DISCUSSION NOTE

Phrasal or lexical constructions?*

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1. INTRODUCTION. Since the 1990s, more and more linguistic articles have been published in the framework of CONSTRUCTION GRAMMAR. Some influential publications are Goldberg 1995, Fillmore 1999, and Kay & Fillmore 1999. Although Kay and Fillmore (1999:19) make it clear that Constructions are not necessarily phrasal, most of the authors suggest phrasal Constructions.[1] This is especially apparent in construction grammar-inspired studies in the framework of head-driven phrase structure grammar (HPSG; see for instance Sag 1997, Ginzburg & Sag 2001, Borsley 2004, Haugereid 2004).

In what follows I show that the difference between phrasal approaches and lexical approaches is not as great as is sometimes claimed, although selecting one approach over the other may nevertheless have serious consequences. This discussion focuses on resultative constructions, a phenomenon for which both phrasal and lexical analyses have been suggested. A considerable number of different Constructions must be postulated to account for all of the patterns that may arise from the reordering of constituents or the realization of the resultative construction in connection with valence-changing processes. It is shown that adjuncts, predicate complexes, and derivational morphology pose considerable problems for the phrasal approach, while they are unproblematic for lexical rule-based approaches. An example of the resultative construction is given in 1. The resultative construction consists of a verb that denotes some event and a secondary predicate that provides information about the result of the event. In 1, the secondary predicate predicates over an NP that is not an argument of the verb. There are other patterns of resultative constructions, but they are not discussed here since they are irrelevant to the issue under discussion (see for instance Simpson 1983 and Rothstein 1985).

(1) They drank the pub dry.

* I thank Brian D. Joseph, the editor of *Language*, associate editor James McCloskey, and an anonymous referee for detailed comments on an earlier version of this discussion note.

I also thank Ann Copestake, Kerstin Fischer, Paul Kay, Laura Michaelis, Detmar Meurers, Frank Richter, Ivan Sag, Anatol Stefanowitsch, and Arne Zeschel for discussion, and John Bateman, Dorothee Beermann, Gisbert Fanselow, Hans-Ulrich Krieger, Andrew McIntyre, and Shravan Vasishth for discussion and comments on earlier versions of this manuscript.

I gave presentations about phrasal and lexical analyses of the resultative construction at the Institute for General and Applied Linguistics at the University of Bremen, at the Institute of Cognitive Science at the University of Osnabrück, at the Deutsches Seminar of the University of Tübingen, at the Linguistics Institute of the Ruhr University Bochum, at the workshop Foundations of Natural-Language Grammar at the ESSLLI 2005 in Edinburgh, and at HPSG 2005 in Lisbon. I thank the respective departments for the invitation, the reviewers of the conference and the workshop for comments, and the audiences for comments and discussion.

The resultative construction was also one of the topics discussed during the Ph.D. school Languages and Theories in Contrast in Bergen in 2005. I enjoyed the discussion very much and want to thank the organizers Helge Dyvik and Torbjørn Nordgård, my coteachers Miriam Butt, Helge Dyvik, and Peter Svenonius, and the audience again.

[1] Throughout the discussion note I use the term 'construction' in a theory-neutral way. For constructions in the sense of construction grammar, I use 'Construction.'

Such constructions have been analyzed as SMALL CLAUSES (see for instance Hoekstra 1988, den Dikken 1995), as complex predicates where *drank* and *dry* form a constituent at some level of representation (Dowty 1979:Ch. 4.7 for English; Neeleman & Weermann 1993, Neeleman 1995 for English and Dutch; Müller 2002:Ch. 5 for German), or as phrasal constructions (Goldberg 1995, Jackendoff 1997, Goldberg & Jackendoff 2004). In the following, I mainly discuss the question of how the combination of the verb with the NP *the pub* and the predicate *dry* is licensed. Proponents of (phrasal) construction grammar suggest either a phrasal Construction that licenses subject, verb, object, and secondary predicate as in 2a or a phrasal Construction that licenses verb, object, and secondary predicate as in 2b.

(2) a. [SUBJ [V OBJ OBL]] (Goldberg 1995:192)
b. VP → V NP AP/PP (Goldberg & Jackendoff 2004)

The lexicon-oriented approaches, by contrast, do not assume special phrase structure rules for resultative constructions, but rather additional lexical items that license the elements present in resultative constructions (see Simpson 1983, Wunderlich 1992:45, Verspoor 1997, Wechsler 1997, Wechsler & Noh 2001, and Müller 2002 for analyses of English, German, and Korean resultative constructions).

Approaches like Goldberg's face certain problems when interaction with other phenomena (e.g. passive, middle) is considered. In the following, I transfer Goldberg's analysis to German and show that further problems arise since German has a much freer constituent order than English and allows interaction with derivational morphology. The problems that already exist in the analysis of English are thus much more apparent. I deal with interactions between resultative constructions and syntax (§2) and morphology (§5). While there are several phenomena for which it is unclear what a phrasal analysis might look like, it is clear that a large number of phrasal Constructions is needed to account for the patterns that can be analyzed. Proponents of construction grammar argue that this is not a problem since the regularities are captured in an inheritance hierarchy and such inheritance hierarchies can be computed automatically from the set of Constructions that are stated by the grammar writer. I show in §3 that the algorithm that was suggested by Kay (2002:§7.1) does not work and that attempts to fix it lead to unwanted consequences. I then discuss examples from Yucatec Maya that show that passives cannot be analyzed with reference to classification in an inheritance hierarchy. A discussion of the alternative lexical rule-based approaches follows, in which I compare them with the phrasal approach. I next address the question of whether phrasal approaches are needed at all, and show how phrasal approaches to other phenomena such as idioms, for instance, can be converted into lexical approaches.

2. INTERACTIONS BETWEEN RESULTATIVE CONSTRUCTIONS AND SYNTAX. Goldberg (1995:192) assumes the following Construction for English resultative constructions.

(3) [SUBJ [V OBJ OBL]]

If one wishes to extend Goldberg's analysis to German, one can assume a flat structure of the German clause and assign the structure in 4 to the example in 5.

(4) [SUBJ OBJ OBL V]
(5) (weil) sie die Nordsee leer fischen
because they the North.Sea empty fish
'because they fish the North Sea empty'

Alternatively, one could use binary branching structures, but this would in no way simplify the grammar. On the contrary, one would be forced to specify constraints on

trees of a depth greater than one, and thus the constraints would be nonlocal, something against which, for instance, Sag (2007) explicitly argues.

To give a full account of German resultatives, one has to explain the following constituent-order phenomena.

1. Arguments can be reordered.

(6) a. weil niemand den Teich leer fischt
because nobody.NOM the pond.ACC empty fishes
'because nobody fishes the pond empty'

b. weil den Teich niemand leer fischt
because the pond.ACC nobody.NOM empty fishes

2. The finite verb can appear in both initial (7) and final position (6).

(7) Fischt jemand den Teich leer?
fishes somebody the pond empty
'Does somebody fish the pond empty?'

3. Adjuncts may appear anywhere between arguments.

(8) a. daß schnell jemand den Teich leer fischt
that quickly somebody the pond empty fishes
'that somebody is fishing the pond empty quickly'

b. daß jemand schnell den Teich leer fischt
that somebody quickly the pond empty fishes

c. daß jemand den Teich schnell leer fischt
that somebody the pond quickly empty fishes

4. Arguments and adjuncts belonging to resultative constructions and predicates that embed the resultative construction may be permuted and interleaved.

(9) a. weil niemand ihn den Teich leer fischen sah
because nobody.NOM him.ACC the pond.ACC empty fish saw
'because nobody saw him fish the pond empty'

b. weil ihn den Teich niemand leer fischen sah
because him.ACC the pond.ACC nobody.NOM empty fish saw

In 9, *niemand* 'nobody' is dependent upon *sah* 'saw', but in 9b it is serialized between the resultative predicate and its subject.

In transformation-based accounts, constituent reordering, fronting, and passive can be explained by movement operations. Adjunct serialization can be explained by assuming that adjuncts attach to VPs and the material from inside of the VP is scrambled to positions preceding the adjuncts. Such analyses are usually rejected in nonderivational constraint-based frameworks, and thus they are not an option for proponents of phrasal construction grammar analyses. Instead, additional Constructions have to be stipulated that account for patterns not covered by 4. In what follows, I show which Constructions are needed to account for the patterns mentioned so far and for other interactions with the grammar of German.

2.1. LOCAL REORDERING OF CONSTITUENTS. Since subject and object may be permuted and since the verb can appear both in initial and in final positions, at least the following Constructions are needed.[2]

[2] Of course it is possible to distinguish between immediate dominance and linear precedence, as is done in HPSG. The four Constructions in 10 could then be collapsed into one. But the reorderings come with information-structure effects, and given that other reorderings such as Heavy NP Shift (Kay 2002) and Subject-Auxiliary Inversion (Fillmore 1999) in English are modeled by Constructions, it thus seems safe to assume that proponents of phrasal Constructions would posit Constructions for all of the patterns. See also Goldberg 1995:7 for a statement regarding the representation of information about focused constituents and

(10) a. [SUBJ OBJ OBL V] c. [V SUBJ OBJ OBL]
b. [OBJ SUBJ OBL V] d. [V OBJ SUBJ OBL]

In addition to cases like 6, there are examples with focus split, in which the resultative predicate is separated from the verb. Neeleman (1994:85) gives a Dutch example with a resultative predicate separated from the base verb which transfers to German easily.

(11) a. daß so grün selbst Jan die Tür nicht streicht
that that green even Jan the door not paints
'that not even Jan would paint the door that green'
b. daß so grün die Tür selbst Jan nicht streicht
that that green the door even Jan not paints
c. daß Jan so grün selbst die Tür nicht streicht
that Jan that green even the door not paints
d. daß eine solche Tür so grün niemand streicht
that a such door that green nobody paints
'that nobody paints such a door that green'

See also Lüdeling 2001:50 on resultative constructions and focus split.

As the examples show, the secondary predicate may be placed before the SUBJ and OBJ or between the two NPs. In each case, both SUBJ OBJ and OBJ SUBJ are possible. To account for such linearizations, one would need the following Constructions.

(12) a. [OBL SUBJ OBJ V] e. [V OBL SUBJ OBJ]
b. [OBL OBJ SUBJ V] f. [V OBL OBJ SUBJ]
c. [SUBJ OBL OBJ V] g. [V SUBJ OBL OBJ]
d. [OBJ OBL SUBJ V] h. [V OBJ OBL SUBJ]

2.2. FRONTING. German is a verb-second language. The position in front of the finite verb is filled by a single constituent that is extracted from the remaining clause. The fronted element may be deeply embedded and, thus, a nonlocal dependency is involved.

As far as resultatives are concerned, the subject (13a), the object (13b), an adjunct (13c), or the resultative predicate (13d) can be fronted.

(13) a. Er fischt den Teich schnell leer.
he fishes the pond quickly empty
'He is fishing the pond empty quickly.'
b. Den Teich fischt er schnell leer.
the pond fishes he quickly empty
c. Schnell fischt er den Teich leer.
quickly fishes he the pond empty
d. Leer fischt er den Teich nicht.
empty fishes he the pond not
'He is not fishing the pond empty.'

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topicality in Constructions. Comments about Constructions and information structure can also be found in Goldberg 2006:220.

The question of how verbs are ordered is independent of the order of SUBJ and OBJ, and Goldberg could assume an empty verbal head in clause-final position that is related to an overt verb in clause-initial position. Constructions 10a and 10b would then be sufficient and 10c and 10d would have the structures [V_i [SUBJ OBJ OBL $\_\__i$]] and [V_i [OBJ SUBJ OBL $\_\__i$]], respectively. However, empty elements are usually avoided in construction grammar. See Kathol 1997 for a proposal regarding German clause structure and n. 3 below for remarks on traces.

In any case, for the passive and fronting cases discussed below, additional Constructions are needed since the passive involves valence change and fronting involves a nonlocal dependency.

If one wants to avoid positing empty elements,[3] additional Constructions for the introduction of nonlocal dependencies are needed.[4]

(14) a. [V SUBJ OBL] (OBJ extracted)
b. [V OBJ OBL] (SUBJ extracted)
c. [V SUBJ OBJ] (OBL extracted)
d. [V OBJ SUBJ] (OBL extracted, OBJ and SUBJ permuted)

If one follows the phrasal approach, information about extracted elements cannot be introduced lexically, since some parts of the Construction are contributed by the Construction itself and hence cannot be accessed at the lexical level. An analysis of extraction such as the one suggested by Bouma and colleagues (2001) is thus incompatible with the phrasal approach to resultatives.[5]

In addition to the Constructions in 14, one needs those in 16 to account for resultative constructions in relative clauses and interrogative clauses like those in 15.

(15) a. der Mann, der den Teich leer fischt
the man who the pond empty fishes
'the man who fishes the pond empty'
b. den Teich, den Richard leer fischt
the pond that Richard empty fishes
'the pond that Richard fishes empty'
c. Er hat gefragt, wie platt Max das Metall gehämmert hat.
he has asked how flat Max the metal hammered has
'He asked how flat Max hammered the metal.'

The relative phrase and the interrogative phrase, that is, the phrase containing the relative pronoun or the interrogative pronoun, respectively, is usually analyzed as a phrase that is extracted from the rest of the clause.

(16) a. [SUBJ OBL V] (OBJ extracted)
b. [OBJ OBL V] (SUBJ extracted)
c. [SUBJ OBJ V] (OBL extracted)
d. [OBJ SUBJ V] (OBL extracted)

The Constructions in 16 differ from those in 14 with respect to the serialization of the verb: relative clauses and interrogative clauses are verb-final. Example 16 contains patterns for the extraction of OBJ, SUBJ, and OBL (16a–c) and a fourth Construction in which OBL is extracted and SUBJ and OBJ are permuted.

[3] See for instance Kay & Fillmore 1999:7, 14 for a traceless analysis of extraction and Michaelis & Ruppenhofer 2001:49–50 and Goldberg 2006:10 on the status of empty elements in construction grammar. The analysis of English relative clauses suggested by Sag (1997) was developed in order to eliminate the empty head that was necessary in the analysis of relative clauses in Pollard & Sag 1994:Ch. 5.

[4] See also Müller 2002:Ch. 6.2.5.1, Ch. 7.3 and Müller 2007a for discussion. An approach that corresponds to 14 is proposed by Haugereid (2004). Since Haugereid does not use a valence list that contains all the arguments of a head, he cannot capture the commonalities of Constructions with an extracted subject and those with an extracted object. The respective Constructions have to be stipulated in an inheritance network separately.

[5] Goldberg (2006:155) cites Sag and Fodor (1994) for a traceless account of long-distance dependencies in a monostratal framework. This analysis is the predecessor of the Bouma, Malouf, and Sag paper (2001). It is also lexical and incompatible with a phrasal analysis of resultative constructions.

Extraction patterns for the focus split + resultative construction are also needed.

(17) a. [OBL OBJ V] (SUBJ extracted)
b. [OBL SUBJ V] (OBJ extracted)
c. [V OBL OBJ] (SUBJ extracted)
d. [V OBL SUBJ] (OBJ extracted)

The patterns in 17 are verb-final and verb-initial patterns with SUBJ or OBJ extracted and OBL and the other remaining element permuted.

I have dealt here with local constituent reordering and extraction, but the surface pattern of the resultative construction may also change due to changes in argument realization. I next discuss passives, modal infinitives, and the middle construction.

2.3. PASSIVE, MODAL INFINITIVES, AND THE MIDDLE CONSTRUCTION. Resultatives can appear in agentive passive sentences (18a), in stative passive sentences (18b), in the middle construction (18c), and in modal infinitive constructions (18d).

(18) a. Der Teich wurde leer gefischt.
the pond.NOM was empty fished
b. Der Teich ist leer gefischt.
the pond.NOM is empty fished
c. Der Weinkeller trinkt sich schnell leer.[6]
the wine.cellar.NOM drinks self fast empty
'What's in the wine cellar is drunk quickly.'
d. Der Teich ist bis Montag leer zu fischen.
the pond.NOM is until Monday empty to fish
'The pond has to be fished empty by Monday.'

The previous subsections show that one needs four Constructions for permutations of subject and object, eight permutations for focus-split constructions in which the resultative predicate appears between or in front of the NPs, and twelve Constructions for traceless extractions (if we abstract away from local reordering, four Constructions are still needed). In addition, the following Constructions are needed to account for passive together with reorderings, focus movement, and extractions.

(19) a. [SUBJ OBL V] (passive)
b. [OBL SUBJ V] (passive, focus m.)
c. [OBL V] (passive, SUBJ extracted)
d. [SUBJ V] (passive, OBL extracted)
e. [V SUBJ OBL] (passive)
f. [V OBL SUBJ] (passive, focus m.)
g. [V OBL] (passive, SUBJ extracted)
h. [V SUBJ] (passive, OBL extracted)

On top of that, one needs Constructions for the middle construction and for modal infinitives. The middle suppresses the logical subject of the verb and adds a dummy reflexive, which allows for additional permutations.

Since some of the arguments in the Resultative Construction can be introduced by the Construction, passive cannot be treated as a lexical process but must be treated on the phrasal level. Therefore treatments in terms of lexical linking Constructions as suggested by Kay and Fillmore (1999:12) and Michaelis and Ruppenhofer (2001:Ch. 4) or the more conventional analyses in terms of lexical rules (Bresnan 1982, Pollard & Sag 1987:214–18, Müller 2002:Ch. 3) are excluded. Goldberg (1995:78–79) seems to

[6] Wunderlich 1997:118. See also Koch & Rosengren 1995:17 for similar data.

have in mind some device that is similar to transformations[7] or generalized phrase structure grammar (GPSG) metarules, that is, a rule that maps an active Construction onto a passive Construction.[8] The alternative to a metarule approach would be to assume an abstract Resultative Construction with constraints inherited by both an active and a passive phrasal Resultative Construction (see also Fig. 2). According to Kay 2005, Goldberg assumes such an explicit cross-classification.[9] Goldberg and Jackendoff (2004:536, n. 4) also mention the interaction, but the exact formalization of the interaction is not discussed:

> We set aside here passive and middle resultatives, such as *The metal was hammered flat* and *This metal hammers flat easily*. We take it that these expressions are formed by composing the passive and middle constructions with resultative constructions.

Although Constructions can be represented compactly in inheritance hierarchies, the need to stipulate a special passive Resultative Construction and special extraction variants for Resultative Constructions is rather unattractive. See §3 for a discussion of the automatic computation of Construction hierarchies.

2.4. ADJUNCTS. A further problem seems to be adjuncts like *schnell* 'fast' in 8. Since the adjunct scopes over the semantic contribution of the Resultative Construction, one needs a Construction like 20 to account for 8c, unless one is willing to assume a discontinuous Resultative Construction that allows an adjunct to appear between parts of the Resultative Construction.

(20) [SUBJ OBJ Adjunct OBL V]

In what follows, I discuss approaches to adjuncts suggested in the construction grammar literature and show that these proposals cannot be used to analyze 8 and that therefore, the stipulation of Constructions like 20 seems unavoidable. I start with the analysis suggested by Kay and Fillmore (1999) and then turn to that of Kay (2005).

CONSTRUCTIONAL INTRODUCTION OF ADJUNCTS. Kay and Fillmore (1999) assume that constituents in a VP are licensed if they appear in the valence set of the mother node of the VP. Adjuncts are licensed by unifying a verbal structure with an adjunct Construction. As an example, they give the following lexical entry for *arrive* (their figure 5) and the Setting Construction (their figure 4).[10]

[7] Goldberg (1995:7, 2006:205) states that construction grammar is not transformational.

[8] Since Goldberg (1995:192) assumes the complex structure in (i), GPSG metarules cannot be used to map active Constructions to passive Constructions. GPSG metarules apply to simple phrase structure rules only, not to trees with a depth greater than one.

(i) [SUBJ [V OBJ OBL]]

A metarule approach could be assumed if the Resultative Construction were a specialization of the rule in 2b.

[9] See Goldberg 2006:22, n. 3 for the stipulation of the Passive ditransitive Construction, that is, a specific passive Construction that is relevant for ditransitive verbs only.

[10] Setting adjuncts are, for instance, those of time, place, and condition. Such adjuncts are licensed by the Setting Construction.

(21) a. lexical entry for *arrive*

$$\begin{bmatrix} \text{cat} & \text{v} \\ \text{sem} & \left\{ \begin{bmatrix} ^{\text{I}}\text{FRAME} & \text{ARRIVE} \\ \text{ARGS} & \{\text{A}\} \end{bmatrix} \right\} \\ \text{val} & \{[\text{sem}\{\text{A}\}]\} \end{bmatrix}$$

b. Setting Construction[11]

$$\begin{bmatrix} \text{cat} & \text{v} \\ \text{sem} & \left\{ \begin{bmatrix} ^{\text{I}}\text{FRAME} & [\,] \\ \text{ARGS} & \{\,\} \end{bmatrix}, \begin{bmatrix} ^{\text{II}}\text{FRAME} & [\,] \\ \text{ARGS} & \{\text{I}\} \end{bmatrix} \right\} \\ \text{val} & \{[\text{sem}\{[^{\text{II}}]\}]\} \end{bmatrix}$$

The items in 21 provide information about the part of speech of the respective object (represented as value of CAT) and information about the meaning of the linguistic object (represented as the value of SEM), and also refer to the valence of a linguistic object (represented under VAL). In 21a the semantics of a dependent element—that is, an element that is contained in VAL—is identified with an argument slot in a semantic frame. This is indicated by the 'A'. The Setting Construction is a Construction that has to be unified with a verbal constituent already containing the scene indexed as I. The Setting Construction adds a scene, typically a locational or temporal setting, indexed as II.

Kay and Fillmore want to extend the valence set of the lexical entry by unification with the Setting Construction. The intended result is a structure that contains both the element the verb originally selects in 21a and an additional element, namely the adjunct contributed by the Setting Construction. According to Kay and Fillmore, the unification of 21a and 21b plus additional information provided by the lexical item *before* is as in 22.

(22) Unification of 21a and 21b and the information in the lexical entry of *before*, according to Kay and Fillmore

$$\begin{bmatrix} \text{cat} & \text{v} \\ \text{sem} & \left\{ \begin{bmatrix} ^{\text{I}}\text{FRAME} & \text{ARRIVE} \\ \text{ARGS} & \{\text{A}\} \end{bmatrix}, \begin{bmatrix} ^{\text{II}}\text{FRAME} & \text{BEFORE} \\ \text{ARGS} & \{\text{I, E}\} \end{bmatrix} \right\} \\ \text{val} & \left\{ [\text{sem}\{\text{A}\}], \begin{bmatrix} \text{CAT} & \text{p} \\ \text{LEXICAL-HEAD} & \text{before} \\ \text{VAL} & \left\{ \begin{bmatrix} \text{GF} & \textit{obj} \\ \text{SEM} & \textit{E} \end{bmatrix} \right\} \end{bmatrix} \right\} \end{bmatrix}$$

But this presupposes a special definition of set unification that allows the extension of the number of elements in a set. Since an element of a set may also be unified with one element of the other set (the first element in SEM in 21b with the element in SEM in 21a), Kay and Fillmore's version of unification cannot be understood as a (multi)

[11] The '{ }' stands for an unspecified set, not for the empty set.

set union as in Krieger et al. 2004.[12] If set unification can result in set union and in element unification, the result of the unification of the elements in SEM should be a disjunction of the value given in 22 and a set that contains the set union of the two SEM sets. Thus the notion of set unification that Kay and Fillmore assume seems not to be sound.

The unification of two structures FS_1 and FS_2 is defined to be the structure FS_3 that is subsumed by both FS_1 and FS_2 and that is not subsumed by any other structure that is subsumed by both FS_1 and FS_2. Intuitively, this states that the information represented in FS_1 and the information represented in FS_2 is also represented in FS_3, but FS_3 includes no additional information. FS_1 and FS_2 are less specific than or equally as specific as FS_3. If set unification is assumed to be set union, the definition of unification would require the following understanding of valence representations: a valence value {NP} says something like the following: this lexical item needs at least one NP argument. A valence value {NP, NP} says: this lexical item needs at least two NP arguments. This means that the last valence list is more specific than the first one. The set of objects described by the first valence list includes the set of objects described by the last one. In particular, transitive verbs are a special case of intransitive verbs, which is not what is usually assumed when linguistic objects are classified with respect to their valence.[13]

It is interesting to note that if set unification is (multi) set union, the result of unifying a structure with itself differs from the structure.

(23) [F {a}] $\wedge$ [F {a}] $\stackrel{?}{=}$ [F {a, a}]

This is not consistent with the definition of unification given above since the unification of X with X should be X and not a more specific structure. In some knowledge-representation systems that are used in artificial intelligence, the unification of two sets S_1 and S_2 is defined in a way that elements in S_2 that are compatible with elements from S_1 are unified while elements that are not compatible with any elements of S_1 are added to the result set. The examples given in Clark & Porter 2004:36 are shown in 24.

(24) a. {cat, dog} $\wedge$ {dog, elephant} = {cat, dog, elephant}
b. {cat} $\wedge$ {cat} = {cat}

But since adjunction is recursive (see below), one needs multi sets: it has to be possible that one predicate appears more than once in a set. With the above definition of set unification, the unification of *arrive* with two adjunct constructions would be 25a and not the intended 25b.

(25) a. {[sem {A}]} $\wedge$ {[sem {[^{II}]}]} $\wedge$ {[sem {[^{II}]}]} =
{[sem {A}], [sem {[^{II}]}]}
b. {[sem {A}]} $\wedge$ {[sem {[^{II}]}]} $\wedge$ {[sem {[^{II}]}]} $\neq$
{[sem {A}], [sem {[^{II}]}], [sem {[^{II}]}]}

The following example by Frey and Gärtner (2002:47–48) shows that recursion is needed for handling adjuncts.

(26) dass Hans den Tisch ungeschickt geschickt ungeschickt abräumte
that Hans the table clumsily skillfully clumsily cleared

[12] A multi set may contain an element several times. Thus {a, a, b} is a multi set but no set.

[13] In HPSG, it is assumed that two sets of different arity do not unify unless some elements in the set that has more elements describe the same object. See for instance Pollard & Sag 1987:47–49, Pollard & Moshier 1990, and Carpenter 1992:34 for discussions of set unification. With the HPSG definition, transitive verbs are no more special than intransitive verbs and vice versa.

Regarding the utterance context, Frey and Gärtner write:

> Assume Hans is an actor whose assignment it is to clumsily clear the table. He will thus muster all his skills to skillfully clumsily clear the table. He may, however, fail in this effort. In this sense, he can be taken to have clumsily skillfully clumsily cleared the table. As long as our imagination doesn't fail us, this stacking of 'manners' can continue unboundedly. (Frey & Gärtner 2002:47–48)

Recursion as in 26 cannot be modeled by unification as it is usually defined. If we unify a certain adjunct construction—say a Manner Construction—with another construction two times, the result will not differ from the first unification.

Apart from the noncanonical understanding of sets, there is another problem in Kay and Fillmore's treatment of adjuncts: there is nothing that guarantees that the elements in the sets in 21b are unified with the right elements, that is, there is nothing that enforces the unification of the first element in SEM of 21b with *arrive*. The Setting Construction is unified with a VP Construction, and the VP contains in the SEM set all semantic representations of the elements in the VP (Kay and Fillmore's Subset Principle (1999:9)). Thus the first element in SEM of 21b could be unified with any of the verbal frames from the complete VP (for instance, if there is an adjunct clause). Similarly the element in VAL could be unified with some other dependent of the head.

LEXICAL INTRODUCTION OF ADJUNCTS. Van Noord and Bouma (1994) and Kay (2005) suggest the lexical introduction of adjuncts. This approach cannot be applied to Goldberg's analysis since the resultative meaning is contributed at the phrasal level. The adjunct in 8 scopes over the resultative meaning, in that 'quickly' refers to how the pond is fished DRY, not just how it is fished. Accordingly, it cannot be introduced as part of the meaning of a lexical item for the verb *fischt* 'fishes.'

CONCLUSION FOR PHRASAL TREATMENTS OF RESULTATIVES. The previous subsections show that Kay and Fillmore's phrasal analysis of adjuncts does not work and that a lexical analysis is incompatible with the phrasal approach to resultative constructions. It thus seems necessary to explicitly stipulate a Construction like 27 that mentions adjunct daughters and says something about the relation between the adjunct and the material it attaches to.

(27) [SUBJ OBJ Adjunct OBL V]

Since the number of adjuncts is not restricted, one would need infinitely many Constructions, unless abbreviations like the Kleene star are used.[14] Using the Kleene star, one could represent the Resultative Construction for German as in 28.

(28) [Adjunct* SUBJ Adjunct* OBJ Adjunct* OBL Adjunct* V]

This description does not represent the fact that there are other nonresultative sentences that contain adjuncts. The fact that adjuncts can appear in German sentences has to be restated within various Constructions. Furthermore, adjuncts can appear between OBL and V only if there is a focus split. This means that subconstructions are necessary. One would be the Resultative Construction with Focus Split and Adjuncts between the Split Elements.

If a Kleene star is used as in 28, one has to explain how the adjuncts contribute their meaning to the mother node. This is possible, but it would make the use of relational constraints or equivalent mechanisms necessary (see Kasper 1994 for such a proposal in the framework of HPSG). Relational constraints are powerful devices and should be avoided, if possible.

[14] The Kleene star says that a certain pattern may be repeated any number of times, that is, XP* stands for zero or any number of XPs.

2.5. INTERLEAVING OF DEPENDENTS OF COMPLEX FORMING PREDICATES. The examples in 9—repeated here as 29 for convenience—show that an argument of a predicate embedding a resultative construction may appear between the parts that belong to the resultative construction. In 29b, *niemand* separates *den Teich* and *leer*.

(29) a. weil niemand ihn den Teich leer fischen sah
because nobody.NOM him.ACC the pond.ACC empty fish saw
'because nobody saw him fish the pond empty'
b. weil ihn den Teich niemand leer fischen sah
because him.ACC the pond.ACC nobody.NOM empty fish saw

This is explained by the lexical analysis: *leer fischen* and *sah* form a complex predicate, and the arguments of this complex predicate may be permuted like arguments of simplex heads can. The technical apparatus for this was formalized by Geach (1970) in the framework of categorial grammar and later adapted to HPSG by Hinrichs and Nakazawa (1994). A complex-predicate analysis for resultative predicates in the framework of HPSG was first suggested in Müller 2002.

With the phrasal analysis, transformations (or trace-based simulations thereof) are the only option available for analyzing such permutations, but some researchers working in government and binding theory and its more recent variants have argued that constituent ordering as observed in 29b is not movement but base generation (see for instance Fanselow 2001, 2002).

Analyzing the Resultative Construction in 29b as a discontinuous constituent, as was suggested by Reape (1994) for other clause-union phenomena, leads to problems with subject-verb agreement and the so-called remote passive in German, as Kathol (1998) shows. Furthermore, discontinuous constituents are a very powerful device that is not really needed to account for the syntax of German (Müller 2005b); on the contrary, analyses like those suggested in Müller 1999, 2002 and Kathol 2000 which use discontinuous constituents to account for verb placement cannot cope with multiple frontings, as shown in Müller 2005c and 2007a.

2.6. FREE DATIVES. Andrew McIntyre (p.c., 2004) pointed out the interaction of several other phenomena with resultatives. I mention only one particularly interesting example that shows interaction with all of the phenomena discussed so far: free datives. Free datives, like the one in 30b, can be interpreted as benefactive or malefactive: if *he* refers to a famous painter, the benefactive interpretation may be appropriate; if it refers to a little child, the malefactive interpretation may be the intended one (Wegener 1985:100). The example in 30c shows that such datives allow for the so-called dative passive, in which a dative argument is realized as nominative.

(30) a. Er bemalt den Tisch.
he.NOM paints the table.ACC
'He paints the table.'
b. Er bemalt ihr den Tisch.
he.NOM paints her.DAT the table.ACC
'He paints the table for her.'
c. Sie bekommt den Tisch bemalt.
she.NOM gets the table.ACC painted
'She is getting the table painted.'

The interesting thing is that such datives are possible with resultatives as well. The sentence in 31a shows an example for the active case and those in 31b,c show the two passive variants.

(31) a. daß jemand ihm den Teich leer fischt
that somebody.NOM him.DAT the pond.ACC empty fishes
'that somebody is fishing the pond empty for him'
b. daß ihm der Teich leer gefischt wurde
that him.DAT the pond.NOM empty fished was
'that the pond was fished empty for him'
c. daß er den Teich leer gefischt bekommt
that he.NOM the pond.ACC empty fished was
'that somebody fished the pond empty for him'

Of course, all of the constituents in these examples may be permuted or fronted. Since the example in 31a involves three NPs instead of the two NPs in the examples discussed earlier, the number of required Constructions would increase even more dramatically: we would get ones like: the Dative Passive of Resultative with Free Dative and the Subject Extracted Construction.

2.7. INTERIM SUMMARY. I have shown that an enormous number of Constructions is needed to cover all the patterns in which the resultative construction can appear. To account for permutations of SUBJ, OBJ, and OBL, including special permutations due to focus movement, one needs two × three Constructions. Due to two possible verb positions, the number of Constructions is doubled. One of the tree elements is extracted in the fronting examples. Since the other elements can be reordered, we need two × three Constructions. Since the verb can be in initial or in final position, depending on the clause type (main clause vs. interrogative or relative clause), this number has to be multiplied by two.

In passivized resultative constructions, only two elements remain (SUBJ OBL). If we take into account focus movement, these elements allow for two permutations. Since there are two verb orders, we need four Constructions. The same number of Constructions is needed to handle the extraction cases.

Reordering is much more restricted in middle constructions. The reflexive pronoun can be reordered with respect to other NPs, but reordering of the adjunct that is an obligatory part of the middle construction and reordering of the resultative predicate are at least highly marked, if not completely excluded. The reflexive pronoun may not be extracted.

For sentences with free datives, there is one more element that can be permuted or extracted: ninety-six Constructions are needed for the active, twenty-four Constructions for the passive, and twenty-four Constructions for modal infinitives. In addition, twenty-four Constructions are needed for the dative passive. The middle construction seems to be impossible with free datives and the resultative construction. This is summarized in Table 1.

CONSTITUENTS	PHENOMENON	# OF CONSTRUCTIONS
SUBJ OBJ OBL V	Active RC	24
SUBJ OBL V V-Aux	Passive RC	8
SUBJ OBL V V-Aux	Modal Infinitive RC	8
SUBJ Refl Adj OBL V	Middle RC	10
SUBJ Dat OBJ OBL V	Active RC + Dat	96
SUBJ Dat OBL V V-Aux	RC + Dat + Passive	24
SUBJ Dat OBL V V-Aux	Modal Infinitive RC	24
SUBJ OBJ OBL V V-Aux	RC + Dat + Dat-Passive	24
TOTAL		218

TABLE 1. Constructions needed to account for the phenomena.

This results in a total of 218 Constructions. These Constructions account for most of the phenomena discussed so far. Adjuncts and complex predicates, as discussed in §2.5, are not included, and there are probably other phenomena that interact with the resultative construction in a way that would make the stipulation of even further Constructions necessary.

If local reordering of constituents is accounted for by separating dominance from precedence information, as was done in GPSG (Gazdar et al. 1985), the Constructions given in Table 2 are needed (see n. 2 on reordering).

CONSTITUENTS	PHENOMENON	# OF CONSTRUCTIONS
SUBJ OBJ OBL V	Active RC	1
	Extraction	3
SUBJ OBL V V-Aux	Passive RC	1
	Extraction	3
SUBJ OBL V V-Aux	Modal Infinitive RC	1
	Extraction	3
SUBJ Refl Adj OBL V	Middle RC	1
	Extraction	3
SUBJ Dat OBJ OBL V	Active RC + Dat	1
	Extraction	4
SUBJ Dat OBL V V-Aux	RC + Dat + Passive	1
	Extraction	4
SUBJ Dat OBL V V-Aux	Modal Infinitive RC	1
	Extraction	4
SUBJ OBJ OBL V V-Aux	RC + Dat + Dat-Passive	1
	Extraction	4
TOTAL		32

TABLE 2. Constructions needed if local reordering of constituents is accounted for.

Various readers ask whether it is sufficient for arguing against an analysis to show that one has to pose 218 rules to describe certain phenomena.[15] After all, there are certainly cases in the literature (e.g. Janda 1998) where the formulation of large numbers of rules is justified.

I agree that sometimes the stipulation of special rules or phrasal Constructions is justified. For example, computational grammars are often required to analyze phenomena that are (for diverse reasons) seldom if ever mentioned in the literature on grammatical theory. One example of this is date expressions, where it is probably sensible to assume special rules that cover just these expressions. The difference between such cases and the Constructions discussed so far is that the syntax of date expressions cannot be made to follow from anything, while it is sufficient to state one resultative lexical rule (Müller 2002:241 and §6 below), one participle-formation lexical rule (Müller 2002:151), one infinitive-formation lexical rule (Müller 2002:153), one lexical rule for free datives, and syntactic rules for verb positioning (a lexical rule that licenses fronted verbs (Kiss & Wesche 1991, Müller 2005b)), scrambling (as part of the general schema for head-argument combination (Müller 2005b)), and extraction (Pollard & Sag 1994, Müller 2005b) to get the effect of the 218 Constructions above. The participle-formation lexical rule and the infinitive lexical rule are responsible for appropriate inflection of the infinitives, something that has to be accounted for in a phrasal model as well (in addition to the 218 Constructions). Thus these lexical rules do not count in terms of a comparison. An adjunction rule (Pollard & Sag 1994:Ch. 1.9) together with

[15] I would like to thank editors Brian Joseph and James McCloskey for raising this question.

binary branching structures accounts for the placement of adjuncts in 8, and the predicate complex schema (Hinrichs & Nakazawa 1989, Müller 2005b:21) together with appropriate lexical entries for *sehen* 'see' licenses 29. For the phrasal approach, no analysis exists for 29. A further difference between the lexical and the phrasal model is that the lexical approach states one resultative rule and the interaction with the rest of the grammar follows from constraints on syntactic structures and from input conditions of other lexical rules. By comparison, the phrasal approach has to stipulate a Construction for every single case, since Kay's algorithm, which was suggested to compute interactions of Constructions, is not sound, as is shown in the next section.

Joseph 1997 argues that there are no complete generalizations and that one has to be prepared to find counterexamples and subregularities, which may originate from language contact, for instance. He discusses the claim that Adj N is the normal order in NPs like *the fat cat* and that *the cat fat* is ungrammatical. He states the corresponding generalization in 32.

(32) [NP ADJ N]/*[NP N ADJ]

He notes that sequences like *attorney general*, however, contradict the negative pattern.[16] This problem can be fixed easily in theories that allow for a more fine-grained categorization of linguistic objects: if it is possible to distinguish adjectives that have to appear in prenominal position from those that appear postnominally, grammatical theory has no problem. If a linguistic grammar contains a statement like 32 and it is pointed out that examples like *attorney general* contradict this statement, the statement that describes ADJ has to be made more specific. The same applies for the case at hand: resultative constructions interact with the normal syntax as expected, but if there were a particular resultative construction that did not allow for the placement of the finite verb in initial position (no such thing exists), one would have to specify subclasses and rule out the positioning of the finite verb in initial position for one of the subclasses. So, I believe it to be valid to assume one lexical rule in addition to a general syntactic system containing the six parts mentioned above to account for the data discussed so far, and this solution has to be preferred over the phrasal alternative.

3. AUTOMATIC COMPUTATION OF CONSTRUCTION-LIKE OBJECTS. It might appear that an analysis based on 218 distinct constructions is unobjectionable, given that Kay (2002: §7.1) has suggested an algorithm that computes so-called CONSTRUCTION-LIKE OBJECTS from a small set of specified Constructions. Construction-like objects are descriptions of phrasal configurations or lexical items that result from the interaction of Constructions. For the analysis of resultative constructions one would specify the Construction hierarchy in Figure 1, and the algorithm would compute construction-like objects for all compatible Constructions. The result of this computation would be equivalent to a Construction hierarchy with explicitly specified Constructions for the respective combinations (Figure 2).

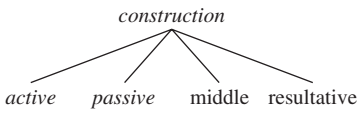


FIGURE 1. Construction hierarchy for resultative constructions.

[16] See also Dürscheid 2002 for a discussion of the German *Forelle blau* 'trout blue' and *Deutsche Syntax deklarativ* 'German syntax declarative.'

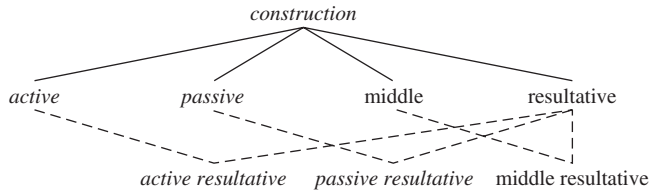


FIGURE 2. Extended construction hierarchy for resultative constructions.

Kay suggests the following in his 'Informal sketch of a formal architecture for construction grammar' (2002:§7.1).

> Unlike LFG phrase structure rules and lexical items and unlike HPSG maximal types, distinct maximal constructions can span the same (piece of) FT [feature structure tree—*SM*]. For example, the English VP construction, which provides for a lexical verb followed by an arbitrary number of constituents (subject to valence restrictions), can unify with a construction specifically licensing a VP displaying the 'heavy NP shift' property. In order to specify an explicit recursive licensing procedure for sentences, we need some way to deal with this overlap of constructions. We wish to reduce the set of constructions of a grammar to a set of construction-like objects (let's call them CLOs) with the property that in licensing a given sentence, exactly one CLO licenses each node. To obtain the set of CLOs from the set of constructions *C*: (1) form the power set of the set of constructions $\wp(C)$; (2) for each set of constructions in $\wp(C)$, attempt to unify all the members, matching the root nodes; (3) throw away all the sets that don't unify; (4) the remainder is the set of CLOs.

Unfortunately, this algorithm does not work, as can be demonstrated by applying it to a set that contains the two Constructions mentioned by Kay. The power set of the set in 33a is 33b.[17] The unification of Constructions in all sets in 33b is defined. Therefore, we get as a result the set of three CLOs in 33d and not the intended singleton set in 33c, which contains only the unification of the two original Constructions.

(33) a. C = {VP Construction, Heavy NP Shift Construction}
b. $\wp(C)$ = { { },
{VP Construction},
{Heavy NP Shift Construction},
{VP Construction, Heavy NP Shift Construction}}
c. desired result:
CLOs = {VP Construction $\wedge$ Heavy NP Shift Construction}
d. result according to Kay's algorithm:
CLOs = {VP Construction,
Heavy NP Shift Construction,
VP Construction $\wedge$ Heavy NP Shift Construction}

To obtain the intended result, Kay's algorithm needs to use a subsumption check, that

[17] At first glance, one might get the impression that the algorithm could be fixed by replacing 'power set' by 'restricted powerset'. RESTRICTED POWERSETS are defined as follows and were used, for instance, for the computation of greatest lower bounds in type hierarchies (Aït-Kaci et al. 1989):

> The *restricted powerset* of a poset $S, \leq$ is the set $2^{(S)}$ of nonempty finite subsets of pairwise incomparable elements of *S*.

But in the case discussed here, only maximally specific Constructions (leaves in the inheritance hierarchy) are considered. Therefore the restricted powerset of the set of Constructions under consideration is identical to the power set of this set without the empty set.

is, the result of the unifications of elements in sets is added to the set of CLOs only if it does not subsume any other unification result.[18]

However, the modified algorithm would fail in one particular case that is otherwise considered a highlight of construction grammar, namely idiomatic expressions: since idiomatic Constructions are subconstructions of regular Constructions, having idiomatic Constructions in the power set would cause the nonidiomatic Constructions to be eliminated from the set of CLOs since nonidiomatic Constructions are more general and subsume the idiomatic Constructions.

For the purpose of illustration let us assume that we have Constructions for the VP, for Transitive, and an idiomatic Construction for *kick the bucket*. The set of Constructions is thus 34a. The power set of this set is 34b. If the set of CLOs is allowed to contain the most specific construction-like objects only, the result would be 34c, but this is a set that contains a construction-like object that describes *kick the bucket* and no other VP with a transitive verb. The intended outcome is 34d, which also admits normal, nonidiomatic VPs with transitive verbs.

(34) a. C = {VP, Transitive, *kick the bucket*}
b. $\wp(C)$ = {{ },
{VP Construction},
{Transitive},
{*kick the bucket*},
{VP Construction, Transitive},
{VP Construction, *kick the bucket*},
{Transitive, *kick the bucket*},
{VP Construction, Transitive, *kick the bucket*}}
c. Result with a subsumption test in the algorithm:
CLOs = {VP Construction $\wedge$ Transitive $\wedge$ *kick the bucket*}
d. Desired result:
CLOs = {VP Construction $\wedge$ Transitive,
VP Construction $\wedge$ Transitive $\wedge$ *kick the bucket*}

It could be argued that idiomatic Constructions have to be specified in a way that does not include the information contributed by more general Constructions (this is what Kay and Fillmore (1999) do in the case of the *What is X doing Y?* Construction[19]). For our artificial example in 34 this means that the *kick the bucket* Construction does not contain information about the VP Construction and the Transitive Construction. The information that was left out on purpose could then be obtained by the CLO computation. However, idioms vary in syntactic flexibility (Fleischer 1982, Nunberg et al. 1994). For instance, some idiomatic expressions resist passivization, and others do not allow fronting of idiom parts or relativization. So, for instance, the *kick the bucket* Construction would not have a passive subconstruction, since the idiom cannot be passivized without losing the idiomatic reading. One way to capture such syntactic

[18] There is a problem with the understanding of valence and semantics sets assumed in Kay & Fillmore 1999. Since {a} subsumes {a, b}, a Construction C_1 that differs from another Construction C_2 by containing more information in semantics sets or valence sets will be subsumed by C_1. This would result in the elimination of C_1 from the set of Constructs. An example for such a situation might be adjuncts or free datives if they are introduced at a phrasal Construction.

[19] Examples of this Construction are given in (i).

(i) a. What is this scratch doing on the table?
b. What is it doing raining?

idiosyncrasies of idioms is to cross-classify idioms with respect to the Constructions in which they may appear—if an idiom can appear in a certain configuration, it has to inherit from the respective Construction. If no such inheritance link exists, the idiom cannot appear in the Construction. Therefore, the fact that an inheritance link is missing from the grammar implicitly encodes that the idiom does not occur in the respective Construction. If the CLO computation were to introduce the unification of the idiom with all compatible Constructions into the CLO set, feature structure trees for ungrammatical utterances would be licensed.

There are two ways of fixing the problem of the modified algorithm. First, one could say that idioms are not Constructions, thereby explicitly excluding them from CLO computation. This would require a special marking of idioms and would be conceptually unattractive since, after all, idioms ARE specialized versions of Constructions (like, for instance, the *What is X doing Y?* Construction). Second, one could deal with this problem by introducing an auxiliary feature IDIOM that has no value for the general Constructions (like, for instance, VP or Heavy NP Shift in the previous example). For each general Construction, a subconstruction would be stipulated (for instance, nonidiomatic-VP) that has *false* for the value of IDIOM. (For example 34, it is necessary to stipulate a Nonidiomatic VP Construction and a Nonidiomatic Transitive Construction as subconstructions of VP and Transitive, respectively.) All idioms would have the IDIOM value *true*. During CLO computation, idioms could be unified with the general Construction, since the IDIOM value of the general Construction would be unspecified. The additionally specified subconstruction would remain in the set of CLOs since it would be more specific than the general Construction, but nevertheless different from all idiomatic Constructions. To rule out the unification of idiom Constructions with other Constructions that are not attested for a particular idiom, one would have to introduce additional features that state that a particular idiom is incompatible with a particular other Construction.

This approach would thus need a large number of additional features and the stipulation of nonidiomatic Subconstructions for all Constructions that are direct super Constructions of idiom Constructions and that also license nonidiomatic phrases.

The conclusion is that the CLO computation does not work in the desired way, and therefore, which Constructions actually do license feature structure trees has to be stipulated; it does not follow from anything. This means that subconstructions for resultatives and passive, resultatives and extraction, and so on have to be specified by the linguist. Consequently, the fact that a verb with a subject and an object with appropriate case can be passivized is not captured by the grammar but has to be stipulated throughout the grammar again and again. In comparison, in the lexical rule-based approach, an item can be passivized if it fits the input description of the passive lexical rule. No explicit marking of Constructions with regard to passivizability is necessary.

Section 2 shows that there is massive interaction between resultatives and other phenomena. In this section, I have shown that the necessary phrasal Constructions have to be stipulated independently, since they cannot be deduced from more general Constructions. Yet there is another type of interaction that is even more problematic for the phrasal approach, namely the interaction between the resultative construction and derivational morphology, to which I turn in §5. I next deal with the passive, however, which is also problematic for inheritance-based approaches.

4. PASSIVE AND INHERITANCE-BASED ANALYSES. I have shown that Kay's algorithm for the computation of interactions between Constructions does not work, and I now turn

to the passive and show that inheritance-based analyses of passive are not appropriate for all languages. The conclusion is that—if one wants to analyze passive crosslinguistically in a uniform way—neither English nor German passives should be analyzed with reference to inheritance hierarchies. As mentioned in §2.3, Goldberg assumes a cross-classification of the Resultative Construction with regard to the active and passive dimension, that is, she assumes a hierarchy of the kind shown in Fig. 2. This cross-classification of Constructions with respect to active and passive is also suggested by Kay and Fillmore (1999:12) and Michaelis and Ruppenhofer (2001:Ch. 4).[20] Kay and Fillmore's and Michaelis and Ruppenhofer's analyses differ from Goldberg's in that they assume that linking patterns are verb-level Constructions, which unify with the lexical entries of verbs (Michaelis & Ruppenhofer 2001:39). With respect to the data that I discuss below, however, it does not matter whether a phrasal or a lexical approach is chosen: the data show that inheritance-based analyses are inappropriate to handle passive.

The examples in 35, which are Yucatec Maya, show that multiple passivization of a word is possible, if a causative morpheme intervenes: 35a shows an active sentence with the verb *learn* and 35b its passive variant.[21] Example 35c demonstrates that the verb *learn* can be causativized. The result is equivalent to the English *teach*. Interestingly, it is possible to embed a passivized verb under the causative morpheme, as is shown in 35d. The causative morpheme adds an argument for the causer, which can be affected by passivization, as is shown in 35e.

(35) a. K=u kan-ik le teòria-o'.
INCOMPL=3.ERG learn-IMPF DET theory-D1
'He is learning the theory.'

b. K=u ká'an-al le teòria-o'.
INCOMPL=3.ERG learn.PASS-IMPF DET theory-D1
'The theory is being learned.'

c. K=u kan-s-k-en le teòria-o'.
INCOMPL=3.ERG learn-CAUS-IMPF-me DET theory-D1
'He teaches me the theory.' ('He causes that I learn the theory.')

d. K=u ká'an-s-ik le teòria-o'.
INCOMPL=3.ERG learn.PASS-CAUS-IMPF DET theory-D1
'He is teaching the theory.' ('He causes that the theory is being learned.')

e. K=u ká'an-s-á'al le teòria-o'.
INCOMPL=3.ERG learn.PASS-CAUS-PASS.IMPF DET theory-D1
'The theory is being taught.' ('Somebody causes that the theory is being learned.')

Thus the following situation is found in 35e: the agent of a bivalent verb is suppressed by passivization, another agent is added by the causative morpheme, and this agent is suppressed by the second passive morpheme. This situation cannot be modeled in an inheritance hierarchy that classifies objects according to an active/passive and a causative/noncausative dimension, since one can say only once about an object that it has a certain property. Consider the hierarchy in Figure 3: if the lexeme *kan* 'learn' is cross-classified according to active/passive and causative/noncausative, we get among

[20] See also Davis & Koenig 2000 for such a proposal in the framework of HPSG.

[21] The data is inspired by Wunderlich (1999:508–9). I thank Thomas Stolz for a modification of the examples that made the arguments overt.

others a description for *passive* ∧ *causative* ∧ *kan*. But for 35e a double application of *passive* is needed, and this is impossible to model in the inheritance hierarchy.

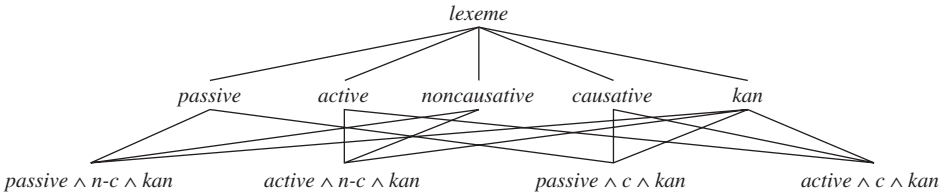


FIGURE 3. Inheritance hierarchy with subtypes of *active*, *passive*, and *causative*.

Thus, Yucatec Maya passive cannot be handled by cross-classification. Analyses for the English passive that are based on inheritance are therefore language-particular solutions that cannot be accepted as valid analyses from a crosslinguistic perspective. It follows that Goldberg's analysis of the Resultative Construction is not able to account for passive in a crosslinguistically adequate way. In comparison, a lexical rule-based approach has problems neither with the data in 35 nor with the interactions of resultative constructions and passive.

5. INTERACTIONS BETWEEN RESULTATIVE CONSTRUCTIONS AND MORPHOLOGY. In what follows, I discuss the interaction between resultative constructions and derivational morphology (nominalization and adjective formation). Various possibilities to combine the phrasal approach to resultative constructions with the derivational data are discussed. The only sensible approach seems to be an inheritance-based one. In §5.3, I show, however, that inheritance is not suited for handling derivational morphology.

5.1. RESULTATIVE CONSTRUCTIONS AND NOMINALIZATION. As the examples in 36 show, resultative constructions also enter into various types of nominalizations.

(36) a. *-ung* nominalizations

Leerfischung	'empty fishing'	(*taz*, 6/20/1996, p. 6)[22]
Kaputterschließung	'broken development'	(*taz*, 9/2/1987, p. 8)
Kaputtmilitarisierung	'broken militarization'	(*taz*, 4/19/1990, p. 5)
Gelbfärbung	'yellow dyeing'	(*taz*, 8/14/1995, p. 3)

b. *-er* nominalizations

Totschläger	'dead beater' or 'cudgel'	(*taz*, Bremen, 5/24/1996, p. 24)[23]
SFB-Gesundbeter	'SFB healthy prayer'	(*taz*, 1/13–14/2001, p. 32)
Ex-Bierflaschenleertrinker	'ex-beer-bottles-empty-drinker'	(*taz*, 8/25/1989, p. 20)

c. marginally in *Ge- -e* nominalizations

Totgeschlage	'beating to death'	(Fleischer & Barz 1995:208)

An analysis that derives such nominalizations from phrasal configurations seems rather unattractive.[24] To derive the phrase *die Leerfischung der Nordsee*, one has to map the

[22] The *taz* (*die tageszeitung*) is a newspaper that appears nationwide in Germany (http://www.taz.de).

[23] Also in *taz*, Hamburg, 7/21/1999, p. 22.

[24] Goldberg (1996:§4.2, 2003:§3.3) argues that the fact that Persian complex predicates interact with derivational morphology is evidence for the zero-level status of the complex predicates. Following this line of argumentation, (German) resultative constructions should be V0s as well. Goldberg (2006:25) explicitly argues against the derivation of deverbal NPs from clauses.

Construction that licenses 37a onto one that licenses the corresponding phrase in 37b or onto the noun in this phrase with an appropriate valence specification.

(37) a. jemand die Nordsee leer fischt
somebody.NOM the North.Sea.ACC empty fishes
b. wegen der Leerfischung der Nordsee (*taz*, 6/20/1996, p. 6)
because.of the empty.fishing of.the North.Sea.GEN

To make this work, one has to assume a Construction that licenses *jemand die Nordsee leer fisch-*, that is, a sentence with a verb that is not inflected. Without this assumption, one has to reverse the inflection of *fischt* to be able to append the suffix *-ung* contained in *Leerfischung*. The alternative to the assumption that phrases or phrasal rules serve as input to morphology or morphological rules is to assume a very general Resultative Construction that does not contain information about the phrasal realization of the elements involved in resultative constructions. A phrasal SUBJ-OBJ-OBL-V Construction and the *-ung* Construction inherit from this general Construction.

Since the automatic computation of possible Constructions in a hierarchy is problematic (see §3), one has to specify explicitly that there is a Construction that inherits from the general Resultative Construction and the *-ung* Construction. The same applies to *-er* and *Ge- -e* nominalizations, which are also compatible with resultative constructions.

Therefore, the phrasal approach has to make explicit statements about the interaction of phenomena that are unnecessary in a lexicon-based system since the interaction between phenomena is governed by rules designed to cover a single phenomenon: either the output of a lexical rule satisfies the input description of another lexical rule or it does not. If it does not, the second lexical rule cannot apply. For instance, 38b is ruled out, since the passive lexical rule cannot apply to the unaccusative verb *schmilzt* that is the output of the resultative lexical rule.

(38) a. Die Butter schmilzt zu einer Pfütze. (Kaufmann 1995:146)
the butter melts to a puddle
b. *weil zu einer Pfütze geschmolzen wurde
because to a puddle melt was

Miriam Butt (p.c. 2005) argues that the nominalizations can be seen as compounds and that therefore the interpretation of the compound is not taken care of by the grammar, but is left underspecified. It is clear that an analysis that derives the readings of the nominalizations in 36 without reference to grammar-external principles should be preferred. Apart from this, it should be noted that the noun *Fischung* does not exist in German in the relevant sense. The noun exists, but it refers to a plank on a boat. So *Leerfischung* is not a compound of *leer* and *Fischung*, but a nominalization of *leer fisch-*. A similar situation is found with derivations of particle verbs: there is a word *Ausraubung* 'robbing', which is derived from *ausraub-* 'to rob', but there is no word *Raubung* (Fleischer & Barz 1995:173), so *Ausraubung* cannot be the combination of a nominalization of *rauben* 'to steal' with *aus*, but should be treated as the nominalization of *ausrauben*. See Müller 2003a for an analysis of the morphology of particle verbs. Since particle verbs and resultative constructions behave similarly in many respects, the problem of nonexisting bases for particle-verb derivation is additional support for the analysis of *Leerfischung* as true nominalization rather then compounding.

5.2. RESULTATIVE CONSTRUCTIONS AND ADJECTIVE DERIVATION. But even if one accepts a compound analysis, not all problems are solved, since the problem with derivation is not restricted to nominalizations, as the examples in 39 show.

(39) a. der leer gefischte Teich
the empty fished pond
'the pond that was fished empty'
b. das zu Schrott gefahrene Auto
the to scrap.metal driven car
'the car that was driven to a wreck'

In 39a *Teich* is not an argument of *fischen*, and there is a reading of 39b where some other vehicle—for instance, a bicycle—is used in the driving event that caused the destruction of the car. See Wunderlich 1997:123 on examples like 39b. The example in 39b is important since it shows that prepositional phrases can appear with prenominal adjectives and that therefore the construction has phrasal status. The problem with examples like the ones in 39 for Goldberg and also for phrasal analyses of complex predicates as they were suggested by Butt (1997) in the framework of lexical functional grammar (LFG) is the following: if the resultative meaning and the respective argument structure are licensed at the phrasal level, the adjectival derivation and inflection has to happen there as well. But if inflection is assumed to be a lexical process, the input to this process has to be lexical too (Dowty 1978:412, Bresnan 1982:21). Since both construction grammar and lexical functional grammar assume the principle of LEXICAL INTEGRITY (Bresnan & Mchombo 1995, Goldberg 2003), an analysis in which a derivational affix attaches to a phrase is not compatible with basic assumptions of these frameworks. The only possible option is to form the adjectival participle in a component that precedes syntax, but the information that is needed for doing so is not available: verbs that do not govern an accusative object cannot be used as adjectival passive participles.

(40) a. *der geschlafene Student
the slept student
b. *der geholfene Mann
the helped man

Example 40a is ruled out since *schlafen* 'to sleep' does not take an object, and 40b is out since *helfen* 'to help' takes a dative object. The adjectival derivation determines the argument that is the subject of the derived adjective and that predicates over the noun. In a phrasal analysis of resultative constructions the derivation of adjective forms that are needed to analyze 39 would be ruled out, since the verbs are used intransitively: it is not the object role of *fischen* that is coindexed with *Teich*, but the subject role of *leer* 'empty', and the information that there will be such an argument and that it will have object status in the complete construction is missing from the lexical items for the verbs. As a consequence, neither the phrasal analysis of complex predicates in LFG nor Goldberg's analysis of resultative constructions can be adapted for German resultative constructions.

5.3. DERIVATION AND INHERITANCE. In §5.1, I showed that modeling the interaction between resultative constructions and nominalization makes it necessary to introduce many subconstructions. In this section, I make a more general point and show that inheritance is not suited as a general means for describing derivation.

In inheritance hierarchies, information specified at higher Constructions is taken over by subconstructions. If a Construction has more than one super Construction, the values of the features of the super Constructions have to be compatible. If they are not, a conflict arises and one has to take care of the resolution of this conflict. One can solve the conflict either by stating at the level of super Constructions which value may be

overridden by subconstructions, or one can throw away the conflicting information and possibly state new values within the inheriting Construction. It is important to note that one can refer only to features inside of a Construction. It is impossible to refer to features in a super Construction if the values of the respective features are overridden. Thus, if we have a general Resultative Construction, as for example in 41a, a nominalization Construction that would be needed to account for *Leerfischung* in 37b cannot be related to 41a by inheritance.[25]

(41) a. general Resultative Construction

syn val {$NP_{\#1}$, $NP_{\#2}$, $Pred_{\#3}$, $V_{\#4}$}
sem cause-become(#1, #2, #3) by #4

b. nominalization Resultative Construction for 37b

syn val {Det, $NP_{\#2}$, $Pred_{\#3}$, $V_{\#4}$}
sem nominal-semantics(cause-become(#1, #2, #3) by #4)

The reason for this is that the semantic properties of the Constructions are different: the general Resultative Construction has a verbal semantics, and the nominalization construction has a nominal semantics in which the resultative semantics is embedded. By overriding the SEM value of the super Construction, the semantic information of the super Construction is lost. Therefore, linkings to arguments (#1, #2, #3, #4) are also lost, and these have to be respecified by hand in the subconstruction.[26] If such respecifications are necessary in an analysis, this indicates that generalizations are lost. If values at subconstructions cannot be inherited but have to be specified, this also means that there is no way to derive the respective subconstruction by some general mechanism like the one discussed in §3.

Apart from such problems, inheritance-based proposals have other problems: first, recursion, as for example in *Vorvorvorversion* 'preprepreversion', cannot be covered

[25] The '#' followed by a number is used to mark identity of values. See Kay 2002. The subscript '#1' in $NP_{\#1}$ is used to refer to the discourse referent of a referring NP.

[26] One way of solving this problem is to use auxiliary features to represent a prototypical semantic representation and specify a mapping from this auxiliary feature to the SEM feature of the subtype. See Kathol 1994: 263 and Koenig 1999 for similar suggestions. Koenig (1999:§4.1.1) also argues against an inheritance-based analysis of derivational morphology. For the inheritance approach to work for the cases at hand, one needs auxiliary features for all features that differ in various instances of the resultative construction, that is, for part of speech, valence, and semantic contribution. If more than one value-changing Construction interacts (as for instance in the complex derivation *Leerfischbarkeit* 'empty fishability' or in the interaction of resultative, free dative, and Accusative with Infinitive Construction), one has to stipulate complex systems of interacting mappings from auxiliary features, which makes this proposal very unattractive. See Müller 2007b for a discussion of inheritance.

Another solution is to use lists to represent semantic information. If relations embed other relations, the embedded relations are stored in the lists and pointers are used to refer to the respective list element. A special pointer is used to mark the main semantic contribution of a sign. In such a setting, one could inherit the resultative semantics from the super Construction and add the nominal semantics at the end of the list (see Müller 2005a for a partial implementation of this idea). The nominal semantics points to the resultative semantics, and the pointer that points to the main semantic contribution is overridden such that it points to the nominal semantics. MINIMAL RECURSION SEMANTICS (Copestake et al. 2005) is a formalism that uses such pointered lists. This framework is also assumed by Kay (2005).

in inheritance networks (Krieger & Nerbonne 1993). If one assumes that *Vorversion* is an object that inherits information from *vor-* and from *Version*, one has problems with the analysis of *Vorvorversion*, since information about the prefix *vor-* is contained in *Vorversion* already and inheriting this information a second time from *vor-* would not add anything. Second, in an inheritance-based approach to derivation, it cannot be explained why *undoable* has the two readings that correspond to the two bracketings in 42 (Krieger & Nerbonne 1993).

(42) a. [un- [do-able]]
b. [[un-do] -able]

If we inherit information about *un-*, *do*, and *-able*, the order of the combination of this information does not matter, and hence only one representation for *undoable* will result in an inheritance-based analysis, which is not adequate.

The conclusion is that embedding Constructions are needed for derivation. The *-ung* Construction could be stated as in 43.

(43) embedding *-ung* Nominalization Construction

syn	N
sem	nominal-semantics(#1)
phon	#2 ⊕ ⟨*ung*⟩
	syn V
	sem #1
	phon #2

In this Construction, a verbal stem is embedded. The embedding is marked by the box in 43. The embedded stem has the syntactic category V (syn V), while the whole Construction has the syntactic category N. The PHON value of this verbal stem (#2) is used for the computation of the PHON value of the whole construction, which is the result of appending *-ung*. The semantic contribution of the construction consists of the nominal semantics, into which the contribution of the embedded verb (#1) is integrated.

This embedding Construction is equivalent to an HPSG analysis that uses lexical rules.[27] The analysis requires the existence of a verbal stem that can function as an embedded construction or as input to the respective lexical rule. No such stems exist in the phrasal analysis. This analysis is therefore incompatible with an embedding analysis of derivation.

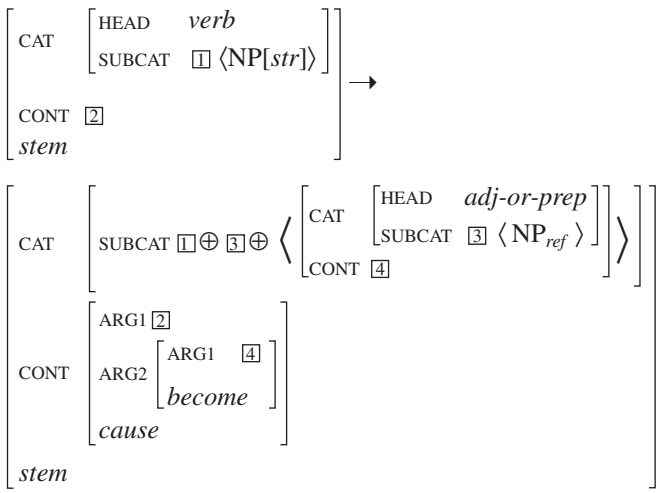
Concluding this section, it can be said that interactions between resultative constructions and derivational morphology can be represented in inheritance hierarchies that allow for default specifications and overriding. Such representations would, however, be stipulations that do not capture the general properties of derivational morphology.

6. LEXICAL RULE-BASED APPROACHES. I now give an outline of the lexical rule-based analysis, compare it with the phrasal approach, and discuss crosslinguistic aspects of the respective analyses.

[27] See Meurers 2001 for a formalization of lexical rules in HPSG and Pollard & Sag 1987:Ch. 8.2, Orgun 1996, Ackerman & Webelhuth 1998, Riehemann 1998, Kathol 1999, Koenig 1999, and Müller 2002 for analyses of inflection and/or derivation that use lexical rules.

6.1. OUTLINE OF THE BASIC ANALYSIS. Lexical rule-based approaches assume a lexical rule that takes an intransitive (version of a) verb as input and licenses a special lexical item that selects for an additional object and a secondary predicate. One formalization of such a lexical rule in the framework of HPSG (Pollard & Sag 1994) is shown in 44.[28]

(44) Lexical rule for resultatives



This lexical rule takes a verb stem as input (an object of type *stem* with a HEAD value *verb*). The input verb has to have a subject and no object. This is represented by the valence specification in the SUBCAT list. The rule licenses an item that selects a predicate that has a referential subject. This subject is raised to the object of the output of the lexical rule, which is indicated by the tag 3 which appears simultaneously before the value of the SUBCAT list of the selected predicate and in the SUBCAT list of the output of the lexical rule. The output item thus selects for a subject (the element in 1), an object that is raised from the secondary predicate, and the secondary predicate. As was suggested by Dowty (1979:221), the semantic content of the input verb (2) is embedded under the *cause* relation, and the semantics of the secondary predicate (4) is embedded under *become*.

The output of the lexical rule is a stem. This stem may be inflected and then used to analyze sentences like 5, repeated here as 45, or it may be the input to derivational lexical rules.

(45) (weil) sie die Nordsee leer fischen
because they the North.Sea empty fish
'because they fish the North Sea empty'

One such derivational lexical rule licenses *-ung* nominalizations, so from *fisch-* 'to fish' one can derive *fischung-*. This *fischung-* is special in that it selects for a secondary predicate and can be used in words such as *Leerfischung*. The stem that is the output of 45 can also be used to derive the passive form or other forms with respective valence

[28] I omit feature paths like SYNSEM or SYNSEM|LOC since they are not relevant in the current context. I also omitt feature value pairs that are important for distinguishing unaccusative verbs from unergative ones. See Müller 2002:241 for the full analysis.

patterns. The case of subjects and direct objects is underspecified in the lexicon. The arguments are marked for structural case. Whether the case value is nominative, accusative, or genitive depends on the syntactic context in the actual utterance and is determined by a case principle. See Meurers 1999 for details.

Several readers suggested that Embick 2004 is relevant here. He claims that lexical approaches to resultatives cannot explain why adjectival passive formation interacts with the resultative constructions. To quote from this article:

> (73) a. The door remained opened.
> b. The metal remained flattened.
> c. the recently hammered metal
>
> . . .
>
> (75) The metal is [hammered [aP flatter than a pancake that has been run over by a steamroller and stomped on by elephants]].
>
> Clearly, one would not want to derive the predicate (75) in the lexicon; it is a syntactic structure. Within standard Lexicalist assumptions, a lexical process cannot form an adjective out of *hammer* and the resultative secondary predicate in (75) because lexical processes cannot follow syntactic processes. Thus, the formation of resultative participles that have resultative secondary predicates must be syntactic, according to Lexicalist assumptions. If the Lexicalist view is to be maintained, this means that there must be two ways of forming resultative participles: one lexical rule for forming adjectival passive predicates like those in (73); and a second, syntactic process that creates an adjective out of *hammer flat* and the like. (Embick 2004:389)

Embick's argument is probably due to a misguided understanding of what it means to encode things in the lexicon. Sentences like his 75 are unproblematic for a lexical analysis of resultatives, provided the results of the resultative analysis can be input to passive and inflection. An integrated account of all three phenomena is provided in Müller 2002. Due to space limitations I cannot explain all components of the analysis here, but I give a sketch and point the interested reader to my book. The passive analysis assumed in Müller 2002:Ch. 3 is a formalization of proposals in Haider 1986 (see also Müller 2003b): a so-called designated argument (usually the agent of an unergative or transitive verb) is blocked in participle formation. The participle can be used in the agentive passive and in the perfect. In perfect constructions, the perfect auxiliary deblocks the blocked argument and it has to be realized as an argument of the auxiliary. In passive constructions, the blocked argument remains blocked. This analysis interacts without problems with the analysis of resultative constructions given above: the subject of the input verb is the designated argument and this NP is blocked in participle formation. The auxiliaries for the perfect deblock it (46a) and the auxiliary of the passive leaves it blocked (46b).

(46) a. Jemand hat den Teich leer gefischt.
somebody has the pond empty fished
'Somebody fished the pond empty.'
b. Der Teich wurde leer gefischt.
the pond.NOM was fished empty

The lexical rule that is responsible for participle formation licenses a stem. This stem can be input to an adjective-formation lexical rule. This lexical rule requires the input to have an argument with structural case that is not blocked. This argument is turned into the subject of the adjective. The output of the adjective-formation lexical rule is a stem, which has to be inflected before it can be used in syntax. Examples for the respective rule applications are given in 47.

(47) a. der angekommene Zug
the arrived train
b. der reparierte Wagen
the repaired car

Example 47a contains an adjective that is derived from an unaccusative verb. Since the unergative verb does not have a designated argument, nothing is blocked by the participle-formation rule. Therefore, the only argument of *angekommen* is accessible and can be turned into the subject of the adjective *angekommen* by the adjective-formation lexical rule. Example 47b demonstrates how the analysis works for a transitive verb: the designated argument of *reparieren* is blocked. The participle *repariert* has one argument that is not blocked, namely the underlying object. This argument is turned into the subject of the adjective *repariert*. If no accessible argument with structural case exists, as in the case of *helfen* 'to help' and *schlafen* 'to sleep' in 40, the lexical rule cannot apply and it is correctly predicted that adjectival derivation is not possible in such cases.

This analysis interacts very nicely with the lexical analysis of the resultative construction: the output of the lexical rule that licenses resultative constructions is input to the participle-formation lexical rule, the output of which is in turn input to the adjective-formation lexical rule. The participle-formation lexical rule blocks the subject of the resultative construction as explained in the discussion of 46b. The adjective-formation lexical rule takes the only remaining accessible argument, which is the subject of the resultative predicate, and turns it into the subject of the adjective. The adjective is inflected and can be used to analyze phrases like 48.

(48) der leer gefischte Teich
the empty fished pond
'the pond that was fished empty'

So this shows that Embick's claim is wrong. In addition, it shows that nothing special has to be said about adjectival passives in interaction with the resultative constructions. Everything follows from normal principles of (German) grammar. In comparison to this it seems impossible to analyze this phenomenon in a phrasal approach in frameworks like construction grammar, HPSG, or LFG, since such frameworks assume lexical integrity and do not use transformations.

6.2. COMPARISON WITH THE PHRASAL APPROACH. In the conclusion of their article, Goldberg and Jackendoff write: 'We leave it as a challenge for practitioners of other approaches to develop comparably detailed accounts' (2004:564). A response to this is that it is easy for people who suggest lexical rule-based accounts to develop a comparably detailed account since the phrasal approach can be more or less directly converted into a lexicon-based approach. For example, consider the graphical representations of the phrasal approach and the lexical approach given in Figure 4.

This figure shows the analysis that the German sentence in 45 would receive. In the phrasal approach, the listed verb *fischen* 'to fish' would be plugged into the Construction right away. The Construction licenses the additional object and the resultative predicate and accounts for the resultative meaning. In a lexical rule-based approach, a (semiproductive) lexical rule maps the listed lexical entry onto another one, which in turn selects the arguments of the input lexical item plus the subject of a secondary predicate and the secondary predicate itself (this is represented in the SUBCAT lists in Fig. 4.). The semantic representation of the input of the lexical rule is incorporated into the output of the lexical rule, and the resultative semantics is added (this is represented in the

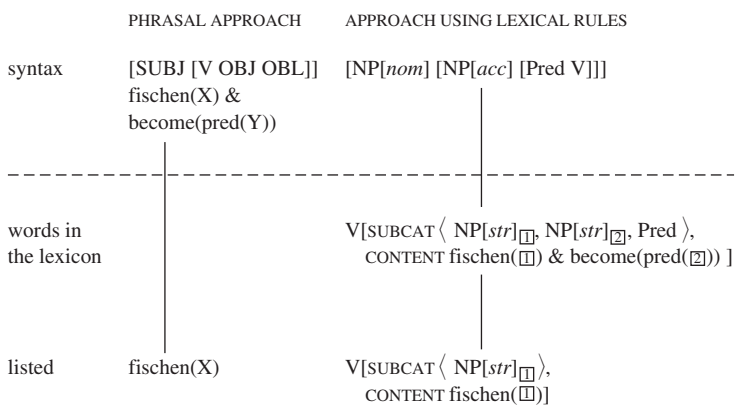


FIGURE 4. Phrasal vs. lexical rule-based analyses.

CONTENT values in Fig. 4.). The additional lexical item is used in the syntax in the way predicted by the syntactic system of a language. No special mention of resultatives must be present in the syntax. All constraints that can be attached to headed phrasal Constructions can also be attached to lexical rules. Instead of specifying what is dominated by a Construction, one specifies what is selected by the lexical item that is the output of a lexical rule. Since lexical rules can be organized in type hierarchies in the same way phrasal Constructions can, there is no advantage offered by the Construction-based approach. Goldberg considers the need to stipulate new verb senses to be a crucial disadvantage of lexical rule-based approaches, but note that one does not say that the intransitive verb *fischen* gets a new meaning. Rather, it is said that when the verb *fischen* is used together with a secondary predicate and the subject of this predicate, the whole complex has a resultative meaning.

Thus, as far as the encoding of constraints is concerned, the approaches are equivalent. Yet the phrasal approach interacts in various undesirable ways with the rest of the grammar.

6.3. CROSSLINGUISTIC CONSIDERATIONS. It is obvious that the syntax of English and German resultative constructions differ, and Korean can be added in as well, to name just a few languages for which lexical rule-based approaches have been suggested (see Wunderlich 1992:45, Verspoor 1997, Wechsler 1997, Wechsler & Noh 2001, Müller 2002). But this is not due to peculiarities of the construction in the respective languages. Rather, the constructions behave as expected, given the overall syntactic systems of the languages; that is, there is no need to say anything special about extraction, about passivization, or verb position that is relevant in the context of resultative constructions only. Lexical rule-based approaches to resultatives capture this, while the phrasal approach has to mention the particular language-specific phrasal realization.

Having shown that lexical rule-based analyses are better suited for the analysis of resultative constructions, I now turn to the question of whether phrasal Constructions are needed at all.

7. DO WE NEED PHRASAL CONSTRUCTIONS AT ALL? In their classic paper, Fillmore and colleagues (1988) show that one has to assign special meaning to certain phrasal configurations, since the meaning of the utterance cannot be determined solely on the basis of the meaning of its parts.

However, the question is what the meanings of the parts are. As it is possible to shift syntactic information around between lexicon and syntactic rules (Constructions), it is also possible to represent semantic information at noncanonical places and, by doing so, to obtain a grammar that can derive the meaning of all utterances compositionally. I demonstrate this by explaining idiom analyses developed in the framework of HPSG. Instead of representing the meaning of a certain expression at the phrasal level, one can represent it in the lexical entry of the head.[29] The specification of the meaning goes hand in hand with lexical restrictions regarding the syntactic context in which the head may be used, meaning that the lexical entry contains a statement of the following kind: if the head X is used with certain arguments or modifiers, it means Y. The meaning provided with such special entries for idioms may be different from the canonical reading of the respective head. For example, Krenn and Erbach (1994) suggest a lexical entry for the analysis of *jemandem den Garaus machen* 'somebody the GARAUS make' = 'to kill somebody' that has the SUBCAT list in 49.

(49) *machen*: SUBCAT ⟨NP[*nom*], NP[*dat*], NP[*acc*]⟩

In addition, they specify that the NP[*acc*] has to contain the bound word *Garaus* and that the article has to be definite. The meaning of this *machen* is specified to be 'kill'. Since this lexical entry is similar to other ditransitive verbs, it is explained why the NPs can be reordered or fronted and why the idiom can be passivized: the normal rules of German syntax apply.[30] In connection with this example, it should be noted that, in a grammar employing a lexical entry like the one suggested by Krenn and Erbach (1994), it is orthogonal to the issue discussed here whether binary branching or flat structures are assumed. In his radical-construction-grammar FAQ, Croft (2001:Ch. 1.6.2) says that his proposals can be formalized in feature-based theories like categorial grammar, but that it is a disadvantage of such frameworks that they assume binary branching structures since there are constructions with more than two parts. Croft notes that a representation like that in 50a can be converted into a categorial grammar notation like 50b.[31]

(50) a. [$_{VP}$ V NP]
b. VP/NP

The representation in 50b stands for an entity that will be a VP if an NP is added. Contrary to Croft's claim, however, such a conversion is also possible for Constructions with three or more parts. The result of converting 51a is 51b.

(51) a. [$_{VP}$ V NP NP]
b. (VP/NP)/NP

The representation in 51b says: if we combine (VP/NP)/NP with NP we get VP/NP

[29] If there is no constituent that can be regarded as the head, an empty head can be stipulated. Of course, this comes with a cost and should be motivated by other theoretical considerations.

[30] The examples in (i) are the respective examples for reordering ((i)a) and fronting ((i)b–c) of arguments and passive ((i)d).

(i) a. weil ihm jemand den Garaus gemacht hat
because him.DAT somebody.NOM the GARAUS.ACC made has
b. Jemand hat ihm den Garaus gemacht.
somebody.NOM has him.DAT the GARAUS.ACC made
c. Ihm hat jemand den Garaus gemacht.
him.DAT has somebody.NOM the GARAUS.ACC made
d. weil ihm der Garaus gemacht wurde
because him.DAT the GARAUS.NOM made was

[31] See for instance Steedman 2002 on the categorial grammar notation.

and if we combine this with NP we get VP. The representation given in 49 corresponds to ((S/NP)/NP)/NP, that is, to a statement saying: if we combine a verb with three NPs, we get a sentence.[32] What the meaning of the sentence will be is specified to a large extent in the lexical representation of the head.

In fact, Kay and Fillmore (1999:20) give a representation of the *What is X doing Y?* Construction that could be a lexical entry. The only argument they put forward for a phrasal Construction is that they avoid stipulating additional senses for the copula BE as it appears in this construction. However, the lexical introduction of adjuncts suggested by Kay (2005) amounts to saying that each head has infinitely many meanings.

A drawback of the Krenn & Erbach approach is that it involves nonlocal selection since the verb *machen* states constraints on the determiner of the NP *den Garaus*. However, locality is not recognized as an issue by those working within construction grammar. For instance, Goldberg's Resultative Construction is specified as [Subj [V OBJ OBL]], and thus the constraints regarding resultatives involve trees of a depth greater than one. In the analysis outlined in Kay & Fillmore 1999, all information about adjuncts and arguments of a head is available at the top-most node in a tree. Since the representation of arguments and adjuncts in turn contains their internal structure, basically the whole internal structure of a linguistic object is represented at the top-most node and it is also possible to select internal parts of it. Selecting internal parts is what Kay and Fillmore do in their analysis of the *What is X doing Y?* Construction.

In HPSG, nonlocal selection is usually made much harder by assuming a feature geometry that does not allow for the selection of daughters of selected elements (Pollard & Sag 1994; see also Sag 2007 on locality). Yet even with this restrictive feature geometry it is possible to specify restrictions on the syntactic context in which a lexical item is uttered. For instance, Sailer (2000) has developed a collocation module that allows a lexical item to look at the whole surrounding sentence. This is possible if one uses relational constraints. This approach was recognized to be too powerful, however, since it did not place enough constraints on what kind of information may be selected. The approach developed in Söhn & Sailer 2003 is more restrictive in this respect.

This discussion shows that it is possible to control everything from the lexicon. Whether this is motivated and whether a particular analysis is too expensive or too powerful because of heavy usage of relational constraints or other devices has to be decided on a case-by-case basis.

8. CONCLUSIONS. Comparing the phrasal approach to the lexical rule-based one, it can be said that the lexical rule-based approach is much simpler: stating lexical rules for the resultative construction is sufficient. Nothing has to be said about the interaction with other phenomena. The output of the resultative lexical rules can serve as the input to the passive lexical rule or for lexical rules that account for derivational morphology. Alternatively, the output of the resultative lexical rules can be inflected and then enter the syntax directly and function as the head in active clauses. Verb placement, constituent reordering, relative-clause formation, interrogative-clause formation, fronting, and adjunction follow straightforwardly from the normal patterns of syntax, and no reference to resultative constructions is necessary in the parts of the grammar that deal with these phenomena. Specific rules like 2b are not necessary—the more abstract head-argument structure of HPSG that basically says 'combine a head with its argument' is sufficient.

[32] Steedman (2002:159) gives a parallel lexical entry for the Dutch verb *gaf* 'gave.'

The discussion of Fig. 4 above shows that information that can be attached to phrasal Constructions can be attached to lexical items as well. The representation of such information can be done at a phonologically filled head (as in the case of the resultative construction) or it can be attached to a phonologically empty head. An example of the latter is the analysis of relative clauses in Pollard & Sag 1994:Ch. 5. As the discussion of the idiom analysis shows, even the tiniest bit of a sentence may be controlled from within a lexical entry. If one does not follow the lexical approach and specifies phrasal Constructions instead, one encounters problems in explaining the interactions between syntax and morphology. This suggests that a lexical treatment of resultative constructions is more appropriate. Such a lexicon-based analysis was suggested by Boas 2003 in the framework of construction grammar. The lexical rules that Boas refused to formulate can be formulated as suggested by authors working in the HPSG framework or as lexical Argument Structure Constructions similar to the ones proposed by Kay (2005). So, I do not argue here against construction grammar as a framework, but rather against a specific type of analysis within this framework and other nontransformational frameworks. Goldberg and Jackendoff (2004) are right in claiming that one needs a tight connection between form and meaning and that some approaches will have difficulties in capturing their findings, but the question is how the resultative Construction is stated. I maintain that stating it in the lexicon is the better solution.

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[Received 22 November 2004;
revision invited 26 February 2005;
revision received 17 May 2005;
accepted 20 March 2006]