separate components of the linguistic system would have to be replicated across all non-alternating intransitive and transitive verbs, a situation that is highly implausible.

Turning to causative alternation verbs, Marantz's argument is based on the implicit generalization that noun cognates of causative alternation verbs (typically) lack the agent argument. But apart from the one example of *grow/growth*, there do not seem to be any clear cases of this pattern. Besides *grow(th)*, Chomsky 1970: examples (7c) and (8c) cited two experienter predicates, *amuse* and *interest*: *John amused (interested) the children with his stories* versus **John's amusement (interest) of the children with his stories*. But this was later shown by Rappaport (1983) and Dowty (1989) to have an independent aspectual explanation. Deverbal experienter nouns like *amusement* and *interest* typically denote a mental state, where the corresponding verb denotes an event in which such a mental state comes about or is caused. These result nominals lack not only the agent but all the eventive arguments of the verb, because they do not refer to events. Exactly to the extent that such nouns can be construed as representing events, expression of the agent becomes acceptable.

In a response to Chomsky (1970), Carlota Smith (1972) surveyed Webster's dictionary and found no support for Chomsky's claim that deverbal nominals do not inherit agent arguments from causative alternation verbs. She listed many counterexamples, including "*explode, divide, accelerate, expand, repeat, neutralize, conclude, unify*, and so on at length." (Smith 1972: 137). Harley and Noyer (2000) also noted many so-called "exceptions": *explode, accumulate, separate, unify, disperse, transform, dissolve/dissolution, detach(ment), disengage-(ment)*, and so on. The simple fact is that these are not exceptions because there is no generalization to which they can be exceptions. These long lists of verbs represent the norm, especially for suffix-derived nominals (in *-tion, -ment*, etc.). Many zero-derived nominals from alternating verbs also allow the agent, such as *change, release*, and *use*: *my constant change of mentors from 1992–1997; the frequent release of the prisoners by the governor; the frequent use of sharp tools by underage children* (examples from Borer (2003: fn. 13)).²⁶

²⁶ Pesetsky (1996: 79, ex. (231)) assigns a star to *the thief's return of the money*, but it is acceptable to many speakers. The *Oxford English Dictionary* lists a transitive sense for the noun *return* (definition 11a), and corpus examples like *her return of the spoils* are not hard to find.

Like the experienter nouns mentioned above, many zero-derived nominals lack event readings. Some reject all the arguments of the corresponding eventive verb, not just the agent: **the freeze of the water*, **the break of the window*, and so on. According to Stephen Wechsler, *his drop of the ball* is slightly odd, but *the drop of the ball* has exactly the same degree of oddness. The locution *a drop in temperature* matches the verbal one *The temperature dropped*, and both verbal and nominal forms disallow the agent: **The storm dropped the temperature*. **the storm's drop of the temperature*. In short, the facts seem to point in exactly the opposite direction from what has been assumed in this oft-repeated argument against lexical valence. Apart from the one isolated case of *grow/growth*, event-denoting deverbal nominals match their cognate verbs in their argument patterns.

Turning to *grow/growth* itself, we find a simple explanation for its unusual behavior (Wechsler 2008a). When the noun *growth* entered the English language, causative (transitive) *grow* did not exist. The OED provides these dates of the earliest attestations of *grow* and *growth*:

- (47) a. intransitive *grow*: c725 'be verdant' ... 'increase' (intransitive)
 b. the noun *growth*: 1587 'increase' (intransitive)
 c. transitive *grow*: 1774 'cultivate (crops)'

Thus *growth* entered the language at a time when transitive *grow* did not exist. The argument structure and meaning were inherited by the noun from its source verb, and then preserved into present-day English. This makes perfect sense if, as we claim, words have predicate argument structures. Nominalization by *-th* suffixation is not productive in English, so *growth* is listed in the lexicon. To explain why *growth* lacks the agent we need only assume that a lexical entry's predicate argument structure dictates whether it takes an agent argument or not. So even this one word provides evidence for lexical argument structure.

21.3.4 Idiosyncratic syntactic selections

The notion of lexical valence structure immediately explains why the argument realization patterns are strongly correlated with the particular lexical heads selecting those arguments. It is not sufficient to have general lexical items without valence information and let the syntax and world knowledge decide about argument realizations, because not all realizational patterns are determined by the meaning. The form of the preposition of a prepositional object is sometimes loosely semantically motivated but in other cases arbitrary. For example, the valence structure of the English verb *depend* captures the fact that it selects an *on*-PP to express one of its semantic arguments:

- (48) a. John depends on Mary. (*counts*, *relies*, etc.)
 b. John trusts (*on) Mary.
 c.
$$\left[\begin{array}{ll} \text{PHON} & \langle \textit{depend} \rangle \\ \text{ARG-ST} & \langle \text{NP}_x, \text{PP}[\textit{on}]_y \rangle \\ \text{CONTENT} & \textit{depend}(x,y) \end{array} \right]$$

Such idiosyncratic lexical selection is utterly pervasive in human language. The verb or other predicator often determines the choice between direct and oblique morphology, and for obliques, it determines the choice of adposition or oblique case. In some languages such as Icelandic even the subject case can be selected by the verb (Zaenen, Maling & Thráinsson 1985).

Selection is language-specific. English *wait* selects *for* (German *für*) while German *warten* selects *auf* ‘on’ with an accusative object:

- (49) a. I am waiting for my man.
b. Ich warte auf meinen Mann.
I wait on my man.ACC

It is often impossible to find semantic motivation for case. In German there is a tendency to replace genitive (50a) with dative (50b) with no apparent semantic motivation:

- (50) a. dass der Opfer gedacht werde
that the victims.GEN remembered was
‘that the victims would be remembered’
b. daß auch hier den Opfern des Faschismus gedacht werde [...] ²⁷
that also here the victims.DAT of.the fascism remembered was
‘that the victims of fascism would be remembered here too’

The synonyms *treffen* and *begegnen* ‘to meet’ govern different cases (example from Polard & Sag (1987: 126)).

- (51) a. Er traf den Mann.
he.NOM met the man.ACC
b. Er begegnete dem Mann.
he.NOM met the man.DAT

One has to specify the case that the respective verbs require in the lexical items of the verbs.²⁸

A radical variant of the plugging approach is suggested by Haugereid (2009). Haugereid (pages 12–13) assumes that the syntax combines a verb with an arbitrary combination of a subset of five different argument roles. Which arguments can be combined with a verb is not restricted by the lexical item of the verb.²⁹ A problem for such views is that the meaning of an ambiguous verb sometimes depends on which of its arguments are expressed. The German verb *borgen* has the two translations ‘borrow’ and ‘lend’, which basically are two different perspectives on the same event (see Kunze (1991, 1993) for an extensive discussion of verbs of exchange of possession). Interestingly, the dative object is obligatory only with the ‘lend’ reading (Müller 2010a: 403):

²⁷ Frankfurter Rundschau, 07.11.1997, p. 6.

²⁸ Or at least mark the fact that *treffen* takes an object with the default case for objects and *begegnen* takes a dative object in German. See Haider (1985a), Heinz & Matiassek (1994), and Müller (2001) on structural and lexical case.

²⁹ Haugereid has the possibility to impose valence restrictions on verbs, but he claims that he uses this possibility just in order to get a more efficient processing of his computer implementation (p. 13).

- (52) a. Ich borge ihm das Eichhörnchen.
 I lend him the squirrel
 ‘I lend the squirrel to him.’
 b. Ich borge (mir) das Eichhörnchen.
 I borrow me the squirrel
 ‘I borrow the squirrel.’

If we omit it, we get only the ‘borrow’ reading. So the grammar must specify for specific verbs that certain arguments are necessary for a certain verb meaning or a certain perspective on an event.

Synonyms with differing valence specifications include the minimal triplet mentioned earlier: *dine* is obligatorily intransitive (or takes an *on*-PP), *devour* is transitive, and *eat* can be used either intransitively or transitively (Dowty 1989: 89–90). Many other examples are given in Levin (1993) and Levin & Rappaport Hovav (2005).

In a phrasal constructionist approach one would have to assume phrasal patterns with the preposition or case, into which the verb is inserted. For (49b), the pattern includes a prepositional object with *auf* and an accusative NP, plus an entry for *warten* specifying that it can be inserted into such a structure (see Kroch & Joshi (1985: Section 5.2) for such a proposal in the framework of TAG). Since there are generalizations regarding verbs with such valence representations, one would be forced to have two inheritance hierarchies: one for lexical entries with their valence properties and another one for specific phrasal patterns that are needed for the specific constructions in which these lexical items can be used.

More often, proponents of neo-constructionist approaches either make proposals that are difficult to distinguish from lexical valence structures (see Section 21.3.7 below) or simply decline to address the problem. For instance, Lohndal (2012) writes:

An unanswered question on this story is how we ensure that the functional heads occur together with the relevant lexical items or roots. This is a general problem for the view that Case is assigned by functional heads, and I do not have anything to say about this issue here. (Lohndal 2012)

We think that getting case assignment right in simple sentences, without vast overgeneration of ill-formed word sequences, is a minimal requirement for a linguistic theory.

21.3.5 Expletives

A final example for the irreducibility of valence to semantics are verbs that select for expletives and reflexive arguments of inherently reflexive verbs in German:

- (53) a. weil es regnet
 because it rains
 b. weil (es) mir (vor der Prüfung) graut
 because EXPL me.DAT before the exam dreads
 ‘because I am dreading the exam’

- c. weil er es bis zum Professor bringt
because he EXPL until to.the professor brings
'because he made it to professor'
- d. weil es sich um den Montag handelt
because EXPL REFL around the Monday trades
'It is about the Monday.'
- e. weil ich mich (jetzt) erhole
because I myself now recreate
'because I am relaxing'

The lexical heads in (53) need to contain information about the expletive subjects/objects and/or reflexive pronouns that do not fill semantic roles. Note that German allows for subjectless predicates and hence the presence of expletive subjects cannot be claimed to follow from general principles. (53c) is an example with an expletive object. Explanations referring to the obligatory presence of a subject would fail on such examples in any case. Furthermore it has to be ensured that *erholen* is not realized in the [Sbj IntrVerb] construction for intransitive verbs or respective functional categories in a Minimalist setting although the relation *erholen'* (*relax'*) is a one-place predicate and hence *erholen* is semantically compatible with the construction.

21.3.6 An exoskeletal approach

In what follows I discuss Haugereid's proposal in more detail. His analysis has all the high-level problems that were mentioned in the previous subsections, but since it is worked out in detail it is interesting to see its predictions.

Haugereid (2007), working in the framework of HPSG, suggests an analysis along the lines of Borer (2005) where the meaning of an expression is defined as depending on the arguments that are present. He assumes that there are five argument slots that are assigned to semantic roles as follows:

- Arg1: agent or source
- Arg2: patient
- Arg3: benefactive or recipient
- Arg4: goal
- Arg5: antecedent

Here, antecedent is a more general role that stands for instrument, comitative, manner and source. The roles Arg1–Arg3 correspond to subject and objects. Arg4 is a resultative predicate of the end of a path. Arg4 can be realized by a PP, an AP or an NP. (54) gives examples for the realization of Arg4:

- (54) a. John smashed the ball *out of the room*.

- b. John hammered the metal *flat*.
- c. He painted the car *a brilliant red*.

Whereas Arg4 follows the other participants in the causal chain of events, the antecedent precedes the patient in the order of events. It is realized as a PP. (55) is an example of the realization of Arg5:

- (55) John punctured the balloon *with a needle*.

Haugereid now assumes that argument frames consist of these roles. He provides the examples in (56):

- | | |
|---|----------------|
| (56) a. John smiles. | (arg1-frame) |
| b. John smashed the ball. | (arg12-frame) |
| c. The boat arrived. | (arg2-frame) |
| d. John gave Mary a book. | (arg123-frame) |
| e. John gave a book to Mary. | (arg124-frame) |
| f. John punctured the ball with a needle. | (arg125-frame) |

Haugereid points out that multiple verbs can occur in multiple argument frames. He provides the variants in (57) for the verb *drip*:

- | | |
|---|------------------|
| (57) a. The roof drips. | (arg1-frame) |
| b. The doctor drips into the eyes. | (arg14-frame) |
| c. The doctor drips with water. | (arg15-frame) |
| d. The doctor drips into the eyes with water. | (arg145-frame) |
| e. The roof drips water. | (arg12-frame) |
| f. The roof drips water into the bucket. | (arg124-frame) |
| g. The doctor dripped the eyes with water. | (arg125-frame) |
| h. The doctor dripped into the eyes with water. | (arg145-frame) |
| i. John dripped himself two drops of water. | (arg123-frame) |
| j. John dripped himself two drops of water into his eyes. | (arg1234-frame) |
| k. John dripped himself two drops of water into his eyes with a drop counter. | (arg12345-frame) |
| l. Water dripped. | (arg2-frame) |
| m. It drips. | (arg0-frame) |

He proposes the inheritance hierarchy in Figure 21.3 in order to represent all possible argument combinations, whereby the Arg5 role is omitted due to space considerations.

Haugereid assumes binary-branching structures where arguments can be combined with a head in any order. There is a dominance schema for each argument role. The schema realizing the argument role 3 provides a link value *arg3+*. If the argument role 2 is provided by another schema, we arrive at the frame *arg23*. For unergative intransitive

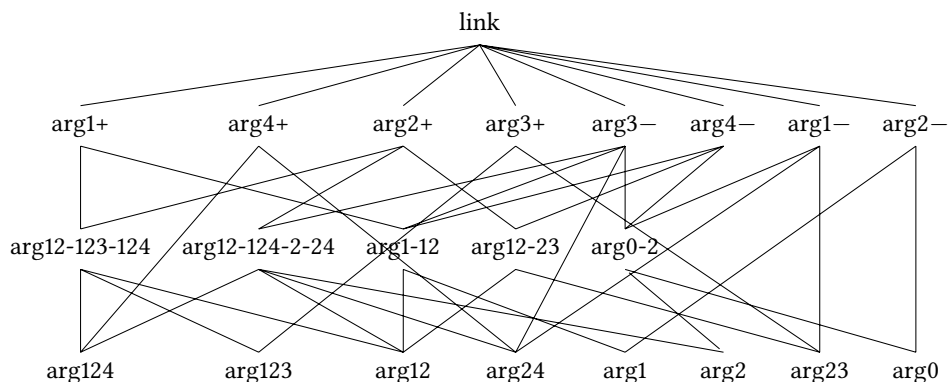


Figure 21.3: Hierarchy of argument frames following Haugereid (2007)

verbs, it is possible to determine that it has an argument frame of *arg1*. This frame is only compatible with the types *arg1+*, *arg2-*, *arg3-* and *arg4-*. Verbs that have an optional object are assigned to *arg1-12* according to Haugereid. This type allows for the following combinations: *arg1+*, *arg2-*, *arg3-* and *arg4-* such as *arg1+*, *arg2+*, *arg3-* and *arg4-*.

This approach comes very close to an idea by Goldberg: verbs are underspecified with regard to the sentence structures in which they occur and it is only the actual realization of arguments in the sentence that decides which combinations of arguments are realized. One should bear in mind that the hierarchy in Figure 21.3 corresponds to a considerable disjunction: it lists all possible realizations of arguments. If we say that *essen* ‘to eat’ has the type *arg1-12*, then this corresponds to the disjunction $arg1 \vee arg12$. In addition to the information in the hierarchy above, one also requires information about the syntactic properties of the arguments (case, the form of prepositions, verb forms in verbal complements). Since this information is in part specific to each verb (see Section 21.1), it cannot be present in the dominance schemata and must instead be listed in each individual lexical entry. For the lexical entry for *warten auf* ‘wait for’, there must be information about the fact that the subject has to be an NP and that the prepositional object is an *auf*-PP with accusative. The use of a type hierarchy then allows one to elegantly encode the fact that the prepositional object is optional. The difference to a disjunctively specified SUBCAT list with the form of (58) is just a matter of formalization.

(58) SUBCAT $\langle \text{NP}[\textit{str}] \rangle \vee \langle \text{NP}[\textit{str}], \text{PP}[\textit{auf}, \textit{acc}] \rangle$

Since Haugereid’s structures are binary-branching, it is possible to derive all permutations of arguments (59a–b), and adjuncts can be attached to every branching node (59c–d).

(59) a. dass [_{arg1} keiner [_{arg2} Pizza isst]]
 that nobody pizza eats
 ‘that nobody eats pizza’

- b. dass [_{arg2} Pizza [_{arg1} keiner isst]]
 that pizza nobody eats
- c. dass [_{arg1} keiner [_{arg2} gerne Pizza isst]]]
 that nobody gladly pizza eats
- d. dass [_{arg1} [hier [keiner [_{arg2} Pizza isst]]]]
 that here nobody pizza eats

Haugereid has therefore found solutions for some of the problems in Goldberg's analysis that were pointed out in Müller (2006). Nevertheless, there are a number of other problems, which I will discuss in what follows. In Haugereid's approach, nothing is said about the composition of meaning. He follows the so-called Neo-Davidsonian approach. In these kind of semantic representations, arguments of the verb are not directly represented on the verb. Instead, the verb normally has an event argument and the argument roles belonging to the event in question are determined in a separate predication. (60) shows two alternative representations, where *e* stands for the event variable.

- (60) a. Der Mann isst eine Pizza.
 the man eats a pizza
 'The man is eating a pizza'
- b. $eat'(e, x, y) \wedge man'(x) \wedge pizza'(y)$
- c. $eat'(e) \wedge agent(e, x) \wedge theme(e, y) \wedge man'(x) \wedge pizza'(y)$

Haugereid adopts Minimal Recursion Semantics (MRS) as his semantic formalism (also, see Section 9.1.6 und 19.3). The fact that arguments belong to a particular predicate is represented by the fact that the relevant predicates have the same handle. The representation in (60c) corresponds to (61):

- (61) $h1:essen'(e), h1:arg1(x), h1:arg2(y), h2:mann'(x), h3:pizza'(y)$

This analysis captures Goldberg's main idea: meaning arises from particular constituents being realized together with a head.

For the sentence in (62a), Haugereid (2007, p. c.) assumes the semantic representation in (62b):³⁰

- (62) a. der Mann den Teich leer fischt
 the man the pond empty fishes
- b. $h1:mann'(x), h2:teich'(y), h3:leer'(e),$
 $h4:fischen'(e2), h4:arg1(x), h4:arg2(y), h4:arg4(h3)$

³⁰ See Haugereid (2009: 165) for an analysis of the Norwegian examples in (i).

(i) Jon maler veggen rød.
 Jon paints wall.DEF red
 'Jon paints the wall red.'

In (62b), the *arg1*, *arg2* and *arg4* relations have the same handle as *fischen'*. Following Haugereid's definitions, this means that *arg2* is the patient of the event. In the case of (62a), this makes incorrect predictions since the accusative element is not a semantic argument of the main verb. It is a semantic argument of the secondary predicate *leer* 'empty' and has been raised to the object of the resultative construction. Depending on the exact analysis one assumes, the accusative object is either a syntactic argument of the verb or of the adjective, however, it is never a semantic argument of the verb. In addition to this problem, the representation in (62b) does not capture the fact that *leer* 'empty' predicates over the object. Haugereid (2007, p.c.) suggests that this is implicit in the representation and follows from the fact that all *arg4*s predicate over all *arg2*s. Unlike Haugereid's analysis, analyses using lexical rules that relate a lexical item of a verb to another verbal item with a resultative meaning allow for a precise specification of the semantic representation that then captures the semantic relation between the predicates involved. In addition, the lexical rule-based analysis makes it possible to license lexical items that do not establish a semantic relation between the accusative object and the verb (Wechsler 1997; Wechsler & Noh 2001; Müller 2002a: Chapter 5).

Haugereid sketches an analysis of the syntax of the German clause and tackles active/passive alternations. However, certain aspects of the grammar are not elaborated on. In particular, it remains unclear how complex clauses containing Acl verbs such as *sehen* 'to see' and *lassen* 'to let' should be analyzed. Arguments of embedded and embedding verbs can be permuted in these constructions. Haugereid (2007, p.c.) assumes special rules that allow one to saturate arguments of more deeply embedded verbs, for example, a special rule that combines an *arg2* argument of an argument with a verb. In order to combine *das Nilpferd* and *nicht füttern helfen lässt* in sentences such as (63), he is forced to assume a special grammatical rule that combines an argument of a doubly embedded verb with another verb:

- (63) weil Hans Cecilia John das Nilpferd nicht füttern helfen lässt
because Hans Cecilia John the hippo not feed help let
'because Hans is not letting Cecilia help John feed the hippo.'

In Müller (2004c: 220), I have argued that embedding under complex-forming predicates is only constrained by performance factors (see also Section 12.6.3). In German, verbal complexes with more than four verbs are barely acceptable. Evers (1975: 58–59) has pointed out, however, that the situation in Dutch is different since Dutch verbal complexes have a different branching: in Dutch, verbal complexes with up to five verbs are possible. Evers attributes this difference to a greater processing load for German verbal complexes (see also Gibson 1998: Section 3.7). Haugereid would have to assume that there are more rules for Dutch than for German. In this way, he would give up the distinction between competence and performance and incorporate performance restrictions directly into the grammar. If he wanted to maintain a distinction between the two, then Haugereid would be forced to assume an infinite number of schemata or a schema with functional uncertainty since depth of embedding is only constrained by performance factors. Existing HPSG approaches to the analysis of verbal complexes do

without functional uncertainty (Hinrichs & Nakazawa 1994). Since such raising analyses are required for object raising anyway (as discussed above), they should be given preference.

Summing up, it must be said that Haugereid's exoskeletal approach does account for different orderings of arguments, but it neither derives the correct semantic representations nor does it offer a solution for the problem of idiosyncratic selection of arguments and the selection of expletives.

21.3.7 Is there an alternative to lexical valence structure?

The question for theories denying the existence of valence structure is what replaces it to explain idiosyncratic lexical selection. In her exoskeletal approach, Borer (2005) explicitly rejects lexical valence structures. But she posits post-syntactic interpretive rules that are difficult to distinguish from them. To explain the correlation of *depend* with an *on*-PP, she posits the following interpretive rule (Borer 2005: Vol. II, p. 29):

$$(64) \text{ MEANING} \Leftrightarrow \pi_9 + [\langle e^{on} \rangle]$$

Borer refers to all such cases of idiosyncratic selection as idioms. In a rule such as (64), "MEANING is whatever the relevant idiom means" (Borer 2005: Vol. II, p. 27). In (64), π_9 is the "phonological index" of the verb *depend* and e^{on} 'corresponds to an open value that must be assigned range by the f-morph *on*' (Borer 2005: Vol. II, p. 29), where f-morphs are function words or morphemes. Hence this rule brings together much the same information as the lexical valence structure in (48c). Discussing such "idiom" rules, Borer writes

Although by assumption a listeme cannot be associated with any grammatical properties, one device used in this work has allowed us to get around the formidable restrictions placed on the grammar by such a constraint – the formation of idioms. [...] Such idiomatic specification could be utilized, potentially, not just for *arrive* and *depend on*, but also for obligatorily transitive verbs [...], for verbs such as *put*, with their obligatory locative, and for verbs which require a sentential complement.

The reader may object that subcategorization, of sorts, is introduced here through the back door, with the introduction, in lieu of lexical syntactic annotation, of an articulated listed structure, called an *idiom*, which accomplishes, de facto, the same task. The objection of course has some validity, and at the present state of the art, the introduction of idioms may represent somewhat of a concession.

(Borer 2005: Vol. II, p. 354–355)

Borer goes on to pose various questions for future research, related to constraining the class of possible idioms. With regard to that research program it should be noted that a major focus of lexicalist research has been narrowing the class of subcategorization and extricating derivable properties from idiosyncratic subcategorization. Those are the functions of HPSG lexical hierarchies, for example.

21.3.8 Summary

In Sections 21.3.2–21.3.5 we showed that the question of which arguments must be realized in a sentence cannot be reduced to semantics and world knowledge or to general facts about subjects. The consequence is that valence information has to be connected to lexical items. One therefore must either assume a connection between a lexical item and a certain phrasal configuration as in Croft’s approach (2003) and in LTAG or assume our lexical variant. In a Minimalist setting the right set of features must be specified lexically to ensure the presence of the right case assigning functional heads. This is basically similar to the lexical valence structures we are proposing here, except that it needlessly introduces various problems discussed above, such as the problem of coordination raised in Section 21.2.1.

21.4 Relations between constructions

On the lexical rules approach, word forms are related by lexical rules: a verb stem can be related to a verb with finite inflection and to a passive verb form; verbs can be converted to adjectives or nouns; and so on. The lexical argument structure accompanies the word and can be manipulated by the lexical rule. In this section we consider what can replace such rules within a phrasal or ASC approach.

21.4.1 Inheritance hierarchies for constructions

For each valence structure that the lexicalist associates with a root lexeme (transitive, ditransitive, etc.), the phrasal approach requires multiple phrasal constructions, one to replace each lexical rule or combination of lexical rules that can apply to the word. Taking ditransitives, for example, the phrasal approach requires an active-ditransitive construction, a passive-ditransitive construction, and so on, to replace the output of every lexical rule or combination of lexical rules applied to a ditransitive verb. (Thus Bergen & Chang (2005: 169–170) assume an active-ditransitive and a passive-ditransitive construction and Kallmeyer & Osswald (2012: 171–172) assume active and passive variants of the transitive construction.) On that view some of the active voice constructions for German would be:

- (65) a. Nom V
- b. Nom Acc V
- c. Nom Dat V
- d. Nom Dat Acc V

The passive voice constructions corresponding to (65) would be:

- (66) a. V V-Aux
- b. Nom V V-Aux
- c. Dat V V-Aux

d. Dat Nom V V-Aux

Merely listing all these constructions is not only uneconomical but fails to capture the obvious systematic relation between active and passive constructions. Since phrasalists reject both lexical rules and transformations, they need an alternative way to relate phrasal configurations and thereby explain the regular relation between active and passive. The only proposals to date involve the use of inheritance hierarchies, so let us examine them.

Researchers working in various frameworks, both with lexical and phrasal orientation, have tried to develop inheritance-based analyses that could capture the relation between valence patterns such as those in (65) and (66) (see for instance Kay & Fillmore (1999: 12); Michaelis & Ruppenhofer (2001: Chapter 4); Candito 1996; Clément & Kinyon 2003: 188; Kallmeyer & Osswald 2012: 171–172; Koenig 1999: Chapter 3; Davis & Koenig 2000; Kordoni 2001 for proposals in CxG, TAG, and HPSG). The idea is that a single representation (lexical or phrasal, depending on the theory) can inherit properties from multiple constructions. In a phrasal approach the description of the pattern in (65b) inherits from the transitive and the active construction and the description of (66b) inherits from both the transitive and the passive constructions. Figure 21.4 illustrates the inheritance-based lexical approach: a lexical entry for a verb such as *read* or *eat* is combined with either an active or passive representation. The respective representations for the active and passive are responsible for the expression of the arguments.

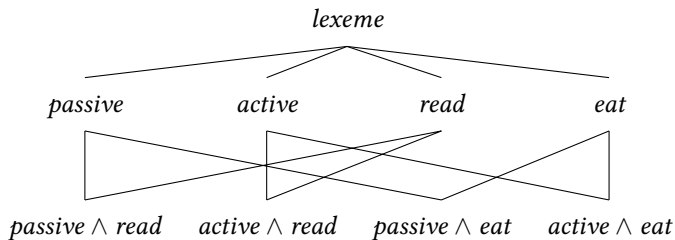


Figure 21.4: Inheritance Hierarchy for active and passive

As was already discussed in Section 10.2, inheritance-based analyses cannot account for multiple changes in valence as for instance the combination of passive and impersonal construction that can be observed in languages like Lithuanian (Timberlake 1982: Section 5), Irish (Noonan 1994), and Turkish (Özkaragöz 1986). Özkaragöz's Turkish examples are repeated here with the original glossing as (67) for convenience:

- (67) a. Bu şato-da boğ-ul-un-ur. (Turkish)
 this château-LOC strangle-PASS-PASS-AOR
 'One is strangled (by one) in this château.'

- b. Bu oda-da döv-ül-ün-ür.
 this room-LOC hit-PASS-PASS-AOR
 ‘One is beaten (by one) in this room.’
- c. Harp-te vur-ul-un-ur.
 war-LOC shoot-PASS-PASS-AOR
 ‘One is shot (by one) in war.’

Another example from Section 10.2 that cannot be handled with inheritance is multiple causativization in Turkish. Turkish allows double and even triple causativization (Lewis 1967: 146):

- (68) Öl-dür-t-tür-t- (Turkish)
 ‘to cause somebody to cause somebody to kill somebody’

An inheritance-based analysis would not work, since inheriting the same information several times does not add anything new. Krieger & Nerbonne (1993) make the same point with respect to derivational morphology in cases like *preprepreversion*: inheriting information about the prefix *pre-* twice or more often, does not add anything.

So assuming phrasal models, the only way to capture the generalization with regard to (65) and (66) seems to be to assume GPSG-like metarules that relate the constructions in (65) to the ones in (66). If the constructions are lexically linked as in LTAG, the respective mapping rules would be lexical rules. For approaches that combine LTAG with the Goldbergerian plugging idea such as the one by Kallmeyer & Osswald (2012) one would have to have extended families of trees that reflect the possibility of having additional arguments and would have to make sure that the right morphological form is inserted into the respective trees. The morphological rules would be independent of the syntactic structures in which the derived verbal lexemes could be used. One would have to assume two independent types of rules: GPSG-like metarules that operate on trees and morphological rules that operate on stems and words. We believe that this is an unnecessary complication and apart from being complicated the morphological rules would not be acceptable as form-meaning pairs in the CxG sense since one aspect of the form namely that additional arguments are required is not captured in these morphological rules. If such morphological rules were accepted as proper constructions then there would not be any reason left to require that the arguments have to be present in a construction in order for it to be recognizable, and hence, the lexical approach would be accepted. Compare the discussion of *Totschießen* ‘shoot dead’ in example (80) below.

Inheritance hierarchies are the main explanatory device in Croft’s Radical Construction Grammar (Croft 2001). He also assumes phrasal constructions and suggests representing these in a taxonomic network (an inheritance hierarchy). He assumes that every idiosyncrasy of a linguistic expression is represented on its own node in this kind of network. Figure 21.5 on the next page shows part of the hierarchy he assumes for sentences.

There are sentences with intransitive verbs and sentences with transitive verbs. Sentences with the form [Sbj kiss Obj] are special instances of the construction [Sbj TrVerb Obj]. The [Sbj kick Obj] construction also has further sub-constructions, namely the

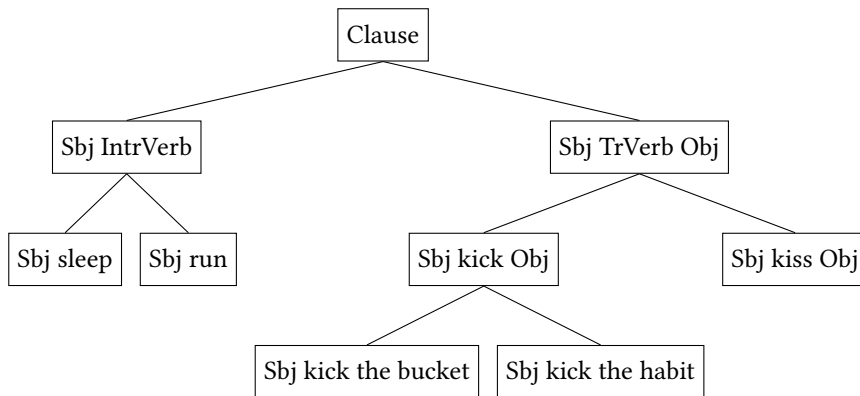


Figure 21.5: Classification of phrasal patterns in Croft (2001: 26)

constructions [Sbj kick the bucket] and [Subj kick the habit]. Since constructions are always pairs of form and meaning, this gives rise to a problem: in a normal sentence with *kick*, there is a kicking relation between the subject and the object of *kick*. This is not the case for the idiomatic use of *kick* in (69):

(69) He kicked the bucket.

This means that there cannot be a normal inheritance relation between the [Sbj kick Obj] and the [Sbj kick the bucket] construction. Instead, only parts of the information may be inherited from the [Sbj kick Obj] construction. The other parts are redefined by the sub-construction. This kind of inheritance is referred to as *default inheritance*.

kick the bucket is a rather fixed expression, that is, it is not possible to passivize it or front parts of it without losing the idiomatic reading (Nunberg, Sag & Wasow 1994: 508). However, this is not true for all idioms. As Nunberg, Sag & Wasow (1994: 510) have shown, there are idioms that can be passivized (70a) as well as realizations of idioms where parts of idioms occur outside of the clause (70b).

- (70) a. The beans were spilled by Pat.
b. The strings [that Pat pulled] got Chris the job.

The problem is now that one would have to assume two nodes in the inheritance hierarchy for idioms that can undergo passivization since the realization of the constituents is different in active and passive variants but the meaning is nevertheless idiosyncratic. The relation between the active and passive form would not be captured. Kay (2002) has proposed a process where one can compute objects (Construction-like objects = CLOs) from hierarchies that then license active and passive variants. As I have shown in Müller (2006: Section 3), this process does not deliver the desired results and it is far from straightforward to improve the procedure to the point that it actually works. Even if one were to adopt the changes I proposed, there are still phenomena that cannot be described using inheritance hierarchies (see Section 10.2 in this book).

A further interesting point is that the verbs have to be explicitly listed in the constructions. This begs the question of how constructions should be represented where the verbs are used differently. If a new node in the taxonomic network is assumed for cases like (71), then Goldberg's criticism of lexical analyses that assume several lexical entries for a verb that can appear in various constructions³¹ will be applicable here: one would have to assume constructions for every verb and every possible usage of that verb.

(71) He kicked the bucket into the corner.

For sentences with negation, Croft assumes the hierarchy with multiple inheritance given in Figure 21.6. The problem with this kind of representation is that it remains

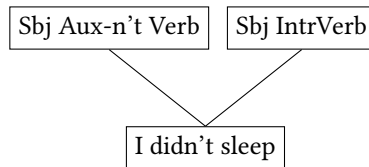


Figure 21.6: Interaction of phrasal patterns following Croft (2001: 26)

unclear as to how the semantic embedding of the verb meaning under negation can be represented. If all constructions are pairs of form and meaning, then there would have to be a semantic representation for [Sbj IntrVerb] (CONT value or SEM value). Similarly, there would have to be a meaning for [Sbj Aux-n't Verb]. The problem now arises that the meaning of [Sbj IntrVerb] has to be embedded under the meaning of the negation and this cannot be achieved directly using inheritance since X and not(X) are incompatible. There is a technical solution to this problem using auxiliary features. Since there are a number of interactions in grammars of natural languages, this kind of analysis is highly implausible if one claims that features are a direct reflection of observable properties of linguistic objects. For a more detailed discussion of approaches with classifications of phrasal patterns, see Müller (2010b) as well as Müller (2007b: Section 18.3.2.2) and for the use of auxiliary features in inheritance-based analyses of the lexicon, see Müller (2007b: Section 7.5.2.2).

21.4.2 Mappings between different levels of representations

Culicover & Jackendoff (2005: Chapter 6.3) suggest that passive should be analyzed as one of several possible mappings from the Grammatical Function tier to the surface realization of arguments. Surface realizations of referential arguments can be NPs in a certain case, with certain agreement properties, or in a certain position. While such

³¹ Note the terminology: I used the word *lexical entry* rather than *lexical item*. The HPSG analysis uses lexical rules that correspond to Goldberg's templates. What Goldberg criticizes is lexical rules that relate lexical entries, not lexical rules that licence new lexical items, which may be stored or not. HPSG takes the latter approach to lexical rules. See Section 9.2,

analyses that work by mapping elements with different properties onto different representations are common in theories like LFG and HPSG (Koenig 1999; Bouma, Malouf & Sag 2001a), a general property of these analyses is that one needs one level of representation per interaction of phenomena (ARG-ST, SEM-ARG, ADD-ARG in Koenig’s proposal, ARG-ST, DEPS, SPR, COMPS in Bouma, Malouf, and Sag’s proposal). This was discussed extensively in Müller (2007b: Section 7.5.2.2) with respect to extensions that would be needed for Koenig’s analysis.

Since Culicover and Jackendoff argue for a phrasal model, we will discuss their proposal here. Culicover and Jackendoff assume a multilayered model in which semantic representations are linked to grammatical functions, which are linked to tree positions. Figure 21.7 shows an example for an active sentence. GF stands for Grammatical Func-

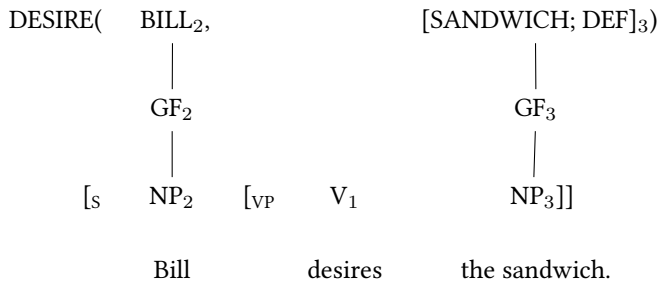


Figure 21.7: Linking grammatical functions to tree positions: active

tion. Culicover & Jackendoff (2005: 204) explicitly avoid names like Subject and Object since this is crucial for their analysis of the passive to work. They assume that the first GF following a bracket is the subject of the clause the bracket corresponds to (p. 195–196) and hence has to be mapped to an appropriate tree position in English. Note that this view of grammatical functions and obliqueness does not account for subjectless sentences that are possible in some languages, for instance in German.³²

Regarding the passive, the authors write:

we wish to formulate the passive not as an operation that deletes or alters part of the argument structure, but rather as a piece of structure in its own right that can be unified with the other independent pieces of the sentence. The result of the unification is an alternative licensing relation between syntax and semantics. (Culicover & Jackendoff 2005: 203)

They suggest the following representation of the passive:

$$(72) \quad [GF_i > [GF \dots]]_k \Leftrightarrow [\dots V_k + \text{pass} \dots (\text{by } NP_i) \dots]_k$$

³² Of course one could assume empty expletive subjects, as was suggested by Grewendorf (1993: 1311), but empty elements and especially those without meaning are generally avoided in the constructionist literature. See Müller (2010a: Section 3.4, Section 11.1.1.3) for further discussion.

The italicized parts are the normal structure of the sentence and the non-italicized parts are an overlay on the normal structure, that is, additional constraints that have to hold in passive sentences. Figure 21.8 shows the mapping of the example discussed above that corresponds to the passive.

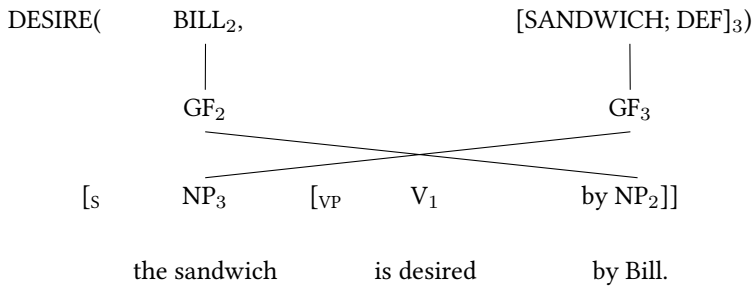


Figure 21.8: Linking grammatical functions to tree positions: passive

Although Culicover and Jackendoff emphasize the similarity between their approach and Relational Grammar (Perlmutter 1983), there is an important difference: in Relational Grammar additional levels (strata) can be stipulated if additional remappings are needed. In Culicover and Jackendoff's proposal there is no additional level. This causes problems for the analysis of languages which allow for double passivization. Examples for such languages were already given in (67) in the previous subsection and specific examples from Turkish were provided in (67). Approaches that assume that the personal passive is the unification of a general structure with a passive-specific structure will not be able to capture this, since they committed to a certain structure too early. The problem for approaches that state syntactic structure for the passive is that such a structure, once stated, cannot be modified. Culicover and Jackendoff's proposal works in this respect since there are no strong constraints in the right-hand side of their constraint in (72). But there is a different problem: when passivization is applied the second time, it has to apply to the innermost bracket, that is, the result of applying (72) should be:

$$(73) \quad [GF_i > [GF_j \dots]]_k \Leftrightarrow [\dots V_k + \text{pass } \dots (\text{by } NP_i) \dots (\text{by } NP_j) \dots]_k$$

This cannot be done with unification, since unification checks for compatibility and since the first application of passive was possible it would be possible for the second time as well. Dots in representations are always dangerous and in the example at hand one would have to make sure that NP_i and NP_j are distinct, since the statement in (72) just says there has to be a *by*-PP somewhere. What is needed instead of unification would be something that takes a GF representation and searches for the outermost bracket and then places a bracket to the left of the next GF. But this is basically a rule that maps one representation onto another one, just like lexical rules do.

If Culicover and Jackendoff want to stick to a mapping analysis, the only option to analyze the data seems to be to assume an additional level for impersonal passives from

which the mapping to phrase structure is done. In the case of Turkish sentences like (74), which is a personal passive, the mapping to this level would be the identity function.

- (74) Arkada-şım bu oda-da döv-ül-dü.
 friend-my this room-LOC hit-PASS-AOR
 ‘My friend is beaten (by one) in this room.’

In the case of double passivization, the correct mappings would be implemented by two mappings between the three levels that finally result in a mapping as the one that is seen in (67b). Note that the double passivization is also problematic for purely inheritance based approaches. What all these approaches can suggest though is that they just stipulate three different relations between argument structure and phrase structure: active, passive, double passive. But this misses the fact that (67b) is a further passivization of (74).

In contrast, the lexical rule-based approach suggested by Müller (2003b) does not have any problems with double passivization: the first application of the passivization lexical rule suppresses the least oblique argument and provides a lexical item with the argument structure of a personal passive. The second application suppresses the now least oblique argument (the object of the active clause) and results in an impersonal passive.

21.4.3 Is there an alternative to lexical rules?

In this section we have reviewed the attempts to replace lexical rules with methods of relating constructions. These attempts have not been successful, in our assessment. We believe that the essential problem with them is that they fail to capture the derivational character of the relationship between certain word forms. Alternations signaled by passive voice and causative morphology are relatively simple and regular when formulated as operations on lexical valence structures that have been abstracted from their phrasal context. But non-transformational rules or systems formulated on the phrasal structures encounter serious problems that have not yet been solved.

21.5 Further problems for phrasal approaches

Müller (2006) discussed the problems shared by proposals that assume phrasal constructions to be a fixed configuration of adjacent material as for instance (Goldberg & Jackendoff 2004). I showed that many argument structure constructions allow great flexibility as far as the order of their parts is concerned. Back then I discussed resultative constructions in their interaction with free datives, passive and other valence changing phenomena and showed that for all these constructions that are licensed by such interactions the construction parts can be scrambled, the verb can appear in different positions, arguments can be extracted and so on. The following subsection discusses particle verbs, which pose similar problems for theories that assume a phrasal construction with fixed order of verb and particle.

21.5.1 Particle verbs and commitment to phrase structure configurations

A general problem of approaches that assume phrase structure configurations paired with meaning is that the construction may appear in different contexts: the construction parts may be involved in derivational morphology (as discussed in the previous subsection) or the construction parts may be involved in dislocations. A clear example of the latter type is the phrasal analysis of particle verbs that was suggested by Booij (2002: Section 2; 2012) and Blom (2005), working in the frameworks of Construction Grammar and LFG, respectively. The authors working on Dutch and German assume that particle verbs are licensed by phrasal constructions (pieces of phrase structure) in which the first slot is occupied by the particle.

(75) [X []_V]_{V'} where X = P, Adv, A, or N

Examples for specific Dutch constructions are:

- (76) a. [af []_V]_{V'}
 b. [door []_V]_{V'}
 c. [op []_V]_{V'}

This suggestion comes with the claim that particles cannot be fronted. This claim is made frequently in the literature, but it is based on introspection and wrong for languages like Dutch and German. On Dutch see Hoeksema (1991: 19), on German, Müller (2002a,c, 2003d, 2007e).³³ A German example is given in (77); several pages of attested examples can be found in the cited references and some more complex examples will also be discussed in Section 21.7.3 on page 641.

- (77) *Los damit geht es schon am 15. April.*³⁴
 PART there.with goes it already at.the 15 April
 'It already starts on April the 15th.'

Particle verbs are mini-idioms. So the conclusion is that idiomatic expressions that allow for a certain flexibility in order should not be represented as phrasal configurations describing adjacent elements. For some idioms, a lexical analysis along the lines of Sag (2007) seems to be required.³⁵ The issue of particle verbs will be taken up in Section 21.7.3 again, where we discuss evidence for/against phrasal analyses from neuro science.

³³ Some more fundamental remarks on introspection and corpus data with relation to particle verbs can also be found in Müller (2007e); Meurers & Müller (2009).

³⁴ *taz*, 01.03.2002, p. 8, see also Müller (2005c: 313).

³⁵ Note also that the German example is best described as a clause with a complex internally structured constituent in front of the finite verb and it is doubtful whether linearization-based proposals like the ones in Kathol (1995: 244–248) or Wetta (2011) can capture this. See also the discussion of multiple frontings in connection to Dependency Grammar in Section 11.7.1.

21.6 Arguments from language acquisition

The question whether language acquisition is pattern-based and hence can be seen as evidence for the phrasal approach has already been touched upon in the Sections 16.3 and 16.4. It was argued that constructions can be realized discontinuously in coordinations and hence it is the notion of dependency that has to be acquired, acquiring simple continuous patterns is not sufficient.

Since the present discussion about phrasal and lexical approaches deals with specific proposals, I would like to add two more special subsections: Section 21.6.1 deals with the recognizability of constructions and Section 21.6.2 discusses specific approaches to coordination in order to demonstrate how frameworks deal with the discontinuous realization of constructions.

21.6.1 Recognizability of constructions

I think that a purely pattern-based approach is weakened by the existence of examples like (78):

- (78) a. John tried to sleep.
b. John tried to be loved.

Although no argument of *sleep* is present in the phrase *to sleep* and neither a subject nor an object is realized in the phrase *to be loved*, both phrases are recognized as phrases containing an intransitive and a transitive verb, respectively.³⁶

The same applies to arguments that are supposed to be introduced/licensed by a phrasal construction: in (79) the resultative construction is passivized and then embedded under a control verb, resulting in a situation in which only the result predicate (*tot* ‘dead’) and the matrix verb (*geschossen* ‘shot’) are realized overtly within the local clause, bracketed here:

- (79) Der kranke Mann wünschte sich, [tot geschossen zu werden].³⁷
the sick man wished SELF dead shot to be
‘The sick man wanted to be shot dead.’

Of course passivization and control are responsible for these occurrences, but the important point here is that arguments can remain unexpressed or implicit and nevertheless a meaning that is usually connected to some overt realization of arguments is present (Müller 2007c: Section 4). So, what has to be acquired by the language learner is that when a result predicate and a main verb are realized together, they contribute the resultative meaning. To take another example, NP arguments that are usually realized in active resultative constructions may remain implicit in nominalizations like the ones in (80):

³⁶ Constructionist theories do not assume empty elements. Of course, in the GB framework the subject would be realized by an empty element. So it would be in the structure, although inaudible.

³⁷ Müller (2007c: 387).

- (80) a. dann scheint uns das Totschießen mindestens ebensoviel Spaß zu machen³⁸
 then seems us the dead-shooting at.least as.much fun to make
 ‘then the shooting dead seems to us to be as least as much fun’
- b. Wir lassen heut das Totgeschieße,
 we let today the annoying.repeated.shooting.dead
 Weil man sowas heut nicht tut.
 since one such.thing today not does
 Und wer einen Tag sich ausruht,
 and who a day SELF rests
 Der schießt morgen doppelt gut.³⁹
 this shoots tomorrow twice good
 ‘We do not shoot anybody today, since one does not do this today, and those
 who rest a day shoot twice as well tomorrow.’

The argument corresponding to the patient of the verb (the one who is shot) can remain unrealized, because of the syntax of nominalizations. The resultative meaning is still understood, which shows that it does not depend upon the presence of a resultative construction involving Subj V Obj and Obl.

21.6.2 Coordination and discontinuousness

The following subsection deals with analyses of coordination in some of the frameworks that were introduced in this book. The purpose of the section is to show that simple phrasal patterns have to be broken up in coordination structures. This was already mentioned in Section 16.3, but I think it is illuminative to have a look at concrete proposals.

In Categorical Grammar, there is a very elegant treatment of coordination (see Steedman 1991). A generalization with regard to so-called symmetric coordination is that two objects with the same syntactic properties are combined to an object with those properties. We have already encountered the relevant data in the discussion of the motivation for feature geometry in HPSG on page 269. Their English versions are repeated below as (81):

- (81) a. the man and the woman
 b. He knows and loves this record.
 c. He is dumb and arrogant.

Steedman (1991) analyzes examples such as those in (81) with a single rule:

- (82) $X \text{ conj } X \Rightarrow X$

³⁸ <https://www.elitepartner.de/forum/wie-gehen-die-maenner-mit-den-veraenderten-anspruechen-der-frauen-um-26421-6.html>. 26.03.0212.

³⁹ <http://home.arcor.de/finishlast/indexset.html?dontgetmestarted/091201-1.html>. 26.03.2012.

This rule combines two categories of the same kind with a conjunction in between to form a category that has the same category as the conjuncts.⁴⁰ Figure 21.9 shows the analysis of (81a) and Figure 21.10 gives an analysis of the corresponding English example of (81b).

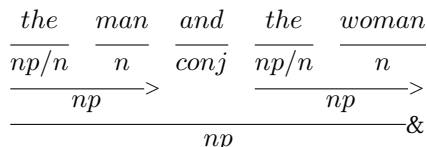


Figure 21.9: Coordination of two NPs in Categorical Grammar

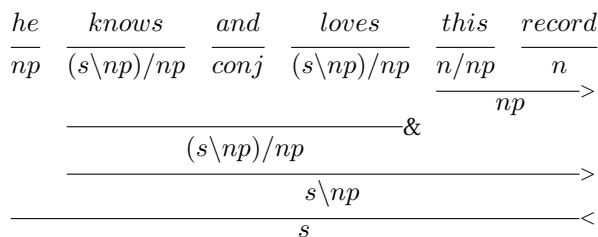


Figure 21.10: Coordination of two transitive verbs in Categorical Grammar

If we compare this analysis to the one that would have to be assumed in traditional phrase structure grammars, it becomes apparent what the advantages are: one rule was required for the analysis of NP coordination where two NPs are coordinated to form an NP and another was required for the analysis of V coordination. This is not only undesirable from a technical point of view, neither does it capture the basic property of symmetric coordination: two symbols with the same syntactic category are combined with each other.

It is interesting to note that it is possible to analyze phrases such as (83) in this way:

(83) give George a book and Martha a record

In Section 1.3.2.4, we have seen that these kind of sentences are problematic for constituent tests. However, in Categorical Grammar, it is possible to analyze them without any problems if one adopts rules for type raising and composition as Dowty (1988) and Steedman (1991) do. In Section 8.5, we have already seen forward type raising as well as

⁴⁰ Alternatively, one could analyze all three examples using a single lexical entry for the conjunction *and*: *and* is a functor that takes a word or phrase of any category to its right and after this combination then needs to be combined with an element of the same category to its left in order to form the relevant category after combining with this second element. This means that the category for *and* would have the form $(X \backslash X) / X$. This analysis does not require any coordination rules. If one wants to assume, as is common in GB/MP, that every structure has a head, then a headless analysis that assumes a special rule for coordination like the one in (82) would be ruled out.

forward and backward composition. In order to analyze (83), one would require backward type raising repeated in (84) and backward composition repeated in (85):

- (84) Backward type raising (< T)
 $X \Rightarrow T \backslash (T/X)$
- (85) Backward composition (< B)
 $Y/Z * X/Y = X/Z$

Dowty's analysis of (83) is given in Figure 21.11. VP stands for s\np.

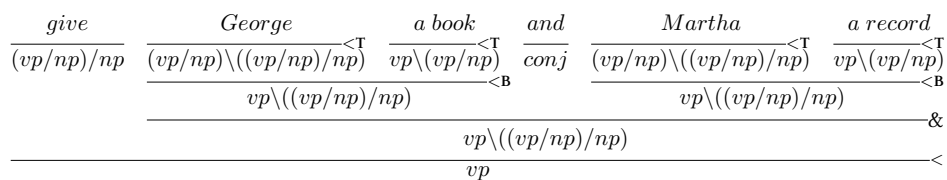


Figure 21.11: Gapping in Categorical Grammar

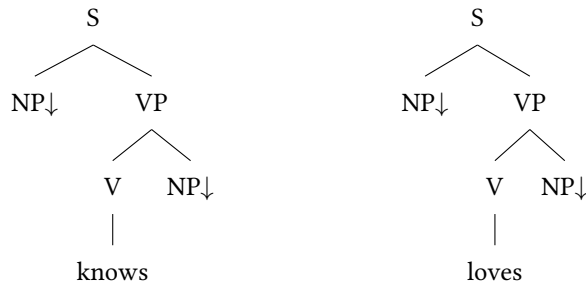
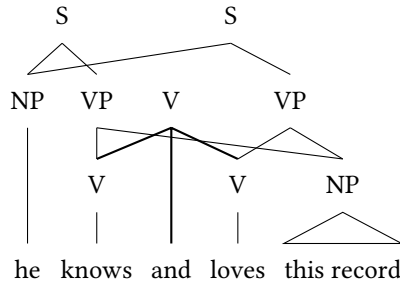
This kind of type-raising analysis was often criticized because raising categories leads to many different analytical possibilities for simple sentences. For example, one could first combine a type-raised subject with the verb and then combine the resulting constituent with the object. This would mean that we would have a $[[S\ V]\ O]$ in addition to the standard $[S\ [V\ O]]$ analysis. Steedman (1991) argues that both analyses differ in terms of information structure and it is therefore valid to assume different structures for the sentences in question.

I will not go into these points further here. However, I would like to compare Steedman's lexical approach to phrasal analyses: all approaches that assume that the ditransitive construction represents a continuous pattern encounter a serious problem with the examples discussed above. This can be best understood by considering the TAG analysis of coordination proposed by Sarkar & Joshi (1996). If one assumes that [Sbj TransVerb Obj] or [S [V O]] constitutes a fixed unit, then the trees in Figure 21.12 on the next page form the starting point for the analysis of coordination.

If one wants to use these trees/constructions for the analysis of (86), there are in principle two possibilities: one assumes that two complete sentences are coordinated or alternatively, one assumes that some nodes are shared in a coordinated structure.

- (86) He knows and loves this record.

Abeillé (2006) has shown that it is not possible to capture all the data if one assumes that cases of coordination such as those in (86) always involve the coordination of two complete clauses. It is also necessary to allow for lexical coordination of the kind we saw in Steedman's analysis (see also Section 4.6.3). Sarkar & Joshi (1996) develop a TAG analysis in which nodes are shared in coordinate structures. The analysis of (86) can be seen in Figure 21.13 on the following page. The subject and object nodes are only present

Figure 21.12: Elementary trees for *knows* and *loves*Figure 21.13: TAG analysis of *He knows and loves this record*.

once in this figure. The S nodes of both elementary trees both dominate the *he* NP. In the same way, the object NP node belongs to both VPs. The conjunction connects two verbs indicated by the thick lines. Sarkar and Joshi provide an algorithm that determines which nodes are to be shared. The structure may look strange at first, but for TAG purposes, it is not the derived tree but rather the derivation tree that is important, since this is the one that is used to compute the semantic interpretation. The authors show that the derivation trees for the example under discussion and even more complex examples can be constructed correctly.

In theories such as HPSG and LFG where structure building is, as in Categorical Grammar, driven by valence, the above sentence is unproblematic: both verbs are conjoined and then the combination behaves like a simple verb. The analysis of this is given in Figure 21.14 on the next page. This analysis is similar to the Categorical Grammar analysis in Figure 21.10.⁴¹ With Goldberg's plugging analysis one could also adopt this approach to

⁴¹ A parallel analysis in Dependency Grammar is possible as well. Tesnière's original analysis was different though. See Section 11.6.2.1 for discussion.

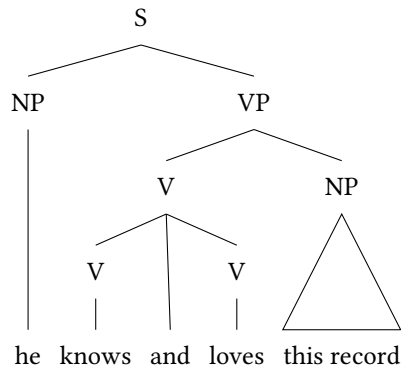


Figure 21.14: Selection-based analysis of *He knows and loves this record.* in tree notation

coordination: here, *knows* and *loves* would first be plugged into a coordination construction and the result would then be plugged into the transitive construction. Exactly how the semantics of *knows and loves* is combined with that of the transitive construction is unclear since the meaning of this phrase is something like *and'(know'(x, y), love'(x, y))*, that is, a complex event with at least two open argument slots *x* and *y* (and possibly additionally an event and a world variable depending on the semantic theory that is used). Goldberg would probably have to adopt an analysis such as the one in Figure 21.13 in order to maintain the plugging analysis.

Croft would definitely have to adopt the TAG analysis since the verb is already present in his constructions. For the example in (83), both Goldberg and Croft would have to draw from the TAG analysis in Figure 21.15.

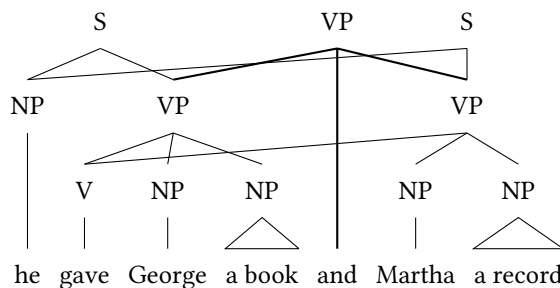


Figure 21.15: TAG analysis of *He gave George a book and Martha a record.*

The consequence of this is that one requires discontinuous constituents. Since coordina-

tion allows a considerable number of variants, there can be gaps between all arguments of constructions. An example with a ditransitive verb is given in (87):

- (87) He gave George and sent Martha a record.

See Crysmann (2008) and Beavers & Sag (2004) for HPSG analyses that assume discontinuous constituents for particular coordination structures.

The result of these considerations is that the argument that particular elements occur next to each other and this occurrence is associated with a particular meaning is considerably weakened. What competent speakers acquire is actually the knowledge that heads must occur with their arguments somewhere in the utterance and that all the requirements of the heads involved have to somehow be satisfied (θ Criterion, coherence/completeness, empty SUBCAT list). The heads themselves must not necessarily occur directly adjacent to their arguments. See the discussion in Section 16.3 about pattern-based models of language acquisition.

The semantics construction for complex structures such as those in Figure 21.15 is by no means trivial. In TAG, there is the derivation tree in addition to the derived tree that can then be used to compute the semantic contribution of a linguistic object. Construction Grammar does not have this separate level of representation. The question of how the meaning of the sentences discussed here is derived from their component parts still remains an open question for phrasal approaches.

Concluding the section on language acquisition, we assume that a valence representation is the result of language acquisition, since this is necessary for establishing the dependency relations in various possible configurations in an utterance. See also Behrens (2009: 439) for a similar conclusion.

21.7 Arguments from psycho- and neurolinguistics

This section has three parts: in the first part we compare approaches that assume that valence alternations are modeled by lexical rules, underspecification, or disjunctions with phrasal approaches. In Subsection 21.7.2 part we discuss approaches to light verb constructions and Subsection 21.7.3 is devoted to neurolinguistic findings.

21.7.1 Lexical rules vs. phrasal constructions

Goldberg (1995: Section 1.4.5) uses evidence from psycholinguistic experiments to argue against lexical approaches that use lexical rules to account for argument structure alternations: Carlson & Tanenhaus (1988) showed that sentences with true lexical ambiguity like those in (88) and sentences with two verbs with the same core meaning have different processing times.

- (88) a. Bill set the alarm clock onto the shelf.
b. Bill set the alarm clock for six.
- (89) a. Bill loaded the truck onto the ship.

- b. Bill loaded the truck with bricks.

Errors due to lexical ambiguity cause a bigger increase in processing time than errors in the use of the same verb. Experiments showed that there was a bigger difference in processing times for the sentences in (88) than for the sentences in (89). The difference in processing times between (89a) and (89b) would be explained by different preferences for phrasal constructions. In a lexicon-based approach one could explain the difference by assuming that one lexical item is more basic, that is, stored in the mental dictionary and the other is derived from the stored one. The application of lexical rules would be time consuming, but since the lexical items are related, the overall time consumption is smaller than the time that is needed to process two unrelated items (Müller 2002a: 405).

Alternatively one could assume that the lexical items for both valence patterns are the result of lexical rule applications. As with the phrasal constructions, the lexical rules would have different preferences. This shows that the lexical approach can explain the experimental results as well, so that they do not force us to prefer phrasal approaches.

Goldberg (1995: 18) claims that lexical approaches have to assume two variants of *load* with different meaning and that this would predict that *load* alternations would behave like two verbs that really have absolutely different meanings. The experiments discussed above show that such predictions are wrong and hence lexical analyses would be falsified. However, as was shown in Müller (2010a: Section 11.11.8.2), the argumentation contains two flaws: let's assume that the construction meaning of the construction that licenses (89a) is C_1 and the construction meaning of the construction that licenses (89b) is C_2 . Under such assumptions the semantic contribution of the two lexical items in the lexical analysis would be (90). *load(...)* is the contribution of the verb that would be assumed in phrasal analyses.

- (90) a. *load (onto)*: $C_1 \wedge \text{load}(\dots)$
 b. *load (with)*: $C_2 \wedge \text{load}(\dots)$

(90) shows that the lexical items partly share their semantic contribution. We hence predict that the processing of the dispreferred argument realization of *load* is simpler than the dispreferred meaning of *set*: in the latter case a completely new verb has to be activated while in the first case parts of the meaning are activated already. (See also Croft (2003: 64–65) for a brief rejection of Goldberg's interpretation of the experiment that corresponds to what is said here)

Goldberg (1995: 107) argues against lexical rule-based approaches for locative alternations like (91), since according to her such approaches have to assume that one of the verb forms has to be the more basic form.

- (91) a. He loaded hay onto the wagon.
 b. He loaded the wagon with hay.

She remarks that this is problematic since we do not have clear intuitions about what the basic and what the derived forms are. She argues that the advantage of phrasal approaches is that various constructions can be related to each other without requiring

the assumption that one of the constructions is more basic than the other. There are two phrasal patterns and the verb is used in one of the two patterns. This criticism can be addressed in two ways: first one could introduce two lexical types (for instance *onto-verb* and *with-verb*) into a type hierarchy. The two types correspond to two valence frames that are needed for the analysis of (91a) and (91b). These types can have a common supertype (*onto-with-verb*) which is relevant for all *spray/load* verbs. One of the subtypes or the respective lexical item of the verb is the preferred one. This corresponds to a disjunction in the lexicon, while the phrasal approach assumes a disjunction in the set of phrasal constructions.

A variant of this approach is to assume that the lexical description of *load* just contains the supertype, that describes all *spray/load* verbs. Since model theoretic approaches assume that all structures that are models of utterances contain only maximally specific types (see for instance King (1999) and Pollard & Sag (1994: 21)), it is sufficient to say about verbs like *load* that they are of type *onto-with-verb*. Since this type has exactly two subtypes, *load* has to be either *onto-verb* or *with-verb* in an actual model.⁴²

A second option is to stick with lexical rules and to assume a single representation for the root of a verb that is listed in the lexicon. In addition, one assumes two lexical rules that map this basic lexical item onto other items that can be used in syntax after being inflected. The two lexical rules can be described by types that are part of a type hierarchy and that have a common supertype. This would capture commonalities between the lexical rules. We therefore have the same situation as with phrasal constructions (two lexical rules vs. two phrasal constructions). The only difference is that the action is one level deeper in the lexical approach, namely in the lexicon (Müller 2002a: 405–406).

The argumentation with regard to the processing of resultative constructions like (92c) is parallel:

- (92) a. He drinks.
- b. He drinks the milk.
- c. He drinks the pub empty.

When humans parse a sentence they build up structure incrementally. If one hears a word that is incompatible with the current hypothesis, the parsing process breaks down or the current hypothesis is revised. In (92c) *the pub* does not correspond to the normal transitive use of *drink*, so the respective hypothesis has to be revised. In the phrasal approach the resultative construction would have to be used instead of the transitive construction. In the lexical analysis the lexical item that is licensed by the resultative lexical rule would have to be used rather than the bi-valent one. Building syntactic structure and lexicon access in general place different demands on our processing capacities. However, when (92c) is parsed, the lexical items for *drink* are active already, we only have to use a different one. It is currently unclear to us whether psycholinguistic experiments can differentiate between the two approaches, but it seems to be unlikely.

⁴² This analysis does not allow one to specify verb specific preferences for one of the realization patterns since the lexicon contains the general type only.

21.7.2 Light verbs

Wittenberg, Jackendoff, Kuperberg, Paczynski, Snedeker & Wiese (2014) report on a number of experiments that test predictions that are made by various approaches to light verb constructions. (93a) shows a typical light verb construction: *take* is a light verb that is combined with the nominal that provides the main predication.

- (93) a. take a walk to the park
b. walk to the park

Wittenberg & Piñango (2011) examined two psychologically plausible theories of light verb constructions. The phrasal approach assumes that light verb constructions are stored objects associated with semantics (Goldberg 2003b). The alternative compositional view assumes that the semantics is computed as a fusion of the semantics of the event noun and the semantics of the light verb (Grimshaw 1997; Butt 2003; Jackendoff 2002; Culicover & Jackendoff 2005; Müller 2010b; Beavers et al. 2008). Since light verb constructions are extremely frequent (Piñango, Mack & Jackendoff 2006; Wittenberg & Piñango 2011: 399), the phrasal approaches that assume that light verb constructions are stored items with the object and verb fixed predict that light verb constructions should be retrievable faster than non-light verb constructions like (94) (Wittenberg & Piñango 2011: 396).

- (94) take a frisbee to the park

This is not the case. As Wittenberg and Piñango found, there is no difference in processing at the licensing condition (the noun in VO languages like English and the verb in OV languages like German).

However, Wittenberg & Piñango (2011) found an increased processing load 300ms *after* the light verb construction is processed. The authors explain this by assuming that semantic integration of the noun with the verbal meaning takes place after the syntactic combination. While the syntactic combination is rather fast, the semantic computation takes additional resources and this is measurable at 300ms. The verb contributes aspectual information and integrates the meaning of the nominal element. The semantic roles are fused. The resource consumption effect would not be expected if the complete light verb construction were a stored item that is retrieved together with the complete meaning (p. 404). We can conclude that Wittenberg and Piñango's results are compatible with the lexical proposal, but are incompatible with the phrasal view.

21.7.3 Arguments from Neurolinguistics

Pulvermüller, Cappelle & Shtyrov (2013) discuss neurolinguistic facts and relate them to the CxG view of grammar theory. One important finding is that deviant words (lexical items) cause brain responses that differ in polarity from brain responses on incorrect strings of words, that is, syntactic combinations. This suggests that there is indeed an empirical basis for deciding the issue.

Concerning the standard example of the caused motion construction in (95) the authors write the following:

- (95) She sneezed the foam off the cappuccino.⁴³

this constellation of brain activities may initially lead to the co-activation of the verb *sneeze* with the DCNAs for *blow* and thus to the sentence mentioned. Ultimately, such co-activation of a one-place verb and DCNAs associated with other verbs may result in the former one-place verb being subsumed into a three-place verb category and DCNA set, a process which arguably has been accomplished for the verb *laugh* as used in the sequence *laugh NP off the stage*. (Pulvermüller, Cappelle & Shtyrov 2013)

A DCNA is a discrete combinatorial neuronal assembly. Regarding the specifics of DCNAs the authors write that

Apart from linking categories together, typical DCNAs establish a temporal order between the category members they bind to. DCNAs that do not impose temporal order (thus acting, in principle, as AND units for two constituents) are thought to join together constituents whose sequential order is free or allow for scrambling. (Pulvermüller, Cappelle & Shtyrov 2013: 404)

I believe that this view is entirely compatible with the lexical view outlined above: the lexical item or DCNA requires certain arguments to be present. A lexical rule that relates an intransitive verb to one that can be used in the caused motion construction is an explicit representation of what it means to activate the valence frame of *blow*.

The authors cite earlier work (Cappelle, Shtyrov & Pulvermüller 2010) and argue that particle verbs are lexical objects, admitting for a discontinuous realization of particle verbs despite their lexical status (p. 21). They restrict their claim to frequently occurring particle verbs. This claim is of course compatible with our assumptions here, but the differences in brain behavior are interesting when it comes to fully productive uses of particle verbs. For instance any semantically appropriate mono-valent verb in German can be combined with the aspectual particle *los*: *lostanzen* ‘start to dance’, *loslachen* ‘start to laugh’, *lossingen* ‘start to sing’, Similarly, the combination of mono-valent verbs with the particle *an* with the reading *directed-towards* is also productive: *anfahren* ‘drive towards’, *anlachen* ‘laugh in the direction of’, *ansegeln* ‘sail towards’, ... (see Stiebels (1996) on various productive patterns). The interesting question is how particle verbs behave that follow these patterns but occur with low frequency. This is still an open question as far as the experimental evidence is concerned, but as I argue below lexical proposals to particle verbs as the one suggested by Müller (2003d) are compatible with both possible outcomes.

Summarizing the discussion so far, lexical approaches are compatible with the accumulated neurobiological evidence and as far as particle verbs are concerned they seem to be better suited than the phrasal proposals by Booij (2002: Section 2) and Blom (2005)

⁴³ Goldberg (2006: 42).

(See Section 21.5.1 for discussion). However, in general, it remains an open question what it means to be a discontinuous lexical item. The idea of discontinuous words is pretty old (Wells 1947), but there have not been many formal accounts of this idea. Nunberg, Sag & Wasow (1994) suggest a representation in a linearization-based framework of the kind that was proposed by Reape (1994) and Kathol (1995: 244–248) and Crysmann (2002) worked out such analyses in detail. Kathol’s lexical item for *aufwachen* ‘to wake up’ is given in (96):

(96) *aufwachen* (following Kathol 1995: 246):

$$\left[\begin{array}{l} \dots | \text{HEAD } \boxed{1} \text{ verb} \\ \dots | \text{VCOMP } \langle \rangle \\ \text{DOM } \left\langle \left[\begin{array}{l} \langle \text{wachen} \rangle \\ \dots | \text{HEAD } \boxed{1} \\ \dots | \text{VCOMP } \langle \boxed{2} \rangle \end{array} \right] \right\rangle \circ \left\langle \left[\begin{array}{l} \langle \text{auf} \rangle \\ \text{SYNSEM } \boxed{2} \left[\begin{array}{l} \dots | \text{HEAD } \left[\begin{array}{l} \text{FLIP } - \\ \text{sepref} \end{array} \right] \end{array} \right] \right] \right\rangle \\ \text{vc} \end{array} \right]$$

The lexical representation contains the list-valued feature *DOM* that contains a description of the main verb and the particle (see Section 11.7.2.2 for details). The *DOM* list is a list that contains the dependents of a head. The dependents can be ordered in any order provided no linearization rule is violated (Reape 1994). The dependency between the particle and the main verb was characterized by the value of the *VCOMP* feature, which is a valence feature for the selection of arguments that form a complex predicate with their head. The shuffle operator \circ concatenates two lists without specifying an order between the elements of the two lists, that is, both *wachen*, *auf* and *auf*, *wachen* are possible. The little marking *vc* is an assignment to a topological field in the clause.

I criticized such linearization-based proposals since it is unclear how analyses that claim that the particle is just linearized in the domain of its verb can account for sentence like (97), in which complex syntactic structures are involved (Müller 2007c). German is a V2 language and the fronting of a constituent into the position before the finite verb is usually described as some sort of nonlocal dependency, that is, even authors who assume linearization-based analyses do not assume that the initial position is filled by simple reordering of material (Kathol 2000; Müller 1999a, 2002a; Bjerre 2006).⁴⁴

- (97) a. [_{vf} [_{mf} Den Atem] [_{vc} an]] hielt die ganze Judenheit.⁴⁵
 the breath PART held the whole Jewish.community
 ‘The whole Jewish community held their breath.’

⁴⁴ Kathol (1995: Section 6.3) working in HPSG suggested such an analysis for simple sentences, but later changed his view. Wetta (2011) also working in HPSG assumes a purely linearization-based approach. Similarly Groß & Osborne (2009) working in Dependency Grammar assume that there is a simple dependency structure in simple sentences while there are special mechanisms to account for extraction out of embedded clauses. I argue against such proposals in Müller (2015b) referring to the scope of adjuncts, coordination of simple with complex sentences and Across the Board Extraction and apparent multiple frontings. See also Section 11.7.1.

⁴⁵ Lion Feuchtwanger, *Jud Süß*, p. 276, quoted from Grubačić (1965: 56).

- b. [vf [mf Wieder] [vc an]] treten auch die beiden Sozialdemokraten.⁴⁶
again PART kick also the two social.democrats
‘The two Social Democrats are also running for office again.’
- c. [vf [vc Los] [nf damit]] geht es schon am 15. April.⁴⁷
PART there.with went it already at.the 15 April
‘It already starts on April the 15th.’

The conclusion that has to be drawn from examples like (97) is that particles interact in complex ways with the syntax of sentences. This is captured by the lexical treatment that was suggested in Müller (2002a: Chapter 6) and Müller (2003d): the main verb selects for the verbal particle. By assuming that *wachen* selects for *auf* the tight connection between verb and particle is represented.⁴⁸ Such a lexical analysis provides an easy way to account for fully intransparent particle verbs like *an-fangen* ‘to begin’. However, I also argued for a lexical treatment of transparent particle verbs like *losfahren* ‘to start to drive’ and *jemanden/etwas anfahren* ‘drive directed towards somebody/something’. The analysis involves a lexical rule that licenses a verbal item selecting for an adjunct particle. The particles *an* and *los* can modify verbs and contribute arguments (in the case of *an*) and the particle semantics. This analysis can be shown to be compatible with the neuro-mechanical findings: if it is the case that even transparent particle verb combinations with low frequency are stored, then the rather general lexical rule that I suggested in the works cited above is the generalization of the relation between a large amount of lexical particle verb items and their respective main verb. The individual particle verbs would be special instantiations that have the form of the particle specified as it is also the case for non-transparent particle verbs like *anfangen*. If it should turn out that productive particle verb combinations with particle verbs of low frequency cause syntactic reflexes in the brain, this could be explained as well: the lexical rule licenses an item that selects for an adverbial element. This selection would then be seen as parallel to the relation between the determiner and the noun in the NP *der Mut* ‘the courage’, which Cappelle et al. (2010: 191) discuss as an example of a syntactic combination. Note that my analysis is also compatible with another observation made by Shtyrov, Pihko & Pulvermüller (2005): Morphological affixes also cause the lexical reflexes. In my analysis the stem of the main verb is related to another stem that selects for a particle. This stem can be combined with (derivational and inflectional) morphological affixes causing the lexical activation pattern in the brain. After this combination the verb is combined with the particle and the dependency can be either a lexical or a syntactic one, depending on the results of the experiments to be carried out. The analysis is compatible with both results.

Note that my analysis allows the principle of lexical integrity to be maintained. I

⁴⁶ taz, bremen, 24.05.2004, p. 21.

⁴⁷ taz, 01.03.2002, p. 8.

⁴⁸ Cappelle et al. (2010: 197) write: *the results provide neurophysiological evidence that phrasal verbs are lexical items. Indeed, the increased activation that we found for existing phrasal verbs, as compared to infelicitous combinations, suggests that a verb and its particle together form one single lexical representation, i. e. a single lexeme, and that a unified cortical memory circuit exists for it, similar to that encoding a single word* I believe that my analysis is compatible with this statement.

therefore do not follow (Cappelle, Shtyrov & Pulvermüller 2010: 198), who claim that they *provide proof that potentially separable multi-word items can nonetheless be word-like themselves, and thus against the validity of a once well-established linguistic principle, the Lexical Integrity Principle*. I agree that non-transparent particle verbs are multi-word lexemes, but the existence of multi-word lexemes does not show that syntax has access to the word internal morphological structure. The parallel between particle verbs and clearly phrasal idioms was discussed in Müller (2002a,c) and it was concluded that idiom-status is irrelevant for the question of wordhood. Since the interaction of clearly phrasal idioms with derivational morphology as evidenced by examples like (98) did not force grammarians to give up on lexical integrity, it can be argued that particle verbs are not convincing evidence for giving up the Lexical Integrity Principle either.⁴⁹

- (98) a. Er hat ins Gras gebissen.
 he has in.the gras bit
 ‘He bit the dust.’
- b. „Heath Ledger“ kann ich nicht einmal schreiben, ohne dass mir sein ins
 Heath Ledger can I not even write without that me his in.the
 Gras-Gebeiß wieder so wahnsinnig leid tut⁵⁰
 grass.biting again so crazy sorrow does
 ‘I cannot even write “Heath Ledger” without being sad again about his biting
 the dust.’

The example in (98b) involves the discontinuous derivation with the circumfix *Ge-* *-e* (Lüdeling 2001: Section 3.4.3; Müller 2002a: 324–327, 372–377; Müller 2003d: Section 2.2.1, Section 5.2.1). Still the parts of the idiom *ins Gras beiß-* ‘bite the dust’ are present and with them the idiomatic reading. See Sag (2007) for a lexical analysis of idioms that can explain examples like (98).

So, while I think that it is impossible to distinguish phrasal and lexical approaches for phenomena where heads are used with different valence patterns (Section 21.7.1), there seem to be ways to test whether patterns with high frequency and strong collocations should be analyzed as one fixed chunk of material with a fixed form and a fixed meaning or whether they should be analyzed compositionally.

21.8 Arguments from statistical distribution

In this section, we want to look at arguments from statistics that have been claimed to support a phrasal view. We first look at data-oriented parsing, a technique that was successfully used by Bod (2009b) to model language acquisition and then we turn to the collostructional analysis by Stefanowitsch & Gries (2009). Lastly we argue that these distributional analyses cannot decide the question whether argument structure constructions are phrasal or lexical.

⁴⁹ However, see Booi (2009) for some challenges to lexical integrity.

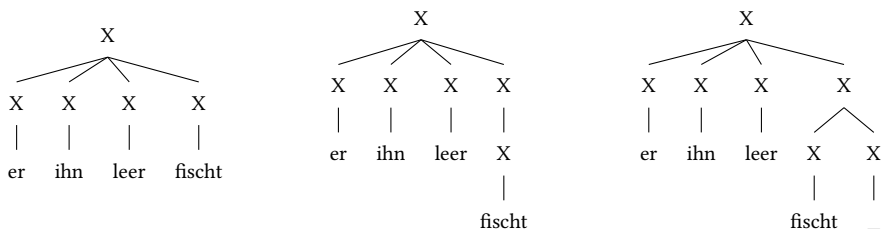
⁵⁰ <http://www.coffee2watch.at/egala>. 23.03.2012

21.8.1 Unsupervised Data-Oriented Parsing

In Section 13.8.3, we saw Rens Bod's approach to the structuring of natural language utterances. If one assumes that language is acquired from the input without innate knowledge, the structure that Bod extracts from the distribution of words would have to be the ones that children also learn (parts of speech, meaning and context would also have to be included). These structures would then also have to be the ones assumed in linguistic theories. Since Bod does not have enough data, he carried out experiments under the assumption of binary-branching trees and for this reason, it is not possible to draw any conclusions from his work about whether rules license flat or binary-branching structures. There will almost certainly be interesting answers to this question in the future. What can certainly not be determined in a distribution-based analysis is the exact node in the tree where meaning is introduced. Bod (2009a: 132) claims that his approach constitutes "a testable realization of CxG" in the Goldbergian sense, but the trees that he can construct do not help us to decide between phrasal or lexical analyses or analyses with empty heads. These alternative analyses are represented in Figure 21.16 on the next page.⁵¹ The first figure stands for a complex construction that contributes the meaning as a whole. The second figure corresponds to the analysis with a lexical rule and the third corresponds to the analysis with an empty head. A distributional analysis cannot decide between these theoretical proposals. Distribution is computed with reference to words, what the words actually mean is not taken into account. As such, it is only possible to say that the word *fischt* 'fishes' occurs in a particular utterance, however it is not possible to see if this word contains resultative semantics or not. Similarly, a distribution analysis does not help one to distinguish between analyses with or without a lexical head. The empty head is not perceptible in the signal. It is a theoretical construct and, as we have seen in Section 19.5, it is possible to translate an analysis using an empty head into one with a lexical rule. For the present example, any argumentation for a particular analysis will be purely theory-internal.

Although U-DOP cannot help us to decide between analyses, there are areas of grammar for which these structures are of interest: under the assumption of binary-branching

⁵¹ The discussion is perhaps easier to follow if one assumes flat structures rather than binary-branching ones.



The first figure corresponds to the Goldbergian view of phrasal constructions where the verb is inserted into the construction and the meaning is present at the top-most node. In the second figure, there is a lexical rule that provides the resultative semantics and the corresponding valence information. In the third analysis, there is an empty head that combines with the verb and has ultimately the same effect as the lexical rule.

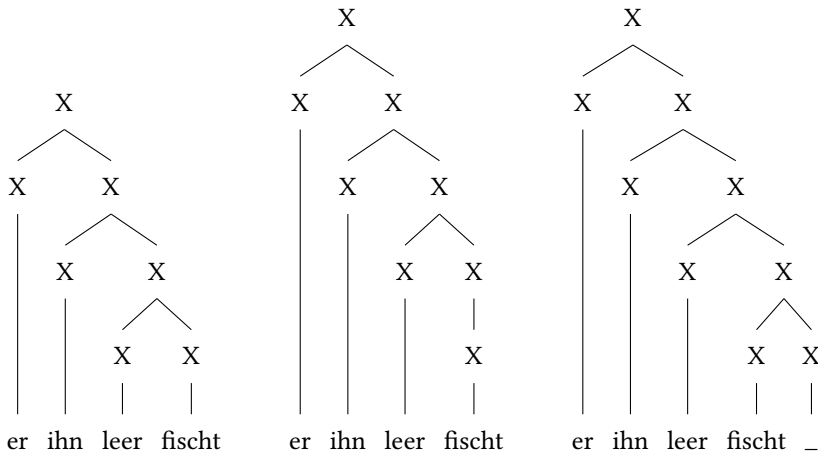


Figure 21.16: Three possible analyses for resultative construction: holistic construction, lexical rule, empty head

structures, there are different branching possibilities depending on whether one assumes an analysis with verb movement or not. This means that although one does not see an empty element in the input, there is a reflex in statistically-derived trees. The left tree in Figure 21.17 shows a structure that one would expect from an analysis following Steedman (2000: 159) (see Section 8.3). The tree on the right shows a structure that would be expected from a GB-type verb movement analysis (see Section 3.2). But at present,

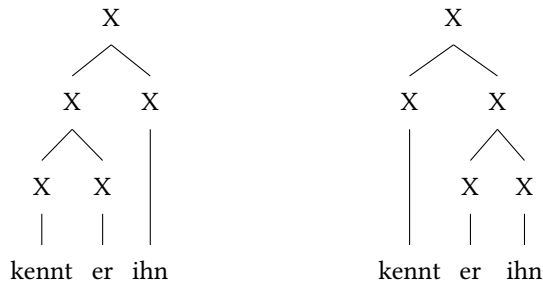


Figure 21.17: Structures corresponding to analysis with or without verb movement

there is no clear finding in this regard (Bod, p. c. 2009). There is a great deal of variance in the U-DOP trees. The structure assigned to an utterance depends on the verb (Bod referring to the Wall Street Journal). Here, it would be interesting to see if this changes with a larger data sample. In any case, it would be interesting to look at how all verbs as well as particular verb classes behave. The U-DOP procedure applies to trees contain-

ing at least one word each. If one makes use of parts of speech in addition, the result is structures that correspond to the ones we have seen in the preceding chapters. Subtrees would then not have two Xs as their daughters but rather NP and V, for example. It is also possible to do statistic work with these kind of subtrees and use the part of speech symbols of words (the preterminal symbols) rather than the words themselves in the computation. For example, one would get trees for the symbol V instead of many trees for specific verbs. So instead of having three different trees for *küssen* ‘kiss’, *kennen* ‘know’ and *sehen* ‘see’, one would have three identical trees for the part of speech verb that corresponds to the trees that are needed for transitive verbs. The probability of the V tree therefore is higher than the probabilities of the trees for the individual verbs. Therefore one would have a better set of data to compute structures for utterances such as those in Figure 21.17. I believe that there are further results in this area to be found in years to come.

Concluding this subsection, we contend that Bod’s paper is a milestone in the Poverty of the Stimulus debate, but it does not and cannot show that a particular version of constructionist theories, namely the phrasal one, is correct.

21.8.2 Collostructions

Stefanowitsch & Gries (2009: Section 5) assume a plugging analysis: “words occur in (slots provided by) a given construction if their meaning matches that of the construction”. The authors claim that their *collostructional analysis has confirmed [the plugging analysis] from various perspectives*. Stefanowitsch and Gries are able to show that certain verbs occur more often than not in particular constructions, while other verbs never occur in the respective constructions. For instance, *give*, *tell*, *send*, *offer* and *show* are attracted by the Ditransitive Construction, while *make* and *do* are repelled by this construction, that is they occur significantly less often in this construction than what would be expected given the overall frequency of verbs in the corpus. Regarding this distribution the authors write:

These results are typical for collexeme analysis in that they show two things. First, there are indeed significant associations between lexical items and grammatical structures. Second, these associations provide clear evidence for semantic coherence: the strongly attracted collexemes all involve a notion of ‘transfer’, either literally or metaphorically, which is the meaning typically posited for the ditransitive. This kind of result is typical enough to warrant a general claim that collostructional analysis can in fact be used to identify the meaning of a grammatical construction in the first place. (Stefanowitsch & Gries 2009: 943)

We hope that the preceding discussion made clear that the distribution of words in a corpus cannot be seen as evidence for a phrasal analysis. The corpus study shows that *give* usually is used with three arguments in a certain pattern that is typical for English (Subject Verb Object1 Object2) and that this verb forms a cluster with other verbs that have a transfer component in their meaning. The corpus data do not show whether this

meaning is contributed by a phrasal pattern or by lexical entries that are used in a certain configuration.

21.9 Conclusion

The essence of the lexical view is that a verb is stored with a valence structure indicating how it combines semantically and syntactically with its dependents. Crucially, that structure is abstracted from the actual syntactic context of particular tokens of the verb. Once abstracted, that valence structure can meet other fates besides licensing the phrasal structure that it most directly encodes: it can undergo lexical rules that manipulate that structure in systematic ways; it can be composed with the valence structure of another predicate; it can be coordinated with similar verbs; and so on. Such an abstraction allows for simple explanations of a wide range of robust, complex linguistic phenomena. We have surveyed the arguments against the lexical valence approach, and in favor of a phrasal representation instead. We find the case for a phrasal representation of argument structure to be unconvincing: there are no compelling arguments in favor of such approaches, and they introduce a number of problems:

- They offer no account for the interaction of valence changing processes and derivational morphology.
- They offer no account for the interaction of valence changing processes and coordination of words.
- They offer no account for the iteration of valence changing processes.
- They overgenerate, unless a link between lexical items and phrasal constructions is assumed.
- They offer no account for distribution of arguments in partial fronting examples.

Assuming a lexical valence structure allows us to solve all the problems that arise with phrasal approaches.

21.10 Why (phrasal) constructions?

In previous sections, I have argued against assuming too much phrasality in grammatical descriptions. If one wishes to avoid transformations in order to derive alternative patterns from a single base structure, while still maintaining lexical integrity, then phrasal analyses become untenable for analyzing all those phenomena where changes in valence and derivational morphology interact. There are, however, some areas in which these two do not interact. In these cases, there is mostly a choice between analyses with silent heads and those with phrasal constructions. In this section, I will discuss some of these cases.

21.10.1 Verbless directives

Jacobs (2008) showed that there are linguistic phenomena where it does not make sense to assume that there is a head in a particular group of words. These configurations are best described as phrasal constructions, in which the adjacency of particular constituents leads to a complete meaning that goes beyond the sum of its parts. Examples of the phenomena that are discussed by Jacobs are phrasal templates such as those in (99) and verbless directives as in (104):

- (99) Pro_{+w,caus/purp} NP
 a. Wozu Konstruktionen?
 why constructions
 ‘Why constructions?’
 b. Warum ich?
 why I.NOM
 ‘Why me?’
- (100) NP_{acc} Y_{PP/A/Adv}
 Den Hut in der Hand (kam er ins Zimmer).
 the hat in the hand came he into.the room
 ‘(He came into the room) hat in hand.’

In (99), we are dealing with abbreviated questions:

- (101) a. Wozu braucht man Konstruktionen? / Wozu sollte man Konstruktionen
 to.what needs one constructions to.what should one constructions
 annehmen?
 assume
 ‘Why do we need constructions?’ / ‘Why should we assume constructions?’
 b. Warum soll ich das machen? / Warum wurde ich ausgewählt? / Warum
 why should I that do why was I chosen why
 passiert mir sowas?
 happens me something.like.that
 ‘Why should I do that?’ / ‘Why was I chosen?’ / ‘Why do things like that
 happen to me?’

In (100), a participle has been omitted:

- (102) Den Hut in der Hand haltend kam er ins Zimmer.
 the hat.ACC in the hand holding came he in.the room
 ‘He came into the room hat in hand.’

Cases such as (100) can be analyzed with an empty head that corresponds to *haltend* ‘holding’. For (99), on the other hand, one would require either a syntactic structure with multiple empty elements, or an empty head that selects both parts of the construction

and contributes the components of meaning that are present in (101). If one adopts the first approach with multiple silent elements, then one would have to explain why these elements cannot occur in other constructions. For example, it would be necessary to assume an empty element corresponding to *man* ‘one’/‘you’. But such an empty element could never occur in embedded clauses since subjects cannot simply be omitted there:

- (103) * weil dieses Buch gerne liest
 because this book gladly reads
 Intended: ‘because he/she/it likes to read this book’

If one were to follow the second approach, one would be forced to assume an empty head with particularly odd semantics.

The directives in (104) and (105) are similarly problematic (see also Jackendoff & Pinker (2005: 220) for parallel examples in English):

- (104) a. Her mit dem Geld / dem gestohlenen Geld!
 here with the money the stolen money
 ‘Hand over the (stolen) money!’
 b. Weg mit dem Krempel / dem alten Krempel!
 away with the junk the old junk
 ‘Get rid off this (old) junk!’
 c. Nieder mit den Studiengebühren / den sozialfeindlichen Studiengebühren!
 down with the tuition.fees the antisocial tuition.fees
 ‘Down with (antisocial) tuition fees!’
- (105) a. In den Müll mit diesen Klamotten.
 in the trash with these clothes
 ‘Throw these clothes in the trash!’
 b. Zur Hölle mit dieser Regierung.
 to.the hell with this government
 ‘To hell with this government!’

Here, it is also not possible to simply identify an elided verb. It is, of course, possible to assume an empty head that selects an adverb or a *mit*-PP, but this would be *ad hoc*. Alternatively, it would be possible to assume that adverbs in (104) select the *mit*-PP. Here, one would have to disregard the fact that adverbs do not normally take any arguments. The same is true of Jacobs’ examples in (105). For these, one would have to assume that *in* and *zur* ‘to the’ are the respective heads. Each of the prepositions would then have to select a noun phrase and a *mit*-PP. While this is technically possible, it is as unattractive as the multiple lexical entries that Categorical Grammar has to assume for pied-piping constructions (see Section 8.6).

A considerably more complicated analysis has been proposed by G. Müller (2009a). Müller treats verbless directives as antipassive constructions. Antipassive constructions

involve either the complete suppression of the direct object or its realization as an oblique element (PP). There can also be morphological marking on the verb. The subject is normally not affected by the antipassive but can, however, receive a different case in ergative case systems due to changes in the realization of the object. According to G. Müller, there is a relation between (106a) and (106b) that is similar to active-passive pairs:

- (106) a. [dass] jemand diese Klamotten in den Müll schmeißt
 that somebody these clothes in the trash throws
 ‘that somebody throws these clothes into the trash’
 b. In den Müll mit diesen Klamotten!
 in the rubbish with these clothes
 ‘Throw these clothes into the garbage!’

An empty passive morpheme absorbs the capability of the verb to assign accusative (see also Section 3.4 on the analysis of the passive in GB theory). The object therefore has to be realized as a PP or not at all. It follows from Burzio’s Generalization that as the accusative object has been suppressed, there cannot be an external argument. G. Müller assumes, like proponents of Distributed Morphology (e.g. Marantz 1997), that lexical entries are inserted into complete trees post-syntactically. The antipassive morpheme creates a feature bundle in the relevant tree node that is not compatible with German verbs such as *schmeißen* ‘throw’ and this is why only a null verb with the corresponding specifications can be inserted. Movement of the directional PP is triggered by mechanisms that cannot be discussed further here. The antipassive morpheme forces an obligatory reordering of the verb in initial position (to C, see Section 3.2 and Section 4.2). By stipulation, filling the prefield is only possible in sentences where the C position is filled by a visible verb and this is why G. Müller’s analysis does only derive V1 clauses. These are interpreted as imperatives or polar questions. Figure 21.18 on the next page gives the analysis of (106b). Budde (2010) and Maché (2010) note that the discussion of the data has neglected the fact that there are also interrogative variants of the construction:

- (107) a. Wohin mit den Klamotten?
 where.to with the clothes
 ‘Where should the clothes go?’
 b. Wohin mit dem ganzen Geld?
 where.to with the entire money
 ‘Where should all this money go?’

Since these questions correspond to V2 sentences, one therefore does not require the constraint that the prefield can only be filled if the C position is filled.

One major plus point of this analysis is that it derives the different sentence types that are possible with these kind of constructions: the V1-variants correspond to polar questions and imperatives, and the V2-variants with a question word correspond to *wh*-questions. A further consequence of the approach that was pointed out by Gereon Müller is that no further explanation is required for other interactions with the grammar. For

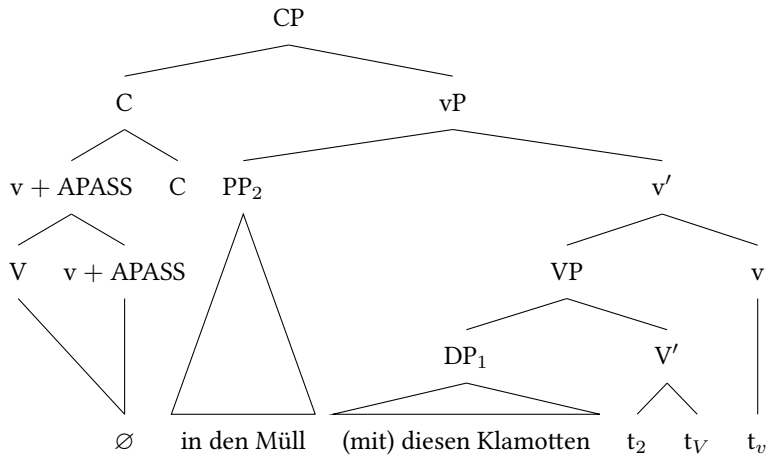


Figure 21.18: *In den Müll mit diesen Klamotten* 'in the trash with these clothes' as an antipassive following Gereon Müller (2009)

example, the way in which the constructions interact with adverbs follows from the analysis:

- (108) a. Schmeiß den Krempel weg!
throw the junk away
b. Schmeiß den Krempel schnell weg!
throw the junk quickly away
c. ?* Schmeiß den Krempel sorgfältig weg!
throw the junk carefully away
- (109) a. Weg mit dem Krempel!
away with the junk
b. Schnell weg mit dem Krempel!
quickly away with the junk
c. ?* Sorgfältig weg mit dem Krempel!
carefully away with the junk

Nevertheless one should still bear the price of this analysis in mind: it assumes an empty antipassive morpheme that is otherwise not needed in German. It would only be used in constructions of the kind discussed here. This morpheme is not compatible with any verb and it also triggers obligatory verb movement, which is something that is not known from any other morpheme that is used to form verb diatheses.

The costs of this analysis are of course less severe if one assumes that humans already have this antipassive morpheme anyway, that is, this morpheme is part of our innate

Universal Grammar. But if one follows the argumentation from the earlier sections of this chapter, then one should only assume innate linguistic knowledge if there is no alternative explanation.

G. Müller's analysis can be translated into HPSG. The result is given in (110):

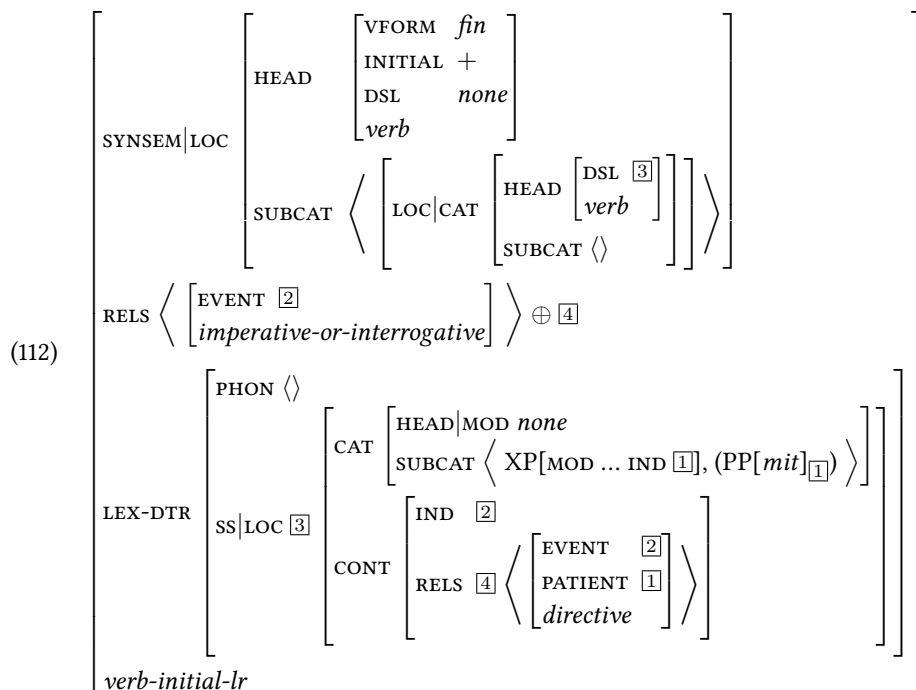
$$(110) \left[\begin{array}{l} \text{RELS} \left\langle \left[\begin{array}{l} \text{EVENT} \boxed{2} \\ \text{imperative-or-interrogative} \end{array} \right] \right\rangle \oplus \square \\ \text{LEX-DTR} \left[\begin{array}{l} \text{PHON} \langle \rangle \\ \text{SS|LOC} \left[\begin{array}{l} \text{CAT} \left[\begin{array}{l} \text{HEAD|MOD} \textit{none} \\ \text{SUBCAT} \left\langle \text{XP}[\text{MOD} \dots \text{IND} \boxed{1}], (\text{PP}[\textit{mit}]_{\boxed{1}}) \right\rangle \end{array} \right] \\ \text{CONT} \left[\begin{array}{l} \text{IND} \boxed{2} \\ \text{RELS} \left\langle \left[\begin{array}{l} \text{EVENT} \boxed{2} \\ \text{PATIENT} \boxed{1} \\ \textit{directive} \end{array} \right] \right\rangle \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \textit{verb-initial-lr}$$

(110) contains a lexical entry for an empty verb in verb-initial position. *directive'* is a placeholder for a more general relation that should be viewed as supertype of all possible meanings of this construction. These subsume both *schmeißen* 'to throw' and cases such as (111) that were pointed out to me by Monika Budde:

- (111) Und mit dem Klavier ganz langsam durch die Tür!
 and with the piano very slowly through the door
 'Carry the piano very slowly through the door!'

Since only verb-initial and verb-second orders are possible in this construction, the application of the lexical rule for verb-initial position (see page 290) is obligatory. This can be achieved by writing the result of the application of this lexical rule into the lexicon, without having the object to which the rule should have applied actually being present in the lexicon itself. Koenig (1999: Section 3.4.2, 5.3) proposed something similar for English *rumored* 'it is rumored that ...' and *aggressive*. There is no active variant of the verb *rumored*, a fact that can be captured by the assumption that only the result of applying a passive lexical rule is present in the lexicon. The actual verb or verb stem from which the participle form has been derived exists only as the daughter of a lexical rule but not as an independent linguistic object. Similarly, the verb **aggress* only exists as the daughter of a (non-productive) adjective rule that licenses *aggressive* and a nominalization rule licensing *aggression*.

The optionality of the *mit*-PP is signaled by the brackets in (110). If one adds the information inherited from the type *verb-initial-lr* under SYNSEM, then the result is (112).



The valence properties of the empty verb in (112) are to a large extent determined by the lexical rule for verb-initial order: the V1-LR licenses a verbal head that requires a VP to its right that is missing a verb with the local properties of the LEX-DTR ($\boxed{3}$).

Semantic information dependent on sentence type (assertion, imperative or question) is determined inside the V1-LR depending on the morphological make-up of the verb and the SLASH value of the selected VP (see Müller 2007b: Section 10.3; 2016b; 2015b). Setting the semantics to *imperative-or-interrogative* rules out *assertion* as it occurs in V2-clauses. Whether this type is resolved in the direction of *imperative* or *interrogative* is ultimately decided by further properties of the utterance such as intonation or the use of interrogative pronouns.

The valence of the lexical daughters in (112) as well as the connection to the semantic role (the linking to the patient role) are simply stipulated. Every approach has to stipulate that an argument of the verb has to be expressed as a *mit*-PP. Since there is no antipassive in German, the effect that could be otherwise achieved by an antipassive lexical rule in (112) is simply written into the LEX-DTR of the verb movement rule.

The SUBCAT list of LEX-DTR contains a modifier (adverb, directional PP) and the *mit*-PP. This *mit*-PP is co-indexed with the patient of *directive'* and the modifier refers to the referent of the *mit*-PP. The agent of *directive'* is unspecified since it depends on the context (speaker, hearer, third person).

This analysis is shown in Figure 21.19 on the following page. Here, V[LOC $\boxed{2}$] corresponds to the LEX-DTR in (112). The V1-LR licenses an element that requires a maximal

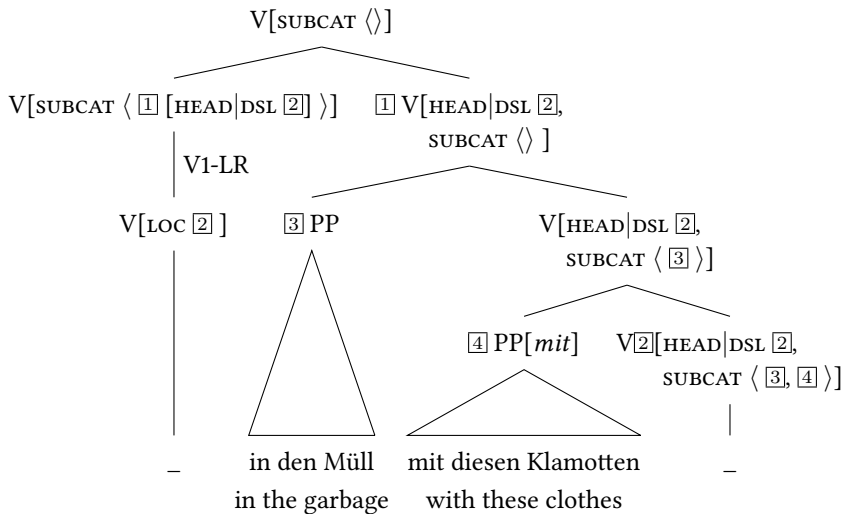


Figure 21.19: HPSG variant of the analysis of *In den Müll mit diesen Klamotten!/?*

verb projection with that exact DSL value [2]. Since DSL is a head feature, the information is present along the head path. The DSL value is identified with the LOCAL value ([2] in Figure 21.19) in the verb movement trace (see page 291). This ensures that the empty element at the end of sentence has exactly the same local properties that the LEX-DTR in (112) has. Thus, both the correct syntactic and semantic information is present on the verb trace and structure building involving the verb trace follows the usual principles. The structures correspond to the structures that were assumed for German sentences in Chapter 9. Therefore, there are the usual possibilities for integrating adjuncts. The correct derivation of the semantics, in particular embedding under imperative or interrogative semantics, follows automatically (for the semantics of adjuncts in conjunction with verb position, see Müller (2007b: Section 9.4)). Also, the ordering variants with the *mit*-PP preceding the direction (111) and direction preceding the *mit*-PP (106b) follow from the usual mechanisms.

If one rejects the analyses discussed up to this point, then one is only really left with phrasal constructions or dominance schemata that connect parts of the construction and contribute the relevant semantics. Exactly how one can integrate adjuncts into the phrasal construction in a non-stipulative way remains an open question, however, there are already some initial results by Jakob Maché (2010) that suggest that directives can still be sensibly integrated into the entire grammar provided an appropriate phrasal schema is assumed.

21.10.2 Serial verbs

There are languages with so-called serial verbs. For example, it is possible to form sentences in Mandarin Chinese where there is only one subject and several verb phrases. There are multiple readings depending on the distribution of aspect marking inside the VP: if the first VP contains a perfect marker, then we have the meaning ‘VP1 in order to do/achieve VP2’ (113a). If the second VP contains a perfect marker, then the entire construction means ‘VP2 because VP1’ (113b) and if the first VP contains a durative marker and the verb *hold* or *use*, then the entire construction means ‘VP2 using VP1’ (113c).

- (113) a. Ta1 qu3 le qian2 qu4 guang1jie1.
 he withdraw PRF money go shop
 ‘He withdrew money to go shopping.’
 b. Ta1 zhu4 Zhong1guo2 xue2 le Han4yu3.
 he live China learn PRF Chinese
 ‘He learned Chinese because he lived in China.’
 c. Ta1 na2 zhe kuai4zi chi1 fan4.
 he take DUR chopsticks eat food
 ‘He eats with chopsticks.’

If we consider the sentences, we only see two adjacent VPs. The meanings of the entire sentences, however, contain parts of meaning that go beyond the meaning of the verb phrases. Depending on the kind of aspect marking, we arrive at different interpretations with regard to the semantic combination of verb phrases. As can be seen in the translations, English sometimes uses conjunctions in order to express relations between clauses or verb phrases.

There are three possible ways to capture these data:

1. One could claim that speakers of Chinese simply deduce the relation between the VPs from the context,
2. one could assume that there are empty heads in Chinese corresponding to *because* or *to*, or
3. one could assume a phrasal construction for serial verbs that contributes the correct semantics for the complete meaning depending on the aspect marking inside the VPs.

The first approach is unsatisfactory because the meaning does not vary arbitrarily. There are grammaticalized conventions that should be captured by a theory. The second solution has a stipulative character and thus, if one wishes to avoid empty elements, only the third solution remains. Müller & Lipenkova (2009) have presented a corresponding analysis.

21.10.3 Relative and interrogative clauses

Sag (1997) develops a phrasal analysis of relative clauses as have Ginzburg & Sag (2000) for interrogative clauses. Relative and interrogative clauses consist of a fronted phrase and a clause or a verb phrase missing the fronted phrase. The fronted phrase contains a relative or interrogative pronoun.

- (114) a. the man [who] sleeps
 b. the man [who] we know
 c. the man [whose mother] visited Kim
 d. a house [in which] to live
- (115) a. I wonder [who] you know.
 b. I want to know [why] you did this.

The GB analysis of relative clauses is given in Figure 21.20. In this analysis, an empty head is in the C position and an element from the IP is moved to the specifier position.

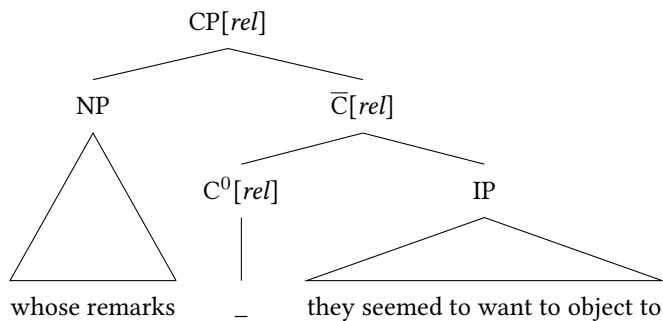


Figure 21.20: Analysis of relative clauses in GB theory

The alternative analysis shown in Figure 21.21 on the next page involves combining the subparts directly in order to form a relative clause. Borsley (2006) has shown that one would require six empty heads in order to capture the various relative clauses possible in English, if one would want to analyze them lexically. These heads can be avoided and replaced by corresponding schemata (see Chapter 19 on empty elements). A parallel argument can also be found in Webelhuth (2011) for German: grammars of German would also have to assume six empty heads for the relevant types of relative clause.

Unlike the resultative constructions that were already discussed, there is no variability among interrogative and relative clauses with regard to the order of their parts. There are no changes in valence and no interaction with derivational morphology. Thus, nothing speaks against a phrasal analysis. If one wishes to avoid the assumption of empty heads, then one should opt for the analysis of relative clauses by Sag, or the variant in Müller (1999a: Chapter 10; 2007b: Chapter 11). The latter analysis does without a special schema

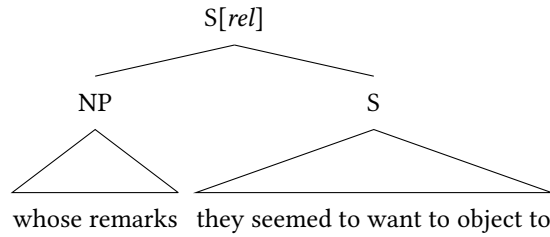


Figure 21.21: Analysis of relative clauses in HPSG following Sag (1997)

for noun-relative clause combinations since the semantic content of the relative clause is provided by the relative clause schema.

Sag (2010) discusses long-distance dependencies in English that are subsumed under the term *wh*-movement in GB theory and the MP. He shows that this is by no means a uniform phenomenon. He investigates *wh*-questions (116), *wh*-exclamatives (117), topicalization (118), *wh*-relative clauses (119) and *the*-clauses (120):

- (116) a. How foolish is he?
b. I wonder *how foolish he is*.
- (117) a. What a fool he is!
b. It's amazing *how odd it is*.
- (118) The bagels, I like.
- (119) a. I met the person *who they nominated*.
b. I'm looking for a bank *in which to place my trust*.
- (120) a. The more people I met, *the happier I became*.
b. *The more people I met*, the happier I became.

These individual constructions vary in many respects. Sag lists the following questions that have to be answered for each construction:

- Is there a special *wh*-element in the filler daughter and, if so, what kind of element is it?
- Which syntactic categories can the filler daughters have?
- Can the head-daughter be inverted or finite? Is this obligatory?
- What is the semantic and/or syntactic category of the mother node?
- What is the semantic and/or syntactic category of the head-daughter?

- Is the sentence an island? Does it have to be an independent clause?

The variation that exists in this domain has to somehow be captured by a theory of grammar. Sag develops an analysis with multiple schemata that ensure that the category and semantic contribution of the mother node correspond to the properties of both daughters. The constraints for both classes of constructions and specific constructions are represented in an inheritance hierarchy so that the similarities between the constructions can be accounted for. The analysis can of course also be formulated in a GB-style using empty heads. One would then have to find some way of capturing the generalizations pertaining to the construction. This is possible if one represents the constraints on empty heads in an inheritance hierarchy. Then, the approaches would simply be notational variants of one another. If one wishes to avoid empty elements in the grammar, then the phrasal approach would be preferable.

21.10.4 The N-P-N construction

Jackendoff (2008) discusses the English N-P-N construction. Examples of this construction are given in (121):

- (121) a. day by day, paragraph by paragraph, country by country
 b. dollar for dollar, student for student, point for point
 c. face to face, bumper to bumper
 d. term paper after term paper, picture after picture
 e. book upon book, argument upon argument

This construction is relatively restricted: articles and plural nouns are not allowed. The phonological content of the first noun has to correspond to that of the second. There are also similar constructions in German:

- (122) a. Er hat Buch um Buch verschlungen.
 he has book around book swallowed
 'He binge-read book after book.'
 b. Zeile für Zeile⁵²
 line for line
 'line by line'

Determining the meaning contribution of this kind of N-P-N construction is by no means trivial. Jackendoff suggests the meaning *many Xs in succession* as an approximation.

Jackendoff points out that this construction is problematic from a syntactic perspective since it is not straightforwardly possible to determine a head. It is also not clear what the structure of the remaining material is if one is working under assumptions of \bar{X} theory. If the preposition *um* were the head in (122a), then one would expect that it is combined with an NP, however this is not possible:

⁵² *Zwölf Städte*. Einstürzende Neubauten. Fünf auf der nach oben offenen Richterskala, 1987.

- (123) a. * Er hat dieses Buch um jenes Buch verschlungen.
 he has this book around this book swallowed
 b. * Er hat ein Buch um ein Buch verschlungen.
 he has a book around a book swallowed

For these kind of structures, it would be necessary to assume that a preposition selects a noun to its right and, if it finds this, it then requires a second noun of this exact form to its left. For N-*um*-N and N-*für*-N, it is not entirely clear what the entire construction has to do with the individual prepositions. It could also try to develop a lexical analysis for this phenomenon, but the facts are different to those for resultative constructions: in resultative constructions, the semantics of simplex verbs plays a clear role. Furthermore, unlike with the resultative construction, the order of the component parts of the construction are fixed in the N-P-N construction. It is not possible to extract a noun or place the preposition in front of both nouns. Syntactically, the N-P-N combination with some prepositions behaves like an NP (Jackendoff 2008: 9):

- (124) Student after/upon/*by student flunked.

This is also strange if one wishes to view the preposition as the head of the construction.

Instead of a lexical analysis, Jackendoff proposes the following phrasal construction for N-*after*-N combinations:

- (125) Meaning: MANY X_i s IN SUCCESSION [or however it is encoded]
 Syntax: [_{NP} N_i P_j N_i]
 Phonology: Wd_i after_j Wd_i

The entire meaning as well as the fact that the N-P-N has the syntactic properties of an NP would be captured on the construction level.

I already discussed examples by Bragmann (2015) in Section 11.7.2.4 that show that N-P-N constructions may be extended by further P-N combinations:

- (126) Day after day after day went by, but I never found the courage to talk to her.

So rather than an N-P-N pattern Bragmann suggests the pattern in (127), where ‘+’ stands for at least one repetition of a sequence.

- (127) N (P N)+

As was pointed out on page 407 this pattern is not easy to cover in selection-based approaches. One could assume that an N takes arbitrarily many P-N combinations, which would be very unusual for heads. Alternatively, one could assume recursion, so N would be combined with a P and with an N-P-N to yield N-P-N-P-N. But such an analysis would make it really difficult to enforce the restrictions regarding the identity of the nouns in the complete construction. In order to enforce such an identity the N that is combined with N-P-N would have to impose constraints regarding deeply embedded nouns inside the embedded N-P-N object (see also Section 18.2).

G. Müller (2011a) proposed a lexical analysis of the N-P-N construction. He assumes that prepositions can have a feature REDUP. In the analysis of *Buch um Buch* ‘book after

book', the preposition is combined with the right noun *um Buch*. In the phonological component, reduplication of *Buch* is triggered by the REDUP feature, thereby yielding *Buch um Buch*. This analysis also suffers from the problems pointed out by Jackendoff: in order to derive the semantics of the construction, the semantics would have to be present in the lexical entry of the reduplicating preposition (or in a relevant subsequent component that interprets the syntax). Furthermore it is unclear how a reduplication analysis would deal with the Bragmann data.