Partial Verb Phrases and Spurious Ambiguities*

John Nerbonne
nerbonne@let.rug.nl

Alfa Informatica and
Centre for Behavioral, Cognitive and Neuro-sciences
Rijksuniversiteit Groningen
P.O.Box 716
9700-AS Groningen
The Netherlands

Abstract

Phrase structure analyses of partial verb phrase (hence: PVP) fronting in German recognize PVPs as potential constituents—i.e, they are constituents not only in the Vorfeld, which they can and must be, but existing analyses inevitably have the consequence that PVPs are potential constituents in the Mittelfeld as well. Given the range of frontable PVPs this has the undesirable consequence that a great deal of otherwise unmotivated phrase structure is postulated in the Mittelfeld, which, moreover, must be assumed to provide alternative constituent structures—the structures overlap in ways incompatible with simple tree structures. Haider has noted this problem, which results in the postulation of spurious ambiguity—structural ambiguity which appears to have neither semantic correlate nor syntactic motivation.

This is a problem which Pollard's "On Head Non-Movement" ends with, and the contribution here is a simple suggestion on how to avoid these unwanted ambiguities. The suggestion is to allow PVPs to participate in long-distance dependencies (by allowing them to appear in SLASH) whenever they might otherwise appear as part of (the subcategorization requirements of) the controlled VP complement to a finite auxiliary. Thus we propose allowing that, rather than (i) immediately satisfying SUBCAT requirements, or (ii) allowing them to be satisfied by a superordinate auxiliary (raising), we transfer them into SLASH, where they must be satisfied remotely (in the Vorfeld—focus—position). This obviates the postulation of excessive constituent structure in nonfronted verb phrases, and it even

*I thank Gosse Bouma, Gertjan van Noord, Hans Uszkoreit, an anonymous referee, and the audience at the Workshop, HPSG and German, (where the paper was presented on 8.Aug 1991) for useful suggestions about the ideas presented here, and Ingo Neis for help with the tree drawings. A special thanks to Erhard Hinrichs, Tilman Höhle, Tsuneko Nakazawa and Klaus Netter for very detailed comments. This work was supported by a research grant, ITW 9002 0, from the German Bundesministerium für Forschung und Technologie to the DFKI DISCO project.

removes the need for ambiguity in the position of the trace (there need not be any trace). This is so because the long-distance dependency (SLASH), if used, must be discharged at a unique location—the Vorfeld. Subcategorization requirements, by contrast, are normally satisfied in various ways, so that a given string may represent more than one constellation of subcategorization requirements (either satisfied directly by the embedded verb or through inheritance to the matrix).

The analysis proposed here—by not insisting that Vorfeld elements be possible Mittelfeld constituents—is furthermore superior to alternatives in providing a treatment of a further problem Haider noted, viz., cases involving extraposition in which Vorfeld elements cannot appear in the Mittelfeld. It should be clear that the present analysis rejects the general principle that slashed constituents may always be able to appear as constituents (in at least some alternative analyses).

1 Introduction

Existing treatments of partial verb phrase (PVP) fronting postulate that Vorfeld phrases might have been Mittelfeld constituents as well. In several theoretical frameworks the Vorfeld constituent is linked by a rule of "fronting" or "topicalization" to a source "trace" in the Mittelfeld. But it turns out that no single bracketing of the Mittelfeld can provide all of the candidates for fronting. We find pairs like the following:

(1) a. **Das Buch lesen** wird er schon können
the book read will he already can
He'll surely be able to read the book

b. **Lesen können** wird er das Buch schon

The bracketings required for the Mittelfeld for these two examples are contradictory, so the attempt to relate the Vorfeld occupant to a Mittelfeld provenance leads inevitably to the postulation of a great deal of otherwise unmotivated ambiguity in the Mittelfeld. This is the problem of SPURIOUS AMBIGUITY: under treatments in which fronted constituents must always correspond to potential Mittelfeld constituents, the Mittelfeld must support a great variety of otherwise unmotivated constituent structures.

The goal of this paper is to reconcile a much simpler view of the variety of constituent structures of the German Mittelfeld to the evidence above that has almost universally been taken to indicate quite complex constituent structure (we note honorable exceptions below). The tack taken will NOT be to find fault with the argumentation or evidence, but rather to show how an alternative analysis may be formulated in some detail with no assumption of complex Mittelfeld structure.

The proposed treatment does not depend on constituent structure at all, but rather on subcategorization (government), and it is compatible with a variety of hypotheses about constituent structure in the Mittelfeld. In order to emphasize how independent it is, we illustrate the fronting analysis together with an analysis in which the Mittelfeld is quite flat—in particular the illustration of the analysis eschews the popular binary-branching analysis of the Mittelfeld in favor of an analysis with strictly weaker assumptions—a flat analysis in which all verbal complements and adjuncts are sisters. Thus in this extended illustration none of the constituent structure required under other analyses is present at all. The modifications needed for application to treatments which treat the Mittelfeld as more "contoured"—e.g., as right-branching—are straightforward, however.

As must be expected, the analysis foresees no use of traces. Since a trace is an "atomic constituent", analogous to a word, the simple use of traces would guarantee the difficulty illustrated in (1) above.

The point of illustrating the proposal against the background of a flat analysis of the Mittelfeld might seem questionable to those to whom the flat analysis seems clearly wrong—presumably the majority of researchers. The motivation for nonetheless presenting it this way is partly methodological: since we claim that the constituent structure in the Mittelfeld is irrelevant in determining the possibilities for the Vorfeld, it seems cleanest to develop the analysis with minimal assumptions about the constituent structure. The flat structure is minimal in postulating no constituents that are not also accepted on all the other analyses (NPs, PPs, etc.). We do not attempt to demonstrate that the flatter analysis is the only possible one, or that the more contoured analyses are false—only that they are strictly superfluous in determining Vorfeld candidates. This motivation for adopting the flat analysis in the present paper is NOT that we imagine that all of its competitors have been shown to be false, but rather clarity about the explanation proposed: the mechanism proposed turns on subcategorization and makes no assumptions about constituent structure. It could also be used in connection with postulates of elaborate (binary-branching) constituent structure in the Mittelfeld. Examples like (1) above suggest that some mechanism like the one proposed here is indeed REQUIRED in right-branching analyses, at least if these are to eschew the problem of spurious ambiguity.

But we wish to be candid about a more insidious agenda, which is to cast some doubt on the more contoured—right-branching—analyses. For this reason there is a review of arguments in favor of non-flat, or CONTOURED constituent structures, as well. But these are not developed into analyses.

We turn then to a more careful development of the analysis and its motivation.

1.1 Motivation

In this section we review the literature on PVP fronting, noting how it has led to a right-branching view of the Mittelfeld.

The flat analysis of the Mittelfeld postulates fewer constituents than others, and therefore has fewer entities to manipulate in providing explanations. This justifies a *prima facie* preference for flat constituent structure, but one which is hard to insist on in the face of apparent exceptions to a very plausible law of German syntax:

Generalization: Only single constituents before finite matrix verbs.

A common variation is to say that finite matrix verbs appear in second position (Wackernagel's position), and this formulation too assumes a SINGLE element before the verb. See Kufner 1962:9-13 and Heidolph et al. 1981:703ff for further defense of this generalization. There are many apparent exceptions to this generalization which will not concern us here. For example, the notion "single constituent" is vague and would appear to need more precise formulations in view of structures such as these below:

(2)

a. In Wien am 25.Dez. 1990 wußte ...
   Vienna on knew

b. Aber Schmidt wußte ...
   but knew

c. Schmidt, allerdings, wußte ...
   however knew

d. Den Professor, sie lobten ihn
   the(acc) professor they praised him
   (McCray 1981:78)

e. Habe ich schon gewußt.
   AUX I already know(prt)

f. Wüßte ich nur!
   know(subj) I only
   If I only knew!

g. Die Kinder nach Stuttgart sollst du bringen?
   the kids to should you bring
   (Lühr 1985,1ff)

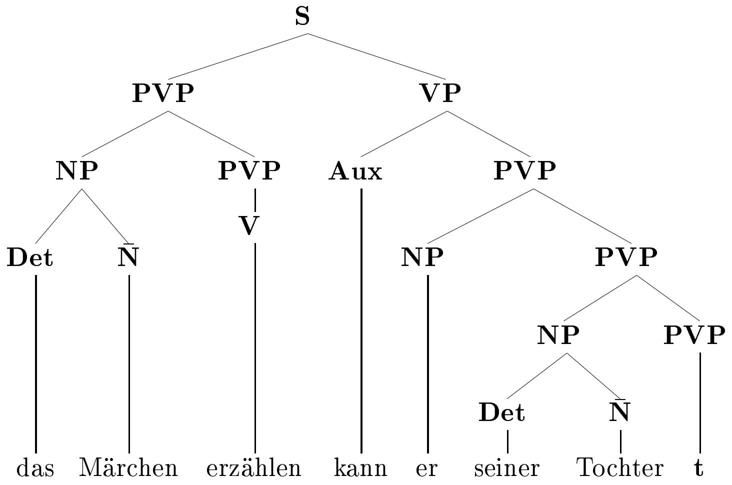


Figure 1: **PVPs and constituent structure**: The postulation of partial verb phrase constituents is justified by the possible occurrence of these phrases before finite matrix verbs.

Thus some combinations of adverbials (*In Wien am 25.Dez 1990*) may function as single constituents; some discourse particles (*aber, allerdings*) and some dislocations (2d) do not seem to count; topics (2e) may be omitted; some finite matrix clauses (in subjunctive or interrogative mood) may have nothing before the verb (2f); and some directionals seem prone to allow combinations with other verbal dependents. Hoberg 1981 is a large corpus studies with further examples of this sort.

1.2 Partial Verb Phrases

There is a further group of apparent counterexamples which has been tackled by the introduction of PARTIAL VERB PHRASES (hence: PVP) constituents.[1] These are illustrated here.

(3) a. **ein Märchen erzählen** kann er seiner Tochter
a story tell can he his(dat) daughter
He can tell his daughter a story

b. **seiner Tochter ein Märchen erzählen** kann er

This sort of example may be analyzed as involving a single constituent

[1]I am following the custom of referring to the finite verb plus all that follows it in the clause as a VP—even though it clearly has a different categorial status from the English VP. It is a VERBAL phrase, since it has a verb as head, but it may be lacking any of several complements (or none). 'PVP' will then be reserved for verbal constituents which are less complete.

in fronted position, so that it thus presents no genuine counterexample to the "single constituent" generalization. Nerbonne 1985 and Nerbonne 1986 analyze the fronted constituents as nonfinite verbal heads accompanied by one or more verbal complements, and argued that this supported the categorial view of grammatical relations proposed then by Dowty 1982. Note that two assumptions conspire to account for the occurrence of PVPs in the Vorfeld. First, one assumes that verbal heads may combine with their arguments one at a time, and second, that the resultant verbal constituents are licensed in the Vorfeld by virtue of their being licensed in the Mittelfeld. We must retain something like the first assumption if the Vorfeld elements are to be licensed at all. But we are free to drop the second assumption—that Vorfeld occupants are linked to a vestigial occurrence as trace in the Mittelfeld.

The structure foreseen by this early analysis is illustrated in Figure 1, and it is similar to structures proposed by Fourquet 1971, who did not, however, apply it to the problem at hand. The postulation of PVPs allowed an explanation for the range of constituent combinations which could appear in fronted position, always with a nonfinite verb:

(4) a. **Erzählen** kann er seiner Tochter ein Märchen

b. **Ein Märchen erzählen** kann er seiner Tochter

c. **Seiner Tochter ein Märchen erzählen** kann er

Uszkoreit 1987b:158ff rejected Nerbonne's proposal,[2] noting two areas in which this first solution was incomplete: first, it did not explain the possibility that a single verb might appear with a variety of complements (a possibility not foreseen, e.g., in Heidolph et al. 1981:721):

(5) a. **Ein Märchen erzählen** kann er seiner Tochter

b. **Seiner Tochter erzählen** kann er ein Märchen

Nerbonne 1985:149-51 had already suggested modeling German subcategorization as an unordered set as a solution to this problem. For varieties which distinguish (4a) and (4b) in acceptability (cf. Heidolph et al. 1981:721, which marks (4b) as unacceptable), some (perhaps partial) ordering would need to be imposed.

The second problem Uszkoreit noted was that Nerbonne 1985 made no provision for auxiliary verbs except as sisters to VP. As a solution to the second problem, Johnson 1986 extends the basic analysis to the case of

[2] Uszkoreit 1987a recanted, however.

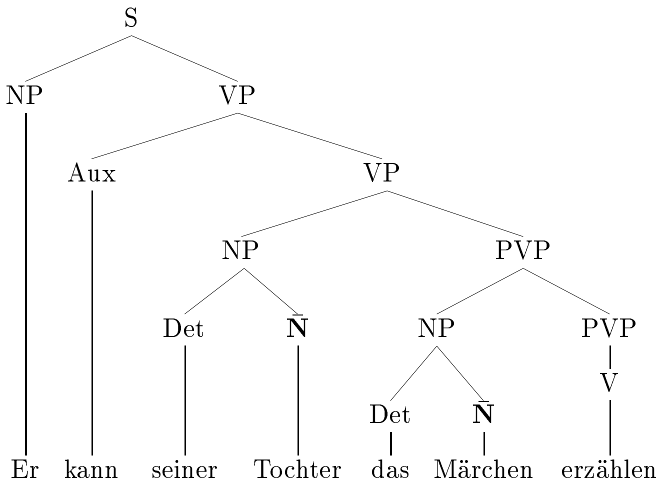


Figure 2: **Right-branching VPs and PVPs**. Examination of the range of frontable PVPs (cf. text, (4)) leads to a "contoured", in fact right-branching, view of the nonfinite VP.

modal auxiliary verbs, allowing that these be sisters to V as well as VP, in order to account for data such as the following:

(6)	**Erzählen**	**können**	wird	er	es	ihr	schon
	tell	can	will	he	it	her(dat)	already
	He'll surely be able to tell it to her						

Johnson 1986 allows auxiliary verbs to be systematically ambiguous, subcategorizing either for VPs, PVPs or for Vs. Example (5) suggests the motivation for the V subcategorization, and (3) provides evidence for the VP subcategorization. Allowing both analyses admits syntactic ambiguity in almost all structures involving auxiliary verbs, although, as Johnson points out (p.878), the syntactic ambiguity provably does not result in semantic ambiguity. We return to this issue in the following section.

Finally, Hinrichs and Nakazawa 1989 refine these analyses by restricting auxiliary attachments to V in order to account for "auxiliary flips" (among other things), but they accept the right-branching structure as a hypothesis for the relations between verbal complex and the rest of the ver-

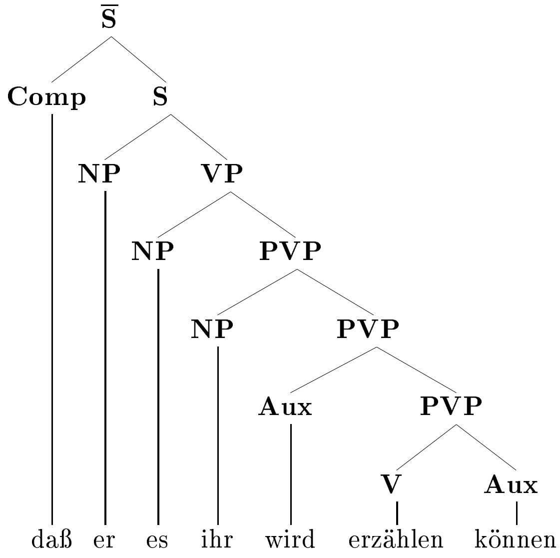


Figure 3: **Right-branching VP structure** is also postulated in subordinate clauses, where "auxiliary flip" is the justification. Hinrichs and Nakazawa 1989 have defended this structure.

bal dependents (complements and adjuncts). Auxiliary flip is exemplified here:

(7)	Ich	weiß,	daß	er	es	ihr	**wird**	**<u>erzählen</u>**	**<u>können</u>**
	I	know	that	he	it	her(dat)	will	tell	can
	I know that he'll be able to tell her that								

Hinrichs and Nakazawa 1989 would foresee a right-branching structure of approximately the shape sketched in Figure 3.

There is therefore a fair amount of consensus about the desirability of admitting partial verb phrases as constituents, at least as in their fronted position. But the analyses sketched above do not treat example (1) except by postulating a systematic ambiguity in the Mittelfeld, which of course we should prefer not to have to accept. We shall therefore reject the position that PVP fronting is to be explained as the displacement (or alternative expression) of a potential Mittelfeld constituent.

This paper advances an analysis in which PVPs ARE constituents when in fronted positions but need not otherwise be. A "flat" structure is a sufficient provenance for these constituents, which otherwise would not have occurred as constituents (at least, not in general). In formulating the position this way, we should clarify that we of course recognize standard clausal elements, such as NPs and PPs as constituents, and moreover, we recognize the arguments of Hinrichs and Nakazawa 1989 that verbal complexes must play a role in the explanation of the syntactic structure of "auxiliary flip", so that, e.g., *erzählen können* must be a constituent in (6).

When this paper proceeds from a "flat" analysis of nonfinite VPs (in the Mittelfeld) as opposed to a "contoured" one, it denies the theoretical utility of postulating constituents such as *Märchen erzählen* or *seinem Sohn ein Märchen erzählen* in sentences such as (8). The contoured analysis recognizes these (cf. Figure 2):

(8)	Er	wird	seinem	Sohn	ein	Märchen	erzählen
	he	will	his(dat)	son	a	story	tell
	He'll tell his son a story						

Of course, we can only demonstrate that the constituents are superfluous in the limited domain of Vorfeld analysis. Since the general question of whether Mittelfeld terrain is flatter or more contoured is also interesting, we also examine this question in the following sections.

One aspect of the argumentation here is unusual—that a constituent exists in one position but not in another. This is unusual because it contradicts the well-known methodology of arguing for constituency, viz. demonstrating that some linguistic process (in this case fronting) treats a group of words as a functional unit. But this is a rule-of-thumb, not a linguistic principle.

Let us note that allowing PVPs to be constituents in one position but not in another is not as radical a departure from standard notions as it might first appear. After all, we should all agree that **Tom and Dave** is a constituent in (9a), but not in (9b). Analogously, we shall propose an analysis in which *ein Märchen erzählen* is a constituent in (10a) but

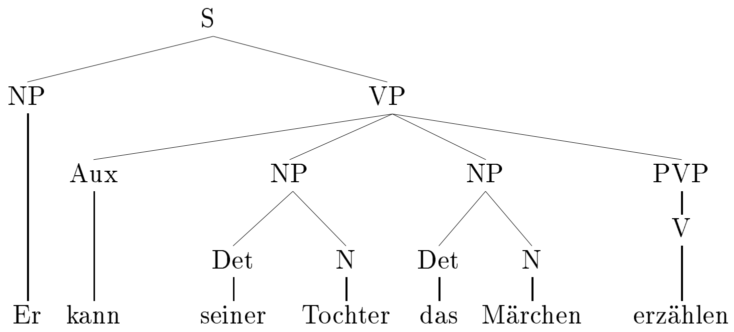


Figure 4: **A "flat" view of constituent structure in the verb phrase**: The analytical challenge to this view is to explain why partial verb phrases constituents such as *das Märchen erzählen* may occur before finite matrix verbs.

not in (10b). 'Constituent' is always a relative notion—relative to a larger syntactic analysis.

(9) a. **Tom and Dave** sang
b. Mary danced with **Tom and Dave** sang

(10) a. **Ein Märchen erzählen** wird er ihr
a story tell will he her(dat)
He will tell her a story

b. Er wird ihr **ein Märchen erzählen**

Lest anyone mistake the mention of the examples above for an attempt to argue positively for a flat structure internal to the VP, let me hasten to add that no such thing is intended. The point is merely a gentle reminder that "constituents" may be identified only with respect to (analyses) of phrases.

We turn now, therefore, to problems which arise in this sort of analysis.

1.3 Problems with PVPs in the Mittelfeld

We consider analyses which allow BOTH flat and contoured VPs in this section, and turn to problems in analyses with only contoured VPs in the next. The problem with analyses which allow both flat and contoured VPs is spurious ambiguity. Nerbonne 1985, Nerbonne 1986 and subsequent analyses were designed to allow both the contoured VP constituent structure motivated by the examples above, but also flat structures. Pollard 1991 notes the basic problem with this, viz., the multiplication of analyses. Now if these multiple analyses were syntactically or semantically motivated, then this would simply be a curious consequence of the analysis. But, apart from this fronting construction, there is little evidence for the right-branching structure and none whatsoever for systematic structural ambiguity in the VP. (Since we take up the case for right-branching structures directly, I won't anticipate the arguments against right-branching structures here.) Thus the above analyses are guilty of spurious ambiguity.

If the fronting evidence is taken as probative of whether a constituent exists in the Mittelfeld as well, then some ambiguity in the Mittelfeld is unavoidable, as the data below indicate:

(11) a. **Das Buch lesen** wird er schon können
the book read will he already can
He'll surely be able to read the book

b. **Lesen können** wird er das Buch schon

A first desideratum for an analysis which is to be less profligate in postulating ambiguity would therefore be the relaxation of the requirement that

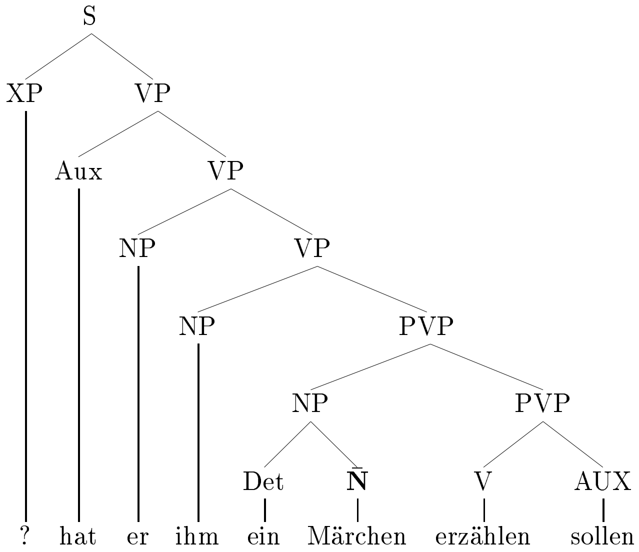


Figure 5: **Right-branching Analyses of PVP fronting** cannot analyze all Vorfeld PVPs as constituent fronting. The above tree is the most plausible "neutral" structure from which PVP fronting candidates might be taken, but (i) the final AUX *sollen* is unfrontable; and more seriously (ii) the (on this analysis) nonconstituent *ein Märchen erzählen* is frontable. Any attempt to allow this as a constituent along with the right-branching analysis results in spurious ambiguity. Section 2.3 below provides a derivation of this fronting in the current analysis.

only Mittelfeld constituents are frontable. We should prefer a mechanism which allows that nonce constituents be created solely for the purpose of fronting.

1.4 Arguments for Eliminating Traces

The key to eliminating the spurious ambiguity problem noted in (1), repeated above for convenience as (11), is the elimination of traces in favor of an analysis in which long distance dependence is grounded not in a missing constituent, but rather in an unrealized functor-argument relation. There are two imminent indications that this tack is correct, each noted in Haider 1990.

Vorfeld-Mittelfeld Mismatch As noted above, Nerbonne 1986 and others argued that the contoured VP analysis provided a basis from which to explain the ability of partial VPs to appear in the Vorfeld. But the behavior of double infinitives in fronting is not explained under this hypothesis, at least not without admitting spurious ambiguity (or a mechanism such as the one proposed here). Using examples like (11), Haider 1990 thus notes that fronting yields inconsistent results as a test for constituency. On the one hand some frontable segments would not be constituents on the right-branching view (12a), while some nonfrontable final segments would be (12b). The latter might be dismissed as an idiosyncratic additional restriction on PVP fronting (and the present treatment will not improve on this unexplanatory restriction), but the former indicates that something serious is wrong with the received view—non-constituents simply should not participate in fronting.

One could of salvage a more standard analysis by providing a SECOND ANALYSIS of the sentence with an alternative constituent structure alongside the right-branching one, but this is to admit an ambiguity with no apparent further motivation—a spurious ambiguity. Figure 5 illustrates the problem using the example below:

(12) a. **Ein Märchen erzählen** hat er ihm sollen.
a story tell AUX he him should

b. * **Sollen** hat er ihm ein Märchen erzählen.

We comment on three aspects of this argument: first, it does not show that the right-branching analysis is impossible, and a right-branching analysis can indeed be formulated for the examples for (12a). Rather, the data demonstrate that one cannot suppose that Vorfeld elements would always correspond to constituents on a right-branching analysis, or indeed or any single analysis, no matter how elaborate. Thus one cannot rely on a right-branching analysis together with a simple filler-trace mechanism to account for Vorfeld constituents. But the adherent of the right-branching view is free to give up the trace mechanism rather than the right-branching hypothesis to obtain the desired descriptions.

Second, Haider 1990 uses this and other facts to argue that a "nonderivational" (or unistratal) treatment is required—by which he means a treatment using a single level of syntactic analysis and therefore which does not identify the Vorfeld occupant with a trace in the Mittelfeld. The present treatment is certainly nonderivational in Haider's sense: there is no place in the description for a Mittelfeld position which corresponds—as shared structure or as derivational source—to the Vorfeld constituent. On the other hand, it would not be surprising to find that derivational treatments of some sort were possible—just no very simple "movement" analyses.

Finally, this argument is not affected by the existence of verbal complexes which might not be right-branching—there will be no difference in the structures postulated in the case of two verbs. We argue below that these are better treated in the flat analysis. We provide a treatment of these in Section 2.7 below.

Extraposition Mismatches Haider 1990 notes a second problem concerning the generality of the hypothesis that fronted constituents may also be found in unfronted position.[3] The existence of fronted constituents with extraposed parts—which likewise cannot be found in unfronted positions—also confirms the need for mechanisms such as the one suggested in this paper below.

(13) a. **Einen Hund füttern, der Hunger**
a(acc) dog feed(inf) REL(nom) hunger
hat, wird wohl jeder dürfen
have will well every(nom) may
Presumably everyone is allowed to feed a dog that is hungry

a′. * Es wird wohl jeder **einen Hund füttern,** der Hunger hat, dürfen

a″. Es wird wohl jeder **einen Hund füttern** dürfen, **der Hunger hat.**

1.5 Problems with Contoured VPs

But we can suppress ambiguity in two different ways: we can reject either the flat structures or the contoured ones. We sketch reasons for preferring the latter strategy in this section.

The first reason concerns the asymmetry between finite and nonfinite VPs. There is simply no sensible way to construe finite (matrix) VPs without auxiliary verbs as right branching—at least none short of postulating a rightmost empty verbal node which is somehow related to second position. Netter 1992 develops an HPSG analysis in which a right-branching VP is present even in finite matrix clauses, but at the cost of assuming final empty verbal nodes in all such sentences.

(14) Er erzählt seiner Tochter ein Märchen
he tell his(dat) daughter a story

[3]In the handout for a lecture "Wie hältst Du's mit der VP", Stuttgart, 13.1.86 Haider attributes the observation to Tilman Höhle.

A second reason is methodological and will perhaps therefore be less convincing to some. The flat analysis hypothesizes only those constituents accepted by contoured analyses. Thus any explanation based on the constituent structure in the flat analysis transfers immediately to all more contoured analyses, but not vice versa. The flat analysis is strictly simpler in the number and types of constituents it postulates. Since constituents are ultimately the units on which syntax relations are defined, this means that the flat analysis foresees strictly fewer syntactic relationships as well. This argument is at base an appeal to simplicity. Elaborate constituent structure is an assumption to be used sparingly.

At the risk of blunting an old point through repetition, we repeat that the flat analysis is useful here even if it ultimately turns out to be wrong since it provides a more general background against which to demonstrate the treatment of fronting. It is the treatment of fronting which allows us to suppress spurious ambiguity, and which is the central point of the paper.

1.6 Non-arguments for Contoured VPs

In this section we shall very briefly review four arguments, all found at least in the "folk tradition" of syntactic analysis, which unsuccessfully purport to demonstrate right-branching in nonfinite VPs.

coordination If there were PVPs in non-fronted position, one should expect them to form coordinate structures, and they certainly can (15a). But then again, so can non-constituents (15b,c,d):

(15) a.

Er	wird	seiner	Tochter	**ein**	**Buch**
He	will	his(dat)	daughter	a(acc)	book

schenken	und	**ein**	**Märchen**	**vorlesen**
give	and	a(acc)	story	read

He'll give a book and read a story to his daughter

b.

Er	erzählt	**seiner**	**Tochter**	**ein**	**Märchen**
He	tell	his(dat)	daughter	a(acc)	story

und	**seinem**	**Sohn**	**eine**	**Abenteurgeschichte**
and	his(dat)	son	a(acc)	adventure yarn

He'll tell his daughter a story and his son an adventure yarn

c.

Er	hat	**der**	**Tochter**	**ein**	**Märchen**	und
He	AUX	his(dat)	daughter	a(acc)	story	and

dem	**Sohn**	**eine**	**Geschichte**	erzählt
his(dat)	son	a(acc)	adventure yarn	tell

He has told his daughter a story and his son a yarn

d. Er fährt mit **Tom nach Paris** und **Max**
He go with to and
nach London
to
He'll go to Paris with Tom and London with Max

(15b) is not even problematic if one accepts an analysis in which finite matrix verbs have a clause-final representation (in some appropriate sense). In this case (15b) would be an example of constituent coordination with two final empty verb nodes. But the same tack can hardly work for (15c), where the verb node is presumably filled. (15d) is difficult to analyze as part of a general pattern; thus even slightly more complicated NPs begin to make the examples sound peculiar, so that it may be worth reiterating that (15d)—like all the data in this section—is not adduced as evidence against the right-branching analysis, but rather as an indication that its explanatory potential is limited. (15d) suggests that subsentential coordinations such as (15a) require more general accounts—ultimately making the right-branching hypothesis otiose. (Let me reiterate that the point here is not to pretend to insights about coordination—much less concrete hypotheses, but rather to note the difficulty in arguing from facts involving this poorly understood construction.)

right-node raising While PVPs certainly may appear in right-node raising constructions (16a), this does not show that they are constituents. This once popular test[4] for constituent structure has been shown to be flawed, as (16b,c) show (Hunze 1991, 2):

[4]It is not clear that the test was ever popular for Germanists; I mention it because it has been used in lectures I have heard and because of its (earlier) popularity in English.

(16) a. H sollte der Tochter, und K muß dem Sohn,
should the daughter and must the son
ein langes, urdeutsches Märchen vorlesen
a(acc) long German story read
H has to read a long German story to his daughter, and K to his son

b. Vati beschreibt, und Mutti zeigt, **der lieben**
Dad describes and Mom shows the(dat) dear
Tochter ein bildhübsches Märchenhaus
daughter a(acc) pretty house
Dad describes, and Mom shows, a pretty house to their dear daughter

c. Peter hat einen roten und Karl einen grünen
AUX a(acc) red and a(acc) green
Ball bestellt
ball order(prt)
Peter ordered a red and Karl a green ball

semantic scope There is a very strong tendency in German to accept left-right order as the order of scope, and since this order is reflected in the right-branching structure used by those who favor contoured VPs, this fact might equally appear to justify the right-branching structure.[5] This line of argument is objectionable on two grounds. First, let us note that we need an auxiliary hypothesis about the structure of finite matrix clauses in order bring these into line with the putative generalization. We can motivate this by examining sentences without infinitive VPs, where the right-branching structure would not be expected, but where the left-right bias persists:

(17) Er erzählte fast jedem Mädchen mindestens ein
He told almost every girl at least one
Märchen
story
He told almost every girl at least one story

The auxiliary hypothesis is that of "verb movement", by which we shall mean accounts in which the finite matrix verb is treated as

[5]The obvious way to test this hypothesis—by examining scope in left-branching structures—is stymied by the lack of more complicated examples of clearly left-branching structures in German. Prenominal modification would be a potential candidate but recursive use of such structures is quite unacceptable.

if it occurred clause-finally (Thiersch 1978 is an early defense of a treatment along such lines). Of course, we can obtain the same effect without movement rules by postulating an empty verb node at the rightmost edge of the clause, related to the actual occurrence by structure-sharing equations (see Netter 1992 for an HPSG development of this idea). For those willing to accept such empty rightmost verbal nodes, right-branching structures may be postulated for these examples as well, and their preferred scope falls within the predicted pattern. But the proponents of verb movement have a harder time explaining the scope variation found among modal verbs. There are two possibilities for adherents of the right-branching hypothesis: either modal verbs are treated like finite main verbs, scoping as if they occurred at the end of the clause, or they are treated as if they occurred where they're pronounced (and are postulated then to scope over everything to the right). The former treatment works for *müssen*, the latter for *sollen*—but neither generalizes to both cases.

(18)	a.	$\Box\neg$	Du sollst/solltest nicht töten You shall/should not kill
	b.	$\neg\Box$	Du mußt nicht töten You must not kill

dürfen 'may' is perhaps freest in allowing ambiguous interpretations (it can occur within or without the semantic scope of negation). The reading within the scope of negation is most natural, but negation takes wide scope in examples such as *Du darfst gehen, und du darfst auch <u>nicht</u> gehen.* 'You can go, and you can also <u>not</u> go' (where sentence accent is underlined). Each reading is problematic for one of the two simple hypotheses which might salvage the right-branching analysis. Hidden variability in the syntactic contexts in which modals occur will therefore be the subject of speculation among staunch advocates of structure-determined scope, to whom we leave the further pursuit of the matter, concluding only that there is no simple relation of modal scope and constituent structure which the right-branching postulate may claim to explain.

Second, it must be noted that the left-right tendency of scope preference (and therefore the constituent structure tendency as well), while strong, is not absolute. There are scopally ambiguous sentences such as (19a)—whose ambiguity is inexplicable if either left-right order or c-command determines scope; there are scopally unambiguous sentences where the elements occur in the wrong order such as (19b)—where conceptual implausibility may rule out structurally possible readings (and where the offending element cannot be construed as part of the Nachfeld, as (19b′) demonstrates); and the cases of "backward" scoping include verbal adjuncts (19a-b), verbal complements (19c), combinations of these (19d), and adnominal elements (19e).

(19) a.

Das	Baby	heulte	ab und zu	stundenlang
the	baby	cried	every-now-and-then	for-hours

The baby cried occasionally for hours (ambig)

b.

Die	Züge	fahren	stündlich	werktags
The	trains	go	hourly	on workdays

The trains go hourly on workdays (Kasper 1993)

b′.

Die	Züge	sind	stündlich	werktags	gefahren
The	trains	AUX	hourly	on workdays	go(prt)

The trains went hourly on workdays

c.

...daß	er	mindestens	ein	Gemälde	fast
that	he	at least	one	painting	almost

jedem	Gast	zeigte
every(dat)	guest	showed

...that he showed at least one painting to almost every guest (ambig.) (cf. Frey 1989, 202)

d.

...ob	er	etwas	nicht	vergessen	habe
whether	he	something	not	forget(prt)	AUX

whether he had not forgotten something

e.

Ein	Vertreter	jeder	Partei	[war anwesend]
A	rep.	every(gen)	party	[was present]

A representative of every party was present

There may be an implicit assumption behind the argument from scope to constituent structure, viz. that we just cannot describe scope correctly without assuming the contoured syntax. Indeed, there are significant technical difficulties, but Kasper 1993 shows in detail how these may be overcome in an HPSG proposal for accounting for the scope of adjuncts in flat VPs.

auxiliary flip There are varieties of German which allow the finite auxiliary in auxiliary flip to move not only around nonfinite verbal complexes, but around some nonverbal clause elements as well. In these varieties, we find that all of the variations below are acceptable (see Hinrichs and Nakazawa 1993):

(20) a. ...daß er jedem Kind ein Märchen hat
that he every(dat) kid a(acc) story AUX
erzählen sollen
tell should
that he should have told every child a story

b. ...daß er jedem Kind hat ein Märchen erzählen sollen

c. ...daß er hat jedem Kind ein Märchen erzählen sollen

(And there is a growing tendency for the auxiliary verb not to respect the verbal complex, appearing between pairs of verbs, but this does not affect the main point.) But for this pattern to demonstrate that PVP constituent structure plays a role, it would have to be the case that the finite auxiliary is not merely free in position in VP (or S)—with the single constraint that it precede the verbal complex. The pattern above is consistent with this hypothesis as well.

In summary, there are no strong arguments that PVPs exist anywhere except in fronted position. If we can account for its occurrence there without postulating its occurrence elsewhere, we shall describe not only the facts above, but we shall furthermore have laid the foundation for a theory of VP constituent structure with minimal assumptions.

2 Analysis

The first three subsections below clarify some notation and some theoretical assumptions which the analysis, presented in Section 2.4, depends on. The subsequent three subsections develop examples of increasing complexity, while the final two sketch further assumptions needed in order to deal with verbal complexes and Haider's extraposition cases.

2.1 Background and Sort Definitions

We asssume as background the framework of Pollard and Sag 1993, to which modifications are suggested. In particular, we will use items of the sort *synsem*—the syntactic and semantic information associated with a sign—as subcategorization specifications. Furthermore, although I believe the issue of whether subjects appear in the subcategorization list (or whether, alternatively, there is a distinguished feature SUBJECT) is tangential to the main points of this paper, examples need to be specific. We shall adopt the variant in which subjects DO not appear in SUBCAT, following Pollard 1991, among others. I believe the treatment is applicable, *mutatis* *mutandis*, to frameworks which do not distinguish subjects, but there will be no effort to demonstrate that.

Thus we shall make use of the following as abbreviations for subsorts of *synsem*:

$$\begin{array}{ll}
\mathit{NP}\text{case} & \left[\begin{array}{l} \mathit{synsem} \\ \textsc{loc}|\textsc{cat} \left[\begin{array}{l} \textsc{head} \left[\begin{array}{l} \mathit{noun} \\ \textsc{case}\ \text{case} \end{array}\right] \\ \textsc{subcat}\ \{\ \} \end{array}\right] \end{array}\right] \\
\mathit{unspec\text{-}lex} & \left[\begin{array}{l} \mathit{local} \\ \textsc{cat}|\textsc{lex}\ \mathit{bool} \end{array}\right] \\
\mathit{lexical} & \left[\begin{array}{l} \mathit{synsem} \\ \textsc{loc}|\textsc{cat}|\textsc{lex}\ + \end{array}\right] \\
\mathit{verbal\text{-}ss} & \left[\begin{array}{l} \mathit{synsem} \\ \textsc{loc}|\textsc{cat}|\textsc{head}\ \mathit{verb} \end{array}\right] \\
\mathit{prt\text{-}verb\text{-}ss} & \left[\begin{array}{l} \mathit{verbal\text{-}ss} \\ \textsc{loc}|\textsc{cat}|\textsc{head}|\textsc{vform}\ \mathit{prt} \end{array}\right] \\
\mathit{bse\text{-}verb\text{-}ss} & \left[\begin{array}{l} \mathit{verbal\text{-}ss} \\ \textsc{loc}|\textsc{cat}|\textsc{head}|\textsc{vform}\ \mathit{bse} \end{array}\right] \\
\mathit{vp} & \left[\begin{array}{l} \mathit{verbal\text{-}ss} \\ \textsc{loc}|\textsc{cat} \left[\begin{array}{l} \textsc{subcat}\ \{\ \} \\ \textsc{subject}\ \{[\ ]\} \end{array}\right] \end{array}\right] \\
\mathit{vp\text{-}prt} & \mathit{vp} \wedge \mathit{prt\text{-}verb\text{-}ss} \\
\mathit{vp\text{-}bse} & \mathit{vp} \wedge \mathit{bse\text{-}verb\text{-}ss} \\
\mathit{lex\text{-}prt\text{-}v} & \mathit{lexical} \wedge \mathit{prt\text{-}verb\text{-}ss} \\
\mathit{lex\text{-}bse\text{-}v} & \mathit{lexical} \wedge \mathit{bse\text{-}verb\text{-}ss}
\end{array}$$

Since we shall also make specifications about the values of SLASH, it will also be convenient to have abbreviations for some subtypes of *local*:

$$\begin{array}{ll} \textit{prt-verb-loc} & \left[\begin{array}{l} \textit{local} \\ \textsc{cat}|\textsc{head}|\textsc{vform}\ \textit{prt} \end{array}\right] \\[2ex] \textit{bse-verb-loc} & \left[\begin{array}{l} \textit{local} \\ \textsc{cat}|\textsc{head}|\textsc{vform}\ \textit{bse} \end{array}\right] \\[2ex] \textit{lex-local} & \left[\begin{array}{l} \textit{local} \\ \textsc{cat}|\textsc{lex}\ + \end{array}\right] \\[2ex] \textit{lex-prt-v-loc} & \textit{lex-local} \wedge \textit{prt-verb-loc} \\[2ex] \textit{lex-bse-v-loc} & \textit{lex-local} \wedge \textit{bse-verb-loc} \end{array}$$

2.2 Restricting PVPs to Vorfeld

The present paper disallows complements from being added incrementally to verbal complexes to form partial VPs EXCEPT in the case where the PVP appears in fronted position. Thus, to begin, we must employ grammatical schemata which are not restricted to adding elements one at a time to verbal heads, but rather which allow a head and all of its complements to build a flat structure (Pollard and Sag 1987:151). Our head-complement schema must allow many complements to combine with a head simultaneously:

$$\left[\ \textsc{synsem}|\textsc{loc}|\textsc{cat} \left[\begin{array}{l} \textsc{subcat}\ \{\ \} \\ \textsc{subj}\ \{\ \} \end{array}\right]\ \right] \rightarrow\ H,\ C*$$

Because we have only this rule, together with a special-purpose rule focusing rule which can create unsaturated constituents, there are no PVPs in the Mittelfeld. There is (almost) no chance to create them.

Note the rule admits sentential constituents—those including the subject and all other complements. The intention is that this rule accounts for the non-Vorfeld constituent in matrix clauses (as well as the entirety of subordinate clauses). The head-complement schema above is complicated in comparison to Pollard and Sag 1987, p.151 because we require separate mention of the subject.

Why is that PVPs cannot occur in the Mittelfeld? The answer to this lies first in the Hinrichs-Nakazawa analysis of auxiliaries (presented in more detail below), according to which auxiliaries subcategorize for "lexical" verbs, i.e., verbs without any of their nominal or prepositional phrase complements. See Hinrichs and Nakazawa 1993 and Kiss 1993 for different developments of this basic idea. There is no alternative subcategorization for possibly phrasal verbs. But a second necessary condition is that we disallows the building of unsaturated constituents in general, making exception only for the focused constituents found in the Vorfeld.

Phrasal PVPs are licensed in the Vorfeld first because they are licensed by a SLASH specification generated via the complement extraction rule (Pollard and Sag 1993, 446), with an important modification—the feature LEX is nonmonotonically relaxed on SLASH specifications. It is this nonmonotonic relaxing of LEX which ultimately explains the lack of perfect correspondence between Vorfeld "fillers" and Mittelfeld "sources".

But the complement extraction lexical rule explains only the licensing of the S node (as an instance of the filler-gap rule). The filler itself, the PVP, also must be licensed by some phrase structure rule. This clearly cannot be the same rule as that above, which only admits fully saturated constituents. Since we prefer to differentiate the saturated and unsaturated structures in a non *ad hoc* way, we should like to find properties which distinguish the constituents in that position, and clearly this ought to be a property not immediately reflected in phrase structure or subcategorization. Fortunately, in the case of fronted PVPs, it seems clear that there is such a difference. In particular, these phrases are always associated with FOCUS. For example, in a sentence such as the following,

Gehen	muß	er
go	must	he

He must <u>go</u>

Gehen is in focus. This is reflected in its normal pronunciation—with sentence accent on *Gehen*, and in the semantics, which roughly parallels that of English clefts: *What he'll have to do is leave.* I.e., there is a presupposition that the open sentence denoted by *muß er* is satisfied by something of a contextually restricted sort, $\exists P \Box P(x)$, and an assertion that $P = \mathbf{leave}'$.[6]

We assume that PVPs in the Vorfeld must bear the feature [FOCUS +], which may be required either in the SLASH specifications of the finite auxiliary or in the filler-gap rule. I do not choose between these alternatives here, but, for the sake of keeping the illustrations below concrete, I have included the specification on the SLASH (and do not reformulate the filler-gap rule at all).

$$[\textsc{synsem}|\textsc{loc}|\textsc{content}|\textsc{focus}+] \quad \rightarrow \quad H,\ C*$$

Note that this rule creates unsaturated constituents (in contrast to the head-complement rule above).

We furthermore assume that focus is restricted to occurring a small number of times per utterance, so that highly contoured structures, which are not ruled out SYNTACTICALLY here, but which would assign focus to every PVP, would count as ill-formed.

This means that spurious ambiguity is NOT banned syntactically, but only in combination with semantic-pragmatic assumptions about focus, but

[6]The remarks here are compatible with contemporary semantic theories of focus, e.g., Rooth 1985, Krifka 1991.

this seems alright (to me). And we could dispense with the use of FOCUS altogether if we were willing to introduce a feature, say [FRONTED ±], which took a positive value on constituents before the finite verb, and was negative otherwise (and probably assigned by the filler-gap rule). This seems technically simple, but also somewhat *ad hoc*, which is why the solution using [FOCUS ±] is presented here. We will use the feature [FOCUS ±] below, but it should be borne in mind that the treatment could be reformulated with a positional feature [FRONTED ±] if this is useful.

2.3 Set-Valued Subcategorization Specs

Before presenting the specifics of the analysis, I should like to call attention to a general assumption about the (German) subcategorization feature used below, viz., that it is treated as having a set value rather than an ordered (list) value. The assumption is NOT absolutely crucial to the analysis, but it is made for two reasons, first, because it is now common (see other contributions in this volume), and this eases the comparison of this treatment to treatments of other phenomena (to check compatibility, etc.); and second, because it facilitates the statement of raising and complement extraction a good deal. The latter rule would otherwise have to generalize over "subsequences" of a special sort: NOT sequences a found in exactly the same form (without interposed elements) in supersequences b, but rather a whose elements are drawn from b in order. For example, we would want to refer to $\{ab, bc, ac\}$ as the two-element "subsequences" of *abc* (in the sense required), even though *ac* does not occur in *abc*. The remainder sequences would also require definition. The set manipulations are more straightforward. It is clear how the analysis based on ordered SUBCAT values would proceed, however. It is also clear that some of the work done by the ordering on SUBCAT values—the binding theory—would have to be assumed elsewhere, but we shall not take this up here. If it turns out that SUBCAT should be ordered, then the set specifications below should be regarded as conditions on the sets defined by sequences.

2.4 Auxiliary Verbs

Let us turn now to the treatment of auxiliaries. In explaining the interaction of the finite auxiliary verb with the nonfinite main verb, we proceed from what seems the most compelling fundamental analysis of German VP structure, Hinrichs and Nakazawa 1989. The key differentiating step they take is to require that verbal complexes be formed from combinations of (head) auxiliary and (complement) main verbs, where the subcategorization requirements of the complex are inherited from the nonhead main verb. The key to their analysis is the lexical specification of auxiliaries, illustrated here:

$$\begin{bmatrix} \text{MORPH}|\text{FORM} & \textit{dürfen} \\ \text{SYNSEM}|\text{LOC}|\text{CAT} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{MAJ} & v \\ \text{VFORM} & bse \\ \text{AUX} & + \end{bmatrix} \\ \text{SUBCAT} & \left\{ \begin{bmatrix} \textit{lex-bse-v} & \\ \text{LOC}|\text{CAT}|\text{SUBCAT} & \boxed{1} \end{bmatrix} \right\} \cup \boxed{1} \\ \text{LEX} & + \end{bmatrix} \end{bmatrix}$$

The coindexed subcategorized-for elements are crucial here—the auxiliary *dürfen* subcategorizes for whatever complements its governed main verb normally subcategorizes for PLUS that main verb itself. The governed verb (or verb complex) may be added as a complement even in the absence of its own complements—a departure from yet another tenet of $\overline{\text{X}}$ theory. This effectively "raises" the arguments of main verbs to be arguments of verbal complexes which include main verbs and auxiliaries. (See Heinz and Matiasek 1993, Hinrichs and Nakazawa 1993, Kathol 1993 for contemporary work on raising in HPSG.) The technique is reminiscent of function composition analyses in categorial grammar, but here the composition is "enforced."

This analysis of auxiliaries, together with the head-complement schema above, assigns a flat structure to VPs as they occur either with or without auxiliaries.[7] And we require that finite auxiliaries have ONLY this "flattened" SUBCAT. Thus there are no lexical entries for auxiliaries with VP SUBCATs—this raising analysis is general. The motivation here should be obvious: if there are finite AUXs with flattened and nonflattened AUXs, then we have reintroduced spurious ambiguity.

This basic assumption certainly solves the problem of spurious ambiguity: since auxiliaries ALWAYS subcategorize lexical verbs and their subcategorized-for complements, there is no opportunity for the building of alternative structures. In our illustration only flat structures will occur. If one alternatively prefers binary-branching structures, then only a change in the head-complement schema is required.

But now the problem is how to license Vorfeld constituents—to show how partial verb phrases may be allowed to appear in fronted position. As we noted above, if we used traces for this, the variation in fronted constituents can only be mirrored if spurious ambiguity is admitted in the Mittelfeld. Instead, of using traces, therefore, we will license Vorfeld elements via their potential appearance on SUBCAT.

We accomplish this by allowing arguments to be inherited, not only to

[7] The technical guarantee that the flat structure is REQUIRED, and not merely allowed, is provided the subcategorized-for element must be [LEX +]. This essential refinement is due to Kiss 1993. Kiss's own treatment is thoroughly right-branching but does not include coverage of auxiliary flip—a difficult hurdle for right-branching verb clusters.

the SUBCAT of (finite) auxiliaries but also to SLASH directly.[8] The basic strategy is that, rather than (i) immediately satisfying SUBCAT requirements, or (ii) allowing them to be satisfied by a superordinate auxiliary, we pass them into SLASH. We realize this strategy through a lexical rule, which operates *inter alia* on auxiliary verbs. Given a lexical entry for a verb with SUBCAT $s = \{\ldots, a, \ldots\}$, this lexical rule produces an variant with SUBCAT $s - a$ and a in SLASH.

It is desirable to avoid formulating a novel special-purpose lexical rule, and there fortunately is a reasonable candidate for this, viz., the lexical rule of COMPLEMENT EXTRACTION proposed in Pollard and Sag 1993, p.446. We modify this below for application to German.[9] This rule allows elements licensed by SUBCAT to be assumed into SLASH.

But this does not SOLVE the problem of the lack of correspondence between Vorfeld constituent and Mittelfeld "source": it only removes the problem from a context in which it seemed inevitable. If auxiliaries can only subcategorize for lexical verbs, and if SLASH elements come from SUBCAT, then how could we possibly have any phrases at all in the Vorfeld (headed by verbs)?

The complement extraction rule formulated below stipulates that elements assumed into slash are nonmonotonically specified to be unmarked for the lexical feature. The nonmonotonic nature of the specification makes it seem better suited for a lexical treatment than a syntactic one.[10]

Let us examine the rule before commenting further (but cf. below for more discussion vis-à-vis a treatment with traces).

Complement Extraction Lexical Rule:

$$\left[\ \textsc{synsem}|\textsc{loc}|\textsc{cat}\ \left[\begin{array}{l}\textsc{head}\ \left[\ \mathit{verb}\ \right]\\ \textsc{subcat}\ \boxed{1}\{\ldots, \boxed{2}\ [\textsc{loc}\ \boxed{3}], \ldots\}\end{array}\right]\ \right]$$

$$\Longrightarrow \left[\ \textsc{synsem}\ \left[\begin{array}{l}\textsc{loc}|\textsc{cat}\ \left[\begin{array}{l}\textsc{head}\ [\textsc{fin}\ +]\\ \textsc{subcat}\ \boxed{1} - \boxed{2}\end{array}\right]\\ \textsc{nonloc}|\textsc{slash}\ \ \{\boxed{3} \sqcap'\ \mathit{unspec\text{-}lex}\}\end{array}\right]\ \right]$$

where $\sqcap'$ is default unification in the sense of Bouma 1992

[8]A non-standard sort of SLASH feature, like that introduced by Hukari and Levine 1991 and discussed by Flickinger and Nerbonne 1992, would be more appropriate here, but for orthogonal reasons. Its use is discussed further in Section 3.

[9]I circulated widely an earlier version of this paper in which a "/-PVP" lexical rule was formulated which had the same effect as the complement extraction rule for the case limited to the extraction of (partial) verb phrases. It would probably never have been formulated except that my less general formulation originated before the complement extraction scheme.

[10]The present proposal may therefore also be seen as a confirmation of the HPSG strategy of distinguishing subcategorization requirements from the requirements imposed by long-distance dependencies, a theme elaborated on by Pollard 1988.

Several specifications are worth note. First, we have limited the rule to apply only to verbs in accordance with a well-known restriction on German topicalization, that it applies only to "clause elements". There is no topicalization of complements of nouns or prepositional objects, for example.

Second, the right side of the rule adds the feature [FIN +], and indeed, we do not appear to need to apply the rule to nonfinite verbs—ever. On the other hand, I do not necessarily wish to rule this out forever, and I am not aware of incorrect consequences which would obtain if the rule applied to nonfinite AUXs.[11]

Third, let us consider the crucial case for our present purposes, the case in which the verbal complement of an auxiliary taken into SLASH. Given the analysis above, this will always be marked [LEX +] while on SUBCAT. The rule here puts it into SLASH unmarked for the feature LEX—as indeed it must be if we are to allow, e.g., *ein Märchen erzählen* in the Vorfeld.

Finally, since we have emphasized above the advantages this provides over analyses which postulate a trace, let us note why this analysis would resist a formulation in which traces were used. The difficulty would lie in the nonmonotonic specification allowing fillers more freedom (vis-à-vis the feature LEX) than traces have. In the present analysis this nonmomotonicity is quarantined in a lexical specification where it need not infect the smooth monotonic functioning of the grammar. If a trace were used it would not conincide on the LEX feature with the filler it ultimately licenses—and would thus run afoul of the normal feature sharing required in unbounded dependencies.

2.5 A Simple Example

We assume that there is a lexical entry for the base form of *erzählen* with the following properties:

$$\begin{bmatrix} \text{MORPH}|\text{FORM}\ \textit{erzählen} & \\ \text{SS}|\text{L}|\text{C} & \begin{bmatrix} \text{HEAD}|\text{VFORM} & bse \\ \text{SC}\ \{[NPacc],[NPdat]\} & \\ \text{SUBJ}\ \{[NPnom]\} & \end{bmatrix} \end{bmatrix}$$

(Notice that we abbreviate SYNSEM as SS, LOCAL as L, CAT as C, and SUBCAT as SC—in the interest of keeping down the size of the displayed AVMs. We shall similarly abbreviate NONLOCAL as NL and attslash as /.) Similarly, we require an entry for an auxiliary verb lexeme, e.g., *sollen*, which we present in Hinrichs-Nakazawa form:

[11] In fact, the analysis of the so-called "third-construction" may be an interesting application, but the formulation here is cautious:

Er hat das Buch versucht, zu lesen

$$\begin{bmatrix} \textsc{morph}|\textsc{stem}\ \textit{soll-} & \\ \textsc{ss}|\textsc{l}|\textsc{c} & \begin{bmatrix} \textsc{head} & \begin{bmatrix} \textit{verb} \\ \textsc{aux}\ + \end{bmatrix} \\ \textsc{sc} & \left\{ \begin{bmatrix} \textit{lex-bse-v} \\ \textsc{l}|\textsc{c}|\textsc{sc}\ \boxed{1} \end{bmatrix} \right\} \cup \boxed{1} \end{bmatrix} \end{bmatrix}$$

This is subject to the complement extraction lexical rule, which we now apply, obtaining:

$$\begin{bmatrix} \textsc{morph}|\textsc{form}\ \textit{soll} & \\ \textsc{ss} & \begin{bmatrix} \textsc{l}|\textsc{c} & \begin{bmatrix} \textsc{head} & \begin{bmatrix} \textit{verb} \\ \textsc{aux}\ + \end{bmatrix} \\ \textsc{sc}\ \boxed{1} & \end{bmatrix} \\ \textsc{nl}|/ & \left\{ \begin{bmatrix} \textit{bse-verb-loc} \\ \textsc{c}|\textsc{sc}\ \boxed{1} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix}$$

(Cf. Krieger 1993 for a principled proposal for a treatment of lexical rules in HPSG.) We illustrate one application of this immediately, allowing the variable '$\boxed{1}$' above to be instantiated by $\{[NPacc], [NPdat]\}$. This is interpretable only for lexical entries which subcategorize for at least this set, e.g., *erzählen*, which we employ for the purpose of this illustration. Cf. Figure 6 for further details.

2.6 Example Involving Double Infinitives

A slightly more complicated example, involving double auxiliaries, also proceeds from the V/V analysis of auxiliaries (Hinrichs/Nakazawa), and involves not only an application of the complement extraction lexical rule (on the finite auxiliary), but furthermore raising of the main verb's arguments to the fronted nonfinite auxiliary, again à la Hinrichs/Nakazawa. That is, we apply the complement extraction rule to the lexeme *haben* to derive the finite form *hat* in a fashion exactly parallel to that used in the last example:

$$\begin{bmatrix} \textsc{morph}|\textsc{form}\ \textit{hat} & \\ \textsc{ss} & \begin{bmatrix} \textsc{l}|\textsc{c} & \begin{bmatrix} \textsc{head} & \begin{bmatrix} \textit{verb} \\ \textsc{aux}\ + \end{bmatrix} \\ \textsc{sc}\ \boxed{1} & \end{bmatrix} \\ \textsc{nl}|/ & \left\{ \begin{bmatrix} \textit{prt-verb-loc} \\ \textsc{c}|\textsc{sc}\ \boxed{1} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix}$$

The novelty in this example lies not in the finite verb, but rather in the fronted double infinitive, in which a further application of raising must be postulated. We require a particular configuration of the schematic subcategorization foreseen by Hinrichs and Nakazawa 1989. This is needed to ensure that the main verb *erzählen*'s subcategorization is inherited by the double infinitive (*erzählen sollen*), even though it isn't the head:

Erzählen soll er es ihm.

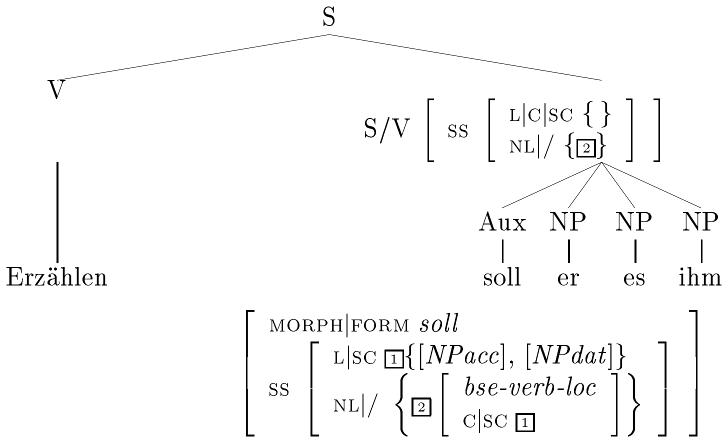
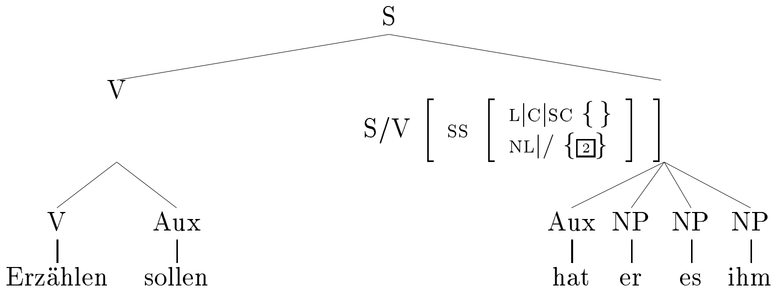


Figure 6: **PVP derivation**. In the lower part of the figure we show the finite auxiliary *soll*, to which the complement extraction lexical rule has applied, and a tree in which it is used above. The usual head-complement rule licenses the S/V node, and the Nonlocal Inheritance Principle requires that *soll*'s SLASH value be passed to the mother, which then combines with *erzählen* in an instance of the filler-gap rule. By requiring that SUBCAT requirements of the fronted nonfinite main verb be assumed by the finite auxiliary, we guarantee that all of the main verb's subcategorization requirements are satisfied, albeit remotely.

Erzählen sollen hat er es ihm.



$$\textit{sollen}|\text{SS}|\text{L}|\text{C}|\text{SC} \;=\; \boxed{1} \bigcup \left\{ \begin{bmatrix} \textit{bse-verb-ss} \\ \text{L}|\text{C}|\text{SC}\ \boxed{1} \end{bmatrix} \right\}$$

$$\textit{erzählen-sollen}|\text{SS}|\text{L}|\text{C}|\text{SC} \;=\; \boxed{1}\ \{[\textit{NPacc}],\ [\textit{NPdat}]\}$$

$$\textit{hat}|\text{SS}|\text{NL}|/ \;=\; \left\{ \boxed{2} \begin{bmatrix} \textit{prt-verb-loc} \\ \text{C}|\text{SC}\ \boxed{1} \end{bmatrix} \right\}$$

Figure 7: **Double infinitives** crucially require the Hinrichs-Nakazawa "raising", applied here to the nonfinite auxiliary *sollen*—in addition to the complement extraction rule, applied here to the finite perfect auxiliary *hat*. The SUBCAT value of *hat* is not shown here, but it is exactly $\boxed{1}$ above (just as *soll* in Figure 4).

$$\begin{bmatrix} \text{FORM}|\text{STEM}\ \textit{soll-} \\ \text{SS}|\text{L}|\text{C} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{AUX}\ + \end{bmatrix} \\ \text{SC} \left\{ \begin{bmatrix} \textit{lex-bse-v} \\ \text{L}|\text{C}|\text{SC}\ \boxed{1}\ \{[\textit{NPacc}], [\textit{NPdat}]\} \end{bmatrix} \right\} \cup \boxed{1} \end{bmatrix} \end{bmatrix}$$

These two lexical definitions are crucial for an appreciation of the licensing of the structures illustrated in Figure 7.

2.7 "Splitting" Double Infinitives

As the last section demonstrated, we can front double infinitives. And it should be obvious that we can also leave them unfronted. But we get interestingly different results when we try "splitting" double infinitives, fronting only one of them at a time. A complement infinitive may be fronted without its governing nonfinite auxiliary, but not vice versa, as we saw in (11) above (repeated below for convenience). It is these examples which give lie to the generalization that one can simply front any final segment of the VP. They also present a challenge to the right-branching view of the VP, since on that view, they are not constituents. As we saw in Section 1, the major challenge they present is to the view that fronted constituents always correspond simply to nonfronted ones. Given such a view, these sentences would require the admission of spurious ambiguity.

In this section we demonstrate how these examples are unproblematic for the treatment proposed in this paper:

(12) a. **Ein Märchen erzählen** hat er ihm sollen.
a story tell AUX he him(dat) should
He should have told him a story

b. * **Sollen** hat er ihm ein Märchen erzählen.

The variation illustrates an important assumption we are making about subcategorizations involved in the argument raising rule. We return to this below. We indicate first how the (a) example may be derived and then go on to propose a simple restriction to prevent the (b) examples. We employ nearly the same (raised) instantiation of the modal auxiliary used above (Section 2.6). This time we instantiate $\boxed{1}$ with $\{[NPdat]\}$ rather than $\{[NPacc], [NPdat]\}$ as before—this will illustrate the significance of the nonmonotonic overwriting of the feature LEX.

$$\begin{bmatrix} \text{FORM}|\text{STEM } \textit{soll-} \\ \text{SS}|\text{L}|\text{C} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{AUX } + \end{bmatrix} \\ \text{SC } \left\{ \begin{bmatrix} \textit{lex-bse-v} \\ \text{L}|\text{C}|\text{SC } \boxed{1} \{[NPdat]\} \end{bmatrix} \right\} \cup \boxed{1} \end{bmatrix} \end{bmatrix}$$

It is this form which points up an important aspect of the complement extraction rule we use. Note that this auxiliary subcategorizes for a lexical verb which in turn subcategorizes for a dative NP. We will eventually "satisfy" this subcategorization specification with the PHRASAL element *ein Märchen erzählen*—but it is crucial to the program of reducing spurious ambiguity that we disallow this constituent in the Mittelfeld. It is disallowed because there is no immediate subcategorization for nonlexical PVPs.

Since we have instantiated differently here (from the way instantiated in Section 2.6), we will derive (11a), in which the accusative complement appears with the verb, but if we instantiated $\boxed{1}$ as $\{[NPacc], [NPdat]\}$ above and throughout, then we would have a derivation of the simpler examples below:

(21)	a.	**Erzählen**	hat	er	es	ihm	sollen
		tell	AUX	he	it	him(dat)	should
		He should have <u>told</u> him					

b. * **Sollen** hat er es ihm erzählen.

The only novelty required for these "split infinitive" cases is that we now apply the complement extraction rule to the finite auxiliary which subcategorizes for the above output of the raising rule. We are focusing on the following instantiation of the auxiliary *haben*:

$$\begin{bmatrix} \textsc{form}|\textsc{stem}\ \textit{hab-} \\ \textsc{ss}|\textsc{l}|\textsc{c} \begin{bmatrix} \textsc{head} \begin{bmatrix} \textit{verb} \\ \textsc{aux}\ + \end{bmatrix} \\ \textsc{sc} \left\{ \begin{bmatrix} \textit{lex-prt-v} \\ \textsc{l}|\textsc{c}|\textsc{sc}\ \boxed{2} \end{bmatrix} \right\} \cup \boxed{2} \end{bmatrix} \end{bmatrix}$$

But $\boxed{2}$ may be just the SUBCAT of (raised) *sollen* above, i.e.,

$$\textit{let}\ \boxed{2} = \left\{ \begin{bmatrix} \textit{lex-bse-v} \\ \textsc{l}|\textsc{c}|\textsc{sc}\ \boxed{1}\ \{[\textit{NPdat}]\} \end{bmatrix} \right\} \cup \boxed{1}$$

where $\boxed{1}$ is instantiated as above, but could (again) be $\{[\textit{NPacc}], [\textit{NPdat}]\}$, if we wished to derive example (21a). We are thus interested in the following specification for the finite auxiliary *hat*:

$$\begin{bmatrix} \ldots\textsc{sc} \left\{ \begin{bmatrix} \textit{lex-prt-v} \\ \textsc{l}|\textsc{c}|\textsc{sc}\ \boxed{2} \end{bmatrix} \right\} \cup \boxed{2} \left(\left\{ \boxed{3} \begin{bmatrix} \textit{lex-bse-v} \\ \textsc{l}|\textsc{c}|\textsc{sc}\ \boxed{1}\ \{[\textit{NPdat}]\} \end{bmatrix} \right\} \cup \boxed{1} \right) \end{bmatrix}$$

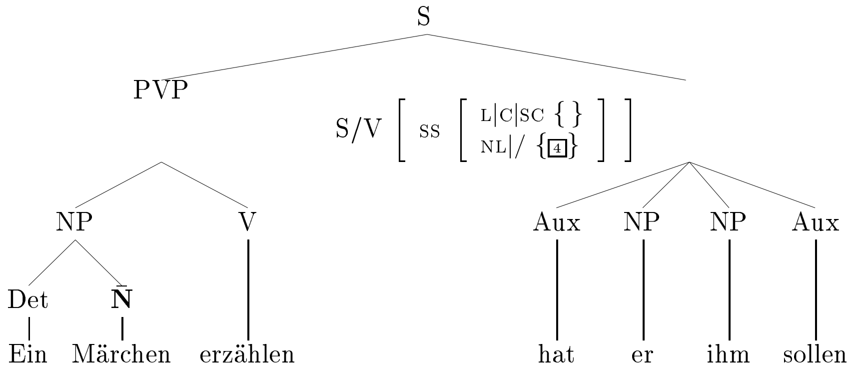
(We have suppressed the path specification 'SS|L|C|', which ought to prefix 'SUBCAT' at the top level, in order to fit everything on the page.)

The left-hand side of the complement extraction rule is in fact compatible with this, so that we apply it, assuming the [*lex-bse-v-loc*] element (from *lex-bse-v*) into SLASH, yielding:

$$\begin{bmatrix} \textsc{morph}|\textsc{form}\ \textit{hat} \\ \textsc{ss} \begin{bmatrix} \textsc{l}|\textsc{c} \begin{bmatrix} \textsc{head} \begin{bmatrix} \textit{verb} \\ \textsc{aux}\ + \end{bmatrix} \\ \textsc{sc} \left\{ \begin{bmatrix} \textit{lex-prt-v} \\ \textsc{l}|\textsc{c}|\textsc{sc}\ \boxed{2} \end{bmatrix} \right\} \cup \boxed{2} (\{\boxed{3}[\textsc{l}\boxed{4}]\} \cup \boxed{1}) - \boxed{3} \end{bmatrix} \\ \textsc{nl}|/ \left\{ \boxed{4} \begin{bmatrix} \textit{lex-bse-v-loc} \\ \textsc{l}|\textsc{c}|\textsc{sc}\ \boxed{1}\ \{[\textit{NPdat}]\} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix}$$

The subcategorization requirement is expressed in an extremely complex fashion, including one term '$\boxed{2}(\{\boxed{3}\} \cup \boxed{1}) - \boxed{3}$', which of course simplifies set-theoretically to $\boxed{1}$. It remains in the complex expression here, because the VP complement subcategorization is constrained to be the minuend of the

Ein Märchen erzählen hat er ihm sollen.



$$hat|\textsc{ss}|\textsc{l}|\textsc{sc} \; = \left\{\begin{bmatrix} lex\text{-}prt\text{-}v \\ \textsc{l}|\textsc{c}|\textsc{sc}\,\boxed{2}\end{bmatrix}\right\} \cup \boxed{2}\left(\left\{\boxed{3}\begin{bmatrix} lex\text{-}bse\text{-}v \\ \textsc{l}\,\boxed{4}[\textsc{c}|\textsc{sc}\,\boxed{1}\,\{[NPdat]\}]\end{bmatrix}\right\} \cup \boxed{1}\right) - \boxed{3}$$

Figure 8: **The "Split" Double Infinitives** require an application of the complement extraction rule to an auxiliary which anticipates applications of the Hinrichs-Nakazawa "raising" rule applied to itself and its verbal complement. After that, the "raised" V is assumed into SLASH. Without the application of further constraints, EITHER of the subcategorized V's would be eligible for assumption into SLASH, yielding the ungrammatical (12b,21b) (see text).

complex term, i.e., '$\boxed{2}(\{\boxed{3}\} \cup \boxed{1})$', but of course $\boxed{3}$ is not a subcategorization requirement of (this variant) of the finite auxiliary.

Figure 8 shows a tree in which these instantiations of the lexical items are used, illustrating our account of the well-formedness of (12a,21a), the rebarbative data on the filler-source correspondence view.

This demonstration may be surprising not only for its complexity but also because it allows free, even recursive instantiation of underspecified lexical variables. This commits us to a potentially infinite lexicon and could suggest processing difficulties. But we need not assume that the lexicon is fully instantiated in order to process with it, so there need not be barriers to processing. An alternative is to retain constraints, postponing their resolution until enough further information is available for solution.

A further problem is the inability of the modal verbs to front alone. It is unsettling that, as things stand here, the complement extraction rule could just as well be applied to move the (local value of a SUBCAT element, [*prt-verb-loc*], into SLASH, allowing the derivation of the ill-formed (12b,21b). This suggests that we restrict the complement extraction rule to disallow the assumption of modals into SLASH in case they govern Vs in SUBCAT, a condition we note on the revision of the rule immediately below.

Complement Extraction Lexical Rule:

$$\begin{bmatrix} \text{SS|L|C} \begin{bmatrix} \text{HEAD}\ [\ \textit{verb}\ ] \\ \text{SC}\ \boxed{1}\{\ldots,\boxed{2}\,[\text{L}\ \boxed{3}],\ldots\} \end{bmatrix} \end{bmatrix}$$

$$\Longrightarrow \begin{bmatrix} \text{SS} \begin{bmatrix} \text{L|C} \begin{bmatrix} \text{HEAD}\ [\text{FIN}\ +] \\ \text{SC}\ \boxed{1} - \boxed{2} \end{bmatrix} \\ \text{NL|/}\ \{\boxed{3} \sqcap \textit{unspec-lex}\} \end{bmatrix} \end{bmatrix}$$

Condition: for $\boxed{2}$ a *modal-V-synsem*, $\neg\exists V \in \boxed{4}$, where $\boxed{3}[\text{C|SC}\ \boxed{4}]$.
The condition forbids that a modal verb be taken into SLASH unless the verbs it governs come along.

It is clear that this is a stipulation, not an explanation of the restriction. We claim only to be able to describe this phenomena. Since I argued above that the existence of sentences such as (12b,21b) was problematic for thorough-going right-branching analyses, I should clarify here that I do not claim that these might not use a restriction of the same kind, but only that their claim to explain these facts is thus vitiated. Their main difficulty is of course with (12a,21a).

The importance of this section lay not in the *ad hoc* restriction suggested to prevent final auxiliaries from participating in the fronting construction, but rather in the demonstration that "split-infinitive" fronting is seamlessly accounted for in the proposal here.

2.8 Accommodating a Verbal Complex

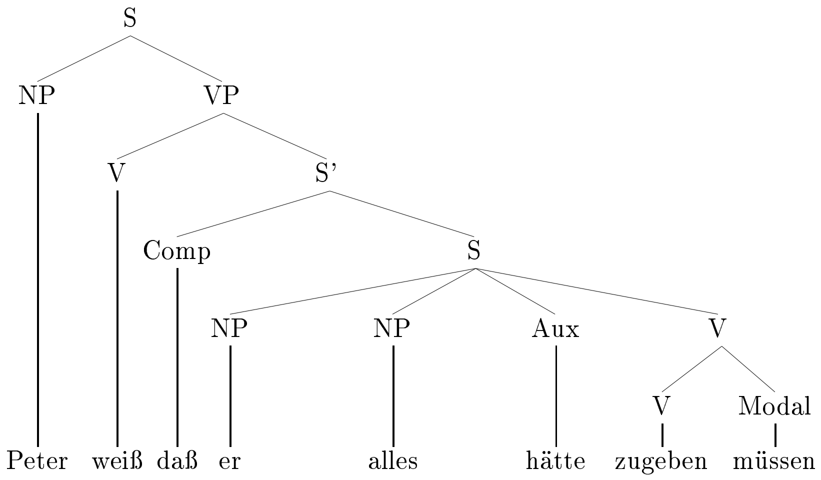
Hinrichs and Nakazawa 1989 and Hinrichs and Nakazawa 1993 provides an HPSG treatment of verbal complexes in which the verbs at the end of subordinate clauses are analyzed as forming a constituent. The most important evidence for this analysis is the phenomenon known as "auxiliary flip", illustrated here:

Peter	*weiß,*	*dass*	*er*	*alles*	*hätte*	***zugeben***	***sollen***
Peter	*knows*	*that*	*he*	*all*	*AUX*	*admit(inf)*	*should*

Peter knows that he should have admitted everything

The finite auxiliaries *haben* and *werden* regularly appear before complexes of two or more verbs, but after single verbs. The postulate of verbal complexes explains why the auxiliaries appear where they do (and not, e.g., between the other verbs).

Since (PVP) fronting occurs only in matrix clauses, and auxiliary flip only in subordinate clauses, there is no necessary overlap, but I would prefer to extend the flat analysis of the Mittelfeld to the subordinate clauses, and it is imaginable that one would postulate the same verbal complexes in matrix clauses. For subordinate clauses such as that above, we would then obtain analyses such as the following:



It is not the goal of the present paper to attempt a reanalysis of these facts in order to try to show that there is no non-minimal constituent structure here; we do not see the existence of a verbal complex as a slippery slope at whose foot lies the originally over-contoured structures we argued against above. The reasons for this may be appreciated if one compares the verbal complex structures in matrix clauses. The flat Mittelfeld hypothesis would like to maintain the first of the bracketings below in contrast to the second:

(Sie (hat es mir (schicken wollen)))
(Sie (hat (es (mir schicken)) wollen))

But this is exactly the constituent structure which the auxiliary flip construction requires (in subordinate clauses) in the most important particular: the main verb must not combine first with its objects and only then with modal auxiliaries, but rather the reverse. It is the latter (thoroughly right-branching) analysis which impedes analyses of auxiliary flip. See Hinrichs and Nakazawa 1993 for a detailed HPSG analysis of auxiliary flip.

We see no reason why there could not be a flat Mittelfeld of arguments and adjuncts whose final element was a verbal complex. In fact, the rules formulated in Hinrichs and Nakazawa 1993 do not make assumptions about the constituent structure of the Mittelfeld: the same rules (with minimal adjustments) should work in coordination with the complement extraction rule. A detailed demonstration will have to await another paper.

2.9 Extraposition in the Vorfeld

Before working out a theory of extraposition more thoroughly, we cannot provide full and interesting derivations of the problematic case of fronted constituents with extraposed parts, (13) in Section 1 above. The examples are repeated here for convenience:

(13) a. **Einen Hund füttern, der Hunger**
a(acc) dog feed(inf) REL(nom) hunger
hat, wird wohl jeder dürfen
have will well every(nom) may
Presumably everyone is allowed to feed a dog that is hungry

a′. * Es wird wohl jeder **einen Hund füttern,** der Hunger hat, dürfen

a″. Es wird wohl jeder **einen Hund füttern** dürfen, **der Hunger hat.**

It is nonetheless interesting to sketch the rough outlines of a promising treatment of extraposition (Reape 1991) in order to substantiate the claim that the present proposal can provide the analysis of fronting needed for examples like (13). What follows then is a very informal sketch of the ideas behind Reape's treatment of extraposition and some analysis trees, which, given Reape's equations, analyze the examples above. For more formal development, the reader is urged to consult Reape 1991 directly.

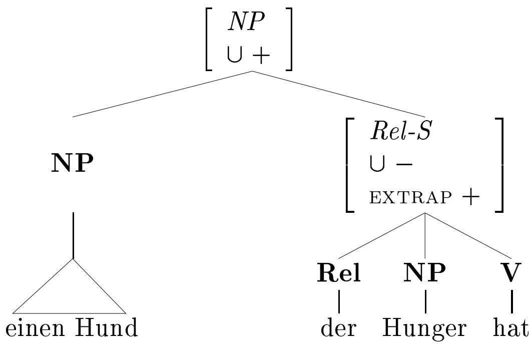
To understand Reape's idea, think of the relation between a sequence of words (say, in a sentence) and the analysis tree(s) for that sequence. In standard phrase structure grammar, the ordered analysis tree must have the sequence as its terminal yield (something we get by noting the terminals in preorder traversal, i.e., walking the tree from the root, going to each daughter in left-right order, and leaving a given daughter only after its subtree has been traversed). ID/LP format (Gazdar and Pullum 1982) provides a first degree of freedom in separating grammatical rules into statements of IMMEDIATE DOMINANCE (ID) and LINEAR PRECEDENCE (LP), and may be thought of as generalizing this notion—regarding an analysis tree as analyzing a sequence just in case there is a traversal from the root where the daughters are in some order conforming to all LP statements. In this case the tree shown in the analysis tree need not reflect the order in which terminals actually appear (the formal development of Gazdar and Pullum 1982 actually linearizes the trees themselves—this is a reformulation). Reape proposes adding a further degree of freedom between strings and analysis trees in allowing that, while traversing a tree to determine terminal yield, we do not require that the yield of each subtree necessarily occur as a subsequence of the final yield. The yields of some subtrees may be "shuffled".

To do this, we allow some daughters to be marked as [UNIONED +] (which we shall abbreviate [$\cup$ +]). If a daughter has this marking, then its (perhaps partially ordered) yield need not occur as a subsequence of the yield of its mother. Instead, the elements of its yield may be interspersed with (the yields of) its sister constituents. To illustrate his treatment, Reape provides an analysis of the subordinate clause *daß es ihm jemand zu lesen versprochen hat*, shown in Figure 9.

To apply Reape's analysis to the case at hand, we need only assume that we have an NP node marked [$\cup$ +] so that the relative clause may appear remotely from the rest of the NP, and in which the relative clause itself bears a feature we make reference to in LP statements. To avoid distractions, let us simply use the feature [EXTRAP +], intending to replace it with something less ad hoc when we can.[12] In addition, we need an LP statement making relative clauses final in their domains:

$$[\,] < [\text{EXTRAP} +]$$

A simplest structure with these properties would be that below:



Though others would be possible.[13] this structure together with Reape's equations, we can provide the necessary analyses.

[12]For example, we could just use relative clause as the relevant category, i.e., an S with a nonempty REL:

$$\begin{bmatrix} S \\ \text{NONLOCAL}|\text{INHERIT}|\text{REL } \{[\,]\} \end{bmatrix}$$

[13]I did not use the more common $\bar{\mathbf{N}}$-Rel structure because it would require that not only the $\bar{\mathbf{N}}$, but also the NP be [$\cup$ +], raising the question of how to keep the rest of the NP constituent together. The way chosen here is more straightforward. Remember that the purpose of this section is NOT to defend Reape's analysis, but only to show that given an analysis of extraposition, Haider's problematic cases may be analyzed correctly. We employ Reape's analysis because it is the best very explicit one we have.

An example of an extraposed clause which would be difficult to treat using domain union together with a $\bar{\mathbf{N}}$-Rel analysis would be:

...daß es ihm jemand zu lesen versprochen hat

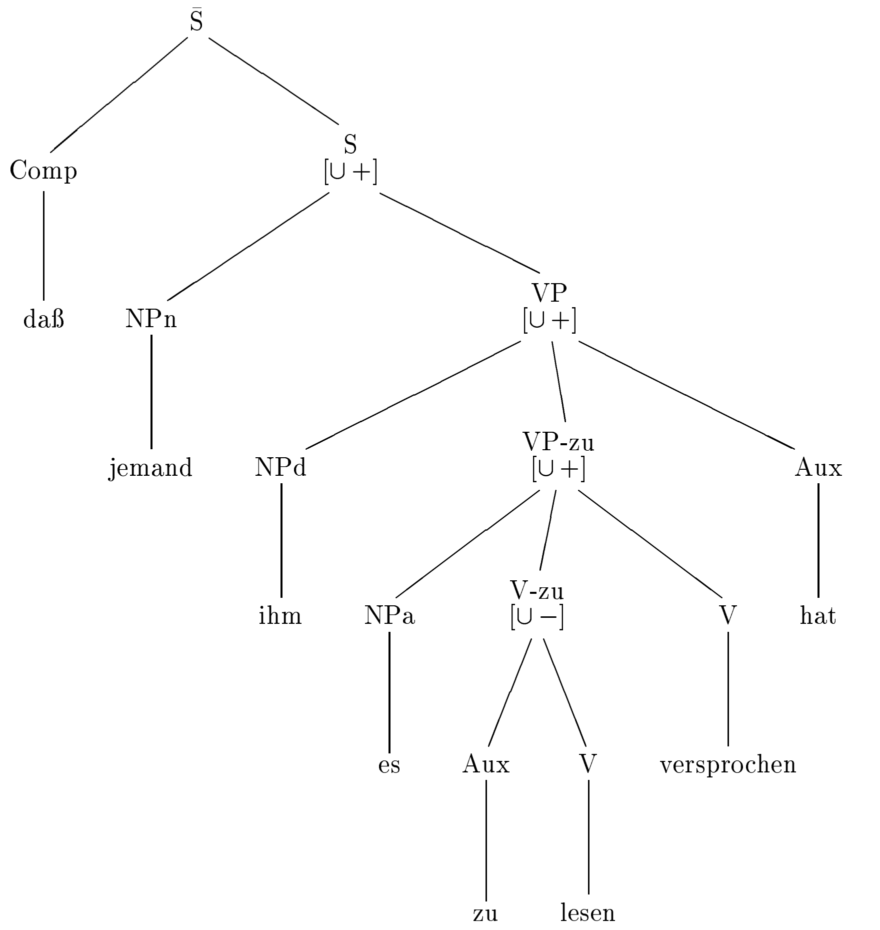
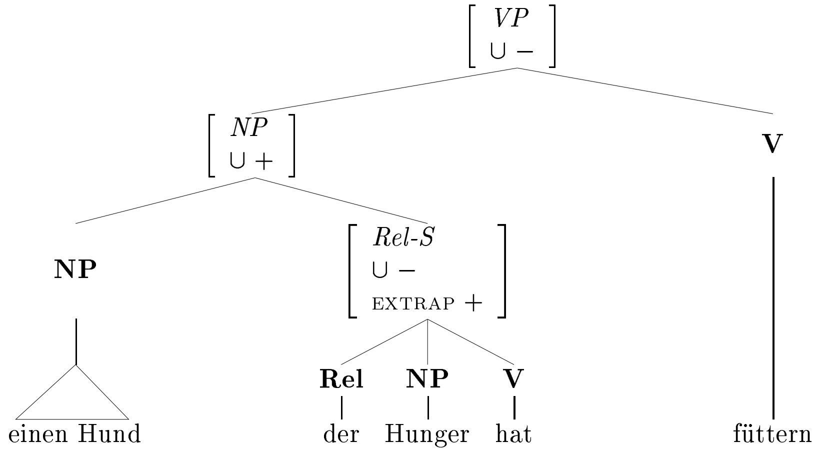


Figure 9: **An Analysis Tree for a Sequence** need not be the terminal yield (of a preorder traversal). Reape 1991 provides definitions in which a node marked [∪ +] need not define an inviolable subsequence of the eventual yield, but rather several subsequences which may be intermingled with the yields of sisters. To see how this tree may be regarded as an analysis tree for the sentence above, begin with the innermost verbal constituent, *V-zu*. Since this is marked [∪ -], its daughters may never be interrupted by sister constituents (or their daughters). Working outward, we examine the *VP-zu* which is marked [∪ +], meaning that its elements, *es* and *zu lesen* need not defined a subsequence in the yield of the mother. Thus the yield of the mother might be either *ihm es zu lesen versprochen* or *es ihm zu lesen versprochen.* Other possibilities have not been ruled out here, but Reape uses (fairly standard) LP rules requiring that elements occur before their nonfinite governors and NPs before [MAJ V]. This fixes the end of the sequence as *zu lesen versprochen*, leaving only the variability noted. Because this *VP* is also marked [∪ +], its elements may also be "shuffled" into elements of sisters' yields, giving us *es ihm jemand zu lesen versprochen hat*, and thus *daß es ihm jemand zu lesen versprochen hat.*

Sentence (13a) is simply an example of what we dubbed a "split infinitive" above. See Section 2.7 for the required derivation of the finite auxiliary *wird*. The fronted *VP* is receives the following analysis.



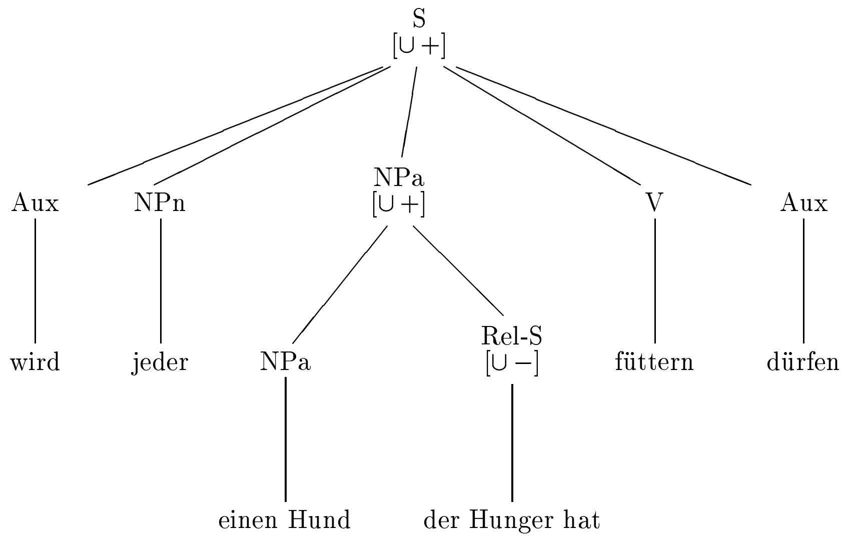
Because the higher (*NP*) node is [∪ +], the yield of the tree is an ordering of the elements *NP*, *V*, [*Rel-S,* EXTRAP +]. Given the standard ordering of governed elements before governors and given the LP rule above requiring the constituent marked [EXTRAP +] to be last, the yield is that of the fronted constituent in (13a), *einen Hund füttern, der Hunger hat.* The *VP* itself is marked [∪ −] because, with very rare exception, fronted elements do not intermingle with others.

(13a′) and (13a″) are both explained best on the basis of the analysis tree below. (This is simplified inessentially in order to fit on the page.) (13a′) violates the LP restriction on extraposed constituents, while (13a″) is exactly the yield expected.

Eine	Dame	ist	an	der	Tür,	die	Sie	gerne	sprechen	würde.
a(nom)	lady	is	at	the	door	who(nom)	you(acc)	gladly	speak	AUX

A lady is at the door who would like to speak to you

These sorts of examples would seem to pose a challenge to Reape's analysis (and therefore to the account here of (13a-a″)) since, even though the extraposed clause should be liberated, the others must remain.



The point of this section was to show that, given a reasonable treatment of extraposition, the final class of problematic examples of PVP fronting could be treated. Reape's analysis was used because it seems the best presently available, but the focus here is on fronting, and other treatments of extraposition might be as congenial to the present analysis of fronting.

3 Conclusions

This paper began with a problem: if one attempts to account for PVP fronting by postulating that potential Mittelfeld constituents may appear before the finite matrix verb, then one must postulate a variety of conflicting constituent structures in the Mittelfeld—which results in a good deal of otherwise unmotivated ambiguity. The most important data here was first noted by Haider 1990, specifically the problems encountered when infinitives are split in various ways (Section 2.7). The goal of the paper was to account for the difficult fronting data without postulating ambiguity.

The primary goal was thus the elimination of the spurious ambiguity necessary in accounts which foresee a correspondence between Vorfeld occupants and Mittelfeld positions, but we noted that further data of Haider's involving extraposition that are similarly problematic in having no positional correspondence in the Mittelfeld.

We have accomplished this by identifying the licensing conditions for Vorfeld elements not on the basis of constituent structure POSITIONS, but rather in the SUBCATEGORIZATION of finite verbs and their verbal complements. The treatment allows one to formulate necessary and sufficient conditions for the occurrence of partial verb phrases without countenancing spurious ambiguity in the Mittelfeld, and we argued that it provides a foundation for the extraposition data as well, which, however, could not be treated as thoroughly (in the absence of a theory of extraposition). We believe that the proposed analysis may be seen as one instance of the nonderivational account which Haider 1990:24 advocates (without details, however). Haider clarifies that by "nonderivational" he means an account in which Vorfeld elements need NOT be associated with Mittelfeld positions which they might have occupied.

This account is interesting for other reasons. The constituent structure correspondence analysis is the single most convincing pillar that theories of (complex) Mittelfeld structure have rested on. The present paper demonstrates that this evidence is not compelling. The complex consituent structures these analyses propose are of no aid in the analysis of PVP fronting. The structures needed must be varied, particularly in the case of "split infintives" (Section 2.7), and even wildly ambiguous analyses are helpless before the extraposition data.

Of course the discrediting of one line of argumentation is uninteresting if the same result can be obtained otherwise. And indeed, the right-branching analysis of the German Mittelfeld has been seen as the cause of various other phenomena, including coordination, scope, auxiliary flip and right-node raising. It is beyond the scope of a single paper to examine these in detail, but we do suggest in a cursory examination that the explanations have been less than convincing. We do not attempt to point to superior analyses for these phenomena, however.

In this section we examine remaining problems, indicate some of the finer points of the analysis, and suggest some of its consequences.

3.1 Remaining Problems

It will be useful to comment further here on two aspects of fronting which remains mysterious on the present account. This concerns the different behavior of various constituents when fronting across an S boundary is attempted. For example, it seems impossible to front a PVP across such a boundary:

* **Erzählen**	**können**	hat	er	gesagt,	daß	der	Babysitter
tell	can	AUX	he	say(prt)	COMP	the(nom)	babysitter
den	Kindern	ein	Märchen	muß			
the(dat)	kids	a(acc)	story	must			

Other constituents may be fronted across an S boundary, of course (cf. Uszkoreit 1987b:57). For other purposes, Hukari and Levine 1991 suggest distinguishing SLASH categories. Their proposal, if correct, might be applied to distinguish German unbounded fronting from clause-bound fronting.

A second aspect of PVP fronting which we have not examined is the ability of some verbs to front in combinations with SUBJECTS (Uszkoreit 1987b:55, attributed to Craig Thiersch):

Solch	ein	Fehler	unterlaufen	war	ihm	noch	nie
So	a	mistake	undergone	AUX	him(dat)	yet	never

He had never made such a mistake

3.2 Highlights

We turn now to a brief synopsis of the highlights of the proposed treatment. The argumentation in this paper has been exclusively linguistic: we have argued that a nonambiguous analysis (the SLASH assumption treatment) of the Mittelfeld was possible, and, given the dearth of evidence to the contrary, therefore preferable. Several properties of this treatment are worthy of note. First, the treatment is conservative vis-à-vis phrasal grammar: both the subcategorization principle and the binding inheritance principle may be preserved in exactly their customary form. We have added a single additional rule for focused constituents. Second, the treatment eliminates (one source of) phrasal ambiguity in constituents headed by finite verbs. Third, as we saw in the second example derivation, we continue to require a raising analysis within fronted constituents. Fourth, and this has not received comment above, the treatment trades phrasal for lexical ambiguity: finite auxiliaries are now analyzed as ambiguously having or not having a PVP in SLASH. Fifth, it's clear that this analysis rejects the general principle that slashed constituents may always appear as constituents (at least in alternative analyses). But this is the "poltergeist principle" appealed to in Nerbonne 1986—a constituent in the Vorfeld need not correspond to one of exactly the same form in the Mittelfeld. Sixth, this analysis is committed to the nonexistence of "traces", at least in these cases. This has long been a goal of LFG Bresnan 1982, for it allows a principled answer to the otherwise embarrassing question of the location of the trace in complex VP's, e.g.:

Welchem	Kind	hat	er	das	Märchen	erzählt?
which	kid	AUX	he	the(acc)	story	tell(prt)

Which kid did he tell the story to?

This is essentially another problem of spurious ambiguity: there is no nonarbitrary single location at which "trace" might be posited. Thus this aspect of the present proposal is independently motivated.

3.3 Ramifications

But even if the argumentation has been linguistic, it is also worth remarking that the processing properties of the grammar without spurious ambiguity are also preferable, for the same reason that lexical ambiguity is generally preferable to phrasal.

There is at least one direction in which an analysis of this sort might fruitfully be extended. There is a further interaction between variable subcategorization and fronting evidenced in the structures below which might yield to a similar analysis:

a. | Stolz | ist | er | auf | die | Kinder |
|---|---|---|---|---|---|
| proud | COP(fin) | he | on | the(acc) | kids |

He is proud of the kids

b. Auf die Kinder ist er stolz

These sorts of examples are often discussed in terms of "argument inheritance" (which would appear to be a kind of raising from nonverbal constituents) and could be analyzed in analogy with auxiliary verbs. In this case the SLASH assumption analysis should extend to the analysis of fronting straightforwardly.

References

Bouma, G. 1992. Feature Structures and Nonmonotonicity. *Computational Linguistics* 18(3):185–205.

Bresnan, J. (ed.). 1982. *The Mental Representation of Grammatical Relations.* Cambridge, Mass.: MIT Press.

Dowty, D. 1982. Grammatical Relations and Montague Grammar. In *The Nature of Syntactic Representation*, ed. P. Jacobson and G. K. Pullum, 79–130. Dordrecht: Reidel.

Flickinger, D., and J. Nerbonne. 1992. Inheritance and Complementation: A Case Study of *Easy* Adjectives and Related Nouns. *Computational Linguistics* 19(3):269–309.

Fourquet, J. 1971. Satzgliedfolge und Satzverneinung als Probleme der Struktur. In *Frage der strukturellen und der kontrastiven Grammatik*, Vol. 17 of Sprache der Gegenwart, 151–159. Düsseldorf: Schwann.

Frey, W. 1989. *Syntaktische Bedingungen für die Interpretation.* PhD thesis, Universität Stuttgart, December.

Gazdar, G., and G. Pullum. 1982. Subcategorization, Constituent Order and the Notion 'Head'. In *The Scope of Lexical Rules*, ed. M. Moortgaat, H. van der Hulst, and T. Hoekstra, 107–123. No. 1Linguistic Models. Dordrecht: Foris.

Haider, H. 1990. Topicalization and other Puzzles of German Syntax. In *Scrambling and Barriers*, ed. G. Grewendorf and W. Sternefeld, 93–112. Amsterdam: Benjamins.

Heidolph, K. E., W. Fämig, and W. Motsch. 1981. *Grundzüge einer deutschen Grammatik.* Berlin: Akademie Verlag.

Heinz, W., and J. Matiasek. 1993. Argument Structure and Case Assignment in German. In *German Grammar in HPSG*, ed. J. Nerbonne, K. Netter, and C. Pollard, (this volume). Stanford. CSLI.

Hinrichs, E., and T. Nakazawa. 1989. Flipped out: AUX in German. In *Papers from the 25th Annual Regional Meeting of the Chicago Linguistic Society*, 187–202. Chicago: Chicago Linguistics Society.

Hinrichs, E., and T. Nakazawa. 1993. Linearizing AUX in German Verbal Complexes. In *German Grammar in HPSG*, ed. J. Nerbonne, K. Netter, and C. Pollard, (this volume). Stanford: CSLI.

Hoberg, U. 1981. *Die Wortstellung in der geschriebenen deutschen Gegenwartssprache*. Vol. I/10 of Heutiges Deutsch. München: Hueber.

Hukari, T., and R. Levine. 1991. On the Disunity of Unbounded Dependency Constructions. *Natural Language and Linguistic Theory* 9:97–144.

Hunze, R. 1991. Eine deklarative Beschreibung von Linkstilgungslücken in koordinierten Strukturen des Deutschen. Technical Report ASL-TR-6-91/SIM, ASL, Siemens ZFE, München.

Johnson, M. 1986. A GPSG Account of VP Structure in German. *Linguistics* 24-25(285):871–882.

Kasper, R. T. 1993. Adjuncts in the Mittelfeld. In *German Grammar in HPSG*, ed. J. Nerbonne, K. Netter, and C. Pollard, (this volume). Stanford. CSLI.

Kathol, A. 1993. Passive without Lexical Rules. In *German Grammar in HPSG*, ed. J. Nerbonne, K. Netter, and C. Pollard, (this volume). Stanford. CSLI.

Kiss, T. 1993. Obligatory Coherence—An Investigation into the Syntax of Modal and Semi-Modal Verbs in German. In *German Grammar in HPSG*, ed. J. Nerbonne, K. Netter, and C. Pollard. Stanford: CSLI.

Krieger, H.-U. 1993. Derivation Without Lexical Rules. In *Constraint Propagation, Linguistic Description and Computation*, ed. R. Johnson, M. Rosner, and C. Rupp. Academic Press.

Krifka, M. 1991. A Compositional Semantics for Multiple Focus Constructions. draft.

Kufner, H. 1962. *The Grammatical Structures of English and German*. Chicago: University of Chicago Press.

Lühr, R. 1985. Sonderfälle der Vorfeldbesetzung im heutigen Deutsch. *Deutsche Sprache* 13:1–23.

McCray, A. 1981. *German Sentence Structure*. PhD thesis, Georgetown.

Nerbonne, J. 1985. *German Temporal Semantics*. New York: Garland.

Nerbonne, J. 1986. "Phantoms" and German Fronting: Poltergeist Constituents? *Linguistics* 24-25(285):857–870. distributed in 1982 as Winter LSA talk.

Netter, K. 1992. On Non-Head Non-Movement. An HPSG Treatment of Finite Verb Position in German. In *Proceedings of KONVENS 92*, ed. G. Görz. Berlin and Heidelberg and New York: Springer.

Pollard, C. 1988. Categorial Grammar and Phrase Structure Grammar: An Excursion on the Syntax-Semantics Frontier. In *Categorial Grammars and Natural Language Structures*, ed. R. T. Oehrle, E. Bach, and D. Wheeler, 391–416. Dordrecht: Reidel.

Pollard, C. 1991. On Head Non-Movement. In *Tilburg Symposium on Discontinuous Constituency*. Tilburg, The Netherlands: Institute for Language Technology and Artificial Intelligence, Tilburg University.

Pollard, C., and I. Sag. 1987. *Information-Based Syntax and Semantics, Vol.I.* Stanford: CSLI.

Pollard, C., and I. Sag. 1993. *Head-Driven Phrase Structure Grammar.* Stanford: CSLI.

Reape, M. 1991. A Theory of Word Order and Discontinuous Constituency in West Continental Germanic. In *Parametric Variation in Germanic and Romance: Preliminary Investigations*, chapter 3, 25–39. University of Edinburgh: Centre for Cognitive Science, January. DYANA Deliverable R1.1.A.

Rooth, M. 1985. *Association with Focus.* PhD thesis, University of Massachusetts at Amherst.

Thiersch, C. L. 1978. *Topics in German Syntax.* PhD thesis, MIT, Cambridge, Mass., March.

Uszkoreit, H. 1987a. Linear Precedence in Discontinuous Constituents: Complex Fronting in German. In *Syntax and Semantics 20: Discontinuous Constituency.*, ed. G. J. Huck and A. E. Ojeda, 406–24. New York: Academic Press.

Uszkoreit, H. 1987b. *Word Order and Constituent Structure in German.* Vol. 8 of CSLI Lecture Notes. Stanford: CSLI.