Word Order Constraints on Verb Clusters in German and Dutch

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1 Introduction

There is a broad concensus among researchers working within the paradigm of HPSG that *complement inheritance* of the kind proposed in Hinrichs and Nakazawa (1989; 1994) is an essential operation in the analysis of the *verb cluster* in German and Dutch. Both languages have a class of verbs (including auxiliaries and modals) that subcategorize for a (possibly) unsaturated verbal complement, and for all the complements on the COMPS-list of this verbal complement. Most analyses of German have assumed that these *complement inheritance* verbs combine with their verbal complements to form a phrase consisting of (lexical) verbs only. This phrase is usually referred to as the *verbal complex*.

In this paper, we argue that the word order of German as well as Dutch verb clusters can be accounted for without introducing a verbal complex.[1] Our analysis rests on the assumption that a single HEAD-COMPLEMENT schema exists, which licences phrases consisting of a lexical head and an arbitrary number of its complements. This schema allows a *complement inheritance* verb to combine with its verbal complement, as well as the complements of this complement, in one step. A consequence of this analysis is that there is no room within the verb phrase for *partial* VPs or a *verbal complex*. The advantage of such an account is that there is no need to distinguish between a rule schema for verbal complexes and for (partial) VPs. Furthermore, a 'flat VP' implies that phrase structure does not impose any constraints on word order. Therefore, the full range of word order possibilities found in German and Dutch verb clusters is captured by a single schema. Of course, the main challenge for this 'flat VP' analysis is to demonstrate that it can do so without leading to vast overgeneration. This is the main topic of the current paper.

In the next section, we introduce the German data and discuss the analysis of Hinrichs and Nakazawa (1989; 1994) as well as a number of related approaches. Next, we present our analysis of German. It uses a general HEAD-COMPLEMENT schema in conjunction with linear precedence statements. We demonstrate that the proposed set of LP-statements accounts for all ordering possibilities encountered in the German verb cluster. Furthermore, we argue that our analysis leads to an improved account of *partial* VP *fronting* (Nerbonne, 1994).

The account to word order adopted here, is considerably more sophisticated than the proposal in van Noord and Bouma (1996), in which an account of the Dutch verb cluster was presented which relied primarily on ordering in terms of *obliqueness*. In section 4, we demonstrate that the improvements that were necessary in order to account for German also lead to a smoother account of some of the more problematic Dutch data.

[1] In this paper we use *verb cluster* as a descriptive term for the sequence of verbs which is typically found in clause-final position in German and Dutch subordinate clauses. The *verbal complex* is a theoretical notion, and refers to the *phrasal category* used in some grammars to analyze verb clusters.

2 The constituent structure of German VPs

German subordinate clauses containing a cluster of a main verb and modal and/or auxiliary verbs, give rise to a nesting (or embedding) dependency word order:

(1) daß er das Examen bestehen können wird
that he the exam pass be-able-to will
that he will be able to pass the exam

Hinrichs and Nakazawa (1989; 1994) argue that the phenomenon known as *Oberfeldumstellung* or *auxiliary flip* (2) provides evidence for the fact that the complement of auxiliaries and modals (i.e. *wird* and *können* in (2)) is not a full VP, but a constituent consisting of verbal material only.

(2) daß er das Examen wird bestehen können

If *können* were to select the VP *das Examen bestehen* as complement, giving rise to a constituent which is itself the complement of *wird*, the word order in (2) would be completely unexpected. If *können* and *wird* are 'complement inheritors', however, an analysis suggests itself in which *bestehen können*, but not *das Examen bestehen können* is a constituent. The proposed lexical entries for *können* and *wird* are given below:[2]

(3) a. können (*to be able to*) $\mapsto \begin{bmatrix} \text{HEAD} & verb[inf] \\ \text{COMPS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & verb[inf] \\ \text{COMPS} & \boxed{1} \\ \text{NPCOMPS} & - \end{bmatrix} \right\rangle \end{bmatrix}$

b. wird (*will*) $\mapsto \begin{bmatrix} \text{HEAD} & verb[fin] \\ \text{COMPS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & verb[inf] \\ \text{COMPS} & \boxed{1} \\ \text{NPCOMPS} & - \end{bmatrix} \right\rangle \end{bmatrix}$

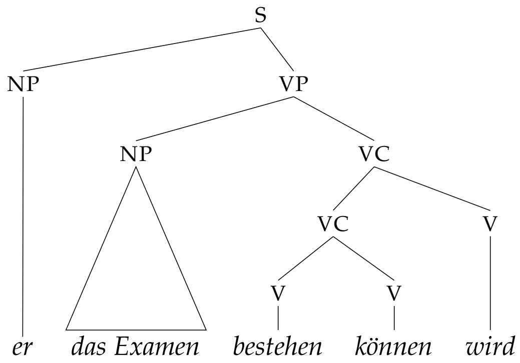
The NPCOMPS feature plays a role in the following two HEAD-COMPLEMENT schemata:

(4) a. $\text{V}\begin{bmatrix}\text{NPCOMPS} & -\end{bmatrix} \rightarrow \text{H}\begin{bmatrix}\text{LEX} & +\end{bmatrix}, \text{V}$

b. $\text{V}\begin{bmatrix}\text{NPCOMPS} & +\end{bmatrix} \rightarrow \text{NP, H}$

The first rule in (4) licenses the derivation of a verbal complex, whereas the second rule licences the derivation of (partial) verb phrases. Note that, in VPs with standard word order, these two schemata give rise to a binary, left-branching, tree:[3]

(5)



[2] $\boxed{1} \oplus \boxed{2}$ denotes the list which is obtained by appending the lists $\boxed{1}$ and $\boxed{2}$.
[3] In the examples below, VC is a verbal complex, VP is a (partial) verb phrase, and S is a verb phrase including a subject.

Auxiliary flip is accounted for by means of a binary head feature FLIP. The following *linear precedence* statement expresses that verbal complements marked [FLIP +] must follow the head:

$$\text{(6)}\quad \text{HEAD}\begin{bmatrix}\text{LEX} & +\end{bmatrix} < \text{COMPLEMENT}\begin{bmatrix}\text{MAJ} & v\\ \text{FLIP} & +\end{bmatrix}$$

Since main verbs never induce *flipped* word order, they are considered to be marked [FLIP -]. Infinitival modals such as *können* are unspecified for the head feature FLIP. Thus, given the constituent structure in (5) and the LP statement in (6), it is predicted that both the word order in (1) and in (2) is allowed.

A complication arises from the fact that *können* can also function as *Ersatzinfinitiv* (substitute infinitive).[4] In those cases, flipped word order is obligatory. This fact is accounted for by assigning the *Ersatzinfinitiv können* the value [FLIP +]:

$$\text{(7)}\quad \text{können } (\textit{to be able to}) \mapsto \begin{bmatrix}\text{HEAD} & \begin{bmatrix}\text{MAJ} & \text{v}\\ \text{VFORM} & \text{psp}\\ \text{FLIP} & +\end{bmatrix}\\ \text{COMPS} & \boxed{1} \bigoplus \left\langle \begin{bmatrix}\text{HEAD} & \textit{verb}[\textit{inf}]\\ \text{COMPS} & \boxed{1}\\ \text{NPCOMPS} & -\end{bmatrix}\right\rangle\end{bmatrix}$$

This accounts for the contrast in (8):

(8) a. daß er das Examen hat bestehen können
that he the exam has pass be-able-to
that he has been able to pass the exam

b. *daß er das Examen bestehen können hat

The auxiliary *haben*, finally, functions as a 'trigger' for flipped word order only in case it appears in 'flipped' position itself. This is illustrated in (9).

(9) a. daß er die Lieder wird haben singen können
that he the songs will have sing be-able-to
that he will have been able to sing the songs

b. *daß er die Lieder haben singen können wird

c. daß er die Lieder gesungen haben wird

In (9a), *haben* must precede *singen können*, and therefore is a trigger for flipped word order itself. In (9c), *haben* does not appear in flipped position, and consequently cannot trigger flipped word order for *wird*. This can be accounted for by assuming that *haben* inherits the FLIP-value of its verbal complement:

$$\text{(10)}\quad \text{haben } (\textit{to have}) \mapsto \begin{bmatrix}\text{HEAD} & \begin{bmatrix}\text{MAJ} & \text{v}\\ \text{VFORM} & \text{inf}\\ \text{FLIP} & \boxed{2}\end{bmatrix}\\ \text{COMPS} & \boxed{1} \bigoplus \left\langle \begin{bmatrix}\text{HEAD} & \begin{bmatrix}\text{MAJ} & \text{v}\\ \text{VFORM} & \text{psp}\\ \text{FLIP} & \boxed{2}\end{bmatrix}\\ \text{COMPS} & \boxed{1}\\ \text{NPCOMPS} & -\end{bmatrix}\right\rangle\end{bmatrix}$$

[4] I.e. as an infinitive which occurs as the complement of an auxiliary selecting a past participle verbal complement.

An essential aspect of the Hinrichs and Nakazawa account of word order within the verb cluster is the distinction between verbal complexes and other partial verb phrases expressed by the feature NPCOMPS. First, in sentences with 'normal' word order, selection for a [NPCOMPS -] complement prevents ambiguity. That is, in those cases the [NPCOMPS -] specification on the complement ensures that the inheritance verb combines with a verb or verbal complex, rather than a full VP. Second, in sentences with 'flipped' word order, the NPCOMPS feature ensures that the auxiliary 'flips' only over the verbal complex, and not over a full or partial VP. This is illustrated in (11):

(11) a. wenn er dem Professor die Studenten hätte vorstellen dürfen
if he the professor the students had introduce be allowed
if he had been allowed to introduce the students to the professor

b. *wenn er die Studenten hätte dem Professor vorstellen dürfen

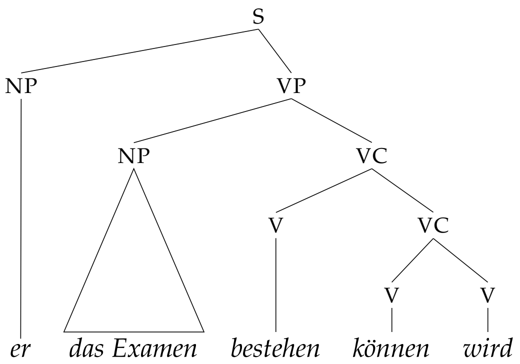
c. *wenn er dem Professor hätte die Studenten vorstellen dürfen

d. *wenn er hätte dem Professor die Studenten vorstellen dürfen

While the examples in (11b-d) are judged grammatical by some speakers, other speakers reject such examples.

The fact that auxiliaries and modal verbs are complement inheritance verbs has been widely accepted. Questions concerning the constituency of phrases headed by such, however, have not been answered uniformly. In Kiss (1994), for instance, it is argued that the verbal complex is right-branching instead of left-branching:

(12)



This analysis has the advantage that it is no longer necessary to have two HEAD-COMPLEMENT schemata, one for creating verbal complexes and a second rule for creating (partial) VPs. The feature NPCOMPS can dispensed with as well. Instead, complement inheritance verbs select a verbal complement which is marked +LEX. A problem for this kind of analysis is obviously that there is no easy way to account for auxiliary flip.

Proposals for a non-binary branching analysis have been put forward as well. In Nerbonne (1994), for instance, it is argued that instances of *partial* VP *fronting* (13) are best accounted for by making minimal assumptions about the internal structure of VPs.

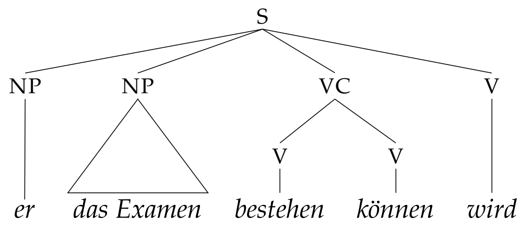
(13) a. Das Buch lesen wird er schon können.
the book read will he already can
He'll surely be able to read the book

b. Lesen können wird er das Buch schon.

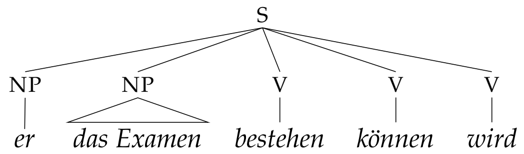
For transformational accounts, which assume a correspondence between a fronted element and a *trace* in the remaining clause, such examples are problematic. Only an analysis that assigns multiple bracketings to *das Buch lesen können* can account for the two examples in (13). However, such an analysis must accept spurious ambiguity in examples without fronting.

Nerbonne provides an alternative, nontransformational and traceless, account, in which a complement extraction lexical rule shifts an element from COMPS to SLASH. A special feature of this rule is that the requirement that a complement must be [NPCOMPS -] or +LEX is not carried over to SLASH. This essentially allows an complement inheritance verb, which normally selects for a verbal complex or lexical verb, to have an element on SLASH matching an arbitrary partial VP.

Nerbonne emphasizes that, given his analysis, fronting of partial VPs is no longer an argument for assigning constituent-status to such phrases in non-fronted positions as well. Consequently, there seems to be no reason why a verbal head could not combine with all its complements in one step. Although Nerbonne does not address this issue in detail, he suggests that an account of *auxiliary flip* still necessitates the introduction of a *verbal complex*. That is, an auxiliary could have a verbal complex as one of its arguments:

(14)


However, even the existence of verbal complexes can be questioned. In Baker (1994), for instance, the example above is assigned the following structure:

(15)


Flat structures of this kind can be obtained if complement inheritance verbs select a lexical complement, and furthermore, the HEAD-COMPLEMENT schema imposes the constraint that the head must be lexical (i.e. of type *word*). It should be noted, however, that Baker tries to account for auxiliary flip by assuming that in those cases the auxiliary takes a partial VP as argument. As is admitted by Baker herself, such an account overgenerates, as it not only accepts ordinary cases of auxiliary flip, but also all of the examples in (11) and even such sequences as (16), which are completely ungrammatical:

(16) *daß er bestehen wird das Examen können
that he pass will the exam be-able-to
that he will be able to pass the exam

The proposal of Hinrichs and Nakazawa (1994) deals succesfully with auxiliary flip in the German verb cluster. Alternatives which also explicitly address this issue, such as Baker (1994), are not without problems. This does not imply, however, that alternatives are not worth considering. For one thing, while the analysis of Hinrichs and Nakazawa leads to a smooth account of auxiliary flip, it cannot easily account for some other word order patterns.

In Dutch subordinate clauses, for instance, the presence of auxiliaries and modals also leads to a cluster of verbs in clause-final position. The standard order in this case, however, is one where the governing verb precedes the verb it governs:

(17) dat Jan het boek moet hebben gelezen
that John the book must have read
that John must have read the book

As in German, a certain amount of word order variation is permitted. The participle in (17), for instance, may also be the first element in the cluster:

(18) dat Jan het boek gelezen moet hebben

An analysis which assigns constituent status to *gelezen hebben* cannot easily account for this possibility.

Of course, it may be that constituency within the verb cluster in Dutch is simply different than in German. However, there are also German examples which appear to be problematic. Meurers (1994) has drawn attention to the following examples, which he refers to as cases of *Zwischenstellung*:

(19)	zu dem Zeitpunkt	an dem	ich	mich	entscheiden	hätte	müssen
	at the point	at which	I	me	decide	had	must
	at the point at which I should have made a decision						

The analysis of Hinrichs and Nakazawa (1994) considers *entscheiden müssen* as a constituent. The fact that *hätte* may, for a considerable number of speakers, 'flip' over the modal verb only in this case, is cleary problematic for their analysis.

Below, we develop an alternative analysis for the German verb cluster. It not only handles auxiliary flip, but also *Zwischenstellung*. An advantage of our 'flat' analysis is that it uses a single HEAD-COMPLEMENT schema to derive both full and partial VPs, without spurious ambiguity. In previous work (van Noord and Bouma, 1996), we argued that this means that a single rule can account for the derivation of full VPs as well as the kind of partial VPs encountered in examples of partial VP fronting and partial extraposition (third construction) in Dutch. Thus, the alternative developed below accounts for a wider range of data, and does so by using fewer rules, than previous proposals. Moreover, there is no need for a feature such as NPCOMPS. This is advantageous because the percolation of this feature in previous analyses is rather peculiar and not subject to one of the ordinary feature percolation constraints (such as the head feature principle).

3 Word order within the German Verb Cluster

In this section, we present our analysis of German verb clusters. We present a HEAD-COMPLEMENT schema which allows both full and partial verb phrases to be derived. Furthermore, we present our approach to word order, which relies on LINEAR PRECEDENCE statements. [5] Linear precedence within phrases is determined by three principles:

Directionality. Directionality determines the position of a complement daughter relative to the head daughter.

Topology. Topological constraints determine in which 'topological field' a daughter appears. Instead of adopting the full range of topological fieds usually assumed for German syntax, we will only distinguish between 'inner zone' and 'outer zone' positions, where the 'inner zone' contains the verb cluster, and the 'outer zone' contains all other elements of the VP.

Government. The direction of government determines the position of a complement relative to its governor, where government is defined in terms of *argument structure*.

The distinction between the verb cluster and other parts of the VP is expressed by means of the distinction between inner and outer zone, and the order of elements within the verb cluster is determined by the direction of government.

3.1 The Head-Complement Schema

We assume the following, general, HEAD-COMPLEMENT schema:

[5]This aspect of the analysis is inspired by Kathol (1997).

(20) **Head-complement schema:**

$$\begin{bmatrix} \textit{phrase} & \\ \text{DTRS} & \textit{head-complement} \end{bmatrix} \rightarrow \begin{bmatrix} \text{DTRS} & \begin{bmatrix} \text{HEAD-DTR} & \textit{word} \\ \text{COMP-DTRS} & \textit{ne-list} \end{bmatrix} \end{bmatrix}$$

Schema (20) states that a phrase may consist of a *lexical* head daughter and one or more complement daughters. The requirement that the head daughter must be of type *word*, while the mother is a *phrase* rules out recursive rule application, i.e. no phrase derived by means of the HEAD-COMPLEMENT schema can be the head of a larger phrase also derived by means of the HEAD-COMPLEMENT schema. The requirement that there must always be at least one complement means that there can be no non-branching derivations. Both constraints are required to rule out spurious derivations.

The HEAD-COMPLEMENT schema is subject to the VALENCE Principle, which is similar to the Subcategorization Principle of Pollard and Sag (1994, 34): [6]

(21) **Valence principle:** The COMPS-list of the head daughter is the append ($\oplus$) of the COMPS-list of the mother and the list of SYNSEM-values of the complement daughters.

Note that valence does not distinguish between a case where all complements are selected, and cases where one or more complements are not selected. The latter allows *partial* phrases to be derived.[7] This is essential for our account of *partial* VP *fronting* and *partial extraposition* (or *third construction*) verbs.

The order of complements relative to the head daughter is determined by the feature DIR. A head daughter may specify its complements as either [DIR $\rightarrow$], in which case the complement must precede the head, or as [DIR $\leftarrow$], in which case it follows the head. In German subordinate clauses, NP complements must precede the head daughter, which means that a ditransitive verb such as *geben* (*to give*), can be specified as:

(22) geben (*to give*) $\mapsto$

$$\begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{SUBJ} & \left\langle \text{NP} \right\rangle \\ \text{COMPS} & \left\langle \begin{bmatrix} \text{HEAD} & \textit{np}[\textit{dat}] \\ \text{DIR} & \rightarrow \\ \text{ZONE} & \textit{outer} \end{bmatrix}, \begin{bmatrix} \text{HEAD} & \textit{np}[\textit{acc}] \\ \text{DIR} & \rightarrow \\ \text{ZONE} & \textit{outer} \end{bmatrix} \right\rangle \end{bmatrix}$$

The following two LP statements implement *directionality*:

(23) **Directionality**

1. $\text{COMPLEMENT}\begin{bmatrix}\text{DIR} & \rightarrow\end{bmatrix} < \text{HEAD}$
2. $\text{HEAD} < \text{COMPLEMENT}\begin{bmatrix}\text{DIR} & \leftarrow\end{bmatrix}$

Note that directionality only orders complements relative to the head daughter, the order of complements with respect to each other is left open. In previous work on Dutch (van Noord and Bouma, 1996), we have assumed that *obliqueness* provides an ordering of complements: if C_1 is more oblique than C_2 (i.e. the SYNSEM-value of C_1 follows the SYNSEM-value of C_2 on COMPS),

[6] As well as a number of other principles introduced in Pollard and Sag (1994), such as the HEAD FEATURE and NONLOCAL FEATURE principle. For simplicity, we are silent about other valence features, since subjects or specifiers do not play any significant role in the following examples.

[7] Note, however, that we do impose the requirement that the selected complements must form a suffix of COMPS on the head daughter. This implies that the order of complements on COMPS (i.e. *obliqueness*) does constrain the type of partial phrases that can be derived. In this respect, our proposal differs from that of Baker (1994).

than C_1 appears closer to the head daughter than C_2. Such a constraint might be too restrictive for German, however.[8] The order of lexical, verbal, complements is discussed below.

Note finally, that the head daughter of a HEAD-COMPLEMENT phrase is marked [ZONE *inner*], also referred to as I-ZONE; whereas NP-complements are marked [ZONE *outer*] (O-ZONE). The relevance of this distinction is explained below.

3.2 Complement Inheritance and the I-Zone

Following the analysis of Hinrichs and Nakazawa (1989), we assume that modals and auxiliaries are *complement inheritance* verbs, which select for a list of complements consisting of a verb and the complements selected by that verb:

(24) a. wollen (*to want*) $\mapsto \begin{bmatrix} \text{HEAD} & verb[inf] \\ \text{SUBJ} & \left\langle \text{NP} \right\rangle \\ \text{COMPS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & verb[inf] \\ \text{COMPS} & \boxed{1} \\ \text{ZONE} & inner \end{bmatrix} \right\rangle \end{bmatrix}$

b. haben (*to have*) $\mapsto \begin{bmatrix} \text{HEAD} & verb[inf] \\ \text{SUBJ} & \left\langle \text{NP} \right\rangle \\ \text{COMPS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & verb[prt] \\ \text{COMPS} & \boxed{1} \\ \text{ZONE} & inner \end{bmatrix} \right\rangle \end{bmatrix}$

The verbs *helfen* (to help) and *lassen* (to let) are analyzed as complement inheritance verbs as well, but these verbs also select for an additional NP object:

(25) helfen (*to help*) $\mapsto \begin{bmatrix} \text{HEAD} & verb[inf] \\ \text{SUBJ} & \left\langle \text{NP} \right\rangle \\ \text{COMPS} & \left\langle \text{NP}[acc] \right\rangle \oplus \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & verb[inf] \\ \text{COMPS} & \boxed{1} \\ \text{ZONE} & inner \end{bmatrix} \right\rangle \end{bmatrix}$

Our account of the verb cluster rests on the assumption that complement inheritance verbs select for an I-ZONE verbal complement. The ZONE feature defines whether an element occupies the 'inner' or 'outer' zone topological field. The inner zone contains the head daughter, along with any complements which are required to appear 'close' to this head. Furthermore, we assume that the I-ZONE may only contain daughters of type *word*. The outer zone is occupied by the other complements. Thus, we make the following assumptions:

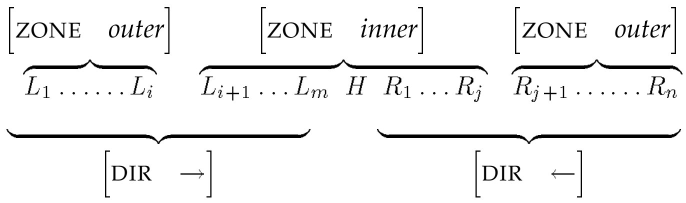
(26) a. **Zone LP Constraints:**

1. $\begin{bmatrix} \text{DIR} & \rightarrow \\ \text{ZONE} & outer \end{bmatrix} < \begin{bmatrix} \text{ZONE} & inner \end{bmatrix}$ 2. $\begin{bmatrix} \text{ZONE} & inner \end{bmatrix} < \begin{bmatrix} \text{DIR} & \leftarrow \\ \text{ZONE} & outer \end{bmatrix}$

b. **I-zone Principle:** In HEAD-COMPLEMENT structures, all [ZONE *inner*] daughters are of type *word*.

[8] See Uszkoreit (1987) for an approach to the ordering of constituents in the *Mittelfeld*. In such an approach, *obliqueness* could be one of the several *competing* constraints determining word order.

The effect of the two LP constraints above is that no O-ZONE daughter can appear in between two I-ZONE daughters. Since head daughters are required to be in the I-ZONE by the HEAD-COMPLEMENT schema, this has the effect of creating a topological field for the head daughter and I-ZONE complements. In verb phrases, the I-ZONE will contain the verb cluster. The interaction of the zone and directionality constraints can be represented schematically as in (27).

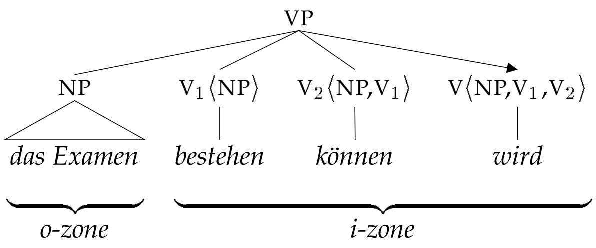
(27)


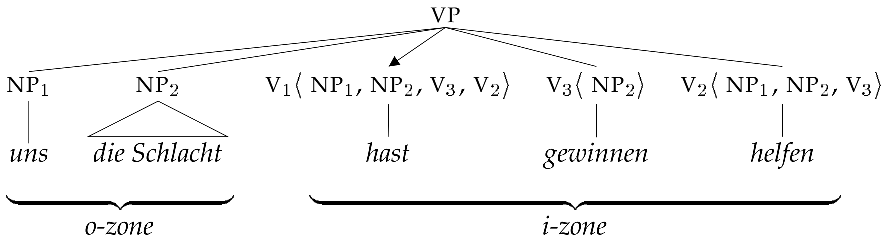
The I-ZONE principle ensures that *complement inheritance* is not just a possibility, but a necessity. Since I-ZONE elements must be words, complement inheritance verbs, which select for an I-ZONE complement, must in fact combine with a lexical verbal complement. Thus, all complements of this lexical verbal complement must be inherited by the higher, complement inheritance, verb.

The effect of the I-ZONE principle is therefore that VPs headed by a complement inheritance verb must be 'flat'. For instance, the VPs in the two examples below, are given in (29) and (30). In these examples, an arrow points toward a head daughter.

(28) a. daß er das Examen bestehen können wird
that he the exam pass be-able-to will
that he will be able to pass the exam

b. daß du uns die Schlacht hast gewinnen helfen
that you us the battle have win help
that you did help us win the battle

(29)


(30)


The 'flat' constituent structures shown here are the only ones possible according to the grammar. Furthermore, NP-complements must precede the I-ZONE and all verbs must appear in the I-ZONE. The relative order of the verbs in the cluster is still unconstrained, however.

3.3 Government

The analysis of word order in German and Dutch verb clusters in Kathol (1997) combines the Hinrichs and Nakazawa (1994) analysis of the verb cluster with a non-concatenative approach to word order. Word order is determined by topological fields as well as *direction of government*. Our account of word order within the verb cluster closely follows Kathol's proposals. The major distinction between the two approaches is that we implement these proposals in a concatenative setting, whereas Kathol presupposes a non-concatenative framework.

An example of the type of *word order domains* used by Kathol is given in (31).

(31) $$\left[\text{DOM} \quad \left\langle \begin{bmatrix} \langle \textit{daß} \rangle \\ \text{COMPL} \\ \textit{cf} \end{bmatrix}, \begin{bmatrix} \langle \textit{Peter} \rangle \\ \text{NP} \\ \textit{mf} \end{bmatrix}, \begin{bmatrix} \langle \textit{das Buch} \rangle \\ \text{NP} \\ \textit{mf} \end{bmatrix}, \begin{bmatrix} \langle \textit{finden} \rangle \\ \text{V} \\ \textit{vc} \end{bmatrix}, \begin{bmatrix} \langle \textit{können} \rangle \\ \text{V} \\ \textit{vc} \end{bmatrix}, \begin{bmatrix} \langle \textit{wird} \rangle \\ \text{V} \\ \textit{vc} \end{bmatrix} \right\rangle \right]$$

Such order domains can be derived using binary branching syntax rules if the daughters in a rule are allowed to be combined by means of sequence union (Reape, 1994), instead of concatenation. This enables Kathol to adopt a constituent structure very similar to that proposed by Hinrichs and Nakazawa (1994), while at the same time word order constraints apply to the 'flat' domain shown in (31). The labels *cf*, *mf*, and *vc* refer to the topological fields complementizer field, *Mittelfeld*, and verb cluster. LP-constraints ensure that *cf* elements must precede *mf* elements, and that *mf* elements must precede *vc* elements.

The *vc* topological field corresponds exactly to our I-ZONE field. Note also that in both cases, all verbal elements are sisters, and thus constituency does not impose any constraints on word order. We demonstrate below that Kathol's proposals for determining order within the verb cluster therefore carry over to our analysis. First we discuss how the notion of government can be incorporated in HPSG, and how linear precendence statements referring to government can be defined. We then go on to present the various constraints that must be imposed on the direction of government for German verbs.

The distinction between the relative order of a head daughter and its complement (which is constrained by the value of DIR) and the relative order of a governor and governee is relevant especially for complement inheritance verbs. The COMPS-list of a complement inheritance verb in general contains a number of complements for which the verb subcategorizes, as well as complements inherited from one of these complements. Only the first are assumed to be *governed* by the complement inheritance verb (i.e. inherited complements are not governed by the verb which inherits them). The distinction between complements that are subcategorized-for and inherited complements is reflected on the level of *argument structure*. Argument structure is a notion which has been introduced recently in HPSG as the level on which the binding constraints are defined. Canonically, it is the append of the valency features SUBJ, SPR, and COMPS. Exceptional cases can arise, for instance, in 'pro-drop' or ergative languages (where ARG-S may contain elements not present on any of the valence lists, or where the mapping between valence and ARG-S is not just append) (see Manning and Sag (1995) for discussion) or as the result of applying lexical rules such as the COMPLEMENT EXTRACTION rule (see Sag (1995)). In van Noord and Bouma (1996), we argued that binding in Dutch indicates that the ARG-S of complement inheritance verbs contains the complements the verb subcategorizes for, but not the inherited complements. Manning *et al.* (1996) reach a similar conclusion for Japanese causatives (which they analyse as bound morphemes which inherit the complements of the host-verb). We will assume, therefore, that the same is true for German: complement inheritance has an effect on valency, but not argument structure. The examples below exemplify this distinction.

(32) a. wollen (*to want*) $\mapsto$ $$\begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{SUBJ} & \left\langle \boxed{1}\ \text{NP} \right\rangle \\ \text{COMPS} & \boxed{3} \oplus \left\langle \boxed{2} \begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{COMPS} & \boxed{3} \\ \text{ZONE} & \textit{inner} \end{bmatrix} \right\rangle \\ \text{ARG-S} & \left\langle \boxed{1}, \boxed{2} \right\rangle \end{bmatrix}$$

$$\text{b. helfen (\textit{to help})} \mapsto \left[\begin{array}{ll} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{SUBJ} & \left\langle \boxed{1}\ \text{NP} \right\rangle \\ \text{COMPS} & \left\langle \boxed{2}\ \text{NP}[\textit{acc}] \right\rangle \oplus \boxed{4} \oplus \left\langle \boxed{3} \left[\begin{array}{ll} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{COMPS} & \boxed{4} \\ \text{ZONE} & \textit{inner} \end{array}\right] \right\rangle \\ \text{ARG-S} & \left\langle \boxed{1}, \boxed{2}, \boxed{3} \right\rangle \end{array}\right]$$

We assume that a verb V *governs* a complement C iff C is an element of the *argument structure* of V.[9]

The feature GVOR replaces the feature FLIP of Hinrichs and Nakazawa (1994), and accounts for the relative order of a governor and governee. This feature takes four values, $\rightarrow$ ($\hookrightarrow$) (the governee must (immediately) precede its governor), and $\leftarrow$ ($\hookleftarrow$) (the governee must (immediately) follow its governor). Since a complement is governed by the sign on whose argument structure it appears, this gives rise to the following LP statements (where $\ll$ expresses immediate precendence):

(33) **Governor Constraints**

1. $\left[\text{SYNSEM}\ \boxed{1}\left[\text{GVOR}\ \rightarrow\right]\right] < \left[\text{ARG-S}\ \left\langle \ldots \boxed{1} \ldots \right\rangle\right]$
2. $\left[\text{SYNSEM}\ \boxed{1}\left[\text{GVOR}\ \hookrightarrow\right]\right] \ll \left[\text{ARG-S}\ \left\langle \ldots \boxed{1} \ldots \right\rangle\right]$
3. $\left[\text{ARG-S}\ \left\langle \ldots \boxed{1} \ldots \right\rangle\right] < \left[\text{SYNSEM}\ \boxed{1}\left[\text{GVOR}\ \leftarrow\right]\right]$
4. $\left[\text{ARG-S}\ \left\langle \ldots \boxed{1} \ldots \right\rangle\right] \ll \left[\text{SYNSEM}\ \boxed{1}\left[\text{GVOR}\ \hookleftarrow\right]\right]$

Kathol (1997) assumes that German main (i.e. non-auxiliary and non-modal) verbs come with the specification [GVOR $\rightarrow$]. That is, a governed main verb must always precede its governor. This accounts for the fact that auxiliaries or modal verbs cannot precede the main verbs they govern (i.e. main verbs cannot 'trigger' auxiliary flip). An example is given in (34):

$$\text{(34) bestehen (\textit{to pass})} \mapsto \left[\begin{array}{ll} \text{GVOR} & \rightarrow \\ \text{COMPS} & \left\langle \left[\begin{array}{ll} \text{HEAD} & \textit{np}[\textit{acc}] \\ \text{ZONE} & \textit{outer} \\ \text{DIR} & \leftarrow \end{array}\right] \right\rangle \end{array}\right]$$

For complement inheritance verbs, two GVOR-specifications are relevant: that of the verb itself, and that on its verbal complement. Modal verbs in general may act as trigger of auxiliary flip, and therefore are themselves unspecified for GVOR. There is a distinction between the modals of the *werden* type, and of the *können* type. The first, in its finite form, may precede its verbal complement (if it is not a main verb) whereas the second must always follow its complement. This distinction implies that finite forms of *werden* do not impose a constraint on the GVOR value of their verbal complement, whereas *können* specifies its verbal complement as [GVOR $\rightarrow$]:[10]

[9] Kathol adopts a somewhat different definition. Since he assumes a valence feature VCOMPL, on which verbal complements are represented and on which there is no inheritance, and since only the governors of verbal complements need to be identified, it is possible to define the governor of a verbal complement as the sign on whose VCOMPL-list this complement appears.

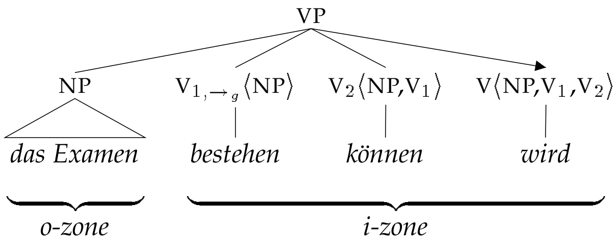
[10] This specification may seem redundant for cases where the modal governs a main verb, but is crucial for cases in which a modal governs another modal or auxiliary verb (i.e. this constraint will rule out **kann singen müssen*).

(35) a. wird (*will*) $\mapsto \begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{fin}] \\ \text{COMPS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{ZONE} & \textit{inner} \\ \text{COMPS} & \boxed{1} \end{bmatrix} \right\rangle \end{bmatrix}$

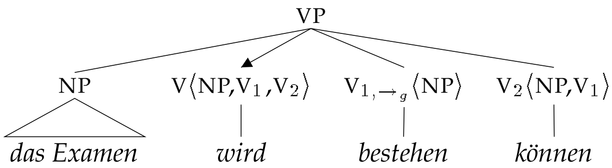
b. können (*be able to*) $\mapsto \begin{bmatrix} \text{COMPS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{ZONE} & \textit{inner} \\ \text{GVOR} & \rightarrow \\ \text{COMPS} & \boxed{1} \end{bmatrix} \right\rangle \end{bmatrix}$

Given these lexical entries, we can derive exactly the three word orders given below (an arrow with subscript *g* illustrates the value of the GVOR feature; an arrow with subscript *d* illustrates the DIR feature):

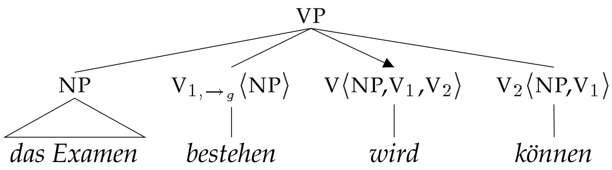
(36)



(37)



(38)



The examples above illustrate that our account predicts the possibility of *auxiliary flip* and *Zwischenstellung*, if an auxiliary such as *werden* governs a modal verb. If the auxiliary governs a main verb, *flipped* word order is ruled out.

For those speakers that do not allow the *Zwischenstellung* order (38), we assume, following Kathol, that the GVOR specification on main verbs is [GVOR $\hookrightarrow$] instead of [GVOR $\rightarrow$]. The restriction that the governor of a main verb must be right-adjacent rules out the derivation in (38), but not the derivations in (36) and (37).

The final issue to be discussed concerns *Ersatzinfinitiv* and the auxiliary *haben*. If *haben* governs a modal verb, this verb will appear in its infinitival form, instead of its participle form. Following Hinrichs and Nakazawa (1994), we will assume that the infinitive form of a modal may be marked [VFORM psp]. Furthermore, since *haben* must obligatorily precede the modal verb in this case (40), it is specified as [GVOR $\leftarrow$]:

$$\text{(39) können } (\textit{be able to}) \mapsto \begin{bmatrix} \text{GVOR} & \leftarrow \\ \text{HEAD} & \textit{verb}[\textit{psp}] \\ \text{COMPS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{ZONE} & \textit{inner} \\ \text{GVOR} & \rightarrow \\ \text{COMPS} & \boxed{1} \end{bmatrix} \right\rangle \end{bmatrix}$$

(40) a. daß er das Examen hat bestehen können
that he the exam has pass be-able-to
that he has been able to pass the exam

b. *daß er das Examen bestehen können hat

The status of the auxiliary *haben* itself as a trigger for 'flipped' word order, depends on the question whether it governs a main verb or a modal. The two cases are illustrated below.

(41) a. daß er die Lieder gesungen haben wird
that he the songs sung have will
that he will have sung the songs

b. ? daß er die Lieder wird gesungen haben

(42) a. * daß er die Lieder singen können haben wird
that he the songs sang be-able-to have will
that he will have been able to sing te songs

b. daß er die Lieder wird haben singen können

c. * daß er die Lieder haben singen können wird

d. * daß er die Lieder wird singen können haben

As in the analysis of Hinrichs and Nakazawa (1994), we may assume that the status of *haben* as a trigger for 'flipped' word order is determined by the verbal complement it governs. That is, there is a reentrancy between the value of GVOR (FLIP in the analysis of Hinrichs and Nakazawa) on the complement of *haben* and *haben* itself:[11]

$$\text{(43) haben } (\textit{to have}) \mapsto \begin{bmatrix} \text{GVOR} & \boxed{1} \\ \text{COMPS} & \boxed{2} \oplus \left\langle \begin{bmatrix} \text{HEAD} & \textit{verb[psp]} \\ \text{GVOR} & \boxed{1} \\ \text{ZONE} & \textit{inner} \\ \text{COMPS} & \boxed{2} \end{bmatrix} \right\rangle \end{bmatrix}$$

The most important difference between the proposal of Hinrichs and Nakazawa (1994) and our own is that Hinrichs and Nakazawa employ two rule schemata which explicitly distinguish between the derivation of verbal complexes and other verbal projections. Our HEAD-COMPLEMENT schema, on the other hand, is general, and applies to all HEAD-COMPLEMENT structures in the

[11] Note that this analysis predicts that example (41b) is ungrammatical. A reviewer claims that this example in fact is grammatical. That would constitute a problem for the analysis of Hinrichs and Nakazawa (1994), and also for our own analysis.

grammar.[12] The feature NPCOMPS, which distinguishes the verbal complex from other verbal projections, is replaced by a distinction between I-ZONE and O-ZONE in our account. Note, however, that since this distinction applies to sister nodes in a 'flat' VP, we can account for a stricktly larger set of word order possibilities. The FLIP feature of Hinrichs and Nakazawa, finally, is replaced by GVOR. Whereas Hinrichs and Nakazawa use FLIP only to determine the order of a lexical head and its complement, the LP-statements for GVOR must be more sophisticated, as they must order a complement relative to its *governor* without the aid of phrase structure (see also Kathol (1997)).

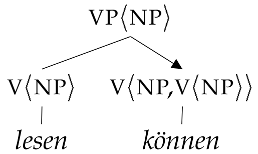
3.4 Partial VP Fronting

The I-ZONE principle (26b) says that all I-ZONE daughters in a HEAD-COMPLEMENT structure must be of type *word*. One reason for stating this requirement as a constraint on rule schemata is that it allows us to refer to the distinction between phrasal and lexical signs without having to introduce a SYNSEM feature such as LEX or NPCOMPS. A more important reason for associating this constraint with the HEAD-COMPLEMENT schema is that it leads to a *monotonic* account of partial VP fronting. [13]

As we pointed out in van Noord and Bouma (1996), one advantage of allowing the HEAD-COMPLEMENT schema to build partial VPs is that it can be used to derive the partial VPs which may be found in fronted position in main clauses. The fronted VP *lesen können* in (44), for instance, can be assigned the structure in (45).

(44) Lesen können wird er das Buch schon
read be-able-to will he the book already
He'll surely be able to read the book

(45)



The use of one rule schema which allows both partial and full VPs to be derived, without having to accept spurious ambiguity, is an improvement of the analysis of Nerbonne (1994), who had to introduce a special rule to account for the derivation of partial VPs in fronted position.

The present set-up has an important additional benefit. To account for the fact that a partial VP in fronted position could be selected by an auxiliary or modal verb that normally would require a lexical (i.e. [LEX +]) verbal complement, Nerbonne introduced a complement extraction rule that moved an element from the COMPS-list of a verb to SLASH, and removed any specification for LEX in the process. In our account, the complication in the complement extraction rule disappears. Since we do not state in the lexical entries of argument-inheritance verbs that they select for a lexical verbal complement, we can simply assume that the canonical complement extraction lexical rule (as given in Pollard and Sag (1994, chpt. 9)) applies:

(46)
$$\begin{bmatrix} \text{COMPS} & \boxed{1} \oplus \left\langle \boxed{2} \right\rangle \oplus \boxed{3} \\ \text{SLASH} & \boxed{4} \end{bmatrix} \Rightarrow \begin{bmatrix} \text{COMPS} & \boxed{1} \oplus \boxed{3} \\ \text{SLASH} & \left\{ \boxed{2} \right\} \uplus \boxed{4} \end{bmatrix}$$

This rule can be applied to the lexical entry for *wird* as follows:[14]

[12]One might object that the feature ZONE is encodes a distinction between two topological fields that is relevant to VPs only. This is not necessarily an objection, for if non-verbal heads only select [ZONE outer] complements, the zone LP constraints are satisfied trivially, while the zone principle will require that the head daughter must be lexical. On the other hand, it is not impossible that the distinction between I-ZONE and O-ZONE complements might play a role for non-verbal heads as well (i.e. to distinguish clitic-like elements from other complements).

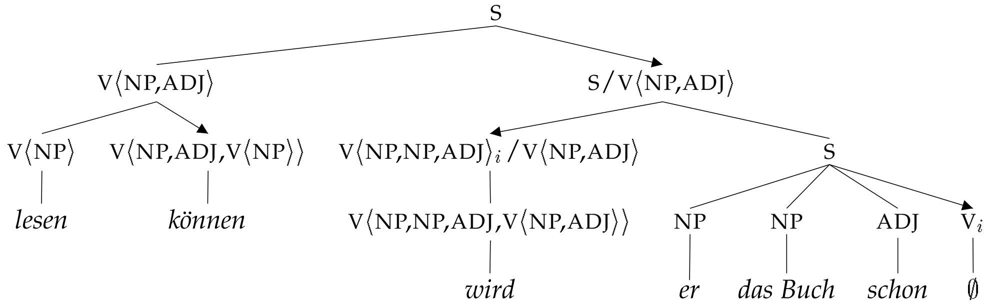
[13]See Müller (1996) for an alternative monotonic proposal.

[14]We assume that finite verbs include a subject as least oblique element on their COMPS-list.

(47)
$$\begin{bmatrix} \text{COMPS} & \left\langle \text{NP[NOM]} \right\rangle \oplus \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & \textit{verb[inf]} \\ \text{ZONE} & \textit{inner} \\ \text{COMPS} & \boxed{1} \end{bmatrix} \right\rangle \\ \text{SLASH} & \left\{ \right\} \end{bmatrix}$$
$$\Downarrow$$
$$\begin{bmatrix} \text{COMPS} & \left\langle \text{NP[NOM]} \right\rangle \oplus \boxed{1} \\ \text{SLASH} & \left\{ \begin{bmatrix} \text{HEAD} & \textit{verb[inf]} \\ \text{ZONE} & \textit{inner} \\ \text{COMPS} & \boxed{1} \end{bmatrix} \right\} \end{bmatrix}$$

Example (44) is now derived as follows: [15]

(48)



Note that the element on SLASH of S is [ZONE *inner*], but is not constrained to be of type *word*. The fronted partial VP can therefore be combined with the S/VP as a HEAD-FILLER structure without problem. In particular, the I-ZONE principle (which requires *i-zone* elements in HEAD-COMPLEMENT structures to be of type *word*) does not apply to this construction.

The elimination of a special rule schema to build partial VPs together with the elimination of the complication of Nerbonne's complement extraction rule is a significant improvement.

It should be noted, however, that fronting of a single modal (as in (49)) can only be excluded by means of a special constraint.

(49) * können wird er das Buch schon lesen

These examples are seen as problematic by Baker (1994) and Kathol (1997), for instance, and are one of the reasons why Kathol does want to maintain the Hinrichs and Nakazawa analysis as far as constituent structure is concerned. In terms of the fragment developed here, these cases can be ruled out by requiring that a filler may not have any I-ZONE elements on its COMPS-list:

(50) In *head-filler* structures, the COMPS value of the filler daughter is a list of elements marked [ZONE *outer*].

[15] The adjunct *schon* is taken to be a modifier of the verb *können* and is added to its COMPS-list by means of a lexical rule (see van Noord and Bouma (1994)). In order to account for verb-second, we could follow Netter (1992), by assuming that main clause word order is obtained by a rule schema which lets a finite verb combine with a clause with an empty verbal head daughter. The COMPS feature of the finite verb (as well as some other features) must unify with that of the empty verb. Alternatively, it is also possible to analyse initial verb-placement by extending the linear precedence component. Notice that in such an approach we should be careful to limit the scope of the linear precedence statements given here.

4 Word order in Dutch verb clusters

In this section we revise and extend the analysis of Dutch presented in van Noord and Bouma (1996).

As in German, Dutch subordinate clauses are verb-final. If the clause is headed by a modal, an auxiliary, or a verb such as *horen* (*to hear*), *proberen* (*to try*), *helpen* (to help) or *laten* (*to let*) (these are so-called 'verb-raising' verbs), the head of its non-finite VP-complement must occur right of the head of the main clause. This is illustrated in (51a,b). As the head of the non-finite VP can be a verb-raising verb itself, the construction can (in principle) lead to an arbitrary number of crossing dependencies between pre-verbal complements and verbs subcategorizing for these complements. This is illustrated in (51c), where subscripts are used to make the dependencies explicit.

(51) a. dat Jan het boek *wil* lezen
that John the book wants read
that John wants to read the book

b. dat Jan Marie het boek *laat* lezen
that John Mary the book lets read
that John lets Mary read the book

c. dat Jan$_1$ Marie$_2$ het boek$_3$ *wil*$_1$ *laten*$_2$ lezen$_3$
that John Mary the book wants let read
that John wants to let Mary read the book

Following our proposals for German in the prevous section, we assume that Dutch 'verb-raising' verbs select for a list of complements consisting of a verb and the complements selected by that verb. The word order constraints for complement-inheritance verbs make reference to GVOR. Furthermore, complement-inheritance verbs select an *i-zone* complement. Some lexical elements are given below.

$$\text{(52) a. willen (\textit{to want})} \mapsto \begin{bmatrix} \text{HEAD} & \textit{verb[inf]} \\ \text{SUBJ} & \left\langle \boxed{2}\ \text{NP} \right\rangle \\ \text{COMPS} & \boxed{1} \oplus \left\langle \boxed{3} \begin{bmatrix} \text{HEAD} & \textit{verb[inf]} \\ \text{COMPS} & \boxed{1} \\ \text{ZONE} & \textit{inner} \\ \text{GVOR} & \leftarrow \end{bmatrix} \right\rangle \\ \text{ARG-S} & \left\langle \boxed{2},\boxed{3} \right\rangle \end{bmatrix}$$

$$\text{b. laten (\textit{to let})} \mapsto \begin{bmatrix} \text{HEAD} & \textit{verb[inf]} \\ \text{SUBJ} & \left\langle \boxed{2}\ \text{NP} \right\rangle \\ \text{COMPS} & \left\langle \boxed{3}\ \text{NP}[\textit{acc},\rightarrow] \right\rangle \oplus \boxed{1} \oplus \left\langle \boxed{4} \begin{bmatrix} \text{HEAD} & \textit{verb[inf]} \\ \text{COMPS} & \boxed{1} \\ \text{ZONE} & \textit{inner} \\ \text{GVOR} & \leftarrow \end{bmatrix} \right\rangle \\ \text{ARG-S} & \left\langle \boxed{2},\boxed{3},\boxed{4} \right\rangle \end{bmatrix}$$

Note that directionality only orders complements relative to the head; the order of complements with respect to each other is left open. In previous work on Dutch (van Noord and Bouma, 1996), we have assumed that *obliqueness* provides an ordering of complements: if C_1 is more oblique than C_2 (i.e. (i.e. the SYNSEM-value of) C_1 follows C_2 on COMPS), than C_1 appears closer to the head than C_2. For German, we have been satisfied with the assumption that the order of non-verbal *o-zone* complements is not (only) determined by obliqueness. For Dutch, this appears to be much less likely. Consider the example in (53), for instance. The perception verb *zien* is an complement-inheritance verb selecting for a verbal complement and an NP object (*Marie*). Both the NP *Marie* and the PP *naar huis* are *o-zone* complements of the head *ziet*. The order of both is strictly determined by the order on COMPS, however.

(53) a. dat Jan Marie naar huis ziet lopen
that Jan Marie towards home sees walk
that Jan sees Mary walk home

b. * dat Jan naar huis Marie ziet lopen

This suggests that the Obliqueness word order constraint must apply for *o-zone* elements. This constraint, applicable to Dutch, is given in (54).

(54) **Obliqueness Constraint (for Dutch):**

1. $\boxed{1}\begin{bmatrix}\text{DIR} & \rightarrow \\ \text{ZONE} & \textit{outer}\end{bmatrix} < \boxed{2}\begin{bmatrix}\text{DIR} & \rightarrow \\ \text{ZONE} & \textit{outer}\end{bmatrix}$ iff $\boxed{1}$ precedes $\boxed{2}$ on the COMPS list of the head.

2. $\boxed{1}\begin{bmatrix}\text{DIR} & \leftarrow \\ \text{ZONE} & \textit{outer}\end{bmatrix} < \boxed{2}\begin{bmatrix}\text{DIR} & \leftarrow \\ \text{ZONE} & \textit{outer}\end{bmatrix}$ iff $\boxed{2}$ precedes $\boxed{1}$ on the COMPS list of the head.

A derivation for the VP of example (51c) can now be given as follows:

(55) $\text{VP}\langle\rangle$

$\text{NP}_{1,\rightarrow_d}$ — *Marie*; $\text{NP}_{2,\rightarrow_d}$ — *het boek*; $\text{V}_1\langle \text{NP}_1, \text{NP}_2, \text{V}_3, \text{V}_2\rangle$ — *wil*; $\text{V}_{2,\leftarrow_g}\langle \text{NP}_1, \text{NP}_2, \text{V}_3\rangle$ — *laten*; $\text{V}_{3,\leftarrow_g}\langle \text{NP}_2\rangle$ — *lezen*

The word order given in this example is the only grammatical word order, and the only word order allowed by the analysis. This is so, because the NPs are ordered to the left of the verbs because of directionality; the order of the NPs is determined by obliqueness; and the order of the verbs is determined by the Governor Constraints.

In comparison with the analysis presented in van Noord and Bouma (1996), the introduction of governor word order constraints has no consequences for the word orders that can or cannot be derived in the case of ordinary verb raising verbs. [16]

It is more interesting for cases where governors and governees do not appear in strict left-to-right order, as in *participle inversion* constructions and in constructions involving *separable prefixes*.

4.1 Separable Prefixes

Certain verbs in Dutch subcategorize for a so-called 'separable prefix'. These particle-like elements appear as part of the verb in subordinate clauses, but appear in clause-final position if their governor heads a main clause:

(57) a. dat Jan Marie *aan* spreekt
that John Mary PREFIX speaks
that John speaks to Mary

[16] Infinite verbs in Dutch are often preceded by *te*:

(56) dat Jan Marie lijkt te haten
that John Mary seems to hate
that John seems to hate Mary

It may be worthwile pointing out that we treat *te* as an inflectional marker, and not as a separate word: unlike *to* in English, no material (not even separable prefixes) can ever intervene between *te* and the infinitive. Therefore, *te haten* is of type WORD.

b. Jan spreekt Marie aan

In complex verb-sequences, the prefix can appear not only as part of its governor, but also in positions further to the left:

(58) a. dat Jan Marie zou hebben *aan* gesproken
that John Mary would have PREFIX spoken
that John would have spoken to Mary

b. dat Jan Marie zou *aan* hebben gesproken

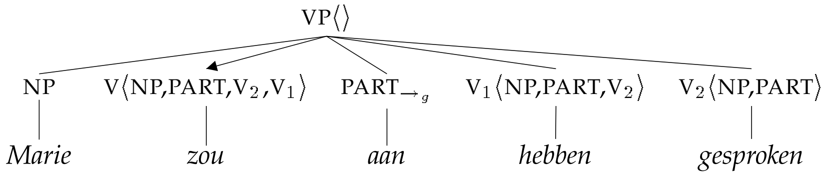
c. dat Jan Marie *aan* zou hebben gesproken

d. * dat Jan Marie zou hebben gesproken *aan*

These examples can now be treated straightforwardly. A verb selecting a separable prefix requires this prefix to be [GVOR →, *i-zone*]. This predicts correctly that this prefix can occur anywhere to the left of the governing verb within the verb cluster. The lexical entry for *spreken* and an example derivation are given below.

(59) $$\text{spreken } (\textit{to speak (to)}) \mapsto \begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{COMPS} & \left\langle \text{NP}[\textit{acc},\rightarrow], \begin{bmatrix} \text{HEAD} & \textit{part[aan]} \\ \text{ZONE} & \textit{inner} \\ \text{GVOR} & \rightarrow \end{bmatrix} \right\rangle \end{bmatrix}$$

(60)



Note that apart from the word order given in (60), the orders *aan zou hebben gesproken* and *zou hebben aan gesproken* are derivable as well.

The verb-cluster sometimes also contains an adjective. The following examples are similar to a large set of examples given in Geerts et al. (1984):

(61) a. dat de Sovjetunie zich niet zal laten *bang* maken door cruiseraketten
will let afraid (ADJ) make
that the Soviet Union will not be scared by cruise missiles

b. dat hij het de leerlingen had duidelijk gemaakt dat het examen niet moeilijk zou zijn
had clear (ADJ) made
he had made it clear to the pupils that the exam would not be difficult

The adjective can be placed at any position left of its governor, just like separable prefixes. The difference with compound verbs which require a separable prefix is not always easy to make. Such examples are not treated as compound verbs in Geerts et al. (1984).

Interestingly, such verbs can often take a full adjectival phrase instead of a single adjective. In those cases, however, the ADJP cannot be part of the verb cluster:

(62) a1. dat de Sovjetunie zich niet erg bang zal laten maken door cruiseraketten
that the Soviet Union will not be scared very much by cruise missiles

a2. * dat de Sovjetunie zich niet zal laten *erg bang* maken door cruiseraketten

b1. dat hij het de leerlingen heel erg duidelijk had gemaakt dat het examen niet moeilijk zou zijn
he had made it clear to the pupils that the exam would not be difficult

b2. * dat hij het de leerlingen had heel erg duidelijk gemaakt dat het examen niet moeilijk zou zijn

These examples can be analysed straightforwardly by assuming that certain verbs subcategorize for an adjectival phrase. Those verbs do not constrain the ZONE feature of this adjectival phrase. This implies that if such an ADJP is selected in the I-ZONE, it must be a word; if it is selected as part of the O-ZONE it can be either a word or a full phrase.

4.2 Participle Inversion

The tense auxiliaries *hebben* (*have*) en *zijn* (*be*) are verb raisers which take a past participle as complement. These auxiliaries are special, however, in that they may take their complement either to the left or to the right:

(63) a. dat Jan het boek heeft gelezen
that John the book has read
that John has read the book

b. dat Jan het boek gelezen heeft

In more complex examples, the pattern is that the participle is either to the left of the finite verb, or the last verb of the cluster:

(64) a. dat Jan het boek moet hebben gelezen
that John the book must have read
that John must have read the book

b. dat Jan het boek gelezen moet hebben

Examples such as:

(65) ? * dat Jan het boek moet gelezen hebben

are acceptable only to a minority of speakers.

The analysis of these examples proceeds as follows. For those speakers that accept examples such as (65), we assume that the lexical entry for *hebben* leaves the GVOR value of its complement unspecified:

(66) hebben (*to want*) $\mapsto$ $$\left[\begin{array}{ll} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{COMPS} & \boxed{1} \oplus \left\langle \left[\begin{array}{ll} \text{HEAD} & \textit{verb}[\textit{psp}] \\ \text{COMPS} & \boxed{1} \\ \text{ZONE} & \textit{inner} \end{array}\right] \right\rangle \end{array}\right]$$

This results in a situation in which the participle may occur anywhere left of the auxiliary within the cluster: both (64a), (64b) and (65) are derivable.

For the standard dialect we assume that the participle may only precede the governing auxiliary if it also precedes the head. Thus, the features for directionality and governor must agree. A modified lexical entry which implements this constraint is given below:

(67) hebben (*to want*) $\mapsto \begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{inf}] \\ \text{COMPS} & \boxed{1} \oplus \left\langle \begin{bmatrix} \text{HEAD} & \textit{verb}[\textit{psp}] \\ \text{COMPS} & \boxed{1} \\ \text{ZONE} & \textit{inner} \\ \text{GVOR} & \boxed{2} \\ \text{DIR} & \boxed{2} \end{bmatrix} \right\rangle \end{bmatrix}$

Note that the reentrancy between GVOR and DIR avoids the introduction of two separate lexical entries (i.e. one for the situation where the participle follows the auxiliary, and one for the situation where it precedes it). In (65), the participle *gelezen* precedes its governor, but follows the head of the phrase (i.e. *zou*), and thus no derivation on the basis of the modified lexical entry for *hebben* is possible.

Summarizing, this analysis correctly predicts the following set of facts, involving both a separable prefix and a participle:

(68) a. dat Jan Marie zou hebben aan gesproken
that John Mary would have to (PREFIX) spoken (PSP)
that John would have spoken to Mary

b. dat Jan Marie zou aan hebben gesproken

c. dat Jan Marie aan zou hebben gesproken

d. * dat Jan Marie zou hebben gesproken aan

e. dat Jan Marie aan gesproken zou hebben

f. * dat Jan Marie gesproken aan zou hebben

g. * dat Jan Marie gesproken zou aan hebben

h. * dat Jan Marie gesproken zou hebben aan

i. ? * dat Jan Marie aan zou gesproken hebben

j. ? * dat Jan Marie zou aan gesproken hebben

k. * dat Jan Marie zou gesproken aan hebben

l. * dat Jan Marie zou gesproken hebben aan

The most interesting cases are the pairs (68e,f) and (68i,j). Example (e) is allowed, because the prefix *aan* precedes its governor *gesproken*; in (f) this is not the case, hence this example is ruled out. The examples (i) and (j) are allowed only in those dialects which allow (65).

5 Comparison and Conclusions

In this paper, we have developed an account of word order in Dutch and German verb clusters based on minimal assumptions about phrase structure. We have assumed that the internal structure of Dutch and German verb phrases is identical and that the word order constraints for both languages are almost identical. Word order differences between Dutch and German verb clusters are therefore a consequence of differences in lexical specification only.

We have demonstrated that the kind of word order variation that has been used to argue for a branching analysis of the verb cluster in German can in fact be accounted for without introducing the 'verb cluster' as a subphrase of the VP. Furthermore, since a 'flat' VP leaves room for a considerable amount of word order variation, phenomena which are problematic for a branching analysis can be accounted for as instances of word order variation as well. Finally, our revised account of 'argument-inheritance' verbs leads to an improved analysis of partial VP fronting.

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