Verb Second
by Lexical Rule or by Underspecification

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Introduction*

This paper focusses on two aspects of the verb second (V2) property in German. One of our concerns is to present an empirically and theoretically motivated analysis of German sentence structure and the V2 phenomenon that covers a comprehensive set of data which any analysis of German sentence structure has to account for. The analysis we propose will be formulated in the HPSG framework, but is closely related in many respects to a GB analysis worked out in Haider(1993).

On the basis of this analysis, we will emphasize our second, and main topic, the formal representation of the V2 phenomenon itself. The focus on formal aspects of this syntactic phenomenon is due to the research objectives of the project B5: "The Formalization and Implementation of Grammar" of the Sonderforschungsbereich SFB 340, which aims at a formalization of insights gained in linguistic theory, especially GB theory, for computational applications. One way of making the results of a GB analysis available for computational purposes is by a formalization of GB theory as a whole. Another way this might be done is to relate a GB analysis to formal concepts of an already established unification based syntactic framework, as e.g. HPSG, and give a formal, computable analysis of the insights in terms of an equivalent HPSG analysis. This is the alternative we want to pursue in the following.

The analysis of V2 is a highly theory sensitive matter. In the framework of the Principles-and Parameters Theory (GB), due to its general model of grammar architecture, the V2 property is conceived as an instance of a derivational, structure-transforming process, move-α, that relates two levels of representation. Though this derivational view on the V2 phenomenon is unquestioned in the GB community, looking carefully at the analyses presented uncovers serious problems: The general constraint on movement relations, the categorial identity of antecedent and trace, is not fully satisfied in verb movement relations. This problem seems generally to go unnoticed in GB theories involving verb movement relations[1], but cannot be ignored if a formal, computable analysis of the V2 phenomenon is aimed at. Since the implementation of a GB analysis of a fragment of German syntax is the objective of the above mentioned SFB project, we have every reason to explore this formal representational problem in detail. To this end, we will present the GB analysis of V2 and German sentence structure developed in Haider(1993) and focus on the formal representational problems involved in this analysis.

Unification based syntactic frameworks, like HPSG, posit only one level of representation, but still allow for a "derivational" view on phenomena like e.g. 'wh-movement'.[2] In HPSG,

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[1] An exception here is Höhle, see handout of a talk given at Stuttgart Unversity, January 1993.

[2] My usage of the term "derivational" in this context is not to be understood in the spirit of transformational concepts, but as a metaphoric usage for constructions involving a nonlocal dependency relation between a "filler" and a "gap" constituent. I will at times use the terms "dependency relation" or "nonlocal dependency structure" if I want to stress the nontransformational view of the phenomenon.

such nonlocal dependency relations are analyzed by a feature percolation mechanism, governed by the Nonlocal Feature Principle. As to the V2 phenomenon, it is still a matter of debate in the HPSG community, whether it should be represented as a local dependency relation (in the following 'V2 dependency') as in Kiss/Wesche(1991), or whether it should rather be conceived of as a phenomenon of constituent order proper, as proposed e.g. in Pollard(1990). Based on the empirical data we discuss in section 1, we will decide to stick to a derivational analysis of the V2 property as a V2 dependency relation without going into a discussion of the analysis presented in Pollard(1990). Instead, we will discuss an already existing HPSG analysis of V2 as a local dependency relation, Kiss/Wesche(1991). First we will show - in the spirit of our first goal - that serious drawbacks of their analysis can be remedied by introducing into the analysis a concept of functional categories along the lines of Netter(1994). Two aspects about this analysis will be crucial for our concerns about the empirical and formal aspects of V2 and German sentence structure:
(i) It will be shown that the revised analysis of Kiss/Wesche(1991) is conceptually closely comparable to the GB analysis of V2 and sentence structure as proposed in Haider(1993).
(ii) The formally precise HPSG analysis of V2 makes use of a lexical rule which defines the V2 dependency relation. This lexical rule, if applied to full-fledged lexicon entries, is inherently structure transforming and comes down to a disjunctive representation of the finite verb's lexical representation. It will be argued that the lexical rule approach for V2 is comparable in spirit to the classical conception of move-α in GB as a relation holding between different levels of syntactic representation.

Given the closeness of the analyses of V2 under discussion, the examination of the formally explicit HPSG analysis uncovers principal differences between antecedent and trace in the V2 head movement relation or V2 dependency relation, respectively. These differences involve functional properties, subcategorization properties, and general differences between antecedent and trace constituents.
For a formal representation of V2 as a relation of move-α in GB theory, these results lead to the conclusion that either the constraint on categorial identity of antecedent and trace has to be loosened, or alternatively, functional and subcategorization properties of finite verbs are not to be tied to their categorial status (V^o vs I^o), thereby allowing maintenance of move-α's general condition of categorial identity.

The first option represents the movement relation as a structure transforming device that alters the functional and subcategorization properties of antecedent and trace. In a GB analysis, due to the categorial status of functional properties, this would come down to a violation of the constraint on categorial identity. In the HPSG analysis, an analogous structure transforming device is implemented by use of a lexical rule.[3]

The second alternative - if taken seriously - would necessitate a revision of the traditional conception of functional categories in GB theory. In the last section, we will propose a V2 analysis in HPSG that makes formally explicit an idea of categorial underspecification, which allows head movement to be defined as a relation involving non-distinct, underspecified verb categories in the antecedent and trace positions. To this end, we will develop a type hierarchy that allows reference to an underspecified category type in the

[3]Again, the characterization of lexical rules as a (possibly) structure transforming device rests on the assumption that lexical rules apply to full-fleged lexical entries.

V2 dependency relation. The differentiation of the abstract category type into a lexical or a functional verb category ensures the proper instantiation of the categorial subtypes for the finite verb in initial or final sentence position, respectively, as well as the instantiation of their respective subcategorization properties. As a consequence, we are able to maintain the idea that antecedent and trace are identical in (underspecified) categorial status, which is compatible with a representation of the V2 dependency relation in a strictly one-level representation analysis. Our final HPSG analysis makes a clear distinction between phrasal and head 'movement' dependencies by restricting head movement to structure sharing of HEAD attributes in the NON-LOCal attribute values (as opposed to LOCal values for phrasal non-local dependencies). It has the further advantage that head 'movement' is now correctly restricted to be an inherently local dependency relation, which doesn't hold for the analysis of Kiss/Wesche(1991).

The paper will proceed along the following lines: Section 1 recalls the discussion about two hypothesis of German sentence structure: the uniformity and non-uniformity hypothesis, and summarizes the principal data and criteria any analysis of the V2 property and German sentence structure has to cover. It will be argued that a derivational view of V2 is superior to a non-derivational analysis. Furthermore we will argue that the arguments that seem to motivate a syntactic non-uniformity analysis are all tightly related to properties of semantic interpretation. The analysis we present in section 4 will allow to say a little more about the interaction of the V2 phenomenon and the syntax-semantics interface.

Section 2 presents the analysis of V2 that Haider(1993) has presented in the GB framework. Some open questions will be addressed, which are of special interest in the light of our focus on formal aspects of the representation of the V2 property.

Section 3 presents the HPSG analysis of V2 given by Kiss/Wesche(1991). After a short discussion of some deficiencies of the analysis, we will introduce a concept of functional categories in HPSG developed by Netter(1994) for the analysis of German nominal phrases. We will show that by integrating a slightly modified concept of functional categories into the analysis of Kiss/Wesche(1991), the main deficiencies of the latter analysis can be remedied, and that this analysis is equivalent in spirit (and problematic aspects) to the analysis of Haider(1993) in the GB framework.
The close relationship between these two analyses allows us to investigate the formal aspects of a derivational analysis of V2. We will argue that the 'classical' move-α relation in GB Theory, as a relation holding between different levels of syntactic representation, is mirrored by the formal device of a structure-transforming lexical rule for V2 in the HPSG analysis. Here, V2 as a lexical rule applies to an input lexical structure which is 'rewritten' into a new lexical entry, partly by redefinition of attribute values. We will discuss the differing properties of the antecedent and trace categories involved in the V2 dependency relation and show that these differences necessitate an inherently structure-transforming analysis of the V2 dependency relation.
As a result of this section, by focussing on the equivalence of the GB and HPSG analyses, we end up with one possible formally explicit representation of the verb movement relation sloppily defined in standard GB analyses.

Section 4 develops an alternative analysis of the V2 dependency relation that does not refer to lexical rules as a structure transforming device. Our account makes use of the concept

of underspecification and a type hierarchy, by defining an underspecified abstract category type which 'specializes' to lexical or functional category types, respectively, depending on the actual structural context the syntactic item appears in. The abstract category type as stated in the lexicon is underspecified for functional and subcategorization properties. These will be properly defined for functional and lexical categories, respectively, by representing the SUBCAT list as a HEAD attribute and by defining a principle of 'Valence Instantiation'. The V2 dependency relation will be defined for a new NON-LOCal attribute type for head movement. We end up with a one level representation analysis for the V2 dependency relation that fulfills the constraint on identity of (underspecified) categorial information structure, and furthermore accounts for the strictly local character of the V2 dependency relation.

The analysis presented in section 4 has been implemented in the CUF system, developed at IMS Stuttgart (see Dörre/Dorna (1993)). The grammar makes direct use of the underspecification analysis, based on the underspecified representation of the finite verb in the lexicon. The type hierarchy presented in Section 4 has been implemented by sorts in the CUF system.

1 German Sentence Structure and the Phenomenon of V2

In this section, we give a quick review of the basic data of German sentence structure in connection with the V2 property. These will serve as a set of criteria which the analyses of V2 to be discussed below have to be evaluated against. We follow here quite closely a recent discussion of the topic in Brand et al.(1992), henceforth BRRZ.

The topological structure of the German sentence is traditionally described by the 'Feldertheorie', which partitions the sentence into Vorfeld, Mittelfeld and Nachfeld. These are delimited by the left and right 'brackets', where the complementizer (left bracket) or finite verb (left or right bracket) may be located.[4]

(1) daß Max gestern das Auto gekauft hat (,das er ..)

	Vorfeld	left bracket	Mittelfeld	right bracket	Nachfeld
Vfinal		dass	Max gestern das Auto gekauft	hat	(,das er..)
V1		Hat	Max gestern das Auto gekauft		(,das er..)
V2	Max	hat	gestern das Auto gekauft		(,das er..)
	Das Auto	hat	Max gestern gekauft		(,das er..)
	Gestern	hat	Max das Auto gekauft		(,das er..)
	Gekauft	hat	Max gestern das Auto		(,das er..)
	Das Auto gekauft	hat	Max gestern		(,das er..)

Criterion (a): Complementarity of Complementizer and Finite Verb

The topological model suggests strongly that in German the complementizer 'daß' and the finite verb are in complementary distribution in the position of the left bracket. This is corroborated by the ungrammaticality of (2)/(3).[5] (4) shows that the left bracket cannot remain empty in main sentences. Here, the finite verb is obligatorily in initial position.

(2) * daß hat Max gestern ein Auto gekauft.
(3) * daß Max hat gestern ein Auto gekauft.
(4) * Max ∅ gestern ein Auto gekauft hat.

Criterion (b): Inflected Complementizers

In Bavarian German the complementizer in the left bracket position may bear verbal inflection. This is usually regarded as evidence for the assumption that the complementizer

[4] We will refer to structures with the verb occupying the left bracket position as 'verb initial' structures in contrast to 'verb final' structures. Hereby, we want to abstract away from the difference between declarative and interrogative sentences, which are generally referred to as 'verb second' and 'verb first' sentences, respectively. The Nachfeld is not relevant to our present concerns and will be ignored in the following.

[5] Of course, there are languages like Yiddish that do allow V2 sentences embedded under a complementizer. For reasons of space, we cannot go into a discussion about cross linguistic parameterization here.

and the finite verb in initial position are located in the same functional position, where inflectional features are spelled out. Yet, it is not clear how the presence of inflectional features on the complementizer is in fact to be explained in these examples. Since the inflected verb itself is located in the final position in these sentences, there is no way of transposing inflectional features to the initial functional head position.

(5) ob*st* kumm*st*.
(6) Vater erzähl, wie*st* eing'rückt bi*st*.

Criterion (c): Structure of the Mittelfeld

Data from binding and scope give strong evidence that the structure of the Mittelfeld does not differ for verb initial and verb final sentences (see also Kiss(1994)). We will not discuss here whether an analysis of binding or scope should refer to hierarchical and/or precedence constraints.[6] The point we are interested in here is simply that the most economical analysis of sentence structure leaves the structure of the Mittelfeld unaltered for the two sentence types.

(7) a. daß der Graf fast jedem Besucher mindestens ein Gemälde zeigte.
b. Der Graf zeigte fast jedem Besucher mindestens ein Gemälde.

(8) a. daß der Graf fast jedem Besucher$_i$ sein$_i$ Zimmer persönlich anwies.
b. Der Graf wies fast jedem Besucher$_i$ sein$_i$ Zimmer persönlich an.

(9) a. weil Maria niemanden$_i$ mit sich$_i$ konfrontieren würde.
b. Maria würde niemanden$_i$ mit sich$_i$ konfrontieren.

Criterion (d): V2 as a Derived Position?

Several data can be argued to provide evidence for a derivational analysis of V2. In (10) the finite verb, although in second position, is under the scope of the negation. Under a hierarchical analysis of scope relations the derivational analysis of V2 can give an explanation of this fact since the trace of the verb in the base position of VP is structurally under the scope of the negation.

(10) aber dir HAT nicht jeder zugehört. (Höhle, Handout 1993)
Es ist nicht der Fall, daß dir jeder zugehört hat.

Data from coordination were argued in Höhle(1991) to support the derivational view on the V2 phenomenon: (11) is a case of VP coordination. The verb in second position can be represented as a case of ATB extraction, thereby accounting for the fact that both conjuncts are subject to wellformedness constraints (subcategorization, selectional properties, etc.) which are imposed by the verb trace or ensured by a reconstruction analysis.

(11) Trotzdem füttert sowohl [Heinz den Kater __] als auch [Karl den Hund __].

Another case for a derivational analysis of V2 was made, also by Höhle, by the phenomenon of separable verb prefixes in German. The prefix 'ab' in 'abtrennen', for example, is

[6] But see Frank/Reyle(1992) for an HPSG analysis of scope, Frank(1992) for an HPSG analysis of binding, which are both based on the work of Frey(1993).

obligatorily separated from the verb stem 'trennen' in verb initial sentences (12.b). The fact that the prefix is located in the 'base' position of the VP, the same position it occupies in (12.a), is most plausibly explained under a derivational view of V2 sentences.

(12) a. weil die V2-Konstruktion das Präfix mancher Verben abtrennt.
b. Die V2-Konstruktion trennt das Präfix mancher Verben ab.

Although the phenomenon of prefix separation in V2 constructions is one of the main arguments for a derivational analysis, at the same time, it constitutes one of the major problems for such analyses.[7] If the move-α relation is required to hold between a phonetically overt antecedent and a silent trace of identical category, it is not clear how one should account for the presence and categorial status of the prefix in the head position of VP, which at the same time should be occupied by a verb trace that relates to the antecedent verb stem in first position.

Uniformity and Non-unformity Hypothesis

The complementarity of complementizer and finite verb (criterion a) lead den Besten(1977) to an analysis of the V2 property by positing movement of the finite verb out of its basic position into the position that otherwise is occupied by the complementizer. Under the assumption that this head position can only host one lexical category, the complementarity of verb initial and complementizer introduced sentences falls out. This is the classical assumption of the so-called uniformity hypothesis, where verb initial and complementizer introduced structures are conceived to be alternative realizations of one and the same, uniform underlying sentence structure. As a side effect, by analyzing the fronted verb in the complementizer position, the uniformity hypothesis predicts that both sentence structures bear the same categorial status, namely CP. Thus, at first view, the classical uniformity hypothesis allows to give an explanatory analysis for the data in criteria (a), (c) and (d).

However, several problematic aspects are to be mentioned. A general problem that is inherent to any theory building on the uniformity hypothesis is the formal representation of verb movement: Since complementizer and finite verb intrinsically have distinct categorial status (C^o, V^o), the category of the verb in the head position of CP must be distinct from the categorial specification its trace bears in the head position of VP. This, however, violates the general condition on move-α, which restricts movement relations to identical categories in extraction and landing site. If, on the other hand, the verb in initial position was conceived as categorially identical to its trace in VP, the uniformity hypothesis would dissolve.
Also, the uniformity hypothesis cannot claim to cope with criterion (a) in general. If the sentence structure of German does not motivate the assumption of a sentence final I^o head position - Haider (1993) presents compelling evidence against this assumption - then it is not prohibited that the finite verb moves to a sentence initial I^o position, embedded under a complementizer (13).

(13) * [$_{CP}$daß [$_{IP}$ ein Satz könnte [$_{VP}$ eine zweite funktionale Kopfposition aufweisen]]].

[7] This point was made by Höhle, in a talk given at Stuttgart University, January 1993.

The non-uniformity hypothesis analyzes verb initial and verb final sentences as alternative realizations of two independent patterns of sentence structure. Still, the verb in initial position can be given a derivational analysis. Therefore, criteria (c) and (d) may still be covered, while it is neither predicted that complementizer and finite verb are in complementary distribution (criterion a) nor that a complementizer may bear inflectional features (criterion b).
A closer look at the V2 structure as it is conceived by the non-uniformity hypothesis reveals that the formal representation of the V2 movement relation is not just a problem for the uniformity hypothesis, but a general problem for any derivational analysis of the V2 phenomenon. The finite verb is moved out of a lexical head position (V^o) into a functional head position (I^o). Since in the GB framework functional heads are analyzed as categorially distinct from lexical heads, we are again confronted with the problem of categorial non-identity of an antecedent and trace in the move-α relation.

In sum, both uniformity and non-uniformity hypothesis can account for criterion (c) and (d), under the proviso that the constraint on categorial identity in move-α relations needs to be carefully considered for movement of the finite verb into a functional head position. This is one of the formal aspects of verb movement we will explore in the following sections. Criterion (a) cannot be covered by the non-uniformity hypothesis for principled reasons, and it cannot be captured by the uniformity hypothesis if a sentence initial I^o head position is assumed that may be filled by verb movement (see (13) above).
Finally, the presence of inflectional features on the complementizer in Bavarian (criterion b) cannot be strictly explained under either of these assumptions. Although the finite verb may be realized in the complementizer head position under the uniformity hypothesis, no nonlocal relation whatsoever exists between the C^o head position and inflectional features in complementizer introduced sentences where the finite verb is located in the head position of VP. The non-uniformity hypothesis, which regards the different sentence patterns as independent structures, cannot account for (criterion b) in any case.

Data Weakening the Non-Uniformity Hypothesis

In line of Reis(1985), BRRZ discuss further properties of verb initial and verb final sentences, which seem to weaken both the uniformity and the non-uniformity hypothesis:

Criterion (e): Verum-Focus

Verum-focus, i.e. focus that bears on the truth value of the sentence, is located on the complementizer in verb final sentences (14.a)/(14.b) and on the fronted verb in verb initial sentences (15.a) (see Höhle(1988), Höhle(1991)). In (14.c), focus on the verb in the VP position comes down to contrastive focus on the verb meaning, as it does in the position of the split particle in the VP of (15.b).

(14) a. Ich weiß, DASS er kommt, aber nicht, WANN er kommt.
b. Ich frage dich, OB er kommen möchte.
c. Ich weiß, daß er nicht kommen WILL, sondern MUSS.

(15) a. Er HÖRT (ja) mit dem Rauchen auf.
b. Er hört (ja) mit dem Rauchen AUF.

These data favour a uniformity analysis if it is the functional head position of the sentence that is associated with focus on the truth value of the sentence. However, Hetland(1992) presents data from other languages that casts doubt upon this assumption. She gives examples from Norwegian that allow verum focus on the verb in base position (16). According to him, the focus on the final verb in subordinated sentences (16.a) is exactly equivalent to focussing the verb in V2 position in (16.b).[8] Further research has to be done to explore this phenomenon before we can use it as a criterion for analyses of sentence structure.

(16) a. (Vet du om han kommer i dag?) - (Do you know whether he will come today?)
Jeg tror at han KOMMER. - I think that he will come.
b. (Kommer han i dag?) - (Will he come today?)
Han KOMMer. - Er kommt.

Data Weakening the Uniformity Hypothesis

In Reis(1985), the point was made that the uniformity analysis of German sentence structure ignores substantial differences between verb initial and verb final sentences.
One of these differences is the default correlation one observes between the different types of sentence structure and their occurrence as subordinated or independent sentences:

Criterion (f): Independent vs Subordinated Sentences

Verb final sentences, introduced by a complementizer, are unmarked as subordinated sentences (17). If they appear as independent sentences, they are interpreted under the scope of an accommodated illocutionary predicate, unlike subordinated complement sentences, where the matrix verb defines the semantic relation that the clause is interpreted in.

(17) Max fragte mich, ob er morgen kommt.

(18) Ob er wohl morgen kommt? - Ich frage mich, ...
(19) Daß du mir ja die Zähne putzt! - Ich fordere Dich auf, ...

Verb initial sentences, in contrast, are the unmarked sentence type for independent clauses. If they occur in embedded position, they are subject to semantic and syntactic restrictions: Subordinated V2 sentences are restricted to complements of verbs of communication and conciousness (20), (largely but not completely corresponding to 'bridge verbs') or to complements of certain nouns (21)).

(20) Anna hatte geglaubt, Peter sei krank.
(21) Die Vorstellung, er könne beim Pferderennen gewinnen, trieb ihn in die Armut.

[8] A similar point can be made for English and French in (i) and (ii):
(i) a. # I know THAT he will come, but I don't know WHEN.
b. I know that he will COME, but I don't know WHEN.
(ii) a. # Je sais QU'il viendra, mais je me demande QUAND.
b. Je sais qu'il VIENDRA, mais je me demande QUAND.

The markedness of embedded V2 sentences is also reflected in syntactic restrictions: they only appear in the Nachfeld, whereas verb final embedded sentences can also be located in the Vorfeld or Mittelfeld.

(22) a. weil Anna glaubte, Peter sei krank geworden.
b. * weil Anna, Peter sei krank geworden, glaubte.

On the basis of the 'default' correspondence between subordinated sentences with verb final structure on the one hand and independent sentences with verb second structure on the other, BRRZ defend an analysis that posits a categorial difference between the respective sentence types: the verb second structure (23) projects to the category IP, whereas the verb final structure (24) is analyzed as a coprojection of CP and IP (the so-called 'hybrid uniformity hypothesis').

(23) $[_{IP}$ SpecI $[_{I'}$ I^o_i $[_{VP}$ ...V_i]]]

(24) $[_{CP/IP}$ SpecC/I $[_{C'/I'}$ C^o/I^o $[_{VP}$ ...V]]]

Yet, these correlations are only correlations of 'unmarkedness'. There *are* verb final CP/IP sentences that are syntactically not subordinate to a governing verb (18)/(19), and there *are* subordinated verb second sentences, of category IP, which are subject to special restrictions that do not apply to non-embedded verb second sentences (see criteria (h) and (i) below). If we want to get hold of these special restrictions, this cannot be done by purely categorial distinctions. We have to refer to the property of subordination as well.

Before we discuss these further differentiating properties of sentential structures, we first have to consider a 'non-argument' for a categorial distinction between verb initial and verb final sentences:

Criterion (g): Asymmetric Coordination – A Non-Argument

Both BRRZ and Haider(1993) make crucial use of the data on asymmetric coordination (25) in order to motivate a categorial distinction between verb second and verb final sentence types.[9]

(25) a. [Wenn du nach Hause kommst], und [der Gerichtsvollzieher steht vor der Tür], ...
b. [Daß man nach Hause kommt], und [der Gerichtsvollzieher steht vor der Tür], erlebt man nicht alle Tage.

The argument goes as follows: If verb second and verb final sentences would be categorially equivalent, one would expect the verb second conjunct in (26.a) to be freely substitutable by a declarative verb final structure as in the b. example. Yet, ungrammaticality results. Sentence (27) is intended to show that coordination does not require identity of the functional features [+/−w] of the two conjuncts. As a conclusion, they reason, only the categorial non-identity of these sentence types can give an explanation of the fact that it is ungrammatical to substitute the V2 sentence by the verb final sentence in (26).

(26) a. Wenn du an das Satzende kommst und [du findest das finite Verb nicht], ..
b. * Wenn du an das Satzende kommst und [daß du das finite Verb nicht findest], ..

[9] The construction is discussed in Höhle(1990).

(27) Er hat gesagt, [[wo sie wohnt] und [daß sie erst kürzlich eingetroffen ist]]. (Haider 1993)

Yet, if a categorial difference between verb final and verb second sentences is to explain the ungrammaticality of (26.b), it should in contrast be possible to substitute a complementizer introduced sentence by any categorially equivalent verb final sentence in a coordination construction. This is clearly not the case, as shown by (28.b).

(28) a. Er hat gesagt, wo Maria ist und daß Helmut nach dem Essen noch kommen wird.
b. * Er hat gefragt, wo Maria ist und daß Helmut noch kommt.

Thus, example (27), which was intended to show that sentences can freely coordinate irrespective of the functional selection features [+/−w], is misleading, since in this example the governing verb licenses both functional features. Example (28) shows that functional selection features *are* to be satisfied in coordinated structures. Since 'fragen' does only license sentences bearing the feature [+w], a symmetric coordination with a sentence introduced by 'daß' [−w] is ungrammatical.

If we now look again at example (26), which motivated the claim for a categorial difference between verb final and verb second sentences, we notice that it violates a selection property: whereas the conjunction 'wenn' is licensed as the head of sentential adjuncts, the complementizer 'daß' isn't so. A sentence introduced by 'daß' is restricted to be selected by a governing verb, but is ungrammatical in the function of an adjunct.

This shows that the argument for the categorial non-uniformity of verb final and verb second sentences, based on (26) is extremely weak. N.b. that this reasoning is not intended to provide an argument for categorial uniformity of verb second and verb final sentences, but argues against the impact of examples based on the asymmetric coordination construction for positing a categorial difference between these sentence types.

Criterion (h): Specifier Phrases

An important difference between verb final and verb initial sentences is the status of phrases that may occupy the specifier position of the sentence. In verb final sentences, only 'operator phrases' (e.g. relative pronouns, w-phrases) may (overtly) fill the specifier position:[10]

(29) Niemand weiß, wem Fritz den Schlüssel anvertraut hatte.
(30) * Max wußte, dem Peter (daß) Fritz den Schlüssel anvertraut hatte.

In verb second sentences the specifier position is open to all types of maximal phrases, including operator phrases:

(31) Wem hat Fritz nur wieder sein Fahrrad geliehen?
(32) Dem Peter hätte ich mein Fahrrad niemals überlassen.

But if the analysis of these data is to depend on the categorial status of sentences, as proposed by BRRZ, there must also be reference to an independent criterion that distinguishes embedded from non-embedded sentences: Whereas in (33) and (34) the verb final CP/IP

[10] An exception here is long topicalization as in (i). The example shows that the restriction only holds for overt phrases in the specifier position.
(i) Den Peter$_i$ glaube ich, e$_i$ daß niemand e$_i$ je hat arbeiten sehen.

structures are restricted to operator phrases in their specifier positions, irrespecitive of their subordinational status, verb second sentences (35) do not fit into this picture.

(33) a. Wem Fritz nur wieder sein Fahrrad geliehen hat?
b. * Dem Peter Fritz wieder sein Fahrrad geliehen hat.

(34) a. Max weiß, wem Fritz wieder sein Fahrrad geliehen hat.
b. * Max weiß, dem Peter Fritz wieder sein Fahhrad geliehen hat.

In their 'unmarked' function as non-embedded sentences verb second sentences are free to host w-phrases in their specifier position. But the marked case of subordinated verb second sentences shows a restriction against w-phrases (35.b)). Note that the w-phrase is licensed by the matrix verb, as shown in (35.c).

(35) a. Max sagte offen, er wolle hier auf keinen Fall Fritz begegnen.
b. * Max sagte offen, wem wolle er hier auf keinen Fall begegnen.
c. Max sagte offen, wem er hier auf keinen Fall begegnen wolle.

If the distinctive properties of verb initial and verb final sentences wrt. the types of specifier phrases they license are to be defined on the basis of their categorial status only, there is no explanation why (35.b) should be excluded.

Criterion (i): Empty Complementizers

A further property that distinguishes the two sentence types, the grammaticality of empty complementizers, might at first sight be analyzed by referring to categorial distinctions.

Non-embedded sentences, like (36.a) in a direct question mode interpretation, do require verb second movement to occur obligatorily. In embedded sentences, the converse holds: Indirect question sentences allow the functional head position to be empty, in fact, it has to be explained why it is obligatorily empty, verb second movement resulting in ungrammaticality (37).
We might decide to reduce these differences to a categorial distinction as proposed in the BRRZ analysis, requiring the head of the IP structure to be filled, whereas the head of the coprojected category CP/IP must remain empty in the context of a w-phrase in the specifier position.
Note, however, that for this reasoning to go through for (36.c), a possibly non-direct question mode, CP/IP structures have to be admitted as syntactically non-embedded sentence structures. Here again, by interaction with the properties discussed in (f) and (h), the correlation between subordinational status and structural sentence type becomes problematic.

(36) a. Wen hat Maria zum Geburtstag eingeladen?
b. * Wen ∅ Maria zum Geburtstag eingeladen hat?
c. Wen ∅ Maria wohl zum Geburtstag eingeladen hat?

(37) a. Max fragte, wen ∅ Maria zum Geburtstag eingeladen hat.
b. * Max fragte, wen hat Maria zum Geburtstag eingeladen.

In sum, the analysis that BRRZ propose in order to cover the criteria (a) - (i) is largely based on a categorial distinction between verb initial and verb final sentences. We will not

discuss their analysis in detail, but we have already noted that any attempt to capture the bundle of differentiating properties (critieria (f) -(i)) of the two structure types by pure categorial differentiations is questionable.

A similar point can be made regarding criteria (a) and (b): The 'hybride non-uniformity analysis' defines verb final sentences as a coprojected category CP/IP and thereby ensures the complementarity of the complementizer and the finite verb: the verb cannot move to the C^o/I^o position if it is occupied by a complementizer. Since I^o is now a coprojecting category, no distinct empty head position is available as a target for verb movement. But, what justifies the assumption that the complementizer projects by its own force as an inflectional functional head category? The existence of inflected complementizers in Bavarian (criterion b) cannot serve as independent evidence for the coprojection analysis, since in Standard German, where we do not find inflectional properties for complementizers, and hence would have no motivation for assuming a coprojection of C^o and I^o, we still observe the complementarity of complementizer and finite verb.

Thus, by stipulating a coprojected category type for verb final sentences, BRRZ prohibit I^o from projecting independently and thereby cover criterion (a) and - under reservation (see p. 50) - criterion (b). In the same way, the analysis attempts to get hold of the differentiating criteria (f) - (i) by categorial distinctions. Although at first sight this approach is quite appealing, we mentioned several problems for encoding the relevant (distinctive or uniform) properties of the alternative sentence structures in categorial terms.

In the next section we will discuss the account of German sentence structure and the V2 property presented in Haider(1993). His analysis subscribes to a conception of 'projective' grammar, a sparse, economical grammatical system, which does not posit a universal set of functional categories that any sentential structure of any language must exhibit. Under these assumptions it is possible to account for criterion (a) without referring to a concept of coprojected categories. Furthermore, in Haiders analysis the differentiating properties of verb initial and verb final sentences are not reduced to purely categorial distinctions, which was shown to be insufficient by the previous discussion.

Summary of criteria for analyses of sentence structure in German

(a) Complementarity of Complementizer and Finite Verb
(b) Inflected Complementizers

(c) Structure of the Mittelfeld
(d) V2 as a Derived Position?

((e) Verum focus [11])

(f) Independent vs Subordinated Sentences
(g) Asymmetric Coordination
(h) Phrases in Specifier Position
(i) Empty Complementizers

[11] We will ignore this aspect in the following. See p. 9

2 A GB Analysis of the V2 Property: V2 as Movement

In this section we give a brief summary of a GB analysis of German sentence structure as it is worked out in Haider(1993). In this work, Haider subscribes to a 'program of projective grammar': Sentence structure is claimed not to be determined by a universally fixed structural skeleton of functional categories, but by a structure that is built up on the basis of language specific information in accordance with universal principles of grammar:

> [...] Es kann, wenn die Hypothesen zutreffen, keine universellen Strukturschablonen und daher auch keine Satzschablone geben. Die Satzstruktur ist ein virtuelles Konstrukt. [...] Je nach einzelsprachlicher Substanz ergibt sich eine bestimmte UG-konforme Strukturierung. Betrachten wir ein Beispiel: Die UG soll keine Antwort geben auf Fragen wie die, ob es eine universell gültige Anzahl funktionaler Köpfe gibt, die jeder Satz einer beliebigen Sprache enthält. [...] Es ist sinnvoll zu fragen, wieviele funktionale Köpfe ein Satz einer spezifischen Sprache enthält. Die Anzahl der Köpfe ist eine Funktion der zu verarbeitenden Information. Es gibt soviele Köpfe, wie es projektionsfähige und -bedürftige Elemente in der Substanz gibt. Die Annahme, beispielsweise, eine Sprache ohne jegliche Kongruenzmarkierungen müsse ebensoviele AGR-Köpfe enthalten wie irgendeine Sprache mit manifester Evidenz für mehrere solcher Elemente, gleicht der Annahme, jedes beliebige Atom enthalte eine universale Anzahl von Elektronen, von denen je nach chemischem Element einige leer sind. (Haider 1993,1:7)

> [...] daß es in einer projektiven Grammatik nicht angeht, bestimmte funktionale Projektionen als universal zu dekretieren und damit auch ihre universelle Verfügbarkeit in jeder Satzstruktur zu postulieren. (Haider 1993,4:92)

This conception of a 'projective grammar' has the effect of minimizing the structural assumptions about German sentence structure and is finally the decisive factor that will make this GB analysis closly comparable to analyses in the HPSG framework.

2.1 Assumptions about German Sentence Structure

Haiders basic assumptions about German sentence structure can be summarized as follows:

1. The finite verb in sentence initial position is in a derived position.
2. The complementizer and the finite verb in initial position both occupy a functional head position.
3. There is only one functional projection in German clause structure. This claim is one of the reflexes of the conception of a 'projective grammar' that Haider pursues.[12]

[12] One of the arguments underlying this assumption is the fact that subordinated V2 sentences in German have an equivalent realization in English, where the complementizer is omitted. If English would allow an

4. F is a variable representing the functional head position of the 'abstract' sentence structure of German (1). It can be instantiated by a complementizer (C^o) (2) or a finite verb (V^o_{fin}) (3), respectively.

   (1) Abstract sentence structure: $[_{\mathrm{FP}}$ SpecF $[_{\mathrm{F'}}$ F^o $[_{\mathrm{VP}}$]]]
   (2) Verb final sentence structure: $[_{\mathrm{CP}}$ SpecC $[_{\mathrm{C'}}$ C^o $[_{\mathrm{VP}}$]]]
   (3) Verb initial sentence structure: $[_{\mathrm{FP}_{(fin)}}$ SpecF $[_{\mathrm{F'}_{(fin)}}$ $\mathrm{V}^{\mathrm{o}}_{(fin)_i}$ $[_{\mathrm{VP}}$ ...e_i]]]

Assumption 1.) directly covers criteria (c) and (d) above, as does any derivational analysis of the verb second phenomenon. Assumption 3.) accounts for the complementarity of the complementizer and the finite verb in initial position (criterion a). By the assumption 4.) - together with 3.) - the analysis captures the complementarity facts that traditionally were covered by subscribing to the uniformity hypothesis, but - due to the abstract functional category variable F - now leads instead to a categorial distinction between the two possible sentence types, i.e. a variant of the non-uniformity hypothesis. However, using this functional variable F as an abstract representation of the functional head of the sentence makes this analysis superior to the classical uniformity hypothesis. We already mentioned in section 1 that any uniformity analysis confronts the serious formal problem of representing the verb movement relation holding between a category V^o in the extraction site and category C^o in the landing site position. In Haiders analysis, the finite verb may freely instantiate the underspecified functional head category F^o.
On the other hand, Haiders analysis is also superior to the classical non-uniformity hypothesis, which does not predict the complementarity of complementizer and finite verb.

Before we can proceed to an evaluation of the theory wrt. the criteria (f) - (i) of section 1, we have to look in more detail at Haiders analysis of the V2 property and the distinction between independent and subordinated sentence types.

2.2 An Explanation of the V2 Property

Haider discusses several attempts that were proposed in the literature for an explanatory analysis of the obligatory movement of the finite verb in V2 languages. Haider argues against them, that for principled reasons of cognitive economy the only explanation for the obligatory movement of the finite verb can be it's not being licensed in its base position in these languages.

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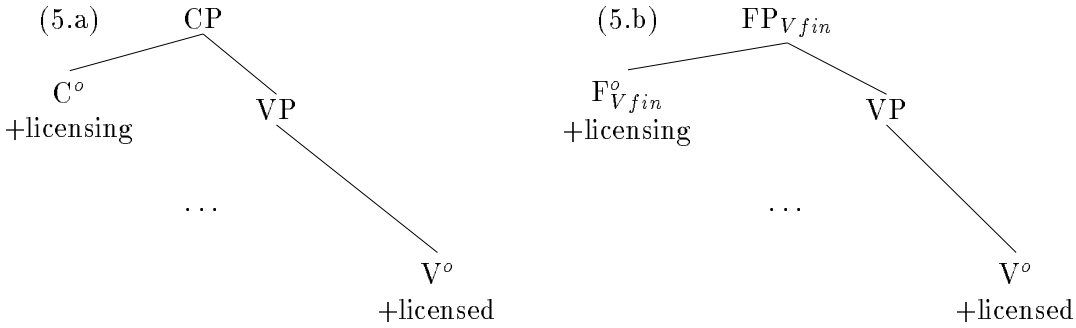
empty C position in these constructions, it is not clear why this should not be possible in German (ii).
(i) They said [$\emptyset$ it was wrong].
(ii) * Man sagt [$\emptyset$ es falsch sei].
(iii) They said [$_{IP}$ it was wrong].
(iv) Man sagt [$_{IP}$ es_i sei_j e_i falsch e_j].
Haider concludes that complementizerless embedded sentences are a projection of IP both in English and German, the only difference being that German as a V2 language fills the functional head position by movement of the finite verb (iv).
Furthermore, since Haider provides arguments that in German the subject is licensed in the base position of VP, there is no reason to postulate an I projection in German sentence structure that hosts the subject argument in its specifier position (see Haider 1993,4:85). A principled reason that finally excludes the assumption of an I projection intervening between the VP and the C-projection in German is a licensing condition on empty heads (Haider 1993,4:95).

> Es gibt keinen anderen Grund dafür, daß sich ein Kopfelement nicht in seiner Grundposition befindet, als der, daß es dort nicht lizenziert ist.
> (Haider 1993, 4:83)

The licensing condition for a finite verb is defined as follows: A finite verb, bearing functional features, is *functionally marked* and therefore must be be *functionally licensed* in order to be wellformed. An appropriate element that may functionally license a verb which is functionally marked, is a functional head that takes the projection of this verb as its complement.
The idea is captured by the generalization (4) about functional licensing in V2 languages:[13]

> (4) *Generalisierung über die funktionale Lizenzierung in V-zweit-Sprachen:*
> Projektionen funktional markierter, lexikalischer X^o-Elemente bedürfen funktionaler Lizenzierung.
>
> Die Projektion XP eines X^o-Elements ist *funktional lizenziert*, wenn XP von einem funktionalen Kopf als Komplement lizenziert wird. (Haider 1993, 4:84)

There are two alternative ways for a structure containing a finite verb to satisfy the constraint on functional licensing of functionally marked elements. Either there is a 'primary' functional head, a complementizer, that takes the functionally marked VP as its complement and thereby licenses the finite verb in its base position (5.a), or there is no such lexicalized functional head that may instantiate the functional projection, as e.g. in matrix sentences. One way to fulfill the requirement of functional licensing is then to instantiate the functional head position F^o by head movement of the finite verb itself (5.b). In this case, the functionally marked VP is licensed by the finite verb in the derived functional head position that takes the VP as its complement, and which constitutes the antecedent for the verb trace in base position.



Notice that in (5.a) the finite verb in base position is a syntactic item that *requires* licensing by a complementizer, while in (5.b) it is the finite verb that *effects* licensing of the functionally marked VP, now headed by the trace of the finite verb in base position. We will have to discuss below what the functional status the verb trace is in (5.b), given that it is in a head movement relation with the licensing verb in the functional head position.

[13] We will discuss several open questions about Haiders generalization at the end of this section.

But this isn't yet the whole picture about the V2 phenomenon and sentence structure. Besides the structure in (5.a), the analysis also has to account for verb final sentences introduced by a w-phrase. Haiders analysis of indirect interrogative sentences posits an empty functional head which occupies the F position and licenses the finite verb heading the VP.

(6) Ich frage mich, [wem $\emptyset$ Max sein Fahrrad geliehen hat].

Once an empty complementizer is admitted for embedded interrogative sentences, the theory has to explain, why it isn't so in non-embedded, direct interrogative sentences (7), in other words, why V2 movement is *obligatory* in matrix sentences.[14]

(7) * Wem $\emptyset$ Max sein Fahrrad geliehen hat?

The obligatory movement of the finite verb in matrix sentences is covered by a visibility condition on empty heads: An empty head must be licensed and identified.

> Auffindbarkeitskriterium für stumme Kopfpositionen: (Haider 1993, 4:95)
> Ein stummes Kopfelement muß lizenziert und identifiziert werden.

An empty head is licensed if it is head governed, while identification is provided by the syntactic context. E.g. an empty head may take over identifying features from its specifier. Identifying features are defined wrt. structural properties: in languages that assign nominative case to the specifier of IP, the subject in the specifier position provides the identifying features for an empty (I^o-) head. In interrogative sentences, a w-phrase provides identifying features for the empty functional head it specifies in languages that show overt w-movement.

Under this assumption, the distribution of lexical vs empty heads as well as the grammaticality of verb movement in embedded and non-embedded sentences is easily explained:
In non-embedded contexts (8), empty heads in (b) and (d) are not grammatical since they are not licensed by a governing head. If verb movement occurs as in (a) and (c), the structures are grammatical by observing the condition of functional licensing. Thus the visibility condition for empty heads accounts for obligatory verb movement in non-embedded sentences.

(8)	(a)	[XP_{+w} V_{fin}	[..	Wen hat Fritz gesehen?
	(b) *	[XP_{+w} $\emptyset$	[..	* Wen $\emptyset$ Fritz gesehen hat?
	(c)	[XP_{-w} V_{fin}	[..	Es steht ein Mann vor der Tür.
	(d) *	[XP_{-w} $\emptyset$	[..	* Es $\emptyset$ ein Mann vor der Tür steht.

In embedded sentences (9) the presence of a lexical complementizer (e) guarantees functional licensing of the finite VP. If the functional head is occupied by an empty element as in (f) and (h), the empty head must be recoverable, i.e. it must be licensed and identified. In embedded contexts, licensing is always ensured by the governing matrix predicate, but identification can only be effected by a w-phrase as in (h). A topicalized non-w-phrase, as in (f), does not bear appropriate functional features that could identify the empty head position.

[14] We disregard 'echo-questions' and other non-basic illocutionary modes for the moment.

(9) (e) [$\emptyset$ C^o [.. Ich weiß, [daß Fritz Maria gesehen hat].
(f) * [XP_{-w} $\emptyset$ [.. * Ich weiß, [den Fritz $\emptyset$ Maria gesehen hat].

(g) * [XP_{+w} V_{fin} [.. * Ich weiß nicht, [wen hat Fritz gesehen].
(h) [XP_{+w} $\emptyset$ [.. Ich weiß nicht, [wen $\emptyset$ Fritz gesehen hat].

However, while (h) is correctly predicted to be grammatical, the theory does not cover the ungrammaticality of (g). In principle, nothing should prevent the finite verb from occupying the functional head position by movement, as it happens in (10)(i) for embedded V2 complements. In absence of an overt complementizer, these embedded sentences allow verb movement to the functional head position to satisfy the condition on functional licensing. The V2 movement is even obligatory in these cases since a non-w-phrase could not identify an empty complementizer (j).

(10) (i) [XP_{-w} V_{fin} [.. Maria glaubt [es steht ein Mann vor der Tür].
(j) * [XP_{-w} $\emptyset$ [.. * Maria glaubt [es $\emptyset$ ein Mann vor der Tür steht]
(j') * [XP_{+w} V_{fin} [.. * Maria glaubt [wer steht vor der Tür.]

Since the cooccurrence of w-phrases and V2 is grammatical in non-embedded sentences (a), but ungrammatical in embedded sentences (g) and (j'), which by the derived verb position would be identical in categorial status to their non-embedded counterparts, the ungrammaticality of (g) and (j') must be tied to syntactic or semantic properties of subordination.

Haider presents convincing arguments that syntactic selectional properties of the embedding verb cannot be the reason for the ungrammaticality of (g). The reasoning goes as follows: One could hypothesize that a verb taking a [+w] complement does not allow verb movement together with a w-phrase in Spec, because it simply does not select V2 sentences in general (11.c).

(11) a. * Ich frage mich, warum ist hier V2 ungrammatisch. (Haider 1993)
b. Ich frage mich, wen $\emptyset$ er einladen wird.
c. * Ich frage mich, er wird Peter einladen.

But Haider shows convincingly that the argument doesn't go through if one tests verbs that take V2 complements in the 'was .. w-' construction: 'glauben' allows V2 complements but doesn't select [+w] complements (12). Although it tolerates a w-phrase in the 'was .. w-' construction (13.a), it cannot realize the V2 structure in this type of construction (13.b) (Haider 1993,4:98).[15] This shows that syntactic selectional properties cannot be responsible for the incompatibility of verb movement and the fronting of w-phrases in embedded sentences as opposed to the fully acceptable matrix constituent question structures.

(12) a. Maria glaubte, Max würde ihr eine Freude bereiten.
b. * Maria glaubte, wer $\emptyset$ ihr eine Freude bereiten würde.

(13) a. Was_i glaubst du denn, [$womit_i$ $\emptyset$ Max gemeint hat, daß wir sie e_i erfreuen könnten]?
b. * Was_i glaubst du denn, [$womit_i$ hat Max gemeint, daß wir sie e_i erfreuen könnten]?

Equivalently, we could reason for (j') that it is ungrammatical because verbs taking V2 complements do in general not license [+w] complements. However, there are some verbs

[15] In the 'was .. w-' construction, the embedded w-phrase is not evaluated under the scope of the governing verb, but takes scope over the matrix clause by the scope indicating was-phrase.

that do accept both V2 and [+w] complements. Here again we can show that it must be an independent reason that prevents the cooccurrence of V2 movement and w-phrases in embedded sentences.

(14) a. Fritz erklärte/erzählte, er würde sich aus dieser Sache heraushalten.
b. Fritz erklärte/erzählte, warum ∅ er sich aus dieser Sache heraushalten möchte.
c. * Fritz erklärte/erzählte, warum möchte er sich aus dieser Sache heraushalten.

Haider gives an explanation for the incompatibility of w-phrases and V2 in embedded contexts that takes into account the subordinational status of the constructions in question: While w-phrases in non-embedded sentences may be 'directly evaluated' under the scope of an illocutionary operator, w-phrases in embedded sentences must be evaluated wrt. the embedding verb.[16]
The selection mechanism, he argues, involves a mechanism of 'feature checking': the features the governing verb selects for its complement are to be checked in the (locally accessible) functional head position of the complement. To this end, the selectional features that are located in the specifier position must be transmitted to the functional head by a specifier-head coindexing mechanism. But, he claims, this transmission of features is blocked as soon as the head is occupied by the finite verb.

> Die Besetzung der F-Position mit dem Finitum verhindert aber die Übertragung des W-Merkmals auf den funktionalen Kopf. (Haider 1993,4:99)

Haider does not explicitly mention what it might be about the finite verb in second position that prohibits the mechanism of feature passing to apply. The most plausible assumption, however, is to postulate an incompatibility of the functional features of w-phrases and the finite verb.[17] But notice that this incompatibility of syntactic features does not do any harm in matrix constituent questions. Haiders claim is that w-phrases are 'directly evaluated' in matrix sentences. Feature checking by a governing verb, and therefore a transmission of functional features to the functional head position is not necessary in these cases. The HPSG analysis of V2 we present in section 3 will make use of this conception of incompatible functional features in order to account for the facts.

2.3 Evaluation of the Analysis and Open Questions

Before we concentrate on the aspect of formal representation of the V2 dependency relation, we want to evaluate Haiders analysis in terms of the criteria discussed in section 1. We've already seen that Haiders explanation for the ungrammaticality of embedded verb movement in (g), although reduced to a mechanism of feature checking, makes crucial reference to notions of semantic evaluation. We will see below that most of the data that BRRZ claimed to be based on a categorial distinction between verb initial and verb final sentences ultimately call for an explanation in semantic terms.

[16] The reader interested in the evaluation of the w-phrase in the 'was ... w'-construction is referred to Haider (1993,4:98)

[17] This assumption was made precise by the SFB project A6 "Ein Syntax-Fragment für das Deutsche".

When we introduced Haiders basic assumptions about German sentence structure we already evaluated his theory wrt. the criteria (a) to (d). Since the V2 phenomenon is analyzed by head movement, the theory automatically captures criteria (c) and (d). The complementary distribution of the complementizer and the verb in initial position is accounted for by positing only one functional projection in German sentence structure. Criterion (b), the existence of inflected complementizers, cannot be explained in Haiders analysis. The theory could only acount for the data if we took inflection, as a functional marking, to be inherently related to functional heads, together with a concept the sentential projection as an 'extended (verb) projection' à la Grimshaw(1991). But even then it would remain mysterious how the agreement of the complementizer's and the finite verb's inflection could be guaranteed.

Subordination and the Syntax-Semantics Interface

The remaining criteria (f) to (i) were argued in section 1 to be problematic for analyses based on the uniformity hypothesis. Haiders theory, due to the concept of an underspecified 'abstract' functional head F_0 and the condition of functional licensing, comes down to a uniformity analysis if we look at the underspecified sentence structure (3) above, but to a non-uniformity analysis if we look at the actual instantiations of the respective sentence types (4) and (5). But in section 1 we already questioned the impact of categorial distinctions for a satisfactory explanation of these facts. We hinted at the property of subordination, which could provide more insight into the interdependence of factors like the types of specifier phrases or the grammaticality of verb movement in subordinated vs independent sentences, as well as for some of the facts about asymmetric coordination.
At this point we want to discuss the explanatory impact of Haiders analysis wrt. these open questions. We will argue that the explanations he provides ultimately go beyond a purely syntactic analysis, and instead call for an analysis that explicitly represents the interdependence of syntactic and semantic properties of subordination.

Criterion (f): Subordinated vs Independent Sentence Types

The basic arguments for the insufficiency of a purely categorial distinction for subordinated vs independent sentence types were the following:

'Default' embedded sentences are verb final sentences, which may only be introduced by a complementizer or an operator phrase in the specifier position. 'Default' non-embedded sentences are verb initial sentences without any restrictions regarding the type of phrases that may occupy the specifier position. Since this correspondence of structural type and subordinational status is only a correspondence of default, a purely categorial distinction based on the verb position cannot serve as a basis for distinguishing syntactic properties of embedded vs non-embedded sentences, as it may be needed to account for criterion (h).

The properties of the non-standard realization patterns, i.e. non-embedded verb final sentences and embedded verb initial sentences, provide arguments to base the necessa-

ry distinctions on a semantic notion of subordination:[18]
Non-embedded verb final sentences are generally not understood as bearing basic illocutionary force (assertion, query, order). Contrary to verb initial sentences, they are not directly evaluated wrt. the discourse situation. This is most transparent with interrogative sentences. Whereas matrix interrogative sentences are interpreted as directed towards an addressee present in the discourse situation (15), the interrogative sentences in (16) may be understood as self-addressed by accommodation of a more specific, reflexive illocutionary predicate in the semantic/pragmatic representation.[19]

(15) a. Kommt Max denn noch? - Ich frage dich, ..
b. Wer schläft denn da? - Ich frage dich, ..
c. Fritz kommt immer zu spät. - Ich behaupte, daß ..

(16) a. Ob Max wohl noch kommt? - Ich frage mich / überlege, ..
b. Wer wohl noch kommt? - Ich frage mich / überlege, ..
c. Daß Fritz immer zu spät kommt. - Ich bin verärgert darüber, daß

Conversely, for the non-standard patterns of embedded verb second clauses, we noted that they are highly constrained by syntactic and semantic restrictions. Syntactically, they are only licensed in extraposition. Semantically these clauses are restricted to be selected by verbs of communication (17.a) or mental attitude verbs of believing (17.b). The fact that in most cases subjunctive mode is to be used - especially with the embedding verb in past tense - suggests an underlying semantics of indirect assertion (reported speech). This suggestion might also be supported by the fact that the 'default' structural type of direct assertion sentences, V2 is used.[20]

(17) a. Max behauptete, er sei schwimmen gewesen.
b. Max glaubte, er könne das Rennen gewinnen.

Therefore, we might conclude that the structural differences between 'standard' subordinated vs non-embedded sentences are ultimately tied to distinct modes of semantic and pragmatic interpretation. Verb initial clauses, standardly realized in non-embedded sentences, are interpreted wrt. the discourse situation, including speaker and addressee, whereas verb final sentences, introduced by a complementizer projection, are interpreted under the scope of an embedding attitudinal predicate. Due to this 'default' correlation between structural type, subordinational status and mode of interpretation, we tend to interpret syntactically non-embedded verb final sentences under the scope of a semantically accommodated attitude verb, which relates to the discourse situation; and we accept verb second sentences

[18] It is beyond the scope of this paper to give a precise semantic analysis for the observations that will be made in the following. The arguments will only be suggestive and are to be sharpened by further research.

[19] Contrary to the 'performative hypothesis', we do not we assume accommodation of an embedding predicate to take place in syntax.

[20] The fact that there are no verb first embeddings (i) or verb second constructions introduced by wh-phrases (ii), may be reduced to a further restriction that only allows for assertive mode in these embedded constructions.

(i) * Max fragte, sei Maria krank.

(ii) * Max überlegte, wer könne das Rennen gewinnen.

Note that there are cases that might be analyzed as subordinated interrogative verb initial sentences. However, they are more likely to be understood as citation readings.

(iii) Da frage ich mich doch, ist V1 grammatisch?

(iv) Ich frage mich, wer ist hier eigentlich der Chef?

in syntactic subordination only if they can be interpreted as indirect modes of assertion, mediated by use of a semantically appropriate embedding verb.

Interpretation wrt. ...

structure type subordination	verb initial	verb final
non-embedded	...discourse situation	...accommodated illoc. predicate
embedded	...'reported' discourse situation	...governing predicate

Criterion (g): Asymmetric Coordination

Haider referred to contrastive examples like (18) to suggest a categorial distinction between the two sentence types. We argued against this conclusion by use of example (19), which shows that selectional restrictions are responsible for the ungrammaticality of (18.b).

(18) a. Wenn du an das Satzende kommst und [du findest das finite Verb nicht], ..
b. * Wenn du an das Satzende kommst und [daß du das finite Verb nicht findest], ..

(19) a. Er hat gesagt, [wo Maria ist] und [daß Helmut nach dem Essen noch kommen wird].
b. * Er hat gefragt, [wo Maria ist] und [daß Helmut noch kommt].

The data in (20) show that asymmetrically coordinated verb second sentences are compatible with declarative (a)/(b), interrogative (c) and 'semi'-interrogative (d) selectional properties.

(20) a. Daß man nach Hause kommt, und der Gerichtsvollziehrer steht vor der Tür, erlebt man nicht alle Tage.
b. Ich vermute, daß Max die Koffer packt und Frida versorgt die Tiere.
c. Ich frage mich, warum Max angeln geht und Lisa bleibt zu Hause.
d. Ich weiß schon, warum Lisa Freunde einlädt und Max kocht für sie.

This suggests that (asymmetrically conjoined) verb second sentences - in contrast to verb final sentences introduced by a complementizer - are underspecified for selectional features and therefore compatible with any syntactic or semantic selectional restrictions imposed by the embedding predicate. The data in (20) then provide further evidence that it is not categorial status that is responsible for the ungrammaticality of (18.b), but the fact that verb final sentences are sensitive to selectional properties, whereas verb second sentences aren't so.
Again, we may correlate the 'sensitivity' of verb final sentences for selectional restrictions to their 'standard' use in subordinated function. Then, by contrast, the verb second sentence as a standardly non-embedded construction, being insensitive to subordinational selection properties, can be used in the asymmetric coordination construction without violating selectional restrictions imposed by the embedding verb.

Another difference between verb final and verb initial sentences in coordination constructions shows up at the level of semantic interpretation. In fact, asymmetric coordination is a primary source of evidence for the claim that verb final and verb initial sentences behave differently in semantic interpretation.

A striking contrast between the two sentence types is found in (21), where the conjoined conditional clauses in (a) define independent restrictive conditions for the consequence clause, whereas the verb second sentence in (b) does not establish an independent condition, but gets 'modally subordinated' (see Roberts(1989)) to the first conjunct to build a complex restrictive condition of summer and winter time as a temporal condition for the event described in the consequent, which must result in semantic anomaly.[21]

(21) a. [Wenn es Sommer ist] und [wenn es Winter ist] gehe ich gerne spazieren.
b. # [Wenn es Sommer ist] und [es ist Winter] gehe ich gerne spazieren.[22]

Another difference in interpretation shows up in propositional attitude contexts. In (22.a), two (possibly) independent facts are noted to be bewildering for Helmut. In (22.b) however, only one, complex fact causes his bewilderment: the strange behaviour of Mary's to go out when Max is inviting guests. A difference in interpretation between verb final and verb second sentences has already been noted by Höhle (Handout). He attributes the same semantic type ('Gedanken', 'Formeln') to verb second sentences (b) and and maximal VPs (c), in contradistinction to 'raised proposition' types for complementizer introduced verb final sentences (a). In the example we are giving below, however, (c) goes along with the (a) example in that there are two independent facts that cause Helmuts bewilderment. Only the asymmetrically conjoined sentence (b) is naturally understood to describe one complex state of affairs that is interpreted under the scope of the attitudinal verb. So a comprehensive analysis has to consider also the difference between verb phrase and sentential coordination.

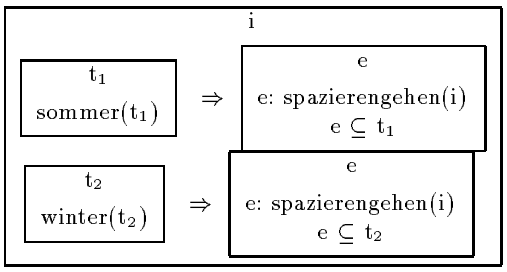
(22) a. Daß Max Freunde einlädt und daß Maria in die Kneipe geht, ist für Helmut unbegreiflich.
b. Daß Max Freunde einlädt und Maria geht in die Kneipe, ist für Helmut unbegreiflich.
c. Daß Max Freunde einlädt und Maria in die Kneipe geht, ist für Helmut unbegreiflich.

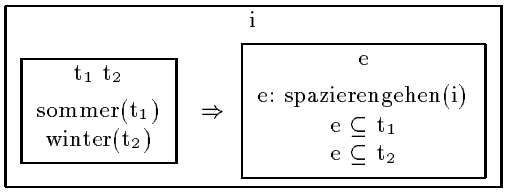
A difference between complementizer introduced sentences and verb second structures is also to be noted in (23). In (23.a) the first conjunct is interpreted as an indirect interrogative sentence, the second conjunct is interpreted as a declarative or indirect interrogative proposition. In the (b) and (c) examples, both conjuncts are interpreted as indirect interrogative clauses, under the scope of the operator phrase 'warum'.

(23) a. Warum Max die Koffer packt und daß/ob Fritz die Fahrkarten holt, weiß nur Lisa.
b. Warum Max die Koffer packt und Fritz die Fahrkarten holt, weiß nur Lisa.
c. Warum Max die Koffer packt und Fritz holt die Fahrkarten, weiß nur Lisa.

[21] This example was discussed with Ellen Brandner and Judith Meier.

[22] A very rough idea about the semantic difference involved is given in terms of DRT below. We abstract away from the generic interpretation of the event.

a.


b.


Such a reinterpretation of the 'default' semantics associated with verb second sentences is even more striking in non-embedded contexts such as (24), where the V2 sentence is not interpreted with assertive illocutionary force, but under the scope of the interrogative illocutionary operator, introduced by the first conjunct.

(24) Spülst Du und Maria trocknet ab?

Further and more detailed investigation of the syntax and semantics of asymmetrically conjoined sentences is needed in order to develop a concise syntactic and semantic analysis of this type of construction. In this paper, we can only hint at the differences that can be noted between verb final and verb second sentences in this particularly interesting construction.
We find that – parallel to the syntactic unselectedness of embedded V2 sentences, which makes this structural type compatible with diverse syntactic selectional contexts (see (21) above) – also at the level of semantic interpretation, verb second sentences turn out to be 'unselected'. Whereas the complementizer introduced sentence - depending on the CP's head or specifier semantics - defines the interpretation of the sentence's content wrt. the illocutionary operator or attitudinal verb, the verb second sentence is 'unselective' in this respect. It can freely be interpreted under the scope of an operator introduced by a preceding asymmetrically coordinated conjunct with a strictly determined semantic interpretation. In analogy to the syntactic unselectiveness of V2 sentences, which is due to the lack of functional selected features associated with a complementizer, the unselectiveness of V2 sentences on the semantic level can be interpreted as due to the lack of the semantic forces defined for complementizer introduced sentences.

We will return to the possibilities of representing these differences in semantic interpretation in section 4, where we propose a new analysis of verb second in HPSG.

Criteria (h) and (i): Specifier Phrases and Empty Complementizers

We argued in section 1 that it is not sufficient to refer to purely categorial distinctions between verb initial and verb final sentences in order to get hold of the restrictions on the types of specifier phrases that are licensed for the two sentence types in various syntactic contexts. The interesting fact about the distribution of types of specifier phrases is the fact that verb final sentences, as 'standard' embedded clauses, do only tolerate so-called operator phrases. Verb initial sentences, 'standard' non-embedded sentences, do allow all types of phrases to fill the specifier position, but do only so if they actually occur in non-subordinated function. Thus, we argued, the subordinational status of the respective sentences is to be taken into account.

Several factors motivate the assumption that the phenomenon of subordination relates to semantic rather than to purely syntactic notions:

The contrast between the (a) and (b) examples in syntactically embedded constructions (25) is found identically in syntactically non-embedded verb final sentences (26). If, as we argued above, non-embedded verb final sentences involve accommodation of a specific illocutionary predicate at the level of semantic or pragmatic interpretation, then the restriction on w-phrases in (26) is to be analyzed as a semantic restriction determined by the accommodated

predicate at the level of semantic representation.[23]

(25) a. Max weiß, [wer ∅ morgen kommt].
b. * Max weiß, [jemand ∅ morgen kommt].

(26) a. Wer ∅ morgen wohl kommt?
b. * Jemand ∅ morgen wohl kommt?

For the problem of verb non-movement in embedded sentences specified by a w-phrase (criterion (i)), Haider sketches an analysis that refers basically to a different mode of semantic evaluation of w-phrases in embedded and non-embedded sentences.
While non-embedded w-phrases may be 'directly' evaluated under the scope of an illocutionary operator, embedded w-phrases can only be locally evaluated under the scope of the embedding predicate in the specifier position (or by being 'related' to a w-phrase occupying this position). Haider claims that, due to a general mechanism of feature checking, the evaluation of a w-phrase under the scope of an embedding verb requires the transmission of the w-features to the functional head position. The incompatiblity of embedded w-phrases and verb movement into the functional head position is then explained by a 'blocking effect' the verb causes for the transposition of the w-feature from the specifier phrase to the head position.

Note, however, that it is not cristal clear why transmission of w-features is obligatory for feature checking in embedded w-sentences and in the 'was .. w-' construction, but why it should not be required in 'directly' evaluated w-sentences in direct illocutionary interrogative mode.

Again, we find the analysis of the data in question to be closely related to semantic notions ('semantic evaluation of w-phrases'), with reference to syntactic conditions (feature transposition from specifier position to head position). We will return to these open questions about the interplay of syntax and semantics in section 4.

Functional Markedness, Functional Projections and the V2 Property

To conclude, we want to address some open problems that are connected to Haiders condition of functional licensing, which he considers as the defining characteristics of V2 languages. We believe to have reason to question the range of data that may be captured by this explanation of the verb second property.
Haider defines the functional licensing condition as a 'generalization' holding in V2 languages, repeated here:

> *Generalisierung über die funktionale Lizenzierung in V-zweit-Sprachen:*
> Projektionen funktional markierter, lexikalischer X^o-Elemente bedürfen funktionaler Lizenzierung.

In his discussion about possible accounts for the V2 property, he presents an overview showing that across languages there is no correlation between the V2 property and properties such as inflectional morphology. Haiders constraint on functional licensing refers to

[23] Notice that the visibility condition for empty heads is not satisfied in (26.a). For discussion see p. 70.

the concept of *functionally marked elements* that demand to be functionally licensed in V2-type languages.
However, his generalization doesn't explain why functionally marked elements are subject to this condition in some languages, but not in other languages that may have functionally marked verb forms without displaying the V2 property. Thus, the theory does still not provide a fully explanatory account of the V2 property.
Furthermore, it is not explicity defined what it comes down to for a lexical item to count as functionally marked. Haiders overview about V2 languages shows that inflectional properties are not the decisive factor for the V2 property, since Danish, Norwegian, Swedish and Africaans do not have inflectional features for person. Africaans doesn't even exhibit temporal inflection.[24] So, finally it not clear at all how the theory should cope with these languages. These problems weaken the crosslinguistic explanatory background of Haiders analysis of V2.

A further aspect, which may weaken the impact of the condition on functional licensing, is the question of functional markedness of infinite verb forms. The condition on functional licensing involves two factors: there has to be a functional head taking the functionally marked projection as its complement and, in appropriate contexts the functionally marked element may itself instantiate the functionally licensing head by head movement. Infinitival constructions constitute a problem for this analysis.

Inifinite verbs never move in V2 languages. This may best be represented by characterizing infinte verb forms as functionally unmarked.

(27) a. Rasen nicht betreten.
b. * Betreten nicht Rasen.
(28) * Max versprach zu küssen Maria.

Incoherent (sentential) infinitival constructions are standardly analyzed in GB theory as being closed by a functional projection. Under the conception of a 'projective grammar', the presence of a functional projection cannot be 'postulated' by a structural sceleton, but can only result from properties inherent to the construction. In the case of sentential infinitives, it is not clear what this property could be. If infinite verb forms are not functionally marked, the condition on functional licensing does not apply.
One might propose to characterize the infinite verb forms marked by *zu* as 'functionally marked'.[25] An analysis along this line has then to provide an explanation for the ungrammaticality of infinite verb movement (27)/(28).[26] But the main problem for such an alternative are again cross linguistic generalizations. In many languages (e.g. French), infinitival constructions are analyzed as sentential constructions without conveying inflectional markedness.

[24] If *functionally marked* would have to be understood as 'finiteness' without overt inflectional properties, the analysis would be problematic for languages like English, where in non-embedded clauses the finite verb doesn't move to I (neither the main verb moves, nor is do-support necessary). On the other hand, an empty functional head fulfilling the condition on functional licensing would not be wellformed in main sentences.

[25] zu-infinitives are the only infinite verb forms that license incoherent (sentential) structures. However, see Kiss(1992) for a critical discussion of the concept of 'sentential' construction.

[26] The fact that many infinitival constructions marked by *zu* may alternatively be realized as coherent, i.e. nonsentential constructions which do not involve a functional projection, should not be problematic for an analysis that makes use of a concept of argument inheritance.

2.4 Aspects of Formal Representation

Categorial Specification of Verb Final and Verb Initial Sentences

Haiders analysis describes the 'abstract' sentence structure of German as a functional projection FP embedding a complement VP that may be headed by a functionally marked finite verb (29). The functional head F may get instantiated in one of two ways:

(29) Abstract sentence structure: $[_{\mathrm{FP}}$ SpecF $[_{\mathrm{F'}}$ F^o $[_{\mathrm{VP}}$ ... V^o]]]

If a complementizer is realized, F^o gets instantiated to the functional category C^o. The functional head C^o licenses a functionally marked finite VP complement.

(30) Verb final sentence structure: $[_{\mathrm{CP}}$ SpecC $[_{\mathrm{C'}}$ C^o $[_{\mathrm{VP}}$ ... $\mathrm{V}^o_{fin}]]]$

Sentences without (lexical or empty) complementizer statisfy the condition of functional licensing by movement of the finite verb into the functional head position which takes the finite VP as its complement. Since the finite verb fills the functional head position, it may be assumed that the sentence projects to a maximal category IP (31.b) (Haider 1993,4:75). Haider also advocates the idea not to focus on the categorial status of the resulting functional projection at all, but "to choose a level of abstraction, where it is not the category, but the type of category that is relevant" (31.a) (see Haider 1993,4:84).

(31) Verb initial sentence structure:

a. $[_{\mathrm{FP}(Vfin)}$ SpecF $[_{\mathrm{F'}(Vfin)}$ $\mathrm{V^o}(fin)_i$ $[_{\mathrm{VP}}$ ... $\mathrm{V}^o_{e_i}$]]]
b. $[_{\mathrm{IP}}$ SpecI $[_{\mathrm{I'}}$ $\mathrm{I}^{\mathrm{o}}_i$ $[_{\mathrm{VP}}$ ... $\mathrm{V}^o_{e_i}$]]]

This leaves open the choice between characterizing the verb initial sentence as a 'functional projection FP with a verbal inflection feature matrix' (a) or as the 'functional projection IP'(b). Accordingly, one has to consider the choice between characterizing the verb final sentence type as a 'functional projection with complementizer features' or as a 'functional projection CP'.

Haider notes one fact that may argue for a feature specification instead of a categorial one (Haider 1993,4:83): Haider provides convincing evidence that German sentence structure does not exhibit a sentence final I^o head position the finite verb moves into. Now, under a categorial view of finiteness, the finite verb in a verb final sentence would then have to be specified contradictorily as a I^o head category in the VP's head position.[27].
Under this perspective, it may be preferrable to diverge from the GB-conformist view of enconding functional properties in terms of categorial status but to encode functional properties by feature specifications instead. We will see in the next sections that this view is closely related to the concept of functional categories in the HPSG framework.

Formal Representation of Verb Movement

An even more important issue, which is also related to the question of the categorial status of verb second sentences, is the formal representation of the movement relation holding

[27] It would not be possible to assume a coprojected category $\mathrm{I}^o/\mathrm{V}^o$ her, since the IP and VP projections are not congruent (see Haider(1988))

between the verb in initial position and the verb trace in the base position of the VP.
A general condition on head movement in the GB framework is the constraint on categorial identity of antecedent and trace. In the case of verb movement, this restriction is highly problematic for any existing GB analysis.

Haider(1993,Ch.4) discusses three alternatives for the representation of verb movement: substitution, adjunction and incorporation. Each of these confronts empirical or formal problems. If verb movement was analyzed as an instance of adjunction, the complementary distribution of complementizer and verb initial structures could not be captured. The same problem arises if incorporation (Baker (1988)) is assumed. The analysis of verb movement as substitution is empirically justified, but formally problematic.

Substituting the finite verb into the functional head position of the sentence predicts categorial identity of antecedent and trace. What differs, however, is their functional status, as well as their complementation properties. While the VP headed by the verb trace satisfies the verb's lexically determined complementation requirements, the antecedent verb in the functional head position takes the VP itself as its complement, disregarding its original, lexically determined subcategorization requirements.
One may argue that this is not really a formal problem for the move-α relation, since subcategorization properties are not directly tied to the categorial status of these syntactic items. Yet, the fact that the verb in initial position takes a VP complement is in fact due to its status as a functional category. So any formal treatment of verb movement has to account for these differing complementation properties of functional antecedent category and lexical trace category in the verb dependency relation. We will address this problem in more detail in the following sections.
For the representation of the functional status of antecedent and trace in the move-α relation the restriction on categorial identity of antecedent and trace is even more serious. Again, there may be alternative views on the representation of functional properties. In the standard GB framework, functional properties are tied to categorial status: the finite verb, occupying a lexical head position of category V, moves to a functional head position of category I^o. If substitution is category preserving, this representation is contradictory in itself.

(32) $[_{\mathrm{IP}}$ SpecI $[_{\mathrm{I'}}$ $\mathrm{I}^{\mathrm{o}}_i$ $[_{\mathrm{VP}}$ $\ldots \mathrm{V}^o_{e_i}$ $]]]$

The analysis that Haider pursues is more non-conformist. Verb final and verb initial sentence types can be represented as projections of an abstract functional head bearing a different categorial or feature specification depending on the syntactic element that instantiates the functional head position F^o.
This may be conceived as an account of underspecification: The complementizer and the finite verb are different subtypes of functional categories that are subsumed by the more general functional type F.
The other way of thinking 'formally' about this proposal is to conceive the realization of the functional category F as a consequence of the condition on functional licensing. Under this view, there is no need to postulate a fixed skeleton of an (underspecified) sentence structure like (33). Instead, either of the functional items, a complementizer (C^o) or the finite verb (V^o_{fin}) may freely create a functional head position, which is required by the condition on functional licensing, and project to the respective category types CP as in

(34) or FP_{Vfin} as in (35).

(33) Abstract sentence structure:
$[_{\mathrm{FP}}$ SpecF $[_{\mathrm{F'}}$ F^{o} $[_{\mathrm{VP}} \ldots \mathrm{V}^{o}$]]]

(34) Verb final sentence structure:
$[_{\mathrm{CP}}$ SpecC $[_{\mathrm{C'}}$ C^{o} $[_{\mathrm{VP}} \ldots \mathrm{V}^{o}_{fin}]]]$

(35) Verb initial sentence structure:
$[_{\mathrm{FP}(Vfin)}$ SpecF $[_{\mathrm{F'}(Vfin)}$ $\mathrm{V^{O}}(fin)_i$ $[_{\mathrm{VP}} \ldots \mathrm{V}_{e_i}$]]]

But on either of these views we are still confronted with the formal problem of defining the relation move-α holding between the functional category F^{o}_{Vfin} and the trace of the lexical category V^{o}_{fin}), which are inherently different in their functional status and complementation properties. Thus, any theory of verb movement based on substitution - and this is the only one that gets the empirical data right - has to confront the formal problem of the complementation properties and functional properties, which differ for antecedent and trace.
It will be the topic of the following sections to explore the possibilities of a computable formalization of the theory of verb movement as it is proposed by Haider. Both ways of 'thinking' about the sentence structure - alternative realizations of a functional head position or instantiations of an underspecified functional head position - will be examined. To this end, we will present of two alternative analyses of V2 in the HPSG framework, both of which can be shown to be closely comparable in spirit to Haiders analysis, but differ in formal details.

3 An HPSG Analysis of V2: V2 as a Lexical Rule

In this section, we present an analysis of the verb second property in an HPSG framework. We build upon an already existing analysis of Kiss & Wesche(1991) and Kiss(1992). This analysis provides the basic techniques for an analysis of V2 as a local dependency structure in HPSG. We discuss several shortcomings of this analysis and show that by integrating a concept of functional categories along the lines of Netter(1992) into this analysis, its weaknesses can be remedied. The analysis gets thereby closely comparable to Haiders GB analysis of verb second, presented in the previous section.

3.1 Verb Movement by Lexical Rules: A Local Dependency Relation

Kiss/Wesche(1991), henceforth K/W, devise an analysis of the V2 structure as involving a local dependency relation. The verb final structure is analyzed as the basic sentence structure, while verb initial sentences are represented as a structure involving a (local) dependency relation between a verbal trace and the lexical verb in the head position outside the VP.[28] In HPSG (non-)local dependency relations are represented by the use of the NON-LOCAL attribute and the Non-local Feature Principle (NFP) (see Pollard/Sag(1993)). In contradistinction to non-local dependencies involving phrasal constituents (X^{max} categories), which are represented by the NON-LOC attribute SLASH, K/W introduce a new attribute DSL (double slash) which is reserved for dependencies involving X^{o} constituents.

Kiss(1992) represents the verb final sentence type as a phrase headed by a complementizer which subcategorizes a finite sentence.[29] The lexical entry for the complementizer 'daß' is given in (1) (Kiss(1992:125)).[30]

(1) daß:
$$\left[\text{SYNSEM}\left[\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{ll}\text{HEAD}_{comp} & \left[\text{C-FORM}\ \ \text{daß}\right]\\ \text{SUBCAT} & <\text{VP: }\boxed{1}>\end{array}\right]\\ \text{CONT}\ \ \boxed{1}\end{array}\right]\right]\right]$$

The V2 structure is obtained by application of a lexical rule reminiscent of a rule of type raising in categorial grammar. The lexical rule (2) is defined on the input domain of finite verbs as they are represented in the lexicon for verb final sentences and returns a modified feature structure that defines the 'raised' verb type as a finite verbal head subcategorizing a verbal constituent which contains a verb trace defined for a nonempty NON-LOC attribute DSL, the value of which is identical to the LOC value of the input structure of the lexical rule, i.e. the original LOC value of the finite verb. The verb second structure of declarative sentences results from an additional non-local dependency relation involving a maximal phrase in the SLASH attribute that get discharged by application of the filler-head schema.

[28] In contrast, Pollard(1990) argues for a non-derivational analysis of the V2 phenomenon with constituent ordering principles defining the relative order of the verb and its arguments. A non-derivational analysis, however, cannot account for the data on verbal scope, coordination and separable verb prefixes, discussed for criterion (d) in section 1.

[29] For arguments against the analysis of complementizers as markers by a special head-marker schema, as proposed in Pollard/Sag(1993), see Kiss(1992:125-127).

[30] In the following, we take the freedom to refer to the category of the complementizer's complement as a maximal VP.

(2) Lexical Rule for V2 (Kiss(1992:144)):

$$\left[\text{SYNSEM}\left[\text{LOC}\,\boxed{3}\left[\begin{array}{l}\text{CAT}\left[\text{HEAD}\,\boxed{1}\left[\text{VFORM}\;\;fin\right]\right]\\ \text{CONTENT}\;\;\boxed{2}\end{array}\right]\right]\right] \quad \begin{array}{r}\text{(i)}\\ \text{(ii)}\end{array}$$

$$\Rightarrow$$

$$\left[\text{SYNSEM}\left[\begin{array}{l}\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\;\;\boxed{1}\\ \text{SUBCAT}<\left[\text{LOC}\left[\text{CAT}\left[\begin{array}{l}\text{HEAD}\;\;\boxed{1}\\ \text{SUBCAT}\;\;<>\end{array}\right]\right]\right.\right.\\ \left.\left.\text{NON-LOC}\left[\text{INH}\left[\text{DSL}\;\;\{\boxed{3}\}\right]\right]\right]>\end{array}\right]\\ \text{CONTENT}\;\;\boxed{2}\end{array}\right]\\ \text{NON-LOC}\left[\text{TO-BIND}\left[\text{DSL}\;\;\{\boxed{3}\}\right]\right]\end{array}\right]\right] \quad \begin{array}{r}\text{(iii)}\\ \text{(iv)}\\ \text{(v)}\\ \text{(vi)}\\ \text{(vii)}\\ \text{(viii)}\end{array}$$

(3) Trace of category X^o: (Kiss(1992:144))

$$\left[\begin{array}{l}\text{PHON}\;\;<>\\ \text{SYNSEM}\left[\begin{array}{l}\text{LOC}\;\;\boxed{1}\\ \text{NON-LOC}\left[\text{INH}\left[\text{DSL}\;\;\{\boxed{1}\}\right]\right]\end{array}\right]\end{array}\right]$$

Several diverse aspects of the analysis of V2 as a local dependency relation are mingled together in the lexical rule (2):

First, the input structure to the lexical rule is restricted to finite verb forms (2)(i). This prohibits nonfinite verbs from undergoing verb movement.

Second, we saw in the previous chapter that any analysis of V2 has to account for the change of complementation properties involved in verb 'movement': the verb in the derived position subcategorizes for a finite VP, whereas the original, lexically determined subcategorization frame is to be associated with the trace in base position, guaranteeing the satisfaction of the lexical subcategorization properties of the verb.
This is done by a redefinition of the SUBCAT attribute: the SUBCAT value of the output structure - the 'raised' verb type - contains an element of type *synsem*, specified as a finite, saturated verbal projection (iv/v). The original subcategorization properties of the input verb structure, however, are not lost, but associated with the verbal trace in base position by coindexing the element in the VPs INH |DSL value $\boxed{3}$ with the LOC value $\boxed{3}$ of the original lexical structure of the verb that contains the lexically determined SUBCAT specification of the verb (i/vi). The definition of the verb trace (3) guarantees that the DSL value $\boxed{3}$ - containing the original SUBCAT and CONTENT specifications of the verb - defines the LOCal structure, i.e. the subcategorization and content properties of the empty head of the finite VP.

Third, the definition of V2 as a dependency relation holding between the 'raised' verb in initial position and its trace in the finite VP is defined by use of the new NON-LOCal attribute DSL: the 'raised' verb subcategorizes for a VP that - in its NON-LOCal value - is constrained to contain a trace the LOC-value of which is identical to the information structure of the non-type raised finite verb (i/vi).
Notice that this dependency relation is restricted to hold between X^o categories only if the lexical rule is applied to X^o categories, i.e. to verbs as they are stated in the lexicon.

Fourth, dependency relations holding between X^o categories are generally restricted to be strictly local (4).

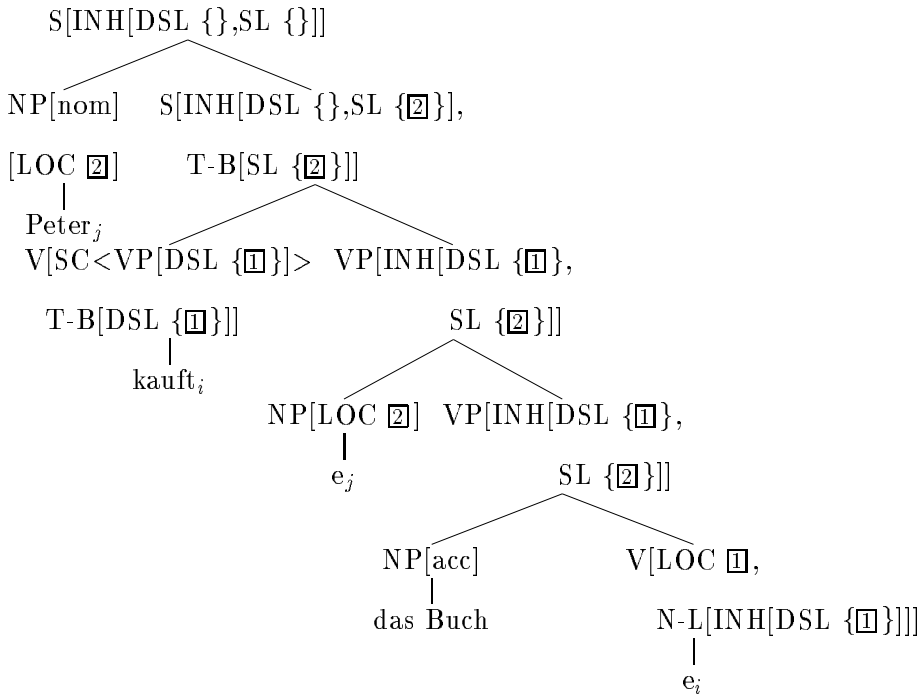
(4) * Max kommt$_i$ sich wünscht, daß Fritz e_i.

In the GB framework, this restriction is covered by the Head Movement Constraint (see Chomsky(1986)). K/W claim that this locality restriction falls out in their analysis by the binding of the 'trace', the value of DSL, in the output structure of the 'raised' verb itself: TO-BIND | DSL is coindexed with the DSL value inherited from the VP (viii). By the NFP, the definition of TO-BIND and the locality of subcategorization, it seems plausible that the dependency relation is strictly local and 'ends' with the introduction of the raised verb in initial position. However, we will show below that the locality restriction, built into the lexical rule for V2 does not predict locality of verb movement in all syntactic contexts. A revision of the analysis of K/W will allow to cope with these cases as well.

Fifth, since the analysis of the verb in initial position parallels the analysis of the complementizer, being defined as a head taking a saturated VP complement, analogous to the definition of CONTENT in the lexical entry of 'daß', the CONTENT value of the VP (defined in the LOC value of the original verb definition and instantiated by the verb trace) is coindexed with CONTENT of the 'raised' verbal head and gets projected to the sentence level (ii/vii).

By application of the Lexical Rule for V2, we get a V2 analysis as illustrated below:

(5) Peter kauft das Buch.



In order to cover the topological data of German sentence structure, precedence constraints defining the order of verbal heads and complements are to be defined.
K/W propose the constraints in (6). Constraint (a) applies
(i) to (the projections of) the verb trace, where the head daughter, DSL being nonempty,

has to follow the complement sisters, and
(ii) to the 'raised' verb, which has to precede its VP complement that contains a non-bound verb trace, i.e. the DSL value is nonempty.[31]

The final position of the verb in base position cannot be covered by (a), since DSL is empty in this case. A separate rule (b) has to define
(iii) the head-final order of infinite and non-raised finite verbs, both characterized by an empty DSL value and
(iv) the order of filler and head in verb second sentences, defining the Vorfeld constituent to precede the raised verb.

(6) (a) X(P) < V $\left[\text{INH}\left[\text{DSL}\ \ \textit{nonempty}\right]\right]$

(b) XP < V $\left[\text{INH}\left[\text{DSL}\ \ \textit{empty}\right]\right]$

However, these definitions seem problematic for the verb in second position: Since INH | DSL is empty for the verb in initial position, the order of the 'raised' verb wrt. its VP complement gets defined contradictorily by (a) and (b), the latter being the wrong order. Therefore, we propose to redefine condition (b) by (b'), which refers to the binding attribute of DSL. The reader may verify that the constraints (a) and (b') cover the data correctly.

(b') XP < V $\left[\text{TO-BIND}\left[\text{DSL}\ \ \textit{empty}\right]\right]$

3.1.1 Open Problems and Evaluation of the Analysis

First we want to discuss a serious problem for the analysis, which concerns the locality restriction on verb movement. K/W claim that by the binding of the complement VP's inherited DSL value by the verb in initial position, the V2 dependency relation is automatically restricted to a local dependency. But it is easy to show that they are mistaken on this point. In (7) the finite verb of the matrix sentence is analyzed in place, whereas the finite verb of the embedded sentence (indexed i) undergoes non-local movement to the initial head position of the non-embedded clause. This ungrammatical structure is not excluded by the analysis of K/W.

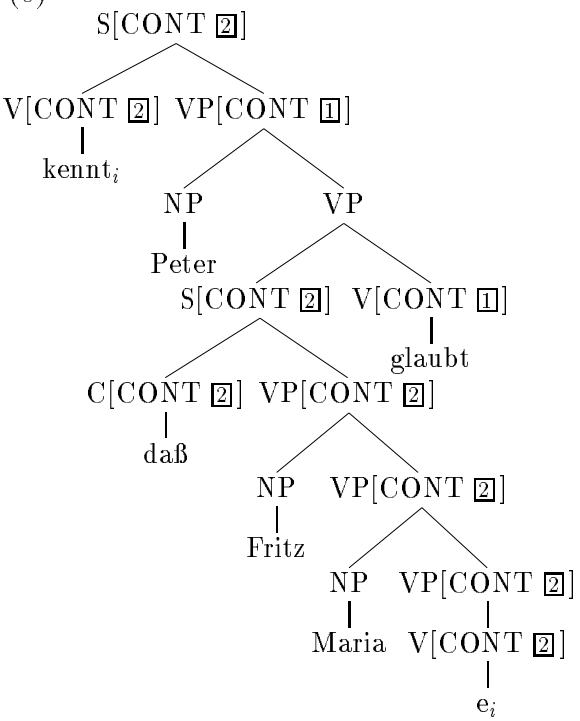
(7) * Peter$_j$ kennt$_i$ e$_j$ glaubt, daß Fritz Maria e$_i$.

'kennt' is a finite verb, so the lexical rule for V2 may apply to it. The output structure is a verb subcategorizing for a finite VP, which in turn is defined for an INH DSL value that is identical to the original LOCal value of 'kennt'. Simultaneously, the raised verb 'kennt' binds this DSL value. Nothing, however, enforces the introduction of the verb trace associated with 'kennt' in the VP that it locally subcategorizes for. We can build a perfectly wellformed structure by realizing 'glaubt' in the VP's final verb position and establishing a non-local dependency for the DSL value bound by 'kennt' by introducing the associated trace in the embedded finite sentence. Without independent locality restrictions on the percolation of the DSL value, the Nonlocal Feature Principle transports the DSL value beyond the embedded sentence until it is bound in the initial head position of the matrix clause.

[31] In this case, the left constituent is not a phrasal category.

K/W might reply that by the content definition for the 'raised' verb in the lexical rule for V2, the structure (8) does not result in a wellformed content description for (7). Yet, the content we get with for this structure does not violate any grammatical principles. The content description [2] for the embedded sentence is duplicated in the projection of the raised verb, while the content of the finite matrix sentence [1] is fully specified at the projection of the finite VP without being projected to the level of the raised verb projection. We will see in the following that by integrating the concept of functional categories together with their semantics projection properties into the analysis of verb movement, it is possible to avoid this problem of unrestricted non-local verb movement.

(8)



We now proceed with a brief evaluation of the analysis wrt. the criteria discussed in section 1. We will discuss serious shortcomings of the analysis which can be avoided - as we will show in the subsequent - by integrating the concept of functional categories, a familiar concept in the GB framework.

Criteria (d) and (c):
V2 as a Derived Position and the Structure of the Mittelfeld

Since K/W represent the verb initial structure by a local dependency relation involving a verb trace in the final position of the VP, there is a principled basis available for an analysis of the data on scope, coordination and separable verb prefixes.[32]

Furthermore, the analysis predicts the structure of the Mittelfeld to be identical in both types of sentence structure. Still, the analysis is open to both a flat or a binary branching structure of the Mittelfeld, depending on the basis of which concepts - precedence constraints or hierarchical configurations - the data of binding, scope and word order restrictions

[32]The separation of verb prefixes can be defined in the lexical rule for V2. For reasons of space, we cannot go into a detailed analysis here.

are to be accounted for.[33]

Criterion (a): Complementarity of Complementizer and V2
The refined analysis in Kiss(1992) introduces differentiating feature specifications for verb final and verb initial sentences. Sentences introduced by a complementizer bear the HEAD specification CFORM, whereas verb initial structures are specified by the HEAD features of the finite verb [VFORM fin]. Yet, this does neither allow an unambiguous identification of the respective sentence types without further assumptions, nor does it ensure the complementary distribution of complementizers and V2.

If complementizer introduced embedded sentences are defined by the specification S[HEAD[CFORM ..]], this 'constraint' is still compatible with (10).[34]

(9) Fritz bedauert, daß Peter das Buch nicht kauft.
(10) a. * Fritz bedauert, Peter das Buch nicht kauft.
b. * Fritz bedauert, Peter kauft das Buch nicht.

A natural move to exclude verb initial structures or bare VPs, bearing the HEAD feature VFORM, to unify with a selectional 'constraint' for the feature CFORM is to distinguish two types of heads: verbal heads (*v-head*), defined for (finite) verb projections, and heads of type complementizer (*c-head*), which are associated with complementizer headed phrases (11). If a *c-head* (or CFORM attribute) is selected by the governing verb, this enrichment prevents structures like (10), since an incompatibility of types would result.

(11) $\left[\text{HEAD}_{v-head}\left[\text{VFORM}\ldots\right]\right]$
$\left[\text{HEAD}_{c-head}\left[\text{CFORM}\ldots\right]\right]$

However, the definition of distinct types of heads does still not allow an unambiguous distinction between verb initial and verb final structures.

First, the head specification [HEAD *v-head*] - if intended as the specification of a V2 structure - allows (12.b) besides (12.a). A verbal head in final position qualifies as a verbal head as good as a 'raised' verb in initial position (see the coindexation of the HEAD attribute in the lexical rule (3)). The same problem arises for the definition of embedded V2 sentences. Along with (13.a), the selection of a finite *v-head* would allow the verb to embed a bare verb final VP.

(12) a. Peter kommt nach Hause.
b. * Peter nach Hause kommt.

(13) a. Maria glaubte, Peter kaufe ein Buch.
b. * Maria glaubte, Peter ein Buch kaufe.

Finally, criterion (a), the complementary distribution of the complementizer and V2 in German is not covered by the analysis of K/W and Kiss(1992). The complementizer, subcategorizing for a finite VP (see (1) above), can also be construed with a VP complement exhibiting a verb initial structure by application of the lexical rule for V2.

[33] See Frank/Reyle(1992) for an analysis of scope restrictions in a binary branching VP structure, which is based on the analysis in Frey(1993).

[34] In order to exclude (10), the formalism would have to provide existential constraints, as they are used in the LFG grammar formalism.

(14) a. daß Peter das Buch kauft.
b. * daß kauft Peter das Buch.
c. * daß Peter kauft das Buch.

Thus, the analysis does not account for criterion (a) since it neither provides a differentiating specification for verb final vs verb initial sentence structures (12)/(13),[35] nor does it allow to refer to one (and only one) obligatory functional sentence projection, which can be either a projection of a 'raised' verbal head or a complementizer head.

Criterion (b): Inflected Complementizers
Since verb final and verb initial sentences are perfectly independent structural realizations, it is easy to see that the possibility of inflectional marking of complementizers in Bavarian cannot be accounted for. The complementizer bears no characteristics that could explain the presence of finite verbal inflection.

We will show in the following subsection that, for both the criterion (a) - and with reservation also for criterion (b) -, the concept of functional categories allows a more explanatory account of the data.

Criteria (f), (g), (h) and (i):
Subordination, Asymmetric Coordination, Specifiers and Verb Non-movement
These criteria were shown in section 1 and 2 to necessitate a distinction to be made between embedded and non-embedded sentences wrt. syntactic and semantic properties. In the analysis of Kiss(1992), the only distinction that could be made is the differentiation of subtypes of heads (*v-head* vs *c-head*) as proposed in (11). This finally comes down to a categorial distinction between verb final and verb initial sentence structures. Yet, we argued in section 1, that a categorial distinction of the structural sentence types is not sufficient to cover the whole range of data to be considered. Therefore, the analysis can be shown to be subject to the same shortcomings that were mentioned in section 1. For reasons of space, we will not go into a detailed discussion at this point, but defer the topic to Section 4.

3.2 Verb Movement by Lexical Rules and Functional Categories

In this subsection, we introduce the basic ingredients of a theory of functional categories in HPSG, developed by Netter(1994) for an analysis of German nominal phrases.
This concept of functional categories has been extended to an analysis of V2 in Netter(1992). There, it is assumed that in V2 sentences an empty functional head in the final VP position subcategorizes the overt verbal head as its least oblique argument as well as - by argument inheritence - the arguments subcategorized for by the verb itself.[36] In the following we will elaborate a different analysis of the V2 phenomenon and sentential structure, by sticking to the K/W characterization of the V2 structure as a 'derivational'

[35] Of course one could refer to the TO-BIND | DSL values in order to prevent embedded V2 structures, but a restriction along this line would lack explanatory content.

[36] One of the objectives in Netter(1992) is to avoid a derivational analysis of V2, and thereby to dispense with the device of a lexical rule. We do not take into account this analysis here, because on our view, it bears rather unorthodox properties. Among them is the appearance of X^o categories on the SUBCAT list, the lack of explanatory background for the data on scope, coordination and particle separation (see criterion(d)) and finally the divergence from assumptions about inherent properties of functional categories, which are widely held to subcategorize for only one complement.

structure, but integrating into this analysis the concept of functional categories developed in Netter(1994).

3.2.1 A Theory of Functional Categories in HPSG

Netter(1994) develops a concept of functional categories in the HPSG framework of syntax. He introduces a distinction between lexical and functional categories by defining the HEAD attributes MAJOR and MINOR, respectively. The MAJOR attribute represents the substantial lexical categories in terms of the binary attributes N(ominal) and V(erbal). This provides the traditional classification of lexical categories in (15).

(15)

	V+	V−
N+	adj	noun
N−	verb	prep

The notion of functional categories that Netter introduces is intended to reflect the syntactic properties of minor categories like determiners and complementizers, but also extends to morphological and structural properties of lexical categories.[37] Due to this wide conception of categorial properties, lexical categories may besides their MAJOR specification bear functional (MINOR) features if they exhibit functional properties. This leads to the definition of an abstract category type *cat*, which may bear MAJOR and MINOR specifications.

(16)
$$\begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{MAJOR} \left[\ldots \right] \\ \text{MINOR} \left[\ldots \right] \end{bmatrix} \\ cat \end{bmatrix}$$

Genuine functional categories form a closed class (determiners and complementizers) and differ from lexical categories by characteristic properties that lead to the definition of the category type *func-cat* in (20):

(a) They obligatorily select one and only one complement, the categorial status of which is fixed by the type of functional category in question. The complement selection is not subject to lexical variation as it is the case for lexical categories: determiners take one nominal argument, complementizers take one verbal complement.[38]

(b) Moreover, Netter observes that "a phrase headed by a functional head often occurs in the same structural environment as a phrase headed by the corresponding substantive head." (Netter(1994:14)) This property will be rendered by the definition of 'Functional Complementation':

[37] Netter mentiones functional characteristics of lexical categories like e.g. analytical vs synthetic comparative forms, declension classes of adjectives, nouns and determiners, as well as the verb second phenomenon.

[38] Whereas in the GB framework, functional categories may recursively embed functional projections, Netter defines functional categories to select a projection of a lexical category. In the following, since we are concerned with an analysis of German sentence structure, we will assume a non-recursive functional embedding, too, but want to be open to this question, especially wrt. languages allowing complementizer introduced V2 sentences, such as e.g. Yiddish.

(17) Functional Complementation:
In a lexical category of the type *func-cat* the value of its MAJOR attribute is token identical with the MAJOR value of its complement. (Netter,1994:15).

(c) It is further observed that the "saturation of subcategorization requirements does not always suffice to define a maximal projection" (Netter(1994:14)). Together with

(d) ".. the (possible) restriction that a functional category must not occur more than once in a phrase" (Netter(1994:14)), this leads to the assumption of the "Functional Completeness Constraint" (18), reminiscent of the "Condition on Functional Licensing" in Haider(1993):

(18) Functional Completeness Constraint:
Every maximal projection is marked as functionally complete in its MINOR feature.

In order to mark a structure as "functionally complete", Netter introduces the binary attribute FCOMPL(ete) as a MINOR attribute, where the specification FCOMPL − reflects the intuition that the projection of the head element has to be construed with a functional category to build up a functionally complete, wellformed structure.
A functional category, which may fulfill a finite verb's requirement for being functionally 'closed' (FCOMPL −), is itself marked as FCOMPL + in its MINOR attribute.

Accordingly, the type definition *f-compl-cat* characterizes categories that do not need a 'functionally closing' element.

(19) a. $\left[\text{LOC}\left[\text{CAT}\left[\text{HEAD}\left[\text{MINOR}\left[\text{FCOMPL}\ +\right]\right]\right]\right]\right]_{f-compl-cat}$

The type *f-incompl-cat* specifies a category as functionally incomplete, i.e. in general these elements have to be 'functionally completed' by a functional category in order to satisfy the functional completeness constraint(18).

(19) b. $\left[\text{LOC}\left[\text{CAT}\left[\text{HEAD}\left[\text{MINOR}\left[\text{FCOMPL}\ -\right]\right]\right]\right]\right]_{f-incompl-cat}$

The type definition *func-cat* in (20) finally defines functional categories as elements which inherit the lexical category type of their complement by coindexation of the HEAD | MAJOR attributes of the functional head and the complement, subcategorize invariantly for one saturated, but functionally incomplete complement, and are defined as a category of type *f-compl-cat*, which projects to a functionally wellformed, maximal phrase. Since *func-cat* requires its complement to be functionally incomplete, but is itself functionally complete, no recursive embedding of functional categories is admitted by this definition.

(20)

$$\textit{func-cat} = \left[\text{LOC}\left[\text{CAT}\left[\begin{array}{l}\text{HEAD}\left[\text{MAJ}\ \boxed{1}\right] \\ \text{SUBCAT} < \left[\text{LOC}\left[\text{CAT}\left[\begin{array}{l}\text{HEAD}\left[\text{MAJ}\ \boxed{1}\right] \\ \text{SUBCAT}\ \ <>\end{array}\right]\right]\right]_{f-incompl-cat} >\end{array}\right]\right]\right]_{f-compl-cat}$$

3.2.2 Verb Second as Functional Closure

With the apparatus of functional categories Netter(1994) provides for, we are in a position to revise the HPSG analysis of K/W by transposing rather directly the ideas we found in the V2 analysis of Haider(1993) into HPSG terms. This move has two objectives. First, it allows us to improve the K/W analysis in all aspects that were mentioned to be problematic above. This will prove the notion of functional categories to be advantageous. And second, the formally precise HPSG analysis we obtain from this 'transposition' will allow us to make clear the problematic aspects of the formal representation of verb movement in both the HPSG and the GB framework.

Finite verbs, the argument goes in Haider(1993), are functionally marked and therefore need to be functionally licensed in German, a V2 language. Functional licensing may be accomplished by a complementizer, a functional category, that takes the finite VP as its complement, or it may be accomplished by the finite verb itself, which has to be realized in a derived, functional position (F^o), which again takes a finite VP - this time projecting down to its own verb trace - as its complement.

Netters concept of functional completeness (18) is stated in HPSG by a type definition *max-cat* that constrains functionally wellformed maximal phrases to be saturated and f-complete:

(21) Constraint on functionally complete maximal phrases:

$$\left[\begin{array}{l} \text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\left[\begin{array}{l}\text{MAJOR}\left[\ldots\right]\\ \text{MINOR}\left[\text{FCOMPL}\ +\right]\end{array}\right]\\ \text{SUBCAT}\ \ <>\end{array}\right]\end{array}\right]\\ max-cat\end{array}\right]$$

Finite verbs, as functionally marked elements, bear the specification VFORM fin in the MINOR HEAD attribute. The requirement of functional licensing that - following Haiders generalization - holds in V2 languages, can then be encoded in the lexical entry of the finite verb by the specification FCOMPL $-$ in the MINOR attribute. If the constraint (21) is operative, this enforces the finite verb projection to be realized as a complement to a functional category, which projects by definition to a functionally complete category (see (20)). The specification of finite verbs as functionally incomplete can be introduced by a lexical rule operative in V2 languages (22):

(22) Lexical rule: Functional marking and licensing condition in V2 languages:

$$\left[\text{LOC}\left[\text{CAT}\ \left[\text{HEAD}\ \left[\text{MINOR}\left[\text{VFORM}\ \ fin\right]\right]\right]\right]\right]$$

$$\Rightarrow$$

$$\left[\text{LOC}\left[\text{CAT}\left[\text{HEAD}\left[\text{MINOR}\left[\text{FCOMPL}\ -\right]\right]\right]\right]\right]$$

In sum, Haiders generalization (4) of Section 2 can be transposed into the HPSG framework by the characterization of finite verbs as functionally incomplete (22), the constraint on functionally complete maximal phrases (21), and the type definition of functional categories, which take functionally incomplete projections as arguments and project themselves to functionally complete maximal phrases of identical MAJOR category (20).

There are two alternative ways by which a finite verb projection may ultimately satisfy the condition of functional licensing (21):
The projection of the finite verb can be realized as a complement to the complementizer, which is characterized as a functional category *func-cat*. It subcategorizes for one, functionally incomplete complement with identical, verbal MAJOR attributes, and projects to a maximal, f-complete category with the MINOR specification CFORM dass.

(23)

$$\left[\begin{array}{l}\text{PHON} < \textit{dass} > \\ \text{S}\left[\text{L}\left[\text{C}\left[\begin{array}{l}\text{HEAD}\left[\begin{array}{l}\text{MAJ}\ \boxed{1}\begin{bmatrix}\text{V} & + \\ \text{N} & -\end{bmatrix} \\ \text{MIN}\begin{bmatrix}\text{FCOMPL} & + \\ \text{CFORM} & \textit{daß}\end{bmatrix}\end{array}\right] \\ \text{SUBC} < \left[\text{LOC}\left[\text{CAT}\left[\begin{array}{l}\text{HEAD}\left[\begin{array}{l}\text{MAJ}\ \boxed{1} \\ \text{MIN}\begin{bmatrix}\text{FCOMPL} & - \\ \text{VFORM} & \textit{fin}\end{bmatrix}\end{array}\right] \\ \text{SUBCAT} <>\end{array}\right]\right]\right] >\end{array}\right]\right]\right]\end{array}\right]$$

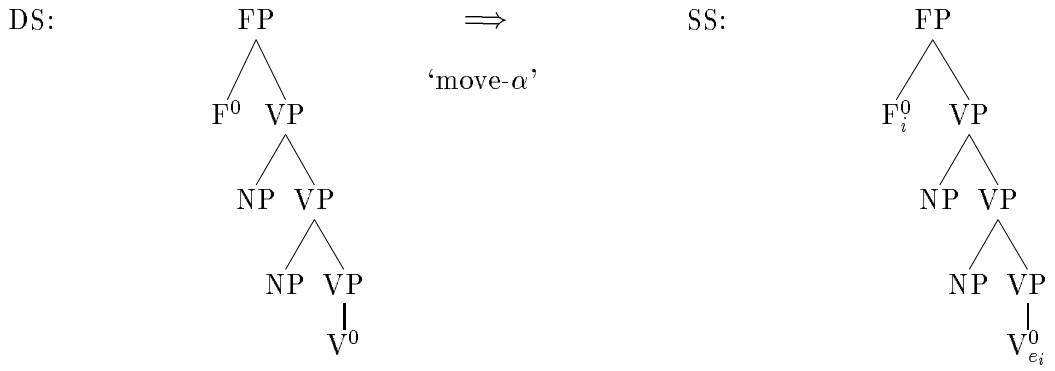
In order to fulfill the constraint on functionally wellformed phrases in sentential structures lacking a complementizer, according to Haiders theory the finite verb itself has to realize in a functional head position, i.e. as an instance of a functional category, thereby licensing the functionally marked finite VP. Two options are available to transpose Haiders intuition into an HPSG analysis of V2.

But before we can illustrate these alternatives, we have to clarify our understanding of the terms 'movement' and '(non)local dependency'.

3.2.3 'Move-α', Lexical Rules and Levels of Representation

The classical GB architecture is characterized by separate levels of representation, related by the relation move-α.

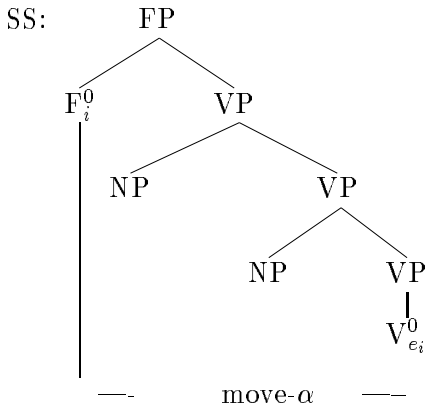
(24) Move-α in a multilevel representation of syntactic structure



Another, less orthodox conception of move-α is to stick to a one-level representation view of syntactic structure, i.e. to use 'movement' as a metaphor. On this view, the D-structure is not taken into account as the input structure for move-α, rather the base position of

moved constituents is read off the S-structure directly, by looking at coindexed (empty) constituents at S-structure.

(25) Move-α in a one-level representation of syntactic structure



In (26) we define new lexical rule for V2, enriched by functional notions, which parallels the classical GB-architectural view of move-α depicted in (24). The input structures of both (24) and (26) specify a functionally marked or incomplete finite verb that is (able to appear) in the final sentence position, whereas the output structures define the functionally complete finite verb as (able to show up) in the sentence initial functional head position, related to a trace in the VP by a structure sharing or coindexing device. What remains mysterious in both relations is the formal status of the move-α relation or lexical rule itself as instances of a structure transforming operation.[39]

(26) Lexical Rule for V2 as Functional Closure:

$$\left[\begin{array}{l}\text{SYNSEM}\left[\begin{array}{l}\text{LOC}\ \boxed{3}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\ \boxed{1}\left[\begin{array}{l}\text{MAJOR}\ \boxed{4}\begin{bmatrix}\text{V}&+\\ \text{N}&-\end{bmatrix}\\ \text{MINOR}\begin{bmatrix}\text{FCOMPL}&-\\ \text{VFORM}&\boxed{5}fin\end{bmatrix}\end{array}\right]\\ \text{CONTENT}\ \boxed{2}\end{array}\right]\end{array}\right]\end{array}\right]$$

$\Rightarrow$

$$\left[\begin{array}{l}\text{SYNSEM}\left[\begin{array}{l}\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\begin{bmatrix}\text{MAJOR}&\boxed{4}\\ \text{MINOR}&\begin{bmatrix}\text{FCOMPL}&+\\ \text{VFORM}&\boxed{5}fin\end{bmatrix}\end{bmatrix}\\ \text{SUBCAT}\ <\left[\begin{array}{l}\text{LOC}\left[\text{CAT}\begin{bmatrix}\text{HEAD}&\boxed{1}\\ \text{SUBCAT}&<>\end{bmatrix}\right]\\ \text{NON-LOC}\left[\text{INHER}\left[\text{DSL}\ \{\boxed{3}\}\right]\right]\end{array}\right]>\\ \text{CONTENT}\ \boxed{2}\end{array}\right]\\ \text{NON-LOC}\left[\text{TO-BIND}\left[\text{DSL}\ \{\boxed{3}\}\right]\right]\end{array}\right]\end{array}\right]$$

But besides the purely mathematical status of such structure transforming operations, other aspects of formal representation have to be considered, which are concerned with

[39]The problem of the formal properties of lexical rules in HPSG has been addressed by Pollard in a talk held at the SFB conference, October 1993, Stuttgart University.

linguistic representation.

Of course, the analogy between (24) and (26) is not perfect. The lexical rule (26) differs from the classical move-α relation by the general perspective HPSG takes wrt. the architecture of grammar. Whereas in the classical GB account the move-α relation relates full-fledged D- and S-structures,[40] the lexical rule (26) does not relate two fully elaborated syntactic structures, but applies to the (full-fledged) lexical entry of a finite verb, which may be used to create a verb final sentence structure, to produce a new lexical entry, which can be independently used to build a verb initial structure. Insofar, the lexical rule comes down to a disjunctive verb definition at the lexical level.

Note however, that the lexical rule (26) refers back to the input structure in defining the output lexical structure by coindexing the LOC value that defines the element in DSL with the LOC value [3] of the input lexical structure.[41] This amounts to a definition of the 'trace' that occupies the head position of the VP in V2 structures as being dependent on the LOCal structure that characterizes the overt finite verb that 'normally' occupies this position in verb final structures. So, although by application of the lexical rule we end up with a disjunctive definition of lexical entries for verb final vs verb initial structures, the definition of the verb initial structure is 'dependent' on the verb final structure in carrying over the LOCal specification that characterizes the overt verb in final position to the definition of the empty element that heads the VP in V2 sentences. More specifically, it is the lexically determined properties of subcategorization and content, as well as the functional status as a functionally marked but incomplete syntactic element which are 'carried over' via the lexical rule to the verb trace definition in DSL.
To illustrate, the lexical rule (26), which defines the verb initial lexical structure by coindexing with the lexical entry for verb final sentences, is stronger than a strictly disjunctive definition of verb initial and verb final lexical entries, illustrated in (27.a) and (27.b).

(27) a. Lexical entry for verb final structure:

$$\left[\begin{array}{l}\text{SYNSEM}\left[\begin{array}{l}\text{LOC}\left[\begin{array}{ll}\text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \left[\begin{array}{ll}\text{MAJ} & \left[\begin{array}{ll}\text{V} & + \\ \text{N} & -\end{array}\right] \\ \text{MIN} & \left[\begin{array}{ll}\text{FCOMPL} & - \\ \text{VFORM} & \mathit{fin}\end{array}\right]\end{array}\right] \\ \text{SUBCAT} & < \text{NP}_{[x]}, \text{NP}_{[y]} >\end{array}\right] \\ \text{CONT} & \left[\begin{array}{ll}\text{REL} & \mathit{relation} \\ \text{ARG1} & x \\ \text{ARG2} & y\end{array}\right]\end{array}\right]\end{array}\right]\end{array}\right]$$

[40] Notice that the wellformedness constraints that are defined for D-structure mustn't exclude the finite verb in base position to be functionally unlicensed in (24).

[41] Moreover, the definition of the content attribute of the output lexical structure [2] makes use of the input definition via the coindexing of DSL with [3], which contains [2].

(27) b. Lexical entry for verb initial structure:

$$\left[\begin{array}{l}
\text{S}\left[\begin{array}{l}
\text{L}\left[\begin{array}{l}
\text{C}\left[\begin{array}{l}
\text{H}\left[\begin{array}{l}\text{MAJ}\begin{bmatrix}\text{V} & + \\ \text{N} & -\end{bmatrix} \\ \text{MIN}\begin{bmatrix}\text{FC} & + \\ \text{VF} & \textit{fin}\end{bmatrix}\end{array}\right] \\
\text{SC} \quad < \left[\begin{array}{l}\text{L}\left[\text{C}\left[\begin{array}{l}\text{H}\left[\begin{array}{l}\text{MAJ}\begin{bmatrix}\text{V} & + \\ \text{N} & -\end{bmatrix} \\ \text{MIN}\begin{bmatrix}\text{FC} & - \\ \text{VF} & \textit{fin}\end{bmatrix}\end{array}\right] \\ \text{SC} \quad <>\end{array}\right]\right] \\
\text{N-LOC} \left[\begin{array}{l}\text{INH} \left[\begin{array}{l}\text{DSL} \ \{ \boxed{3} \left[\begin{array}{l}\text{C}\left[\begin{array}{l}\text{H}\left[\begin{array}{l}\text{MAJ}\begin{bmatrix}\text{V} & + \\ \text{N} & -\end{bmatrix} \\ \text{MIN}\begin{bmatrix}\text{FC} & - \\ \text{VF} & \textit{fin}\end{bmatrix}\end{array}\right] \\ \text{SC} \quad < \text{NP}_{[x]}, \text{NP}_{[y]} >\end{array}\right] \\ \text{CONT} \ \boxed{2}\begin{bmatrix}\text{REL} & \textit{relation} \\ \text{ARG1} & x \\ \text{ARG2} & y\end{bmatrix}\end{array}\right] \ \}\end{array}\right]\end{array}\right] \\
\text{CONT} \ \boxed{2}
\end{array}\right] \\
\text{N-LOC}\left[\text{TO-BIND}\left[\text{DSL} \ \{ \boxed{3} \}\right]\right]
\end{array}\right] \quad >
\end{array}\right]$$

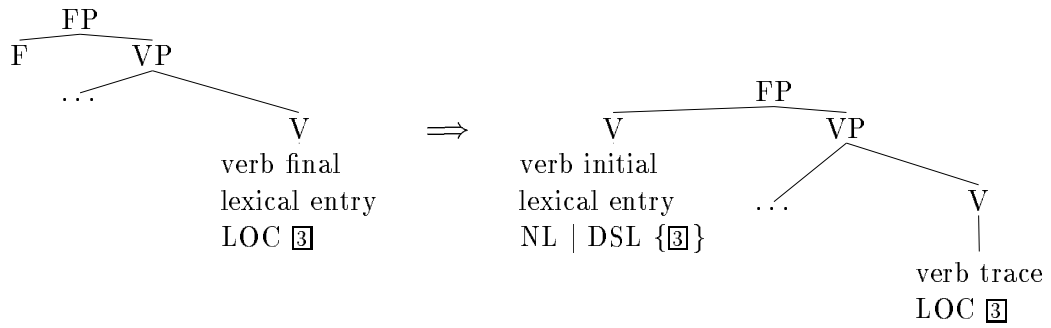
The fact that the partial structure indexed with 3 in (27.b) is identical to the LOC value in (27.a) cannot be guaranteed by pure coindexing in a disjunctive definition: If the second disjunct in (28) is used in a syntactic analysis, the value of 1 is undefined. Therefore, the identity of 3 in (27.a) and (27.b) could only be accidental without usage of the lexical rule (25).

(28) $$\left[\text{A} \ \boxed{1} \begin{bmatrix}\text{B} & \ldots \\ \text{C} & \ldots \\ \text{D} & \ldots\end{bmatrix}\right] \quad \vee \left[\text{E}\left[\text{F}\left[\text{G} \ \{ \boxed{1} \}\right]\right]\right]$$

To sum up, modulo the overall grammar architecture, the lexical rule (26) in the HPSG framework parallels the move-α relation depicted in (24). While the GB-analysis of move-α relates two fully elaborated syntactic structures, the HPSG analogon for V2 movement, the lexical rule (26), operates on the fully elaborated lexicon entry that 'defines' a verb final sentence structure and derives a new lexical entry that 'defines' a verb initial structure involving a local dependency relation with a verb trace in the 'base' position of the VP.

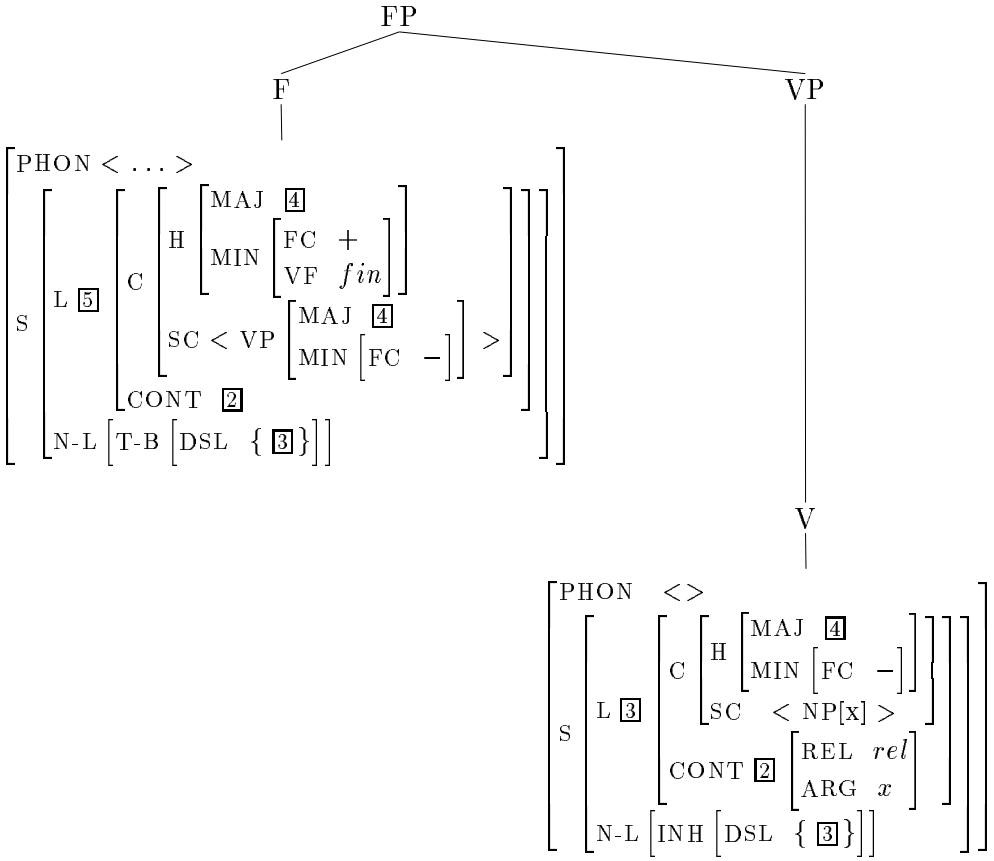
The fact that the LOCAL value of the verb final entry is taken over to define the verb trace in the verb initial lexical entry (see (29)) is decisive for the definition of the 'V2 dependency relation' in the lexical rule for V2, as shown above.

(29)



In the GB framework, verb movement is represented by coindexing the antecedent verb with the empty category in the head position of VP (25). But it is not clear, what this coindexation comes down to in a formal representation of verb movement. Besides the constraint that antecedent and trace are to be identical in categorial status, no general formal restrictions are defined for chains of coindexed categories.
Therefore, it is interesting to note that in the formally explicit dependency relation for V2 defined in the lexical rule (26) the LOCal representation structures of antecedent and trace differ substantially.

(30)



The verb initial lexical entry is characterized as a functionally complete category, it subcategorizes a finite VP and does not define its content by its 'own force', but inherits the content value from the LOC value contained in the DSL attribute (or the verb final input structure, respectively).
The verb trace is instead identical to the verb final lexical entry. It subcategorizes for a number of lexically determined syntactic arguments, it defines a semantic relation the arguments of which are projected from the semantic content of the subcategorized arguments, and it is finally marked as a functionally incomplete category that demands to be governed by a functional category, here the antecedent verb that is 'raised' to a functional category. The only way to reconcile these differing properties is by keeping distinct the LOC value that defines the local structure of the trace [3], and the LOC value of the raised verb in the functional head position [5] (see (30)). This is possible in the HPSG framework of syntax by the division between local and non-local attributes: the 'raised' verb binds in its nonlocal attribute DSL a local structure, its own trace, that bears differing properties.

To summarize, if we take seriously the analysis of V2 as a (non)local dependency relation, where the properties which define the finite verb in a verb final structure are assumed to be identical to those of the verb trace in a verb initial structure, and where nonetheless the antecedent verb is defined to bear diverging properties, we have to use a representation for the dependency between antecedent and trace that keeps distinct the structures that define their inherently different 'local' properties. In the HPSG framework this is solved by distinguishing between the local and nonlocal attributes, in a formal representation of the GB analysis, a similar separation of information structure would be needed.

3.3 Evaluation of the Analysis

Before we return to the open problems of the original HSPG analysis of K/W we discussed above, we want to illustrate the close analogy of the revised analysis, enriched by functional notions, with the GB analysis presented in Haider(1993).

Haiders analysis of German sentence structure involves the assumption of one single functional projection that takes a VP as its complement, together with the V2 property holding in German, which demands functionally marked syntactic elements, as e.g. finite verbs, to be functionally licensed. Functional licensing was defined to be effected by a functional head taking as its complement the projection of the item that demands functional licensing.
Taken together, the basic assumptions about sentence structure, the V2 property and the conditions on empty elements (see p. 17) 'trigger' verb movement in non-embedded sentences.

Our revised HPSG analysis of V2 is closely parallel to Haiders GB analysis:
The definition of functional categories (20), taken over from Netter(1994), restricts the German sentence structure to exhibit only one functional projection. The functional head, subcategorizing for an f-incomplete complement projects itself to an f-complete constituent. Therefore, no recursive functional embeddings are licensed.
The V2 property and functional licensing condition stated in Haider(1993) are transposed into the HPSG analysis by a lexical rule for functional marking and functional licensing (22), which operates over finite verbs in V2 languages and introduces the functional attribute FCOMPL −, which marks these verbs as functionally incomplete. Again, together

with the functional licensing condition for functionally wellformed (i.e. f-complete) maximal constituents in V2 languages, this triggers 'verb movement' to occur in non-embedded sentences:
If the functional licensing condition (21) is operative in a V2 language, the finite verb, defined as functionally incomplete by (22) can only project to a wellformed maximal category if it is subcategorized by a functional head, thereby being projected to a functionally complete category, bearing identical major head features and content specifications.

In a subordinated sentence, functional licensing of the finite verb projection is automatically effected by the complementizer, a functional category. The finite verb is obligatorily realized in the final VP position to satisfy the subcategorization requirement of the functional head, which can only take an f-incomplete complement. Thus, the complementarity of the complementizer and V2 structure in embedded sentences follows immediately. In non-embedded sentences, which (standardly) lack a complementizer to instantiate the functional head position, the constraint on functional licensing is not satisfied if the verb is realized as a functionally incomplete category in the final VP position. Only by application of the lexical rule for V2, the verb 'raises' to a functional(ly complete) category, satisfying (21). Thus, the conditions (21) and (22) account, parallel to Haiders analysis, for 'verb movement' to occur obligatorily in non-embedded finite sentences.

Moreover, by integrating the notion of functional categories as elaborated in Netter(1994) into the K/W account of V2 as a lexical rule, several drawbacks of the latter analysis, discussed above, do vanish:

As illustrated on p. 35, despite the differentiation of two types of head categories, *v-head* and *c-head*, it was not possible to account for the complementarity of complementizer and verb initial position (31). The analysis of the complementizer as a functional category bans these structures since functional categories are defined to subcategorize a functionally incomplete verb projection. This prevents the finite verb in (31) from undergoing the lexical rule for V2. It would end up as a functionally complete category, which is not wellformed as a complement of the complementizer.

(31) a. * daß kauft Peter das Buch.
b. * daß Peter kauft das Buch.

The problematic data in (32), which could not be excluded in the K/W analysis, are unproblematic with the condition on functionally complete maximal projections, as illustrated above. The verb final projections in (32) are functionally incomplete, since neither a complementizer nor the finite verb itself instantiates as a functional category in order to effect functional licensing or the finite VP. Instead, the constraint on functionally complete phrases ensures obligatory verb movement in sentential finite structures lacking a complementizer.

(32) a. * Peter nach Hause kommt.
b. * Maria glaubte, Peter ein Buch kaufe.

Furthermore, the analysis is superior to the analysis in K/W in that the linear precedence constraints ensuring the topological data of the German sentence structure can now be formulated in more generality by referring to the concept of lexical vs functional categories:
The serialization of head and complements is a language specific parameter, dependent on

the lexical category of the head: In German, verbs and adjectives [V +] take their complements to the left, while nouns and prepositions [V −] take their complement to the right. Following Haider(1993,Ch.2), we take functional categories (determiners, complementizers and the verb in initial position) to select their complement to the right.
The differentiation between f-complete vs f-incomplete categories together with the categorial distinction [V +] vs [V −] allows a general definition of the constituent ordering principles in head-complement structures (33). Since the finite verb in the initial vs final position is now distinguished by the functional completeness property, the problem of the conflicting precedence constraints the proposal of K/W was confronted with doesn't arise any more: f-incomplete verbal categories select their complements to the left, whereas f-complete verbal categories select their complement to the right, as do f-complete categories in general.

(33)

precedence constraints on head-comp-struc		category	examples
C > H [MAJOR [V +]		V	Peter das Buch kauft
MINOR [FCOMPL -]]		A	seinem Beruf treu
H [MAJOR [V -]	> C	N	Antwort auf seine Frage
MINOR [FCOMPL -]		P	auf seine Frage
H [FCOMPL +]	> C	C	daß Peter das Buch kauft
		V	kauft Peter das Buch
		D	die Antwort

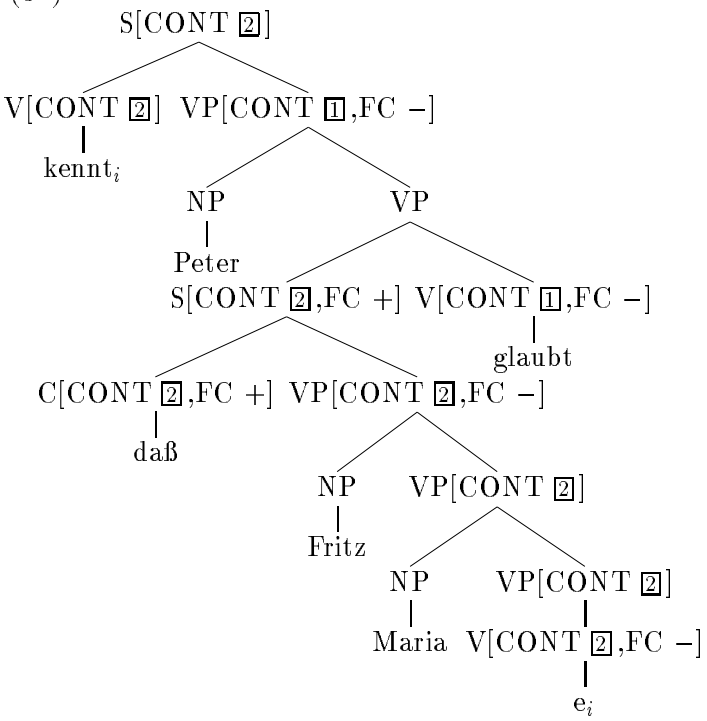
Whereas these improvements are all ultimately based on the concept of functional categories, another serious problem for the analysis in K/W, the locality restriction on verb movement, is not solved by the introduction of purely syntactic functional notions. The relevant example (7) is still not excluded by our functional version of the lexical rule for V2:

(7) * Peter$_j$ kennt$_i$ e$_j$ glaubt, daß Maria Fritz e$_i$.

The lexical entry for 'kennt'[42], obtained by application of the lexical rule for V2, satisfies the requirement to project to a functionally complete sentential projection for the matrix sentence. It subcategorizes for a saturated verbal f-incomplete projection that is specified for a non-local inherited DSL value (3), which is also the source for the content definition of 'kennt' (2). Nothing enforces this DSL value to be introduced (by a trace) in the local VP complement of 'kennt'. Since no independent restrictions on the percolation of slash attributes are stated, we can instead introduce the f-incomplete finite verb 'glaubt' in the VP, which discharges its own arguments, and instantiate the DSL value 3, bound by 'kennt', by a trace in the finite sentential complement of 'glaubt', which, being introduced by a complementizer, is perfectly compatible with the LOCal head, subcategorization, and content specifications as they are defined for 3. The subcategorized arguments for this local structure are properly discharged, the semantic content gets projected accordingly, so all seems fine.
The representation in (33) shows the relevant aspects of the analysis of (7). We see that the semantic content of the embedded sentence (2) gets duplicated and 'raised' to the func-

tional projection of the matrix sentence, while the semantic content projected by 'glaubt' (1) does only project to the level of the finite VP.

(34)[43]



But it is easy to see how we can solve this problem: The definition of functional categories in (20) is not complete in that the semantic representation is not taken into account. If e.g. the content projected by the VP of an embedded sentence is to be combined with the meaning of the governing verb, due to locality restrictions of subcategorization, it must be projected to the maximal level of the functional projection closing the embedded sentence. Therefore, we have to complete the definition for functional categories by a content inheritance property: a functional category inherits the content of its complement.

---

[42]

$$\left[\begin{array}{l}\text{PHON} \ \ <kennt> \\ \text{S}\left[\begin{array}{l}\text{L}\left[\begin{array}{l}\text{C}\left[\begin{array}{l}\text{H}\left[\begin{array}{l}\text{MAJ} \ \ verb \\ \text{MIN}\left[\begin{array}{l}\text{FC} \ \ + \\ \text{VF} \ \ fin\end{array}\right]\end{array}\right] \\ \text{SC} \ \ < \left[\begin{array}{l}\text{L}\left[\text{C}\left[\begin{array}{l}\text{HEAD}\left[\begin{array}{l}\text{MAJ} \ \ verb \\ \text{MIN}\left[\begin{array}{l}\text{FC} \ \ - \\ \text{VF} \ \ +\end{array}\right]\end{array}\right] \\ \text{SC} \ \ <>\end{array}\right]\right] \\ \text{N-L}\left[\text{INH}\left[\text{DSL}\{\ \boxed{3}\ \left[\begin{array}{l}\text{C}\left[\begin{array}{l}\text{H}\left[\begin{array}{l}\text{MAJ} \ \ verb \\ \text{MIN}\left[\text{FC} \ \ -\right]\end{array}\right] \\ \text{SC} \ \ <NP, NP>\end{array}\right] \\ \text{CONT} \ \boxed{2}\left[\begin{array}{l}\text{REL} \ \ kennen \\ \text{ARG1} \ \ x \\ \text{ARG2} \ \ y\end{array}\right]\end{array}\right]\ \}\right]\right]\end{array}\right] > \\ \text{CONT} \ \boxed{2} \\ \text{N-L}\left[\text{INH}\left[\text{DSL} \ \{\ \boxed{3}\ \}\right]\right]\end{array}\right]\end{array}\right]$$

[43] We again abstract away from extraposition in our syntactic analysis.

(35)
$$\left[\begin{array}{l}\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\left[\begin{array}{l}\text{MAJ}\ \boxed{1}\\ \text{MIN}\left[\text{FCOMPL}\ +\right]\end{array}\right]\\ \text{SUBCAT}\ <\left[\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\left[\begin{array}{l}\text{MAJ}\ \boxed{1}\\ \text{MIN}\left[\text{FCOMPL}\ -\right]\end{array}\right]\\ \text{SUBCAT}\ <>\end{array}\right]\\ \text{CONT}\ \boxed{2}\end{array}\right]\right]>\\ \text{CONT}\ \boxed{2}\end{array}\right]\\ \textit{func-cat}\end{array}\right]$$

Since the output of the lexical rule for V2 defines a functional category, the definition of the lexical rule has to be adjusted accordingly:

(36) Lexical Rule for V2 as functional closure: (revised)

$$\left[\begin{array}{l}\text{SYM}\left[\begin{array}{l}\text{LOC}\ \boxed{3}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\ \boxed{1}\left[\begin{array}{l}\text{MAJ}\ \boxed{4}\left[\begin{array}{l}\text{V}\ +\\ \text{N}\ -\end{array}\right]\\ \text{MIN}\left[\begin{array}{l}\text{FCOMPL}\ -\\ \text{VFORM}\ \boxed{5}\textit{fin}\end{array}\right]\end{array}\right]\\ \text{CONT}\ \boxed{2}\end{array}\right]\end{array}\right]\end{array}\right]$$

$\Rightarrow$

$$\left[\begin{array}{l}\text{SYM}\left[\begin{array}{l}\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\left[\begin{array}{l}\text{MAJ}\ \boxed{4}\\ \text{MIN}\left[\begin{array}{l}\text{FCOMPL}\ +\\ \text{VFORM}\ \boxed{5}\textit{fin}\end{array}\right]\end{array}\right]\\ \text{SUBC}\ <\left[\begin{array}{l}\text{LOC}\left[\begin{array}{l}\text{CAT}\left[\begin{array}{l}\text{HEAD}\ \boxed{1}\\ \text{SUBC}\ <>\end{array}\right]\\ \text{CONT}\ \boxed{2}\end{array}\right]\\ \text{N-LOC}\left[\text{INH}\left[\text{DSL}\ \{\ \boxed{3}\ \left[\ldots\text{CONT}\ \boxed{2}\right]\}\right]\right]\end{array}\right]>\\ \text{CONT}\ \boxed{2}\end{array}\right]\\ \text{N-LOC}\left[\text{TO-BIND}\left[\text{DSL}\ \{\ \boxed{3}\}\right]\right]\end{array}\right]\end{array}\right]$$

If we now reconsider the analysis sketched in (34), we see that it is no longer available: the new definition for the verb in initial position demands its content value to be 'projected' from its locally subcategorized VP complement. But by the coindexation with the content value in the DSL attribute, the content of the raised verb is now incompatible with the content defined by the verb 'glauben' in the matrix VP.

The interesting fact about the improvement that results from the correct definition of the syntax-semantics interface for functional categories is that a phenomenon that is generally considered to be strictly syntactically determined – the locality restriction of head movement – falls out in our analysis by the interaction of syntactic and semantic representation. In section 4, we will present an alternative analysis of V2, which - besides the semantic projection properties of functional categories - gives a syntactic explanation for the locality restriction of verb movement.

Criteria (a) and (b):
Complementarity of Complementizer and V2 and Inflected Complementizers

The complementarity of the complementizer and a verb in initial position, which could not be accounted for in the approach of Kiss/Wesche(1991), is now covered by the fact

that a complementizer and a finite verb in initial position are alternative ways of satisfying the constraint on functional completeness, together with the fact that a functional category, which serves this purpose, may not recursively embed another functional, f-complete category. Thus, complementizer introduced sentences like (37) qualify as ungrammatical[44]

(37) * daß Peter kauft ein Buch.

However, we still have no convincing explanation for the fact that in some dialects of German, as in Bavarian, a complementizer may bear verbal inflectional morphology.
One may argue that what the complementizer and the 'raised' finite verb have in common is the status as a functionally complete verbal category, and that the copresence of the verbal category feature and the specification of functional completeness justifies the realization of the typical functional features associated with verbal categories, i.e. verbal inflectional morphology. But this hypothesis leaves more questions open than it answers: If functional completeness of a verbal category 'triggers' inflectional marking, how comes that the functionally incomplete verb in the final VP position is inflected? Moreover, even if the argument would hold, if the agreement features of the finite verb are represented in the MINOR attribute (as is generally assumed), they are not inherited by the complementizer. The agreement of person and number features of the complementizer and the verb in final position is then still mysterious.

Criteria (d) and (c): V2 as a Derived Position and the Structure of the Mittelfeld

As to criteria (d) and (c), since the present analysis sticks to a representation of the V2 phenomenon as a derivational, local dependency structure, the same remarks are in order that were already stated wrt. the analysis of K/W. The derivational analysis provides an explanatory basis for phenomena such as verbal scope and verb ellipsis in coordination, as well as the intricate problem of separable verb prefixes.
As was shown above, the introduction of functional notions also allows a more explanatory analysis of the overall topological data of German sentence structure.

Criteria (f), (g), (h) and (i): Subordination, Asymmetric Coordination, Specifiers and Verb Non-movement

We mentioned in passing above that the present analysis may make use of a type differentiation between verb initial and complementizer introduced verb final sentences. This is not very different from the analysis provided in Kiss(1992), yet it has been argued that an analysis that refers only to categorial distinctions cannot provide a satisfactory account for the data involved in criteria (f) - (i). Instead, we argued, reference to semantic notions and the interaction of syntactic and semantic conditions is necessary to get hold of the data covered by criteria (h) and (i). We will confront these questions again in Section 4.

To conclude, we presented an analysis of German sentence structure that accounts for the V2 phenomenon by means of a structure transforming lexical rule (Kiss/Wesche(1991)). The deficiencies of this analysis could be overcome by integrating into the analysis the notion of functional categories along the lines of Netter(1994) and resulted in an analysis that

[44] Languages like Yiddish, which do not exhibit this complementarity, may be covered by another, language specific definition of functional categories of type *c-head*, which requires the complement to be functionally complete, thereby enforcing the embedded V2 structure.

was shown to be closely related to the GB analysis of V2 in Haider(1993). The evaluation of this new analysis proved it to cover more phenomena in a more explanatory way. One surprising result of the revised HPSG analysis of V2 is that the putatively syntactic locality restriction of verb movement, which couldn't be covered by a purely syntactic notion of functional categories, falls out if we take into account the interaction of syntactic and semantic representation for functional categories.

4 An HPSG Analysis of V2: V2 by Underspecification

We have seen in the preceding section that it is possible to give a formally precise representation of the concept of verb movement as it is conceived in the GB framework, by transposing the relevant aspects of the GB analysis into an HPSG-style analysis.
We discussed the equivalence of the analysis of Haider(1993) with the HPSG analysis stated in section 3, and discussed the formal aspects involved in a structure transforming process like 'movement' or its HPSG analogon, a lexical rule.

Under the conception of V2 as a derivational structure, i.e. involving a local dependency relation, several intricate problems were argued to necessitate a disjunctive representation of the verbal categories involved in this local dependency relation, which ascribes differing properties to the antecedent verb in initial position and its own trace in the 'base' position of the VP:

The finite verb differs in its categorial status depending on its structural position: it may realize in the final position as a functionally incomplete category that needs functional licensing, or as a functional(ly licensing) category if it occupies the sentence initial, functional head position. Consequently, the verb trace, which occupies the verb final position in V2 structures differs in its categorial status from its antecedent.

In this section we want to explore the possibility of an analysis of verb second and German sentence structure that does not refer to a structure transforming device - like the analysis by lexical rule -, but instead makes use of a type hierarchy and of the concept of underspecification in order to capture the differing properties of finite verbs depending on their structural position.

The basic idea is the following. We want to define the finite verb's category in a way that allows it both to fill the head position of the VP for verb final sentences, i.e. to realize as a lexical, functionally incomplete category, or alternatively, to occupy the initial, functional head position of the sentence. Since these alternative realizations require the verb to bear different feature specifications, the lexical entry of the verb must be underspecified wrt. these distinguishing properties. Based on a type hierarchy that defines subtypes of categories, the structural context in which the finite verb appears in the sentence will determine its actual categorial (sub)type.

We first discuss the general problems a V2 analysis by underspecification has to confront. We then revise certain aspects of the analysis presented in section 3, which will enable us to overcome these problems. The major modifications concern the representation of the 'head movement' or V2 dependency relation itself, and the complementation properties of functional vs lexical categories.
Based on this revised analysis, we define the type hierarchy that represents the verb as an instance of the underspecified category type *cat* and illustrate the type inheritance mechanism by which the underspecified verb category gets instantiated to the actual, appropriate verbal subtype depending on and triggered by the structural context the verb appears in.

4.1 The Underspecification Problem for V2

The V2 Lexical Rule (1) comes down to a disjunctive definition of finite verb forms:
The input structure defines the functionally incomplete finite verb in base position, specified for a lexically determined list of subcategorized arguments in SUBCAT. The output structure defines the f-complete functional verb category in second position. It subcategorizes for a single, functionally incomplete verbal complement that is defined to contain a trace in head position (INH | DSL) which gets bound by the verb itself (TO-BIND | DSL), and which bears the same local values that define the verb as it appears in the final position.

(1) Lexical Rule for V2 as functional closure:

$$\left[\begin{array}{l}\text{SYM}\ \left[\begin{array}{l}\text{LOC}\ \boxed{3}\ \left[\begin{array}{l}\text{CAT}\ \left[\begin{array}{l}\text{HEAD}\ \boxed{1}\ \left[\begin{array}{l}\text{MAJ}\ \boxed{4}\ \left[\begin{array}{l}\text{V}\ +\\ \text{N}\ -\end{array}\right]\\ \text{MIN}\ \left[\begin{array}{l}\text{FCOMPL}\ -\\ \text{VFORM}\ \boxed{5}\,fin\end{array}\right]\end{array}\right]\\ \text{CONT}\ \boxed{2}\end{array}\right]\end{array}\right]\end{array}\right]\end{array}\right]$$

$\Rightarrow$

$$\left[\begin{array}{l}\text{SYM}\ \left[\begin{array}{l}\text{LOC}\ \left[\begin{array}{l}\text{CAT}\ \left[\begin{array}{l}\text{HEAD}\ \left[\begin{array}{l}\text{MAJ}\ \boxed{4}\\ \text{MIN}\ \left[\begin{array}{l}\text{FCOMPL}\ +\\ \text{VFORM}\ \boxed{5}\,fin\end{array}\right]\end{array}\right]\\ \text{SUBC}\ \ <\left[\begin{array}{l}\text{LOC}\ \left[\begin{array}{l}\text{CAT}\ \left[\begin{array}{l}\text{HEAD}\ \boxed{1}\\ \text{SUBC}\ \ <>\end{array}\right]\\ \text{CONT}\ \boxed{2}\end{array}\right]\\ \text{N-LOC}\left[\text{INH}\left[\text{DSL}\ \{\boxed{3}\ \left[\ldots\text{CONT}\ \boxed{2}\right]\}\right]\right]\end{array}\right]>\end{array}\right]\\ \text{CONT}\ \boxed{2}\end{array}\right]\\ \text{N-LOC}\left[\text{TO-BIND}\left[\text{DSL}\ \{\boxed{3}\}\right]\right]\end{array}\right]\end{array}\right]$$

The lexical rule defines differing properties for the overt verb in initial and in final position, as well as for the verb trace in final position, as summmarized in the following overview.

(2)	verb initial	verb final	trace
position	head initial	head final	head final
head type	functional head	lexical head	lexical head
functional status	FCOMPL +	FCOMPL −	FCOMPL −
subcategorization	SUBCAT <VP>	SUBCAT < args >	SUBCAT < args >
content definition	entirely inherited from VP content	lexically det. relation parameters projected from SUBCAT items	lexically det. relation parameters projected from SUBCAT items
'derivational status'	'binder'	'base generated'	'trace'
	INH | DSL empty	INH | DSL empty	INH | DSL nempty
	T-B | DSL nempty	T-B | DSL empty	T-B | DSL empty
	DSL value defined by verb final LOC value		DSL value defined by verb final LOC value

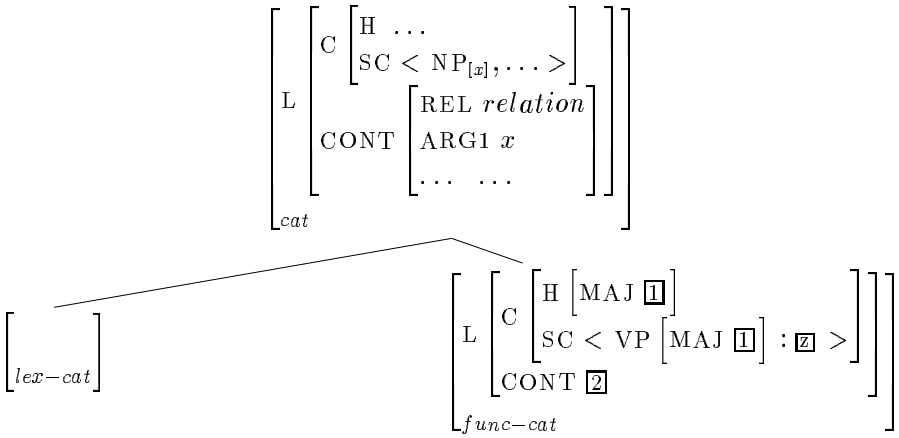
The overt and non-overt verb final structures share most of their defining properties, the only distinctive trait being just their derivational status of 'base generated' vs trace constituent. The verb initial structure, however, differs in almost all aspects from the verb final items: it is different in head type, functional status, subcategorization properties and mode of content definition. On the other hand, it is required to define the properties of its own trace that it binds, and which bears these distinctive properties.

The general idea of an account of underspecification is to define an abstract category type *cat*, which subsumes two distinct subtypes: *lex-cat* for the overt (and non-overt) verb in base position, and *func-cat* for the verb in initial position. The finite verb should then be stated uniquely in the lexicon as a lexical item of type *cat*.

(a) Lexically determined subcategorization and content properties

The main problem we confront here is the differing subcategorization requirements of verb final and verb initial structures: The selectional properties as well as the mapping of the SUBCAT list's arguments' parameters to the argument slots in the CONTENT of the verb are lexically determined and have to be stated in the lexicon, i.e. for the underspecified type *cat*. But the principles of type inheritence do not allow a redefinition of the SUBCAT and CONTENT values in the definition of the subtype *func-cat*, which subcatgorizes a single VP complement and inherits its *entire* CONTENT value from the argument on its SUBCAT list. On the other hand, if we pursue the underspecification account, we are not able to state the lexically determined subcategorization and content properties in the subtype *lex-cat*. This would force us, for one, to state again disjunctive lexical entries, and it would require again a lexical rule or other device that defines the DSL attribute in *func-cat* by referring to the properties defined in *lex-cat*.

(3)



(b) Head 'movement' and functional licensing

The analysis of the local dependency relation for verb initial structures by underspecification confronts us with another substantial problem.
We ignore the subcategorization problem for a moment and try to further specify *func-cat*

by introducing two distinct subtypes, *prim-func-cat* for genuine functional categories and *sec-func-cat* for functional categories that derivationally occupy this position.[45] *sec-func-cat* differs from primary functional categories in defining the DSL | TO-BIND attribute to be nonempty. But note that the definition (5.a) for the verb initial structure is insufficient: The value of the DSL attribute has no connection whatsoever to the LOC value of the finite verb itself, which specifies subcategorization and content properties. Therefore, the LOC value of the trace could represent arbitrary values of the SUBCAT and CONTENT attributes, resulting in ungrammatical sentences like (4).

(4) * kommt Peter ein Buch.

If we chose to coindex the DSL value with the LOC value of the 'antecedent' verb itself (5.b), we are confronted with the problem of verb movement proper: the local values of antecedent and trace differ in their specifications for functional completeness and subcategorization (see overview p. 53).

(5)

$$\left[\begin{array}{l}\text{L}\left[\text{C}\left[\begin{array}{l}\text{H}\left[\begin{array}{l}\text{MAJ } \boxed{1}\\ \text{MIN }\left[\text{FC}+\right]\end{array}\right]\\ \text{SC} < \left[\text{L}\left[\text{C}\left[\text{H}\left[\begin{array}{l}\text{MAJ } \boxed{1}\\ \text{MIN }\left[\text{FC}-\right]\end{array}\right]\right]\right]\right] >\end{array}\right]\right]\\ \textit{func-cat}\end{array}\right]$$

(a)
$$\left[\begin{array}{l}\text{L}\left[\text{C}\left[\text{H}\left[\text{MIN } v-\textit{head}\right]\right]\right]\\ \text{N-L}\left[\text{TO-BIND}\left[\text{DSL } \textit{nonempty}\right]\right]\\ \textit{sec-func-cat}\end{array}\right] \qquad \left[\begin{array}{l}\text{L}\left[\text{C}\left[\text{H}\left[\text{MIN } c-\textit{head}\right]\right]\right]\\ \text{N-L}\left[\text{TO-BIND}\left[\text{DSL } \textit{empty}\right]\right]\\ \textit{prim-func-cat}\end{array}\right]$$

(b)
$$\left[\begin{array}{l}\text{L } \boxed{1}\left[\text{C}\left[\text{H}\left[\text{MIN } v-\textit{head}\right]\right]\right]\\ \text{N-L}\left[\text{TO-BIND}\left[\text{DSL } \{\boxed{1}\}\right]\right]\\ \textit{sec-func-cat}\end{array}\right]$$

4.2 An HPSG Analysis of V2 by Underspecification

The problems for an account by underspecification are inherently related to the distinction between functional and lexical categories: Subcategorization and content projection properties as well as functional properties differ for the two types. In the following subsection, we will introduce a concept of 'valence instantiation', which will enable us to come along with the subcategorization problem (a).

[45] The distinction between primary and secondary realization of functional head categories is made in Haider(1993) and was further elaborated by the SFB A6-'Fragment' project group.

4.2.1 Functional Categories, Subcategorization and Semantics Projection

The subcategorization problem can be solved by a minor revision: If we choose to follow the spirit of 'HPSG-2'[46] in breaking up the SUBCAT specification into a valence representation (SUBJ, COMPS, etc.), we may still keep the original SUBCAT attribute, but now represent it as a HEAD feature (6). An analysis along this line has been shown advantageous for a principled account of the determination of scope restrictions between quantified verb arguments in Frank/Reyle(1992) and is independently needed for the application of the conditions of the HPSG binding theory. As a HEAD attribute, by the Head Feature Principle (HFP), the SUBCAT list will remain unchanged and project to the maximal projection of the phrase, where e.g. the clauses of the binding theory may apply.[47]

(6) Head feature SUBCAT:

$$\begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{MAJOR} \ \textit{major} \\ \text{MINOR} \ \textit{minor} \\ \text{SUBCAT} \ \textit{list} \end{bmatrix} \\ \text{SUBJ} \ \textit{list} \\ \text{COMPS} \ \textit{list} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

On the basis of this new definition of HEAD and Valence features for the abstract category type *cat* we can distinguish the complementation properties of lexical and functional categories by introducing a principle of 'valence instantiation'.

(7) **Valence Instantiation Principle (VIP)**[48]
(a): Lexical categories *lex-cat*

$$\begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \left[\text{SUBCAT} \ \textit{append}(\boxed{1},\boxed{2})\right] \\ \text{LEX} \ + \\ \text{SUBJ} \ < \boxed{1} > \\ \text{COMPS} \ \boxed{2} \end{bmatrix} \end{bmatrix} \\ \textit{lex-cat} \end{bmatrix}$$

(b): Functional categories *func-cat*

$$\begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{MAJ} \ \boxed{1} \ \textit{major} \\ \text{MIN} \ \textit{minor} \\ \text{SUBCAT} \ \textit{list} \end{bmatrix} \\ \text{LEX} \ + \\ \text{SUBJ} \ <> \\ \text{COMPS} \ < \left[\text{MAJ} \ \boxed{1}\right] > \end{bmatrix} \end{bmatrix} \\ \textit{func-cat} \end{bmatrix}$$

[46] Chapter 9 of Pollard/Sag(1993): Reflections and Revisions.

[47] The presence of the complete subcategorization frame at the maximal level of the phrase may also prove desirable for an analysis of ellipsis in coordination structures (e.g. gapping).

[48] Note that VIP is only defined for non-phrasal (LEX +) categories. This restriction ensures that the valence instantiation occurs only once, at the lexical level.

The values of the valence features of lexical categories are lexically determined. This is represented in (7.a) by coindexation of the valence attributes SUBJ and COMPS with the corresponding items on the SUBCAT list. The latter is defined in the lexicon for each verb individually and gets inherited from the abstract category type *cat*.

The complementation properties of functional categories are invariant in that the number and category of the subcategorized argument are not dependent on lexical properties. The categorial type of the argument (NP vs VP) is only dependent on the MAJor attribute of the functional category, not on the lexical item itself. In contradistinction to lexical categories the VIP (b) clause defines the complementation property of functional categories directly in the Valence attribute COMPS without referring to the SUBCAT head attribute. Moreover, this direct encoding allows to state the generalization that functional categories invariantly do not take SUBJects: The type definition sets the SUBJ value to the empty list.

The (independently motivated) decision to represent the SUBCAT list as a HEAD attribute together with the Valence Instantiation Principle allows us to solve the subcategorization problem for an account of V2 by underspecification.

The underspecified category *cat* (8) defines the lexically determined complementation requirements in the HEAD attribute SUBCAT, and defines the mapping of the subcategorized arguments' parameters to the argument slots in the CONTENT attribute.
This abstract category type will be defined to specialize to either a lexical or functional category subtype, which, by application of the Valence Instantiation Principle (VIP), results in the proper instantiation of the valence features (see (8)).

(8) Abstract category type *cat*:

$$\left[\begin{array}{l} \text{LOC} \left[\begin{array}{l} \text{CAT} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \text{MAJ } \textit{major} \\ \text{MIN } \textit{minor} \\ \text{SUBCAT } < \text{NP}_{\boxed{x}}, \ldots > \end{array}\right] \\ \text{LEX } + \end{array}\right] \\ \text{CONT} \left[\begin{array}{l} \text{REL } \textit{relation} \\ \text{ARG1 } \boxed{x} \\ \ldots \quad \ldots \end{array}\right] \end{array}\right] \\ \textit{cat} \end{array}\right]$$

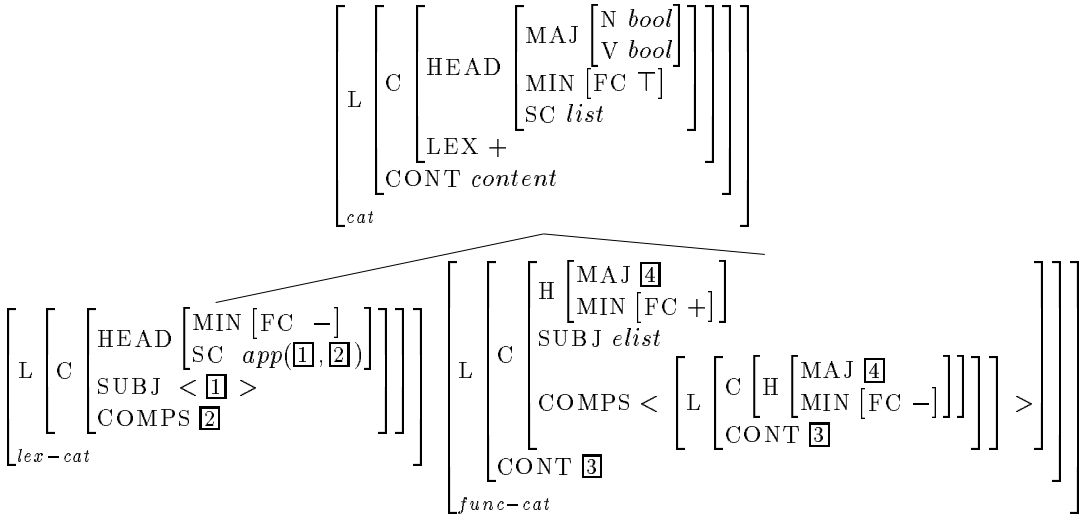
The finite verb can then be stated in the lexicon as an instance of the verbal category type *cat*. If it realizes as an instance of *lex-cat* in base position, the valence features are instantiated, referring to the SUBCAT value, by VIP(a). If it realizes as an instance of *func-cat* in initial position, COMPS gets defined – independently from the HEAD's SUBCAT value – by VIP(b). The lexical entries of genuine functional categories (*func-cat*) like determiners and complementizers only require the definition of the MAJOR and MINOR attributes.

Since the syntax-semantics interface in HPSG maps the semantic content of the elements on the SUBCAT list to the argument slots of the verb's CONTENT by structure sharing, this mapping is already defined in the lexical entry for the abstract verbal category *cat* - as indicated in (8) - and the semantics projection properties are automatically inherited by the verb if it instantiates as the type *func-cat* in initial position. By coindexing of the CONTENT attribute with the VP complement, the verb's semantic representation gets 'projected down' to the VP headed by the verb trace. Genuine functional categories, in

contrast, stated directly as a type *func-cat* in the lexicon, do not specify their SUBCAT attribute, but inherit their full content from the complement.
We will see below that this new property of semantics projection in our analysis of V2 accounts for the locality restriction of verb movement as well as for several distinctive properties of verb final and verb initial structures which were argued in section 3 to interact with semantic properties. Finally, the SUBCAT specification in the head attribute of verb initial structures will be exploited for an alternative representation of 'head movement'.

The type hierarchy above is now easily completed with the functional HEAD specifications for functional completeness, as indicated in (9). While the abstract category type *cat* is underspecified wrt. functional completeness – the value of FCOMPL is the top element $\top$ –, finite verbs of type *lex-cat* will be specified as functionally incomplete, thereby requiring to be embedded by a functional projection. The type *func-cat*, according to the analysis of section 3, gets specified as a functionally complete category that selects a functionally incomplete complement.

(9) Type hierarchy: subcategorization, content and functional completeness (to be revised)



Notice that the underspecified value of FCOMPL in *cat* cannot be instantiated to the positive value without automatically specializing to the type *func-cat*. Therefore, a finite VP like (10) cannot satisfy the constraint on functionally complete projections by simply unifying the underspecified value in FCOMPL with the positive value required by the constraint on functionally wellformed phrases. If it did, it would automatically instantiate as a head of type *func-cat* and subcategorize for an f-incomplete VP complement, i.e. realize as a verb in initial position.

(10) * Hans das Auto reparierte.

4.2.2 Head Movement in a One-Level Representation Analysis

We have seen above that an account of V2 by underspecification confronts the problem that the non-local feature mechanism requires antecedent and trace to bear identical LOCal values, whereas the functional specifications of the two category types differ wrt. complementation and semantics-projection properties as well as functional completeness. We will

solve this problem by redefining the type of the DSL value and the functional selection properties of functional categories.

Kiss/Wesche(1991) introduced the non-local feature DSL in order to distinguish 'verb movement', a relation involving X^o-categories, from phrasal movement.[49] The distinction between heads and phrasal constituents in dependency relations can be sharpened by restricting the value of DSL to be (a set of elements) of type *head*, i.e. a feature structure consisting entirely of head attributes. The definition of a trace involved in a dependency relation of X^o-categories is then defined as in (11):

(11)
$$\begin{bmatrix} \text{PHON} & <> \\ \text{SYNSEM} & \begin{bmatrix} \text{LOC} \left[\text{CAT} \left[\text{HEAD} \ \boxed{1}\right]\right] \\ \text{N-LOC} \left[\text{INH} \left[\text{DSL} \ \{ \boxed{1} \}\right]\right] \end{bmatrix} \end{bmatrix}$$

Due to the definition of SUBCAT as a head attribute, the trace in the base position of the VP can realize as the type *lex-cat* such that the VIP instantiates the valence attributes appropriately by structure sharing with SUBCAT. It thereby guarantees the VP to saturate the subcategorization requirements inherent to the antecedent verb in initial position. Since for lexical categories the semantics projection, mediated by SUBCAT, does only involve the parameters of the argument roles, the CONTENT attribute of the VP would not be completely defined by the trace in the VP structure. However, by our type hierarchy (10), the verb in initial position, as a functional category, inherits its semantic (projection) properties – the SUBCAT and CONTENT attributes – from the underspecified type *cat*. Since we maintain the semantic representation of functional categories (see p.48), this semantic content gets identified with the content of the VP complement by coindexation and thereby guarantees the full content specification of the VP complement. Thus, the instantiation and binding of argument parameters is effected in the VP complement, the semantic relation and the mapping characteristics are originally defined for the verb in initial position by type inheritance from *cat*, and by coindexation both CONTENT values result in a complete information structure.

But subcategorization properties are only one aspect that differs for lexical and functional categories. If we want to stick at the generalization that functional categories uniformly select functionally incomplete categories, with FCOMPL being a HEAD attribute we get an inconsistency for antecedent and trace in V2 dependencies by the required identity of the HEAD features in DSL.

At this point we have to reconsider our discussion about the formal representation of verb movement. In section 3 we mentioned that besides the 'classical' conception of move-α, there is a more non-conformist view on the GB grammar architecture that takes movement to be a metaphor for structural dependencies holding at one single level of representation, namely S-structure.[50]

[49] This distinction was made in order to capture the locality restriction on head movement, but, as was shown above, this is not sufficent to guarantee locality of verb movement.

[50] E.g. Frey's (1993) theory about binding and scope in German syntax is exclusively based on an S-structure representation:

> [...] Durch die Spuren ist die D-Struktur auf der S-Struktur in eindeutiger Weise wiederzuerkennen, und es bedarf daher keiner eigenständigen Repräsentationsebene D-Struktur. Wird

The V2 analysis of Haider(1993) clearly subscribes to this one-level representation view.

> "Eine syntaktische Struktur ist [...] die Berechnungsstruktur über einer Kette von Elementen, die zu projizieren uns die Berechnungskapazität, die wir (kognitive) Grammatik zu nennen pflegen, erlaubt. Das Ökonomieprinzip ist [...] ein Prinzip der kognitiven Ökonomie. Wir projizieren über eine Kette eine minimale, wohlgeformte Struktur und nicht irgendeine komplexe, die auch mit der Kette kompatibel wäre. Eine Kette von elementaren grammatischen Elementen [...] ist dann wohlgeformt, wenn es zu dieser Kette eine vollständige wohlgeformte Berechnungsstruktur gibt. Die Berechnungsstruktur ist vollständig, wenn sie jedes Element der Kette erfaßt und wohlgeformt, wenn sie vollständig interpretierbar ist (Chomsky 1986b:98"Principle of Full Interpretation"). [...] Unter dieser Sichtweise gibt es Elemente, für die nur eine einzige Position in der linearen Verkettung möglich ist, weil es nur eine mögliche Berechnungsstruktur gibt, die mit dieser Verkettung vereinbar ist, und diese nur an der einzigen Stelle einen Platz für das fragliche Element vorsieht. Dies entspricht dem Typ der fixen Positionierung in einer Struktur, sei sie abgeleitet oder nicht. Es ist jedoch nicht ausgeschlossen, daß es für ein Element alternative Anordnungen in der Verkettung gibt, weil mit jeder dieser Anordnungen eine minimale Berechnungsstruktur kompatibel ist. Die minimale Berechnungsstruktur für (2) ist unter (3) angedeutet:"
>
> (2-a) Es hat heute ohne Unterlaß geregnet.
>
> (3) [XP_i [V-fin [...(e_i) ... e_j]]] (Haider 1993,4:70)
>
> "Wenn das finite Verb nicht in allen Kontexten als Kopf in der Grundposition der V-Projektion auftritt, muß es unter diesen Kontexten solche geben, in denen ein Finitum in der Grundposition nicht lizenziert ist. Es gibt keinen anderen Grund dafür, daß sich ein Kopfelement nicht in seiner Grundposition befindet, als der, daß es dort nicht lizenziert ist. Ist dies der Fall, gibt es wiederum nur eine Möglichkeit: Dem Element kann in der syntaktischen Struktur eine abgeleitete Position zugewiesen werden, die in einer zulässigen Relation zur Grundposition steht. In allen anderen Fällen gibt es keine wohlgeformte Struktur und der betreffende Ausdruck ist ungrammatisch, weil die den Ausdruck konstituierende Verkettung von terminalen Elementen keine wohlgeformte syntaktische Struktur im technischen Sinn (vgl. "Satisfy" bei Chomsky 1992) *erfüllt*." (Haider 1993,4:83)

Given this one-level representation view, what is the formal status of the dependency relation in a V2 structure (12), and how can we specify the lexical representation of finite

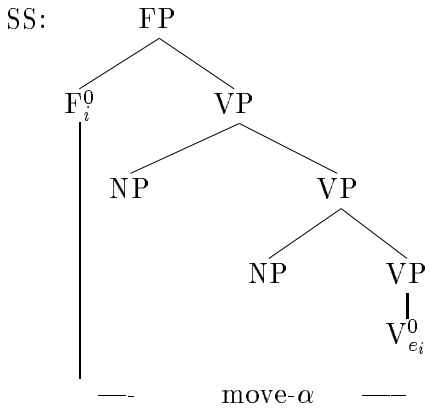
---

im folgenden von der 'Bewegung einer Phrase' gesprochen, ist dies daher rein metaphorisch zu verstehen.

[...] wird eine Repräsentationsebene LF nicht angenommen. Die S-Struktur wird als die Ebene aufgefaßt, auf der die syntaktischen Bedingungen für die Interpretation zu formulieren sind. Es wird demnach von einem GB-Modell ausgegangen, das als alleinige Ebene der syntaktischen Repräsentation die S-Struktur vorsieht. (Frey 1993:14)

verbs in order to render the intuition that there are – for one and the same item, the finite verb – "alternative Anordnungen in der Verkettung [...], weil mit jeder dieser Anordnungen eine minimale Berechnungsstruktur kompatibel ist." (Haider, a.a.O) ?

(12) Move-α in a one-level representation of syntactic structure



If we take seriously this idea, that the verb may realize alternative positions in the structure, its lexical definition must be compatible with each of these realizations. This may be perfectly rendered by our underspecification account. But if the verb specializes to a functional category in initial position, we cannot 'refer back' to the properties of the alternative, verb final realization in order to define the properties of the verb trace, as we did in the lexical rule (1).

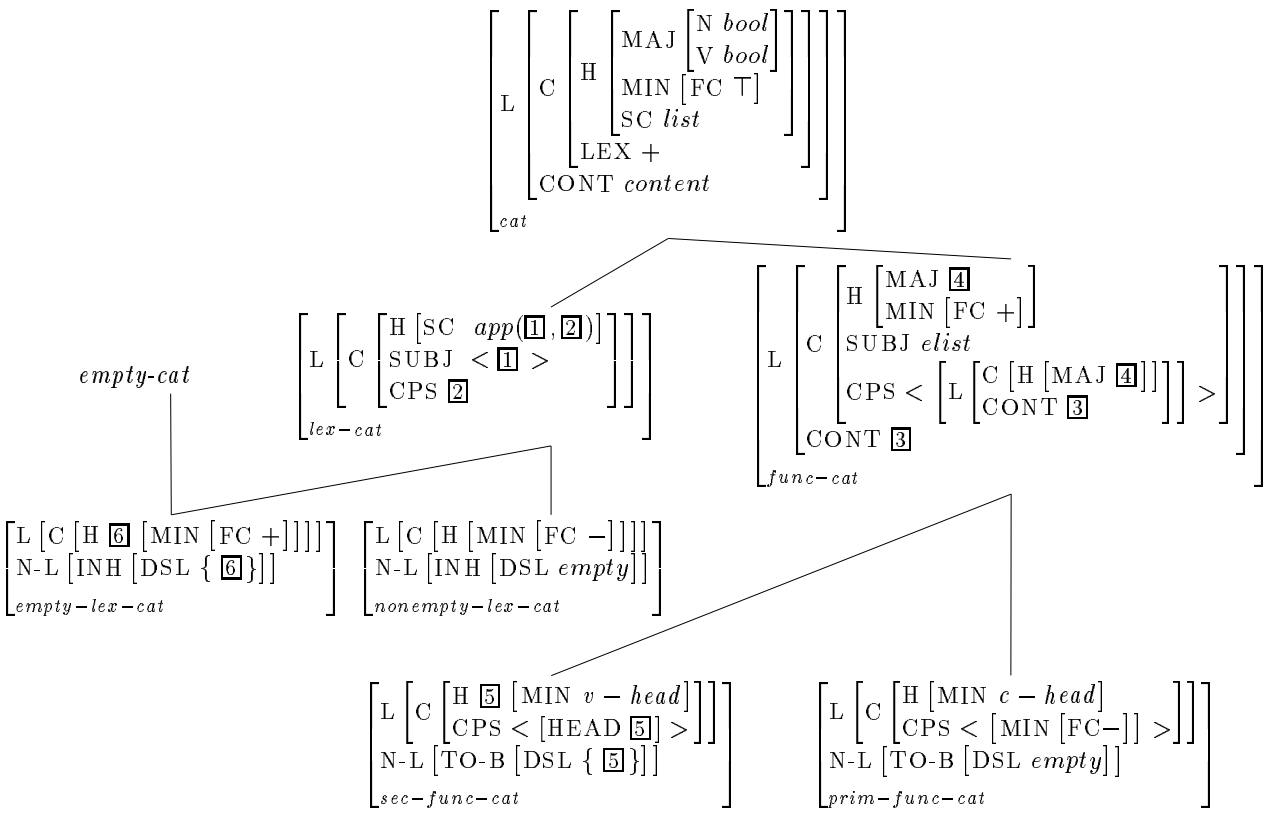
Instead, on a one-level representation view, we may think about a structure like (12) in the following way: If the verb realizes as a functional category, it gains the power of functionally licensing a functionally marked VP complement that requires licensing. However, by the locality of the dependency relation depicted in (12), the element that the fronted verb functionally licenses is its own trace to which it is connected by the coindexing of HEAD attributes via the DSL attribute. Consequently, the verb trace must be defined as a functionally complete category in a V2 dependency structure.
As a result, on a one-level representation view of grammar, the V2 dependency structure is not defined by referring to the properties of the finite verb 'before movement', but gives an independent characterization of the dependency structure where the verb occupies an alternative, non-base position.

In accordance with Haider(1993), we accomplish our hierarchy of category type definitions by introducing a further differentiation for the type *func-cat* (see (13)): We distinguish 'primary' functional categories *prim-func-cat* from 'secondary' functional categories *sec-func-cat*, the latter being involved in a local dependency relation. The major difference between these subtypes concerns the functional property of the subcategorized complement: Whereas primary, non-derivationally realized functional categories have the power of licensing a distinct, functionally incomplete element heading the complement, the secondary-type of functional categories defines its complement to be functionally complete, as required by the identity of HEAD attributes in the local dependency relation involving the functionally complete antecedent verb and the verb trace that heads the VP.

Accordingly, we have to define distinct subtypes of *lex-cat*, which now is still underspecified

for the feature FCOMPL, and only instantiates the valence values according to VIP(a). *empty-lex-cat* defines the subtype for the trace category. It inherits information from both *lex-cat*, and the type *empty-cat*, which defines empty lexical categories,[51] and is specified as a functionally complete category. The type *nonempty-lex-cat*, which defines the overt verb final category, is characterized as a functionally incomplete category.

(13) Type hierarchy: subcategorization, content and functional completeness



From the lexical entry of the underspecified category type *cat* (14.a), which defines the lexically determined subcategorization and content properties of the finite verb, by application of the Valence Instantiation Principle (VIP) we can obtain two alternative structures:
If the finite verb specializes to the lexical category type *lex-cat* by application of the VIP(a) clause, by incompatibility with *empty-cat*, it is characterized as a functionally incomplete category *nonempty-lex-cat* and can only be realized as a complement to a functional head. This verbal structure determines the verb final sentence structure: The verb projection must be functionally closed by a primary functional category, a complementizer, which selects a functionally incomplete VP complement.

(14) a. Underspecified lexical entry for finite verbs:

[51] The type *empty-cat* is defined as a special attribute type for the type *empty-sign* only:

$$\begin{bmatrix}\text{SYNSEM}\begin{bmatrix}\text{LOC}\begin{bmatrix}\text{CAT}\begin{bmatrix}\text{HEAD}\begin{bmatrix}\text{MAJ}\ \textit{verb}\\ \text{MIN}\begin{bmatrix}\text{FCOMPL}\ \top\\ \text{VFORM}\ \textit{fin}\end{bmatrix}\\ \text{SUBCAT}\ <\text{NP}_{[x]}>\end{bmatrix}\\ \text{LEX}\ +\end{bmatrix}\\ \text{CONT}\begin{bmatrix}\text{REL}\ \textit{relation}\\ \text{ARG1}\ x\end{bmatrix}\end{bmatrix}\end{bmatrix}\end{bmatrix}$$

(14) b. Verb final lexical structure:

$$\begin{bmatrix}\text{SYNSEM}\begin{bmatrix}\text{LOC}\begin{bmatrix}\text{CAT}\begin{bmatrix}\text{HEAD}\begin{bmatrix}\text{MAJ}\ \textit{verb}\\ \text{MIN}\begin{bmatrix}\text{FCOMPL}\ -\\ \text{VFORM}\ \textit{fin}\end{bmatrix}\\ \text{SUBCAT}\ <\text{NP}_{[x]}>\end{bmatrix}\\ \text{SUBJ}\ <\text{NP}_{[x]}>\\ \text{LEX}\ +\end{bmatrix}\\ \text{CONT}\begin{bmatrix}\text{REL}\ \textit{relation}\\ \text{ARG1}\ x\end{bmatrix}\end{bmatrix}\end{bmatrix}\end{bmatrix}$$

If (14.a) specializes to the type *func-cat* by application of the (VIP.b) clause, we get the alternative lexical structure of the finite verb (14.c), which defines the verb initial sentence structure. As a functional category, the verb qualifies as a functionally complete element and subcategorizes a complement bearing identical major head features and content attributes. Since in our type hierarchy the functional category subtype *prim-func-cat* is not defined for the VFORM attribute, *func-cat* can only specialize to the subtype *sec-func-cat*, which defines the head dependency relation by coindexing the TO-BIND | DSL value with the verb's HEAD attribute. By the nonlocal feature mechanism and the HFP this results in the definition of the VP complement as a functionally complete projection.

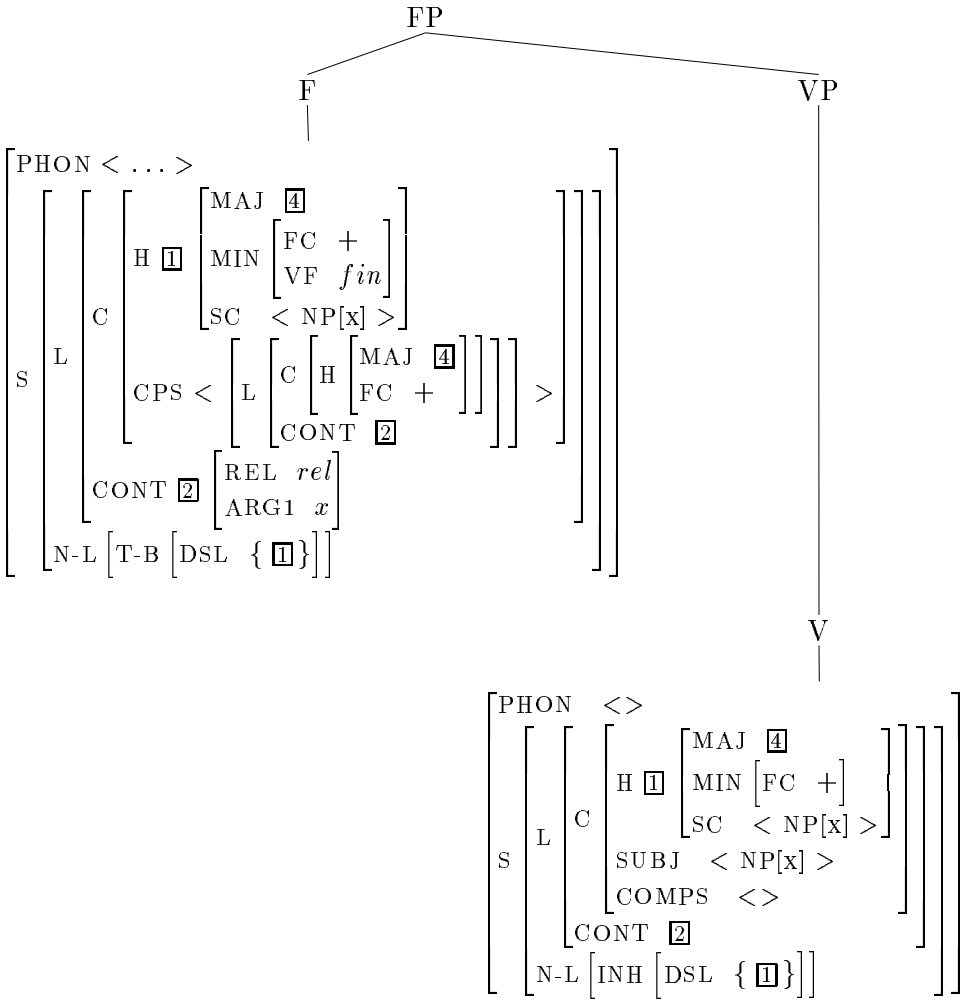
(14) c. Verb initial lexical structure:

$$\begin{bmatrix}\text{S}\begin{bmatrix}\text{L}\begin{bmatrix}\text{C}\begin{bmatrix}\text{H}\ \boxed{1}\begin{bmatrix}\text{MAJ}\ \boxed{4}\ \textit{verb}\\ \text{MIN}\begin{bmatrix}\text{FC}\ +\\ \text{VF}\ \textit{fin}\end{bmatrix}\\ \text{SUBCAT}\ <\text{NP}_{[x]}>\end{bmatrix}\\ \text{SUBJ}\ <>\\ \text{COMPS}\ <\begin{bmatrix}\text{L}\begin{bmatrix}\text{C}\begin{bmatrix}\text{H}\begin{bmatrix}\text{MAJ}\ \boxed{4}\\ \text{MIN}\begin{bmatrix}\text{FC}\ +\\ \text{VF}\ \textit{fin}\end{bmatrix}\\ \text{SC}\ <\text{NP}_{[x]}>\end{bmatrix}\end{bmatrix}\\ \text{CONT}\ \boxed{2}\end{bmatrix}\\ \text{N-LOC}\left[\text{INH}\left[\text{DSL}\ \{\boxed{1}\}\right]\right]\end{bmatrix}>\\ \text{CONT}\ \boxed{2}\begin{bmatrix}\text{REL}\ \textit{relation}\\ \text{ARG1}\ x\end{bmatrix}\end{bmatrix}\\ \text{N-LOC}\left[\text{TO-BIND}\left[\text{DSL}\ \{\boxed{1}\}\right]\right]\end{bmatrix}\end{bmatrix}$$

The HPSG analysis of the V2 structure (12) can now be represented as in (15). In order to fulfill the constraint on functionally wellformed phrases (see p. 39), in a complementizerless

construction the finite verb must be realized as a functional category, more specifically as a lexical item of type *sec-func-cat*. The subcategorization properties inherited from the underspecified lexical entry are projected down to the head of the VP by coindexing the HEAD value with the TO-BIND | DSL value, the latter being defined, by the trace definition (11), as the head specification of the VP. Applied to the trace definition, the VIP(a) clause properly instantiates the valence features SUBJ and COMPS. These must be saturated in the verbal projection and instantiate the argument roles of the relation represented in the CONTENT attribute, according to the syntax-semantics mapping defined for the type *cat* in the underspecified lexical entry (14.a). By the coindexation of the CONTENT values of functional head and functional complement, the content values of the VP and the functional projection are then both fully defined.

(15)



The overview in (16), to be compared with (2) for the lexical rule approach, illustrates the radical difference between the two alternatives: In (2) the lexical structure of the verb trace differed substantially from the syntactic properties of its antecedent verb. Instead, it was nearly identical to the overt verb occupying the verb final position.
In our new analysis, the verb trace still shares many properties with the lexical structure

of a verb in final position (category type, valence instantiation properties), but also shares important information structure with the antecedent verb. By the identification of the HEAD attribute (via the DSL attribute), both functional and content properties are shared: the trace 'inherits' the functional completeness property from the antecedent verb, realized as a functional head; on the other hand, by sharing the SUBCAT attribute, together with the coindexation of CONTENT values, induced by the antecedent verb as a functional category, the verb in initial position 'inherits' the parameter values, instantiated in the VP, and projects them to the argument slots of the CONTENT attribute, according to the lexically determined mapping properties, defined for the abstract category type *cat* in the lexicon entry of the overt finite verb. In exchange, the verb trace 'inherits' the full content definition (the lexically determined information of syntax-semantics mapping and the predicate meaning) from the antecedent verb by the CONTENT (and SUBCAT) coindexation.

(16)	verb second	verb final	trace
position	head initial	head final	head final
head type	functional head	lexical head	lexical head
functional status	FCOMPL +	FCOMPL −	FCOMPL +
subcategorization	VIP (b)	VIP (a)	VIP (a)
content definition	lexically det. relation parameters instantiated in VP content	lexically det. relation parameters instantiated in VP content	relation inherited parameters instantiated in VP content
'derivational status'	'binder' INH | DSL empty T-B | DSL nempty DSL value coindexed with HEAD value	'base generated' INH | DSL empty T-B | DSL empty	'trace' INH | DSL nempty T-B | DSL empty DSL value coindexed with HEAD value

Before we proceed to an evaluation of the analysis, we want to introduce one further concept for the analysis of functional categories. Up to now, the Valence Instantiation Principle and the type hierarchy were defined to distinguish between lexical and functional categories and their inherent properties. Yet, they are only defined at the lexical level. What is still needed is a representation of the projection property of functional vs lexical heads that projects the distinction between lexical and functional heads to the level of phrasal constituents.

What we have in mind is very similar to the concept of functional projections as 'extended projections' in Grimshaw(1991)[52]: A functional projection 'extends' the (maximal) projection of a (lexical) head it takes as its complement, provided they share categorial features. We already saw that by identification of the MAJ head attributes, the functional head category qualifies as an 'extending head' for the respective lexical category type (e.g. the complementizer for the verb, the determiner for the nominal head). In order to characterize a maximal projection as a projection stemming from a lexical vs functional X^o category, we enrich our Valence Instantiation Principle, which defines the main distinguishing properties of the two category types, by a new attribute EXT (extendend): EXT + marking extended, functional projections, EXT − non-extended projections of lexical categories.

[52]See also Haider(1993,Ch.3.3) for discussion.

(17) **Valence Instantiation Principle (VIP) (revised)**

(a): Lexical categories *lex-cat*

$$\begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \left[\text{SUBCAT } \textit{append}(\boxed{1},\boxed{2})\right] \\ \text{LEX } + \\ \text{SUBJ } < \boxed{1} > \\ \text{COMPS } \boxed{2} \\ \text{EXT } - \end{bmatrix} \end{bmatrix} \\ \textit{lex-cat} \end{bmatrix}$$

(b): Functional categories *func-cat*

$$\begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{MAJ } \boxed{1}\ \textit{major} \\ \text{MIN } \textit{minor} \\ \text{SUBCAT } \textit{list} \end{bmatrix} \\ \text{LEX } + \\ \text{SUBJ } <> \\ \text{COMPS } < \left[\text{MAJ } \boxed{1}\right] > \\ \text{EXT } + \end{bmatrix} \end{bmatrix} \\ \textit{func-cat} \end{bmatrix}$$

The EXTended attribute gets projected from the lexical level to the phrasal constituents by the following Principle of Extended Projections (PEP):

(18) **Principle of Extended Projections (PEP)**

The EXT(ended) value of a phrase is identical to the EXT(ended) value of its H-DTR.

$$\begin{bmatrix} \text{SYNSEM} \left[\text{LOC} \left[\text{CAT} \left[\text{EXT } \boxed{1}\right]\right]\right] \\ \text{DTRS} \left[\text{H-DTR} \left[\text{SYNSEM} \left[\text{LOC} \left[\text{CAT} \left[\text{EXT } \boxed{1}\right]\right]\right]\right]\right] \end{bmatrix}$$

The definition of functional categories in the type hierarchy (13) can then be refined (for German sentence structure) by restricting the complement of the functional head to be a non-extended maximal projection, i.e. the projection of a head of type *lex-cat*. This can be done by feature specification or by introducing a further type distinction, *lex-proj* vs *func-proj* – based on the value of the EXT attribute –, which can be used to restrict the complement of a functional head to be of type *lex-proj*.

(19) *func-cat* =

$$\begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{MAJ } \boxed{1} \\ \text{MIN} \left[\text{FCOMPL } +\right] \end{bmatrix} \\ \text{SUBJ } <> \\ \text{COMPS } < \begin{bmatrix} \text{LOC} \begin{bmatrix} \text{CAT} \left[\text{HEAD} \left[\text{MAJ } \boxed{1}\right]\right] \\ \text{CONTENT } \boxed{2} \end{bmatrix} \\ \textit{lex-proj} \end{bmatrix} > \end{bmatrix} \\ \text{CONTENT } \boxed{2} \end{bmatrix} \end{bmatrix}$$

4.2.3 Evaluation of the Analysis

The main reasons for introducing the notion of extended projections into our analysis come from considerations of perspicuity of the analysis, as well as the desire for a flexible syntactic description.

Topological Data of German Sentence Structure

The aspect of flexibility for syntactic description shows up in connection with the topological data of German sentence structure. In the analysis described in section 3, the serialization properties of heads and complements were based on the distinction between MAJor category values as well as the functional completeness property, which distinguished lexical from functional heads (see p. 47). In our new analysis the serialization properties of heads and complements are based on the Valence Instantiation Principle, which ultimately distinguishes between lexical and functional X^o-categories by instantiation of the head's complementation properties. Referring to the type definitions used in the VIP clauses (a) and (b), we can state the precedence constraints for German sentence structure as in (20).

(20)

precedence constraints on head-comp-struc			category	examples
C	> H [MAJ [V +]] *lex−cat*		V A	Peter das Buch kauft seinem Beruf treu
H	[MAJ [V −]] *lex−cat*	> C	N P	Antwort auf seine Frage auf seine Frage
H	*func−cat*	> C	C V D	daß Peter das Buch kauft kauft Peter das Buch die Antwort

Note, however, that the types *lex-cat* and *func-cat* are only defined for the respective X^o-categories. Consequently, the precedence constraint for verbs does only apply at the lexical level. If we do not want to be committed to a flat constituent structure for the German Mittelfeld, but allow for a binary branching VP structure, we have to provide a means to 'project' the type distinction to phrasal constituents in order to define the precedence constraints holding for the verb projection and its complements.
This is just what the Principle of Extended Projections (PEP) does. By projecting the EXTended value from the head daughter to the phrasal level, and the ensuing type distinction between *lex-proj* and *func-proj*, we can generalize the precedence constraints defined in (20) to analyses using binary branching structures by replacing the types *lex-cat* and *func-cat* by *lex-proj* and *func-proj*, respectively.

Locality of Verb Movement

It was shown in section 3 that the locality restriction on the V2 dependency relation, which was not covered by the analysis of Kiss/Wesche(1991), could not be ensured by the supplementary notion of functional completeness alone, but ultimately fell out by the definition of the semantics projection for functional categories (see p. 48). The same explanation can be given in our new analysis, due to the content inheritance property of both types of functional categories.

But – for those who don't believe the locality restriction of head movement to be naturally restricted by semantic notions – it is important to note that by our 'one-level representation analysis' of verb movement, which identifies the HEAD attributes of antecedent verb and verb trace, the locality restriction of the V2 dependency is also independently restricted by purely syntactic notions.

By the identification of the HEAD attributes of antecedent verb and trace, the trace is specified as a functionally complete category (FCOMPL +). Now, long verb movement could only be achieved in two ways: The verb in initial position starts out in an embedded constituent and subcategorizes, as a functional projection, for a VP complement. This complement needs a verbal head, which could either be a verb in its base position (21.a) or – even worse – another 'fronted' verb (21.b).[53] But both structures are excluded by our definition of functional category types.

(21.b) is a special case of recursive embedding of functional categories. It is excluded by the definition of *func-cat* in (19), which restricts the complement of a functional category to be of type *lex-proj*. The VP headed by 'glaubt', itself a functional category type, does not satisfy this restriction, imposed by 'kennt'. (21.a) is ruled out for two reasons: First, by the type definition for secondary functional categories *sec-func-cat*, i.e. the verb in initial position, the VP complement is restricted to be functionally complete. 'glauben', however, as an overt verb of category type *nonempty-lex-cat* violates this condition. Second, the embedded sentence is introduced by a complementizer, which is of type *prim-func-cat* and which is defined to select a functionally incomplete VP. The verb trace, however, by coindexation of the HEAD attributes with the antecedent verb – via DSL – is f-complete.

(21) a. * Peter kennt$_i$ [$_{VP}$ glaubt, daß [$_{VP}$ Maria Fritz e_i]].
b. * Peter kennt$_i$ [$_{VP}$ glaubt$_j$ [$_{VP}$ [daß [$_{VP}$ Maria Fritz e_i]]] e_j].

Criteria (a) and (b): Complementarity of Complementizer and V2 and Inflected Complementizers

The complementarity of complementizer and verb initial structure in German, is ensured by the type definition of the complementizer as *prim-func-cat*, which, for one, selects a complement that is f-incomplete and therefore cannot be headed by a verb of type *func-cat*, and furthermore, restricts its complement to be a non-extended, i.e. lexical projection of type *lex-proj*. A verb in initial position, as a functional category, however, would project to a phrase of type *func-proj*.

As regards the possibility of inflectional marking of complementizers in Bavarian German, the same remarks are in order as for the analysis evaluated in section 3 (see p. 50).

Criteria (d) and (c): Derivational Analysis of V2 and the Structure of the Mittelfeld

It should be evident that the criteria (c) and (d), discussed in section 1 are covered by the analysis of V2 as a local dependency relation. The important difference in comparison with the analysis discussed in section 3, however, resides in the analysis by underspecification. The verb that is realized in the functional head position is not 'redefined' by a structure

[53] We again abstract away from extraposition in our syntactic analysis.

transforming device, but is represented as an underspecified category in the lexicon and instantiated appropriately depending on the syntactic context it appears in without referring 'back' to an independently given, alternative verbal information structure.

4.2.4 The Non-Uniformity Hypothesis and the Syntax-Semantics Interface

In sections 1 and 2 we presented arguments against a purely syntactic account of the criteria (f) – (i): Subordination, asymmetric coordination, specifier types and verb non-movement. The differing properties of verb final and verb initial sentence types were argued to be better explained on the basis of an integrated analysis of syntactic and semantic representation (see section 2.3).
Basically we observed a correspondance of structural sentence type and subordination status at the level of semantic and/or pragmatic interpretation. The main arguments for the relevance of a semantic notion of subordination, instead of a purely syntactic one, can be summarized shortly:

(a) The 'nonstandard' sentence patterns, i.e. non-embedded verb final sentences and embedded V2 sentences, are both characterized by semantic properties of subordination which suggest a uniform correspondance between syntactic structural sentence type and semantic subordinational status (see p. 20).
Verb final sentence types, introduced by an overt or empty complementizer (specified by a w-phrase), are interpreted wrt. the embedding predicate. In non-embedded verb final sentences an illocutionary predicate gets accommodated that plays an equivalent function for the interpretation.[54]
Verb initial sentence types are interpreted wrt. the discourse situation, involving speaker, hearer, and time and location of the discourse situation. The semantics of embedded verb second sentences obeys this correspondance of syntactic form and interpretation mode in being restricted to matrix verbs of communication and thought, which can be naturally understood - especially when in past tense - as reports of discourse situations.

(b) The obligatory presence of empty complementizers - as opposed to verb second movement - in embedded verb final sentences was explained in Haider(1993) by a blocking effect for feature transmission between specifier and head in case the functional head position is occupied by the verb (see p. 25).
Two observations again point towards a semantic notion of subordination and a semantic analysis of the complementizer in head position:
Following Haider(1993), 'standard' non-embedded sentences do not involve transmission of functional features from the specifier to the head, due to the 'direct interpretation' mode of these sentence types. The explanation, then, for the obligatory presence of an empty complementizer in embedded w-sentences is more naturally understood in semantic terms: If the semantic function of the complementizer is understood as the locus of the definition of a semantic relation between the w-phrase, the embedded sentence content, and the embedding predicate, the 'standard' subordinated sentence type, which must be interpreted wrt.

[54] Nothing has nor will be said throughout this paper about adverbial sentences, which are not interpreted as a complement of the embedding predicate.

the embedding predicate (see (a)), cannot display verb movement by the complementary distribution of complementizer and V2.
A further motivation for a semantic rather than a syntactic explanation for the obligatory presence of an empty complementizer comes again from a 'non-standard' sentence pattern: Non-embedded verb final sentences like (22) are not 'directly evaluated' under the scope of an illocutionary sentence operator. But we cannot either refer to a feature checking mechanism, which could only be triggered by a syntactically governing matrix predicate, in order to prohibit the verb to occupy the functional head position. But if the (empty) complementizer position effects the function of inducing a semantic relation for the interpretation of the w-sentence under the scope of the accommodated illocutionary predicate, we can account for verb non-movement in these cases by the interaction of semantic interpretation and the syntactic complementarity of complementizer and verb initial position.
Notice, finally, that the non-standard sentence type exemplified in (22) presents a serious problem for the purely syntactic visibility criterion for empty heads, referred to by Haider(1993) (p.17). The empty head is identified by a w-phrase in the specifier position, but there is no governing predicate that could license the empty head.

(22) Was ∅ Du da wieder angestellt hast. Es empört mich, ...

(c) The main facts to be explained for criterion (h), the distribution of specifier types in verb final vs verb initial sentence structures, are the oppositional pairs (23.a) - (23.b), (23.b) - (24.b), and (23.a) - (24.a) - (25.b).

(23) a. Max wußte, wem ∅ er sein Fahrrad geliehen hatte.
b. * Max wußte, dem Fritz ∅/daß er sein Fahrrad geliehen hatte.

(24) a. Wem hat Max sein Fahrrad geliehen?
b. Dem Fritz hat Max sein Fahrrad geliehen.

(25) a. Max behauptete, dem Fritz habe er sein Fahrrad zum letzten Mal geliehen.
b. * Max behauptete, wem habe er sein Fahrrad zum letzten Mal geliehen.

Ignoring (25) for a moment, the opposition in (23) must again be reduced to the semantic function that has to be defined for the complementizer head position, which has to define the semantic embedding function that relates the scope-taking w-phrase to the embedding predicate on the one hand, and to the semantic content of the VP on the other.
Since we supposed that in 'standard' non-embedded sentences like (24), which are interpreted directly wrt. the discourse situation under the scope of an illocutionary operator (assert, query, ect.), no semantic relation of 'embedding' has to be defined by a complementizer in the functional head position head, which could restrict the specifier phrase to be of the type of an operator phrase.
Taking into account our characterization of embedded V2 sentences, which are evaluated wrt. a 'reported' discourse situation analogously to standard non-embedded verb initial sentences, we would expect (25.b) to be as good as (24.a). Note, however, that embedded V2 sentences are only wellformed in a reported assertive illocutionary mode. Therefore, (24.b) is illformed for two reasons: Verb initial sentences introduced by a w-phrase are to be interpreted under a query operator, which is not admitted for indirect 'reported discourse'. Moreover, we saw that in order for an embedded V2 sentence to be interpreted as a case of indirect 'reported discourse', the embedding predicate must be suited to 'evoke'

such a discourse situation. Yet, the matrix verb 'behaupten' is not compatible with the reported situation of a query.

(d) Further arguments for a semantic difference between verb initial and verb final sentences have been raised in our discussion of asymmetric coordination structures (p. 22).
We presented examples that illustrated the 'unselectiveness' of verb second sentences wrt. syntactic and semantic subordination properties. Much more must be said about this type of construction at both the syntactic and semantic level of representation. Of special interest is the scope relation holding between the functional complementizer head of the first conjunct and the whole verb second conjunct, which seems to be introduced in the semantic representation under the scope of the former.
It is far beyond the scope of this paper to go into an analysis of this type of construction, but we can at least complete our overview of the interplay of syntactic and semantic characteristics of sentence types by attributing a special semantic relation to the complementizer, which - being absent in verb initial structures - can carry over to the asymmetrically conjoined verb initial sentence by some process of scope extension, reminiscent of modal subordination (Roberts(1989)).

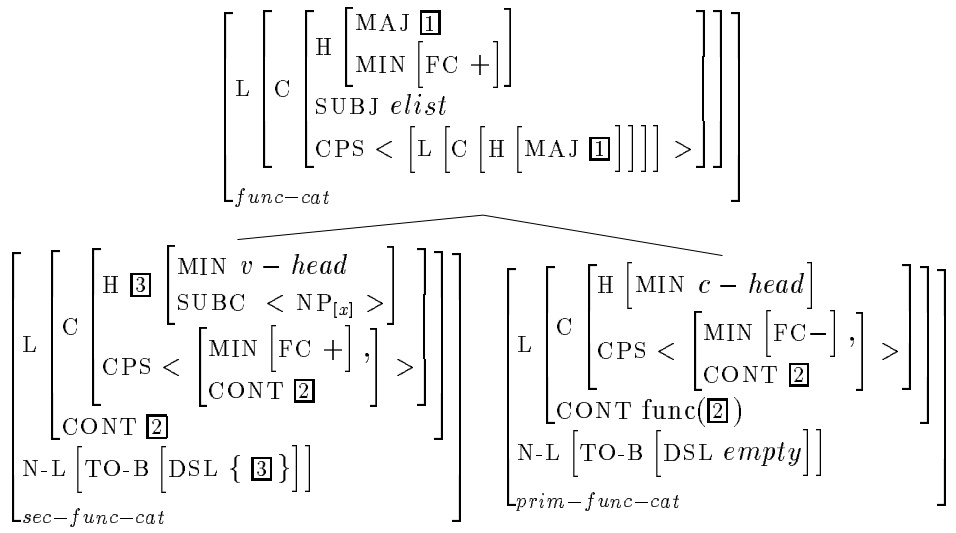
structure type	verb initial	verb final
(a) subordination		
	Interpretation wrt. ...	
non-embedded	...discourse situation	...accommodated illoc. predicate
embedded	...'reported' discourse situation	...governing predicate
(b) empty complementizers	—	embedded and non-embedded C^o 'define' semantic subordination
(c) specifier types	'direct evaluation' of SpecF wrt. illocutionary sentence mode	embedded and non-embedded SpecC 'define' a semantic relation between embedding predicate and embedded sentence content
(d) asymmetric coordination	absence of semantic embedding function	semantic embedding function takes scope over 'bare' V2 conjunct

It is beyond the scope of the present paper to give a detailed analysis of the semantic contribution of the complementizer in declarative and interrogative embedded sentences, as well as for complementizers introducing adjunct sentences. Yet, our motivation for entering this discussion about the syntactic vs semantic explanations of the data discussed for the criteria (f) – (i) was twofold:
First, we wanted to argue against the view that purely categorial distinctions are sufficient to handle the bundle of distinctive properties of the two sentence types. Instead, it turned out that the allegedly syntactic properties that distinguish the two structural sentence types are tightly connected to the semantic contribution of the complementizer, which defines a semantic relation for verb final sentence types that properly 'embeds' the content

of the subordinated sentences into the semantic representation of the governing predicate. Verb initial sentences, by contrast, lacking an item that induces a semantic subordination relation, are interpreted 'directly' under the scope of an illocutionary operator, which is anchored to the discourse situation, or mediated by accommodation of 'reported discourse' contexts.

Even if we cannot be but very vague about the semantic representation one will have to assume to cover these aspects of interpretational differences, our second motivation for discussing these facts is to illustrate that the analysis of verb initial structures by underspecification, taking seriously the idea of a one-level representation view of grammar in allowing the finite verb structure to realize - alternatively - in different syntactic contexts, gives us a very natural explanation for the differences in semantic representation we observed for verb initial vs verb final sentence structures.
Consider the part of our type hierarchy which defines functional categories (26). Assuming that the complementizer head does not only inherit the semantic representation of the VP complement, but induces a semantic relation that takes - inter alia - the semantic content of the VP as its argument, we modify the content definition of primary functional categories. Being not concerned with the precise formulation of the semantic relation of subordination here, we define the content of the complementizer head to be a function of the content of the VP complement.
Now the interesting aspect of our analysis of V2 by underspecification is the fact that it is impossible for principled reasons to assume the functional head in verb initial structures to induce a similar semantic function to define the content of the functional head:
In our underspecification account the finite verb is defined only once as the underspecified type *cat*. The lexically determined content specification is inherited by both the lexical and functional category types. (Recall the total type hierarchy in (13).) By the type inheritance property it is now impossible to redefine the content of the verb in the sentence initial position as a function that takes its own content as an argument. We would, for one, have to redefine an already specified value, and even if this would be possible, the resulting content definition would be recursively defined: $\left[\boxed{2}\,\text{CONT func}(\boxed{2})\right]$

(26)



4.2.5 Formal Representation of Verb 'Movement'

In our underspecification account we end up with an analysis of V2 that does not refer to a verb final lexical structure in defining the relation between antecedent verb and verb trace, but that (i) takes seriously the idea that the lexical entry for a finite verb is underspecified wrt. the structural alternatives the verb may realize, and (ii) does not refer to the verb structure 'before' movement in order to define the dependency relation holding between the verb in initial position and the trace in the head final VP position. These properties clearly characterize our new account of V2 as a one-level representation analysis, which is closer to the grammar architecture promoted in Haider(1993) than to the 'classical' multilevel architecture.
The underspecification account postulates identity of antecedent verb and trace not only wrt. major categorial properties, but also wrt. functional properties, in terms of functional completeness. Moreover, if we recall the problems for a formal representation of verb movement in the GB framework, raised in section 2, our underspecification account seems to offer a solution to all of them.

Categorial Specification of Finiteness

One problem concerned the categorial specification of the finite verb in initial position (p. 27): The question was raised whether the functional projection of verb initial sentences should qualify as a projection of the category I^o, or of an abstract functional head category F^o, enriched by verbal finiteness features F^0_{Vfin}, and accordingly for complementizer introduced verb final sentences. Haider(1993) made a substantial argument for a feature specification of finiteness, based on evidence against a final I^o node in German sentence structure. If the finite verb should qualify as a head of category I^o in verb initial sentences, this would also predict a sentence final finite verb to project as a category I^o, which is obviously not an acceptable solution, the verb in final position not being a functional category type.

In our feature based HPSG analysis, enriched by functional concepts, we characterize finite verb forms by the MINOR specification VFORM fin, which is compatible with the verb occupying the functional or lexical head position (see overview in (27)). Accordingly, we specify the 'categorial' status of the complementizer in the MINOR attribute CFORM. Since the MINOR attribute is not restricted to functional categories in HPSG, but is also defined for categories of type *lex-cat*, it is possible to represent 'functional' finiteness specifications also in the MINOR attribute for the verb in final position, a lexical category type. The necessary clear-cut distinction between functional and lexical categories is made at the level of X^o-category type distinctions (*lex-cat* vs *func-cat*), together with the Valence Instantiation Principle (VIP) – operating differently for lexical and functional category types – and the Principle of Extended Projections (PEP).

(27)

traditional category	feature specification	category type
C^o	$\left[\text{L}\left[\text{C}\left[\text{H}\left[\begin{array}{ll}\text{MAJ} & verb\\ \text{MIN} & \left[\begin{array}{ll}\text{CFORM} & cform\\ \text{FCOMPL} & +\end{array}\right]\end{array}\right]\right]\right]\right]$	*func-cat*
I^o	$\left[\text{L}\left[\text{C}\left[\text{H}\left[\begin{array}{ll}\text{MAJ} & verb\\ \text{MIN} & \left[\begin{array}{ll}\text{VFORM} & \text{fin}\\ \text{FCOMPL} & +\end{array}\right]\end{array}\right]\right]\right]\right]$	*func-cat*
V^o	$\left[\text{L}\left[\text{C}\left[\text{H}\left[\begin{array}{ll}\text{MAJ} & verb\\ \text{MIN} & \left[\begin{array}{ll}\text{VFORM} & vform\\ \text{FCOMPL} & \top\end{array}\right]\end{array}\right]\right]\right]\right]$	*lex-cat*

Formal Representation of Verb Movement

The main problem for the formal representation of verb movement was argued to reside in the traditional category identity restriction of move-α. This restriction must be obeyed by any conception of 'movement', as an operation involving multiple levels or a single level of representation. In the HPSG framework, for maximal phrasal constituents, there is also an identity condition built into the nonlocal dependency analysis: the LOCal values of Filler Daughter and the trace are set equal via the SLASH attributes.[55]

In both the GB and the HPSG frameworks, however, head movement was shown to be problematic for a formal analysis (see p. 27). The verb in initial position differs from the trace in the final VP position wrt. its functional status and complementation properties. The antecedent verb as a functional category acts as a functional licenser and subcategorizes for a single VP complement, whereas the verb trace in final position displays the properties inherent to lexical categories in subcategorizing for the arguments lexically determined by its antecedent verb.
In the GB tradition – even if the distinct category types are not represented by categorial, but feature distinctions (I^o vs $F^o{}_{Vfin}$) – a movement relation holding between a lexical and a functional category is problematic since the intrinsic complementation differences are directly dependent on the functional status, and the verb trace, as a lexical head, does not act as a functionally licensing element, whereas the verb in initial position, a functional head, does so.
In the (functional version of the) HPSG analysis of Kiss/Wesche(1991) the same problem of categorial type mismatch in the V2 dependency relation was observed, though it is in some way 'hided' by the derivational character of the lexical rule for V2. The value of DSL, which defines the LOC value of the trace heading the VP, refers 'back' to the input lexical structure, the verb's lexical category type, but is not unified with the LOC value of the raised verb itself. Only by this unrelatedness of the LOC values of antecedent verb and verb trace the formal problems of differing functional and complementation properties could be overcome.

In the analysis of V2 by underspecification we are forced to derive all structural realization types from the underspecified verb entry simply by type differentiation. No room is left here for the 'raised' verb to refer 'back' to the definition of the verb 'before' movement in order

[55] See for example the Filler Rule for topicalization structures defined in P&S(1993).

to define the properties of the verb trace. Instead, we enriched the HEAD attribute by the SUBCAT feature, and formulated the Valence Instantiation Principle, which accounts for the differing complementation properties of functional and lexical category types. As for the relation between antecendent verb and the verb trace, we distinguished phrasal movement from head movement by restricting the elements in the DSL set value to HEAD attributes.

In our analysis then, the antecedent verb and the verb trace share the HEAD information structure (28).

$$(28)\quad \begin{bmatrix} \text{MAJ} \begin{bmatrix} \text{V} & + \\ \text{N} & - \end{bmatrix} \\ \text{MIN} \begin{bmatrix} \text{FCOMPL} & + \\ \text{VFORM} & fin \end{bmatrix} \\ \text{SUBCAT} \quad < \text{NP}_{[x]}, \ldots > \end{bmatrix}$$

This is the maximal amount of information that can be set equal for antecedent and trace in the V2 dependency relation. Embedded in the partial information structure of the underspecified type *cat*, this information structure, together with the application of the VIP clauses, allows the instantiation of lexical and functional category types, depending on the structural context.

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