

Case Assignment in Partially Fronted Constituents

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1.1 Introduction

1.1.1 Background

The topicalization of partial constituents has played a prominent role in the syntactic discussion of German since the phenomenon provides important empirical evidence for a number of theoretical issues. On the one hand, the construction raises the question which formal means the grammatical architecture has to provide in order to license such fronted partial constituents. Under the so-called *remnant-movement* approach (G. Müller, 1993, 1996, and others), the partially fronted elements are taken to be full constituents containing a trace. The alternative is to analyze such elements as “small” constituents which are licensed, for example, by a special reanalysis rule as proposed by Fanselow (1987). A second issue evolves around partial constituents in the syntax of German non-finite constructions, where partial-VP topicalization is one of the indicators of the so-called *coherent construction* (Bech, 1955). A prominent theoretical question here is whether partial-VP constituents only occur in fronted position, or whether they also occur in the *Mittelfeld* or extraposed (cf., e.g. Geilfuß, 1991).

As these topics have played a central role in the SFB 340, they constitute a natural focus for the project B8, whose task includes the integration and formalization of different proposals in the SFB in order to implement them as part of a phenomenon-oriented HPSG fragment for German (Hinrichs et al., 1997). In addition to general concerns with German sentence structure and verb-second (Richter, 1997; Richter and Sailer, 2001), the two issues mentioned in the last paragraph have thus been

important topics in the work of the B8 project: Hinrichs and Nakazawa (1994b) show how a remnant-movement approach to partial-VP topicalization can be expressed in HPSG, and in Meurers (1994) the formal and computational basis for implementing such an HPSG theory is discussed. An alternative, reanalysis-like approach to partial-VP topicalization is explored in Meurers (1999, 2000), and Hinrichs and Nakazawa (1998) show that such structures can also be used to license partial-VP extraposition in the so-called *third construction*. Finally, in De Kuthy and Meurers (1999, 2000, 2001) the reanalysis-like approach to partial-VP topicalization is generalized in two respects: to partial constituents of different categories and to those which result from missing adjuncts in addition to the generally discussed partial constituents resulting from missing arguments.

One of the issues these papers leave open is the occurrence of subjects in fronted non-finite constituents which is discussed by Haider (1990). The topic is of particular importance for an HPSG fragment of German since the phenomenon involves apparently non-local case and subject-verb agreement relations, which runs counter to the restricted, local nature of these relations generally assumed in HPSG, the principles and parameters paradigm, and other frameworks. In this paper, we show that there is significant empirical evidence for reducing the apparently non-local case assignment and subject-verb agreement relations to an interaction of the ordinary local relations and the lexical class of raising verbs. In the second part, we show how this observation can be captured in an HPSG analysis and discuss how this analysis can be formalized in terms of local constraints which readily lend themselves to an implementation as part of an HPSG fragment of German.

1.1.2 Subjects in non-finite constituents

As mentioned above, it was pointed out by Haider (1990) that under certain conditions it is possible to realize a subject¹ as part of a fronted non-finite verbal constituent, i.e., that it is possible to front the constituent $[N'(= N'') V'']$.² While this option is generally available for ergative subjects (1), the occurrence of unergative subjects is signifi-

¹ Reis (1982) showed that establishing a well-defined notion of subject in German is difficult. Here and in the following we essentially use subject in the sense of nominative case marked NP. In German, only such nominative NPs can be eliminated (i.e., turn into PRO) when the sentence is converted to an infinitival complement in an equi construction.

²In the notation of Bech (1955) we assume here, the bars represent the rank of a verb in a government chain of verbs, i.e., V' governs V'' . The nominal dependents of a verb are represented by a single letter standing for the case, e.g., N' is the logical subject of the verb V' .

cantly more restricted, but nonetheless possible as shown by Haider's example (2).

- (1) Ein Fehler unterlaufen ist ihr noch nie.
 an error crept in is her still never.
 'So far she has never made a mistake.'
- (2) Ein Außenseiter gewonnen hat hier noch nie.
 An outsider won has here still never
 'An outsider has never won here yet.'

There are at least two questions arising from this observation. First, what are the restrictions on the occurrence of subjects in that position? And second, how does the subject included in the fronted non-finite verbal constituent receive nominative case? The first question has played a significant role in the Germanic syntax literature since the restrictions on such occurrences of subjects are an important empirical criterion for the base position of the subject in German, i.e., whether the subject is VP internal or external. In this paper, we focus on the second, more neglected question. On the one hand, the question how a subject fronted as part of a non-finite construction can receive nominative case is an interesting test case for the locality of grammatical relations like case assignment. On the other hand, clarifying when nominative case can be assigned also explains which constructions are ungrammatical because nominative case assignment was not possible. By answering the second question we thus also contribute to an answer of the more complex first question on the different conditions restricting the occurrence of subjects as part of non-finite fronted projections.

1.2 The theoretical starting point

The issue of nominative case assignment to subjects as part of non-finite constituents has not received much attention in the literature. In his investigation of ergative verbs, however, Grewendorf (1989, pp. 134ff) discusses a related problem: Nominative case assignment in the principles and parameters framework traditionally assigns case to an NP co-indexed with and governed by INFL. But since INFL is generally not taken to govern into the VP, it is unclear how an ergative subject, which is taken to be located within the VP, can be assigned nominative case. Note that this problem is different from the one we are concerned with in this paper in that it does not involve non-locality of case assignment arising from having to assign case to a subject embedded within a non-finite verbal complement within the VP. But it is similar enough to take

it as a starting point in exploring possible analyses.

Grewendorf (1989) distinguishes two classes of approaches which have been pursued in the literature. On the one hand, theories of *direct* nominative case assignment (Fanselow, 1985; Den Besten, 1985; Reuland, 1985) keep the idea that INFL assigns nominative case to the NP at the cost of relaxing the conditions under which such case assignment is possible. Fanselow (1985, sec. 4.2), for example, proposes to abandon the restriction that INFL must govern the NP to assign nominative case. Theories of *indirect* nominative case assignment, on the other hand, chose to abandon the idea that INFL assigns case to the NP directly (Hoekstra, 1984; Safir, 1985). Instead, case is assigned to some element co-indexed with and governed by INFL in the traditional way and this element then inherits the case down to the nominative bearing NP.

Returning to the apparently non-local case assignment issue we are concerned with, even though to our knowledge no theory has actually been worked out, one can find examples for the ideas of direct and indirect case assignment in the literature. Haider (1990), for example, does not address the issue of case assignment to subjects fronted as part of a non-finite verbal constituent directly. But in a different context (p. 96) he contemplates whether a trace of the finite verb could be part of the topicalized constituent. Such a finite verbal trace could then supposedly assign nominative case, e.g., in a construction like (3).

- (3) [Ein Außenseiter gewonnen t_i] hat_{*i*} hier noch nie.
 an outsider won has here still never

However, Haider points out that the existence of such structures would predict that verbal particles could generally occur in fronted position. As illustrated by example (4), this is not the case.

- (4) * [Ein Buch auf t_i] schlug_{*i*} Hans.
 a book PART open Hans
 ‘He opened a book.’

Kratzer (1984, p. 46), on the other hand, follows the indirect case assignment idea in suggesting that nominative case “can be inherited from some other NP by means of co-indexation” for which she assumes “some empty NP outside of their VP”. This idea, however, is not worked out any further.

Picking up at this point, we need to clarify Kratzer’s notions and explain how they fit into the general grammatical architecture. As a

first step, we thus need to answer the following three questions:

1. What is the nature of the “*empty NP*” and how can it be assigned case locally?
2. What kind of relationship is the “*co-indexation*” which has to hold between the empty NP and the overt embedded NP?
3. In what way is the “*inheritance*” of case from the empty NP to the overt embedded NP realized?

1.3 The data

1.3.1 Nominative case assignment

A relevant property of the construction which points the way to an answer of the questions we raised above seems to have gone unnoticed: the topicalization of [N' V"] is restricted to sentences in which V' is a raising verb.^{3,4} So while a *zu*-infinitive can be fronted with the subject when embedded under the raising predicate *scheinen* (5), the same construction with an equi predicate like *versuchen* is ungrammatical (6).

- (5) [Ein Außenseiter zu gewinnen] scheint hier eigentlich nie.
 an outsider to win seems here actually never
 ‘An outsider never actually seems to win here.’
- (6) * [Ein Außenseiter zu gewinnen] versuchte hier noch nie.
 an outsider to win tried here actually never
 ‘An outsider never actually tried to win here.’

Supporting this claim, verbs which are ambiguous between an equi and a raising alternative like *versprechen*, *drohen*, or *können* only have the raising reading when occurring in such a construction:

- (7) [Ein Außenseiter zu gewinnen] versprach hier noch nie.
 an outsider to win promised here still never
 a. *‘An outsider never promised to win here.’
 b. ‘It was never probable that an outsider wins here.’
- (8) [Ein Außenseiter zu gewinnen] drohte hier noch nie.
 an outsider to win threatened here still never
 a. *‘An outsider never threatened to win here.’
 b. ‘There was never the danger of an outsider winning here.’

³As so often, this turns out to be a rediscovery: Netter (1991, p. 28) mentions this restriction in passing.

⁴Note that we analyze tense and passive auxiliaries as raising verbs. See Höhle (1978, pp. 88ff) for an argumentation that the notion of auxiliary in German plays no theoretical role.

- (9) [Ein Kollege aus Köln teilnehmen] kann diesmal
 a colleague from Cologne participate be able this time
 leider nicht.⁵
 unfortunately not
- a. *‘Unfortunately, a colleague from Cologne is unable to participate
 this time.’
- b. ‘Unfortunately, it is not possible that a colleague from Cologne
 participates this time.’

So the subject can be realized with the embedded verb *V*” only in structures in which it would ordinarily be raised to become the subject of the governing verb *V*’ (whereas co-indexing as in the equi case is not enough). The conclusion we draw from this is that even though the subject is realized as an argument of the embedded verb, raising of a ‘*spirit*’ of the subject still takes place as far as case assignment is concerned.⁶

This conclusion is confirmed by the fact that subject-to-subject raising verbs which allow extraposition of their verbal complement also allow a nominative NP to be part of the extraposed verbal projection, as illustrated by example (10).

- (10) Obwohl damals anfang, der / *den Mond zu scheinen
 even though back then begun the-N the-A moon to shine
 ‘Even though the moon had begun to shine back then’

With respect to the discussion of direct and indirect case assignment we started with, our conclusion provides natural answers to the three questions a theory of indirect case assignment has to answer. First, the nature of the “empty NP” which can locally be assigned case in the ordinary way is unveiled to be whatever representation is taken to undergo raising. In the HPSG paradigm, for example, where raising is for-

⁵Example due to Tilman Höhle (p.c.).

⁶As Gisbert Fanselow and Gereon Müller pointed out to me, the notion of a spirit we introduce here bears a certain similarity to the idea of abstract feature movement in the minimalist program (Chomsky, 1995). Note, however, that in our proposal the occurrence of spirits is triggered lexically and is of an entirely different nature than ordinary unbounded dependencies like topicalization. Spirits represent (at least the case and agreement information of) an NP that could be but has not been raised in a particular case. As our data discussion shows, there is significant evidence for linking spirits to the lexical occurrence of raising verbs in this way. Without further assumptions this also makes the right locality predictions in that non-locality can only arise through a hypotactic chain of raising predicates, which is discussed in section 1.3.4. It remains to be shown how the data could instead be explained on the basis of abstract feature movement and the locality restrictions assumed for such movement.

mally captured as identification of subcategorization requirements, the “empty NP” is not actually an empty constituent but an element on the list of subcategorization requirements—and it is those subcategorization requirements which in our setup (different from HPSG tradition) represent already realized elements that we want to refer to as spirits in a narrower sense.⁷

Second, the kind of “co-indexation” relationship holding between the “empty NP” (= spirit) and the overt embedded NP is empirically established to be identical to the independently motivated raising relation introduced by verbs of a certain class.

Finally, the “inheritance” of properties like case from the “empty NP” to which it is assigned to the overt NP exhibiting these properties is the immediate effect of the raising relation. In the HPSG paradigm, it is the already mentioned identification of subcategorization requirements as part of the lexical specification of a raising verb which requires part of the realized NP to be identical to the raised spirit.

In sum, the idea to let representations of already realized subjects take part in raising without further stipulations introduces the additional representation required to ‘indirectly’ assign case without having to relax the conditions under which case assignment takes place.⁸

Subject-verb agreement

Additional evidence for such raising of the spirit of the subject comes from subject-verb agreement. Example (11) indicates that the subject realized as complement of the fronted non-finite verb establishes the usual agreement relationship with the embedding finite verb.

- (11) [Ein Außenseiter gewonnen] hat / *hast / *haben hier
 an outsider won has have-2.SG have-PL here
 noch nie.
 still never
 ‘An outsider has never won here yet.’

⁷The use of the term subcategorization requirement is slightly misleading in the context of the HPSG paradigm since the subcategorization ‘requirement’ of a sign in HPSG is actually identified with (a subpart of) the sign realizing this requirement. With respect to a simple finite sentence, for example, the subject requirement of the finite verb is identical to the (*synsem* part of) the actual subject. When we, for lack of a better term, speak of the subcategorization requirement of a sign, one should always keep this identity in mind.

⁸Since raising in the HPSG paradigm establishes an identity between the raised spirit and (a part of) the overt NP, the formalization of the raising spirits idea we present in section 1.4 can also be understood as encoding the idea of direct case assignment. But note that the identification of the raised spirit with (a part of) the overt NP eliminates the otherwise typical need of direct case assignment proposals to relax the conditions under which case assignment takes place.

One might claim that this example does not show agreement but the third person singular marking which surfaces whenever a finite verb has no overt subject as in (12).

- (12) Hier wurde / *wurden getanzt.
 here was were-PL danced
 ‘Here people danced.’

But the example (13) from Höhle (1997, p. 114) shows that proper number agreement has to be accounted for.

- (13) [Die Hände gezittert] haben / *hat ihm diesmal nicht
 the hands-PL tremble have-PL has him this time not
 ‘This time his hands didn’t tremble.’

And as far as a first person subject can be topicalized as an argument of a non-finite verb at all, the example with agreement appears to be better than the case with a non-agreeing third person singular verb (14).

- (14) [Ich Trottel gewonnen] ?habe / *hat hier noch nie.
 I fool won have-1.SG has here still never
 ‘I fool have never won here yet.’

In addition to the nominative case assignment data, the subject-verb agreement facts thus show that the subject fronted as part of a non-finite verbal projection selected by a finite subject-to-subject raising verb behaves just like it does when it constructs as the ordinary subject of the finite verb.

We conclude that in a subject-to-subject raising construction raising of the (spirit of the) subject always takes place as far as grammatical relations like case assignment and subject-verb agreement are concerned—and that this even is the case if the subject is realized as a dependent of the embedded verb. In other words, the raising relation identifying the subject of *V'* with that required by *V*” seems to be independent of where the subject is realized. If this *raising spirits hypothesis* is on the right track, one expects to observe the same kind of effect with other kind of raising phenomena. To test this prediction, in the following sections we take a closer look at case assignment in various constructions which have been analyzed as involving raising.

1.3.2 Accusative case assignment in AcI constructions

One relevant raising phenomenon is the AcI construction under an analysis which raises the subject of the embedded verb to become the object

of the AcI verb. Grewendorf (1994, p.32), S. Müller (1997) and others observed that in examples like those shown in (15)–(17), where an AcI verb selects a fronted verbal complement including the subject, the subject has to bear accusative case.

- (15) [*Der / Den Kanzler tanzen] sah der Oskar.
 the-N the-A chancellor dance saw the Oskar
 ‘Oskar saw the chancellor dance.’
- (16) [Den Sänger jodeln] läßt der König.⁹
 the singer jodel lets the King
 ‘The King allows/forces the singer to jodel.’
- (17) [Den Mechaniker das Auto reparieren] ließ der Lehrer schon
 the mechanic the car repair let the teacher already
 oft.¹⁰
 often
 ‘The teacher already often asked the mechanic to repair the car.’

As in the nominative case discussed in the previous section, the subject of the embedded verb realized in the fronted verbal projection thus receives case as if it were realized directly in the head projection of the AcI verb as in (18).

- (18) Der Oskar sah den Kanzler tanzen.
 The Oskar saw the chancellor dance
 ‘Oskar saw the chancellor dance.’

To round off the picture, a direct comparison of the subject-to-subject raising case (19) with the subject-to-object raising AcI case (20) illustrates that the fronted verbal constituent itself is not responsible for the case assignment.

- (19) [Ein / *Einen Außenseiter gewinnen] wird hier nie.
 an-N an-A outsider win will here never
 ‘An outsider will never win here’
- (20) [*Ein / Einen Außenseiter gewinnen] läßt Gott hier nie.
 an-N an-A outsider win lets god here never
 ‘God never lets an outsider win here.’

⁹Example due to Oppenrieder (1991, p.57, judged ?, cited after S. Müller 1997, p.23).

¹⁰Example due to Grewendorf (1994, p.32).

The only obvious exception to the above characterization of case assignment in AcI constructions is when the fronted predicate assigns a *lexical* case as in (21).

- (21) [Ihm schlecht werden] sah ich noch nie.
 him-D sick become saw I still never
 ‘So far I never saw him become sick.’

The raising spirits hypothesis claiming that raising establishes the local case assignment and agreement relations even if the raised element is realized as part of an embedded projection thus correctly predicts the accusative case assignment observed with AcI constructions. The spirits of the subjects of non-finite projections can be raised by a subject-to-subject raising verb to receive nominative case and establish subject-verb agreement, or it can be raised by a subject-to-object raising (= AcI) verb to receive accusative case.

1.3.3 Case assignment in passive constructions

An interesting test case for the raising spirits hypothesis are passives. The examples in (22)–(23) illustrate that the nominative NP in a passive construction can be fronted as an argument of the embedded verb.

- (22) [Zwei Männer erschossen] wurden während des Wochenendes.¹¹
 two men shot were during the weekend
 ‘Two men were shot during the weekend.’
- (23) [Der Führerschein abgenommen] wurde einem Autofahrer am
 the driving license taken away was a driver on
 Samstag abend bei Friedrichsdorf.
 Saturday evening near Friedrichsdorf
 ‘On Saturday evening, the driving-license of a driver was taken away near Friedrichsdorf.’

Generally speaking, two analyses of such passive constructions are possible. Either the passive auxiliary *werden* is an *object-to-subject* raising verb selecting a *past participle*. Or, the auxiliary is analyzed as a *subject-to-subject* raising verb selecting a *passive participle*. In the former analysis, the generalization over the active–passive relation is encoded in the auxiliary.¹² In the latter it can be expressed in a lexical rule deriving

¹¹Example due to Webelhuth (1985, p. 210, cited after S. Müller 1997, p. 23).

¹²Bech (1955, §28), for example, states: “Das verbum *werden* hat den koeffizienten N’:A”, wenn es den 3. status regiert. [The verb *werden* has the coefficient N’:A” when it governs a participle.]”, which suggests an object-to-subject raising analysis

the passive participle¹³ or as an effect of the passive morpheme¹⁴.

Independent of which passive analysis one chooses, the subject of the auxiliary in a passive sentence stands in a raising relationship with an argument of the selected participle. Furthermore, in case the passive auxiliary is finite, it assigns nominative case to its subject. The raising spirits hypothesis thus correctly predicts the grammaticality of examples like (22) and (23). The argument which is fronted as part of the non-finite complement is raised as spirit to become the subject of the finite auxiliary and is thus assigned nominative case.

An interesting difference between the two passive analyses combined with the raising spirits idea is that under the subject-to-subject analysis of passive one only has to assume that the information on *subjects* of non-finite constituents is available even if the subject is already realized. Or expressed under the raising spirits view, one only has to assume raising of subject spirits—which is all that was needed in the ordinary subject-to-subject raising and the AcI subject-to-object raising cases our empirical discussion started with.¹⁵ Under the object-to-subject raising analysis of passive, on the other hand, one has to provide a link to the *object* realized as part of the non-finite constituent to permit nominative case assignment. Under the raising spirits view of establishing local grammatical relations, this is the only case we are aware of that would require raising of object spirits.

1.3.4 Interaction of multiple raising constructions

In the last sections, we investigated different kinds of raising constructions and showed that each of these constructions behaves as expected under the raising spirits hypothesis. Since multiple raising constructions can be combined in a single sentence, we now turn to an investigation of the interaction between different kinds of raising constructions to clarify whether the possibility to consecutively raise an element also applies to spirits.

Extending the raising relation

Examples in which the construction we are interested in is embedded under a further raising verb are already mentioned by Haider (1990). He

of *werden*. This point of view is worked out in some of the HPSG proposals, like Kathol (1994, pp. 245ff) or Pollard (1994, p. 291).

¹³See, for example, Bresnan (1982), Nerbonne (1982), or Pollard and Sag (1987).

¹⁴See, for example, the discussion in Abraham (1995, pp. 103ff), who also points out that since German passive and perfect participles cannot be morphologically distinguished, the passivizing effect of the morpheme has to be reversed when the participle combines with the perfect auxiliary *haben*.

¹⁵Independent evidence for the accessibility of the properties of a subject contained in a verbal projection is provided by Hühle (1997).

lists the sentences in (24), which extend the example (2) presented in the introduction with the subject-to-subject raising verb *scheinen*.

- (24) a. [Ein Außenseiter gewonnen] scheint hier noch nie zu haben.
 an outsider won seems here still never to have
 ‘An outsider seems never to have won here yet.’
- b. [Ein Außenseiter gewonnen zu haben] scheint hier noch nie.
 an outsider won to have seems here still never

Examples with an ergative verb, like the sentence (1) mentioned in the introduction, also permit such embedding under a raising predicate, as shown in (25).

- (25) a. [Ein Fehler unterlaufen] scheint ihr dabei aber noch nie zu
 an error crept in seems her there but still never to
 sein.
 be
 ‘So far she never seems to have made a mistake there.’
- b. [Ein Fehler unterlaufen zu sein] scheint ihr dabei aber noch
 an error crept in to be seems her there but still
 nie.
 never

Adding a subject-to-subject raising verb in the way exemplified in the above examples adds one additional level of embedding in between the subject fronted as part of the non-finite constituent and the finite verb assigning nominative case. By adding further raising predicates, further levels of embedding are possible—even though the increasing complexity makes such examples hard to process. In (26) the nominative case of the subject of *scheint* is assigned through three levels of embedding raising predicates to the NP argument of *unterzeichnet*.

- (26) ? Der endgültige Vertrag unterzeichnet worden zu sein scheint
 the-N final contract signed be to be seems
 aber erst nach langen Verhandlungen.
 but only after long negotiations
 ‘The final contract was only signed after long negotiations.’

In light of the fact that the apparently non-local case assignment relationship can be reduced to ordinary local case assignment to the spirit of the subject which was raised by a sequence of raising predicates, under the raising spirits hypothesis such case assignment is correctly predicted to be possible.

Multiple case assignment possibilities

In the cases discussed above, subject-to-subject raising verbs were used to extend the raising relation since they do not alter the function and thereby the case of the raised element. While these cases confirm the basic raising spirits hypothesis, the other possibility of extending a sentence with a raising predicate that changes the function of the raised element can disclose further properties.

Höhle (1978, pp. 169–172) points out that a small subset of AcI constructions in German can be passivized. This is illustrated by example (27).

- (27) als das Werkzeug fallen gelassen wurde
 when the tool drop let was
 ‘when the tool was dropped’

Due to the presence of two cases which can potentially be assigned to the NP *das Werkzeug*, accusative by the AcI verb and nominative by the finite passive auxiliary, this construction is an interesting test case for determining the exact circumstances under which structural case assignment is possible. Example (28) shows that if a case-disambiguated NP is fronted by itself, it has to occur in nominative case.

- (28) [Ein / *Einen Hammer] wird hier nie fallen gelassen.
 a-N a-A hammer is here never fallen let
 ‘No one ever drops a hammer here.’

In (28) it thus is the finite verb which assigns case to the NP realized as its subject.

Under our raising spirits perspective, the interesting question is what happens when the subject is realized as part of the verbal complement, i.e., in those circumstances under which in the previously discussed constructions case was assigned to a raised spirit. Example (29) shows that the finite verb can assign nominative case to the embedded NP just like it did to the locally realized NP in the ordinary passivization of an AcI construction we saw in (28).

- (29) [Ein / ?*Einen Hammer fallen gelassen] wird hier eigentlich nie.
 a-N a-A hammer fall let is here usually never
 ‘Usually, no one ever drops a hammer here.’

From this we conclude that an NP which is not assigned lexical case always shows the structural case assigned by the highest case assigner to which it could be raised.

1.4 Theoretical consequences

In sections 1.3.1 through 1.3.3 we argued that the case assignment and subject-verb agreement data makes it plausible to assume that raising establishes local grammatical relations regardless of where the NP to be raised is realized. On the basis of interactions in complex constructions discussed in section 1.3.4, this was made more precise by determining that independent of where the NP is realized, the local case assignment relations are only established at the highest place to which the NP or its spirit can be raised.

In the remaining part of the paper, we want to develop these ideas into a theoretical proposal which we will couch in the framework of HPSG (Pollard and Sag, 1994). We show that the raising spirits idea can be integrated into HPSG in a straightforward and general way and that it interacts properly with a theory of case assignment.

1.4.1 A basic theory

Subcategorization in HPSG

In traditional HPSG (Pollard and Sag, 1994, ch. 1–8), the subcategorization requirements of a word are represented in the sign itself, as shown in the partial lexical entry for the ditransitive verb *gibt* (*gives*) in figure 1.

$$\left[\begin{array}{l} \text{PHON } \langle \textit{gibt} \rangle \\ \text{SYNSEM|LOC|CAT|SUBCAT } \langle \text{NP}, \text{NP}, \text{NP} \rangle \end{array} \right]$$

FIGURE 1 Subcategorization requirements in the lexical entry of *gibt*

The Subcategorization Principle of Pollard and Sag (1994, p. 399) shown in figure 2 ensures that when a word which is licensed by such an entry combines with one or several of its arguments, (the SYNSEM value of) each argument has to be identical to one of the subcategorization

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{head-struct} \end{array} \right] \rightarrow \left[\begin{array}{l} \text{SYNSEM|LOC|CAT|SUBCAT } \boxed{1} \\ \text{DTRS } \left[\begin{array}{l} \text{HEAD-DTR|SYNSEM|LOC|CAT|SUBCAT } \boxed{1} \oplus \boxed{2} \\ \text{COMP-DTRS } \textit{synsems2signs}(\boxed{2}) \end{array} \right] \end{array} \right]$$

FIGURE 2 The Subcategorization Principle of Pollard and Sag (1994)¹⁶

¹⁶The principle is shown in an AVN notation instead of the text of the original. As usual, \oplus stands for the append relation concatenating two lists. The relation *synsems2signs* takes a list of synsems and returns a list of signs as its result argument. It is straightforwardly defined as:

$$\begin{aligned} \textit{synsems2signs}(\langle \rangle) &:= \langle \rangle. \\ \textit{synsems2signs}(\langle \boxed{1} \mid \boxed{2} \rangle) &:= \langle \left[\text{SYNSEM } \boxed{1} \mid \textit{synsems2signs}(\boxed{2}) \right] \rangle. \end{aligned}$$

requirements of that word. The constituent resulting from this combination then bears only the subcategorization requirements of the head daughter which were not already realized. This cancellation mechanism, reminiscent of categorial grammar, is illustrated by the sketch of an analysis of a simple German verb-last sentence in figure 3.¹⁷

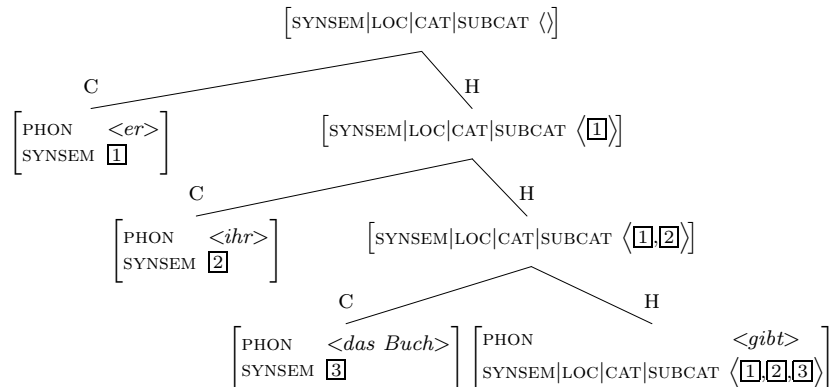


FIGURE 3

SUBCAT percolation in an analysis of a simple verb-last sentence:
 “(daß) er ihr das Buch gibt [(that) he her the book gives]”

The spirits appear on the scene

To formalize the idea of spirits as representations of already realized constituents, we need to change the Subcategorization Principle so that instead of removing all information about an argument that has been realized, we only check off the subcategorization requirement but keep (at least some of) the subcategorization information around. A metaphorical way of thinking about this is that there are two ways of going through a store with a shopping list: The traditional Subcategorization Principle corresponds to tearing off a piece of the shopping list every time one has put that item into the shopping cart. The alternative we propose now is to check off an item on the list once we have picked it up—which has the advantage of still being able to check something about an item on the list later, for example what kind of sweets we bought, without going through the shopping cart to look for it. For our issue, this advantage corresponds to being able to check local grammatical relations like case

¹⁷For exposition purposes, we illustrate the realization of valence requirements with binary branching trees. Nothing hinges on this assumption and the subcategorization principles work equally well with more than two daughters.

with the checked-off element on the local SUBCAT list instead of having to look through the tree for the realized argument.

Technically, we realize the idea of marking elements as realized instead of removing them from the SUBCAT list by introducing REALIZED as a new *boolean*-valued attribute of *synsem*.¹⁸ The idea is that all subcategorization requirements start out in the lexicon as $\left[\begin{smallmatrix} \text{REALIZED} & - \end{smallmatrix} \right]$ and are turned to $\left[\begin{smallmatrix} \text{REALIZED} & + \end{smallmatrix} \right]$ by the modified Subcategorization Principle in figure 4 once they are realized syntactically.¹⁹

$$\left[\begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{head-struct} \end{array} \right] \rightarrow \left[\begin{array}{l} \text{SYNSEM|LOC|CAT|SUBCAT } \boxed{1} \oplus \textit{mark-realized}(\boxed{2}) \oplus \boxed{3} \\ \text{DTRS } \left[\begin{array}{l} \text{HEAD-DTRS|SYNSEM|LOC|CAT|SUBCAT } \boxed{1} \oplus \boxed{2} \oplus \boxed{3} \textit{list}(\left[\begin{smallmatrix} \text{REALIZED} & + \end{smallmatrix} \right]) \\ \text{COMP-DTRS } \textit{synsems2signs}(\boxed{2}) \end{array} \right] \end{array} \right]$$

FIGURE 4 Modified Subcategorization Principle²⁰

Comparing the original Subcategorization Principle in figure 2 with the version modified so as to introduce spirits in figure 4, the important change is that the tag $\boxed{2}$ representing the list of arguments which are realized in the modified principle also occurs in the specification of the SUBCAT list of the mother instead of simply being left off from this list as in the original principle. To keep track of which elements have been realized, the relation *mark-realized* changes the REALIZED value of the *synsem* objects on the list $\boxed{2}$ from $-$ to $+$. In light of the fact that spirits of already realized elements stay on the SUBCAT list, an additional tag $\boxed{3}$ is needed to carry over those spirits to the SUBCAT list of the mother which are already realized as part of the head daughter.

Under the modified percolation of subcategorization requirements, the analysis of the example we sketched in figure 3 now looks as shown in figure 5. As a convenient notation we have represented all *synsem* objects with $\left[\begin{smallmatrix} \text{REALIZED} & + \end{smallmatrix} \right]$ as boxes which have been crossed out. Note that different

¹⁸Note that this attribute differs from the REALIZED attribute of Przepiórkowski (1999a,b). He uses the attribute to record in each argument whether it has been *locally* realized, whereas we use it to record whether the argument is realized at all.

¹⁹We would like to thank Adam Przepiórkowski for pointing out several bugs in an earlier formulation of this principle and suggesting how to fix them.

²⁰The relation *mark-realized* is defined as follows:

$$\textit{mark-realized}(\langle \rangle) := \langle \rangle$$

$$\textit{mark-realized}\left(\left\langle \left\langle \left[\begin{smallmatrix} \text{REALIZED} & - \\ \text{LOCAL} & \boxed{2} \\ \text{NONLOC} & \boxed{3} \end{smallmatrix} \right] \mid \boxed{4} \right\rangle \right)\right) := \left\langle \left[\begin{smallmatrix} \text{REALIZED} & + \\ \text{LOCAL} & \boxed{2} \\ \text{NONLOC} & \boxed{3} \end{smallmatrix} \right] \mid \textit{mark-realized}(\boxed{4}) \right\rangle$$

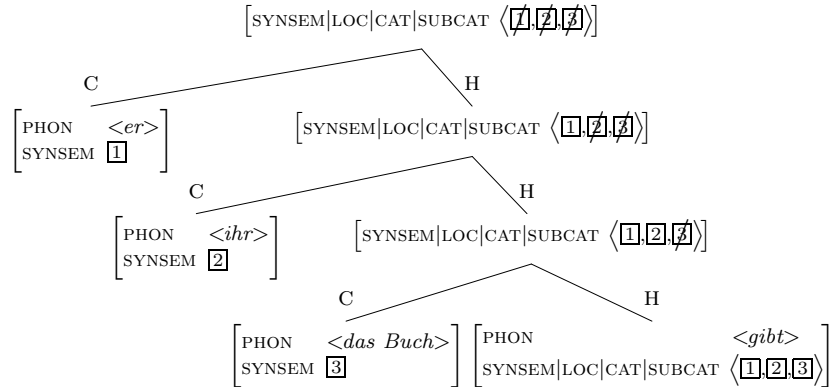


FIGURE 5

Modified SUBCAT percolation introducing spirits in the analysis of:
 “(daß) er ihr das Buch gibt [(that) he her the book gives]”

from the traditional picture, the mother of the entire construction in the tree in figure 5 locally represents the *synsem* information of all realized arguments on its SUBCAT list.

Raising spirits

Having formalized the representation of spirits and how they percolate in the domain of their head, we only need to remind ourselves of the HPSG treatment of raising and equi to see that nothing else is needed in order for the spirits to penetrate the local head domain whenever the head is selected by a raising verb.

Pollard and Sag (1994, pp. 132ff) propose to analyze the regularities involving raising and equi predicates as a result of their lexical properties. Pollard (1996, pp. 299f), Kiss (1995), Heinz and Matiasek (1994, p. 229), Hinrichs and Nakazawa (1994a) and others adopted this lexical analysis of control constructions for German.²¹ While the analyses differ in various respects, the central idea can be illustrated by the following lexical entries.²²

The lexical entry of an equi verb like *versuchen* (*try*) in figure 6 identifies the semantic index ($\bar{1}$) of the unrealized subject requirement of its verbal complement with that of its own subject requirement and assigns a semantic role to this index. Note that this has the consequence that an equi verb cannot select a verbal complement in which all sub-

²¹We use control as cover term for both raising and equi constructions.

²²The issue of argument raising as encoding of coherence is ignored in this paper. For a discussion of this issue with respect to the raising spirits hypothesis see Meurers (2000, ch. 10).

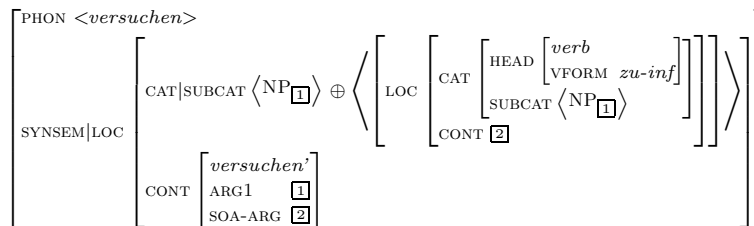


FIGURE 6 Lexical entry of a subject-oriented equi verb

categorization requirements have been realized, which correctly predicts the ungrammaticality of examples such as (6) on p. 7.

The lexical entry of a raising verb like *anfangen* (*start*) shown in figure 7, on the other hand, identifies the list of subcategorization requirements $\boxed{1}$ of the non-finite complement with its own subcategorization requirement list and assigns no semantic roles. This includes the

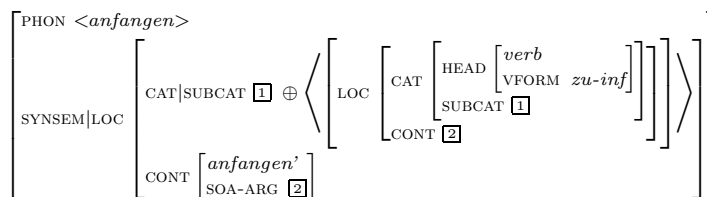


FIGURE 7 Lexical entry of a subject-to-subject raising verb

possibility that $\boxed{1}$ is the empty list, which correctly predicts that the verbal complement of the raising verb can be a saturated projection as was illustrated by example (5) on p. 7.

Finally, the lexical entry of a subject-to-object raising verb such as *sehen* (*see*) in figure 8 identifies the subcategorization requirement of the

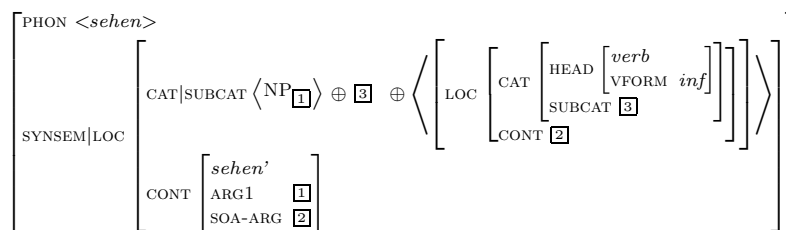


FIGURE 8 Lexical entry of a subject-to-object raising verb

non-finite complement with its object requirement. Just like subject-to-subject raising verbs it assigns no semantic role to a controlled element.

Combining this traditional HPSG analysis of raising and equi verbs with our modified subcategorization principle is sufficient to permit spirits to percolate from one head domain to another whenever they are embedded by a raising verb.²³ Figure 9 illustrates this with an analysis of the example (10) we discussed on page 8.²⁴

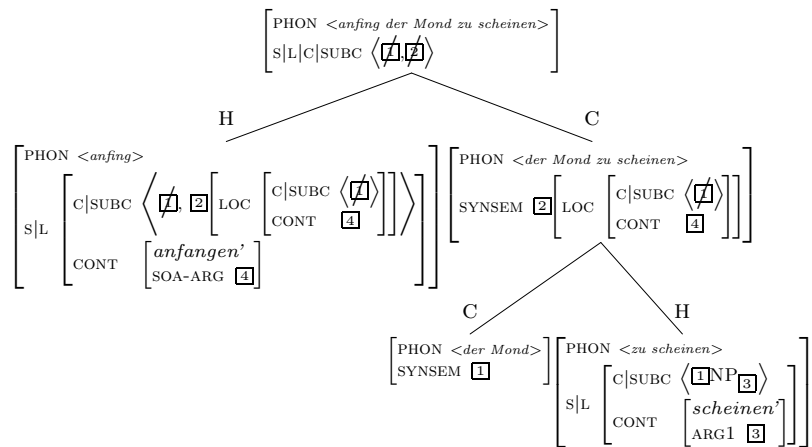


FIGURE 9 A simple example for raising of spirits:
“(obwohl damals) anfing, der Mond zu scheinen”

The central aspect of this analysis is that even though the verbal complement selected by the raising verb *anfangen* is already realized as part of the extraposed²⁵ verbal complement, the subcategorization requirement for the subject is still raised by *anfangen* and identified with its own subject requirement as shown by the two occurrences of $\boxed{1}$ in the entry of *anfangen*. Note that the spirit $\boxed{1}$ of the subject of the embedded verb has thus left its local head domain solely by virtue of being selected

²³Technically, some modifications are needed for the traditional lexical entries of raising and equi verbs to work with the modified subcategorization percolation setup: Where an unrealized subcategorization requirement is specified, as in the case of equi verbs, under the modified setup it needs to be specified as $\left[\begin{smallmatrix} \text{REALIZED} & - \end{smallmatrix} \right]$. And a list of $\left[\begin{smallmatrix} \text{REALIZED} & + \end{smallmatrix} \right]$ elements is added to the end of the SUBCAT specification of verbal complements.

²⁴For space reasons we here and in the following sometimes abbreviate attribute names by their first letters and SUBCAT by SUBC.

²⁵We here ignore the question how to generally capture extraposition phenomena, an issue which is largely orthogonal to the point discussed here.

by a raising verb. In particular, no non-local mechanism like the SLASH percolation employed in HPSG for extraction phenomena is involved.

Case assignment

Having clarified the introduction and percolation of spirits as marked elements on the SUBCAT list of signs, we are ready to show that the existence of such spirits permits a straightforward formulation of case assignment.

Taking up the principles and parameters tradition of structural case assignment, Heinz and Matiasek (1994) and other HPSG proposals argue that a case theory for languages like German needs to make use of information on where an argument is syntactically realized. While certain arguments of a head always surface with a specific case, which can therefore be assigned in the lexical entry of the head (*lexical case*), the case of other arguments depends on the syntactic configuration in which they are realized and thus has to remain underspecified in the head's lexical entry (*structural case*).²⁶ The HPSG proposals differ with respect to exactly what information is needed and how it becomes available to the case principle resolving syntactic case. Heinz and Matiasek (1994) propose a case principle resolving the case of a sign in the syntactic structure in which that sign is realized. This follows from the fact that the case principle of Heinz and Matiasek (1994, pp. 209f) assigns case to an element on the head daughter's SUBCAT list which is required to be missing from the SUBCAT list of the mother.

Przepiórkowski (1999b), on the other hand, presents a case principle which assigns case on the argument structure of a sign in a way that is only indirectly informed about whether the sign is syntactically realized. For this, Przepiórkowski records for each element on the argument structure whether it has been locally realized or not.

The proposal by S. Müller (1996) in essence can be viewed as a hybrid between these two kinds of approaches. On the one hand, Müller's case assignment principle is similar to that of Heinz and Matiasek (1994) in that it refers directly to (the ARG-ST value as *cat* attribute of) the daughters structure, i.e., the syntactic realization. On the other, it shares with the approach of Przepiórkowski (1999b) the fact that case is assigned to elements on ARG-ST, which for S. Müller (1996) includes representations of those elements which have been extracted by a lexical rule as part of a traceless theory of unbounded dependencies.

We believe that the data we presented in section 1.3 provide im-

²⁶We here restrict ourselves to two structural cases arising in verbal environments, nominative and accusative. We are agnostic as to whether a complete structural case theory should also include the dative.

portant evidence for the assumption that case assignment should not directly be linked to the syntactic realization of a sign as, e.g., in the theory of Heinz and Matiasek (1994). While we have argued for spirits as a representation of already realized subcategorization requirements, nothing short of syntactically realizing such spirits as some kind of phonologically empty elements would make it possible to stick with a case principle running on syntactic realization—and we are not aware of independent arguments motivating such a move. Essentially agreeing with Przepiórkowski (1999b) we thus reject the idea that it is the syntactic realization which causes structural case to be resolved. We instead propose to assign case to all subcategorization requirements which are not selected by a raising predicate. For the verbal heads we are concerned with in this paper, the two statements in figure 10 are sufficient to assign case.

Nominative case assignment

In an utterance, the least oblique subcategorization requirement with structural case of each verb which is not raised from that verb receives nominative case.

Accusative case assignment

In an utterance, each non-least oblique subcategorization requirement with structural case of each verb which is not raised from that verb receives accusative case.

FIGURE 10 A Case Principle for verbal environments

Let us explain these statements in detail, starting with the passage “least/non-least oblique subcategorization requirement”. We follow standard HPSG in assuming that the subcategorization requirements of a head are ordered according to a hierarchy of obliqueness. While the motivation for this hierarchy is discussed in Pollard and Sag (1994), here it is sufficient to note that this obliqueness ordering on the subcategorization requirements allows us to identify the subject as the least oblique argument.²⁷

To make the meaning of “subcategorization requirement with structural case” explicit in HPSG, we follow Heinz and Matiasek (1994) and others in assuming that the lexical entry of each verb specifies which of its arguments bears a specific lexical case and which some structural

²⁷Note that this does not yet differentiate between the subjects of ordinary and those of ergative verbs. To make this additional distinction, one can follow Heinz and Matiasek (1994) in introducing the notion of *designated argument* (Haider, 1985, 1986) into HPSG.

case, where structural case is an underspecified marking which in verbal environments can resolve to nominative or accusative.

Finally, the restriction that we only assign case to a verb’s argument “which is not raised from that verb” requires a more detailed explanation, in particular since this is where our case assignment principle differs from other HPSG proposals. As empirical motivation for this restriction, we showed in section 1.3.4 that we only want to assign case to a subcategorization requirement on the highest subcategorization frame it can be raised to. Given a particular verb the subcategorization requirements of which we want to assign case to, we thus only assign case to those requirements which are not raised by a predicate selecting that verb. In other words, given a particular verb, we only assign case to those of its subcategorization requirements which are realized as part of that verb’s head projection or not realized at all.

To discuss the options for formalizing this restriction, let us explain the different ways in which the case assignment rules of figure 10 can be expressed. Since accusative and nominative assignment are identical with respect to the restriction under discussion, it is sufficient to focus on nominative case assignment in the following paragraphs.

Global constraints Using the *Relational Speciate Re-entrant Language (RSRL)* (Richter et al., 1999; Richter, 1999, 2000), an extension of the *Speciate Re-entrant Logic (SRL)* for HPSG defined by King (1989, 1994), we can express nominative case assignment as a global constraint on complete utterances. In figure 11, we see that each of the passages in the nominative case assignment rule of figure 10 can directly be translated to a subterm of an implicational RSRL statement. To formalize the concept of an utterance, we make use of the sub-classification of *sign* into *unembedded-sign* and *embedded-sign* as introduced and motivated by Richter (1997). In RSRL, quantification is restricted to substructures of the particular linguistic object described. The first conjunct of the principle in figure 11 thus fixes that the principle talks about case assignment relative to an unembedded sign, or more properly speaking, it does so with respect to each unembedded sign.

The second conjunct of the principle refers to each verbal word (⊐) which occurs in this unembedded sign that has a least oblique²⁸ argument (⊓) marked as structural case receiving. The type *struc* is an abbreviation for the type *structural-case* of which *nominative* and *accusative* are defined to be subtypes.

²⁸As mentioned above, we follow Pollard and Sag (1994) in assuming that the SUBCAT list which encodes the subcategorization requirements is ordered by increasing obliqueness. The FIRST element under SUBCAT thus is the least oblique argument.

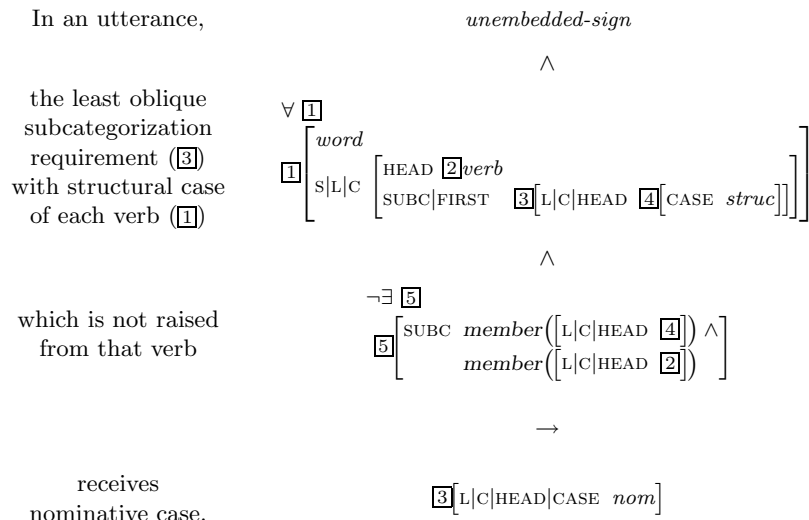


FIGURE 11 Nominative case assignment as a global constraint

The third conjunct, which is introduced by the negative existential, serves to exclude those elements $\boxed{3}$ which are raised from the SUBCAT list of a verb $\boxed{1}$. This is expressed by checking whether there is an element $\boxed{5}$ in the unembedded sign which has a subcategorization frame on which both the verb $\boxed{1}$ and its argument $\boxed{3}$ are present. In that case, the element $\boxed{5}$ would be the subcategorization frame of a head which has raised the argument $\boxed{3}$ from the verb $\boxed{1}$, in which case we do not want to assign case to $\boxed{3}$ with respect to the verb $\boxed{1}$. Since this check also needs to catch *projections* of the verb $\boxed{1}$ and since the REALIZED value of the argument $\boxed{3}$ changes to record that it has been realized (cf., sec. 1.4.1), the actual condition in the third conjunct of figure 11 is not formulated in terms of $\boxed{1}$ and $\boxed{3}$ being members of the same SUBCAT list, but by referring to the HEAD values of $\boxed{1}$ and $\boxed{3}$, namely $\boxed{2}$ and $\boxed{4}$.²⁹

Once the antecedent of the nominative case assignment principle in figure 11 is satisfied, i.e., once it has identified the least oblique structural case marked arguments $\boxed{3}$ of verbal words $\boxed{1}$ such that $\boxed{3}$ is not raised from the verb $\boxed{1}$, then the consequent of the principle assigns nominative case to each such element.

²⁹The necessity to refer to the HEAD values instead of the *synsem* objects directly is illustrated in the discussion of figure 16. Note that this use of the HEAD values assumes that the HEAD values of different head projections are never (accidentally) token identical, which could be explicitly enforced by a constraint on unembedded signs.

Global constraints with local bookkeeping It is possible to keep the case assignment as such local if one separates the case assignment from the global condition checking for raising of arguments. To do so, one needs to locally record in each subcategorization requirement whether it has been raised or not. Przepiórkowski (1999a, p.94) integrates our raising spirits analysis into his general theory of case assignment in this way. He introduces the *boolean*-valued attribute RAISED as appropriate for subcategorization requirements and specifies a global constraint on *unembedded-sign* to ensure the proper value for this attribute. Figure 12 shows a global constraint expressing this idea using the notational conventions and the signature we have adopted throughout the paper.

unembedded-sign \rightarrow

$$\left(\begin{array}{c} \forall \boxed{1} \forall \boxed{3} \\ \left[\begin{array}{c} \text{category} \\ \boxed{1} \text{ HEAD } \boxed{2} \\ \text{SUBC } \boxed{6} \text{ member}(\boxed{3} \text{ [L|C|HEAD } \boxed{4}]) \end{array} \right] \end{array} \right) \rightarrow \\ \left(\boxed{3} \text{ [RAISED +]} \leftrightarrow \exists \boxed{5} \left[\begin{array}{c} \text{SUBCAT } \text{ member}(\text{[L|C|HEAD } \boxed{4}]) \wedge \\ \text{member}(\text{[L|C|HEAD } \boxed{2}]) \end{array} \right] \right)$$

FIGURE 12 A global constraint marking raised elements

Note the similarity of this raised marking principle and the case assignment principle of figure 11. The raised marking principle captures the same global searching for all raised elements within an *unembedded-sign*. But different from the case assignment principle it does not assign case itself to the elements which are not raised. Instead, it stores the result of this global search in the RAISED value of each subcategorized element. Based on these RAISED values, the principle assigning case can be simplified significantly. The negative existential condition in the nominative case assignment principle of figure 11 reduces to the requirement that the argument $\boxed{3}$ of that figure needs to be [RAISED -] to receive case. Nominative case assignment can thus be collapsed to a local constraint on *word* such as the one shown in figure 13.

Local constraints We saw in the last paragraph that one can locally assign case if one records in each subcategorization requirement of a lexical head whether the requirement is raised from that head or not. The encoding still requires one global constraint to determine the RAISED value of each argument, which in terms of an implementation of this theory means that case assignment has to occur after the entire structure

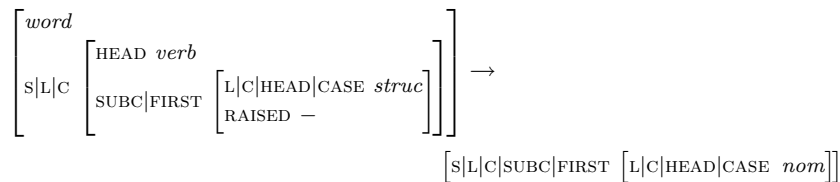


FIGURE 13 A local constraint assigning nominative case

has been built. Also, even though the interpretation of global constraints in RSRL is as precise as one can get, linguists working in the HPSG paradigm in general aim for local characterizations of generalizations. S. Müller (2001, p. 249), for example, remarks on the "unfortunate" non-locality of our global case assignment principle right after concluding that it is the most adequate approach. He leaves it as "an open question whether it is possible to make the domain more local in which case is assigned." In the following we answer this question by showing that it is possible to provide a more local formalization of our approach.

Looking at the task to be achieved by the global constraint in figure 12, on the one hand such a global search over the entire structure of the utterance is a very general way of achieving the intended goal. On the other hand, we saw in section 1.3 that all relations causing arguments to be raised are in fact introduced by specific lexical entries, such as those of subject-to-subject or subject-to-object raising verbs. This means that the global constraint of figure 12 can be reduced to a lexical specification. Figure 14 shows the relevant valence specifications in the revised entries of a subject-to-subject and a subject-to-object raising verb. The

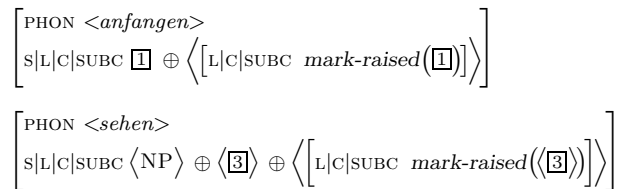


FIGURE 14 Marking raised arguments in lexical entries of raising verbs

relation *mark-raised* defined in figure 15 is very simple. All it does is mark the RAISED attribute of the argument on the subcategorization list of the verbal complement as + (if there is such an argument).

Once the lexical entries of raising verbs are specified in this way to ensure the correct RAISED value, the global principle of figure 12

$$\text{mark-raised} \left(\left\langle \left\langle \left[\begin{array}{l} \text{REALIZED} \\ \text{LOCAL} \\ \text{NONLOC} \end{array} \right] \begin{array}{l} \boxed{1} \\ \boxed{2} \\ \boxed{3} \end{array} \right\rangle \right\rangle \right) := \left\langle \left[\begin{array}{l} \text{RAISED} \\ \text{REALIZED} \\ \text{LOCAL} \\ \text{NONLOC} \end{array} \right] \begin{array}{l} + \\ \boxed{1} \\ \boxed{2} \\ \boxed{3} \end{array} \right\rangle$$

$$\text{mark-raised} (\langle \rangle) := \langle \rangle.$$

FIGURE 15 Defining the *mark-raised* relation

is no longer needed.³⁰ Independent of how the RAISED specification is ensured, the case assignment can be taken care of by a local principle such as the one we saw in figure 13. Lexicalizing the raised specification as shown in the lexical entries above thus results in a completely local case assignment theory. This local rendition of the theory is particularly interesting from a computational perspective as it makes it possible to check for case violations already before the entire structure is built.

Two examples

Let us illustrate the case principle and its interaction with the subcategorization principle modified so as to introduce spirits with two example analyses. In figure 16 we see the analysis assigned to the example (2)

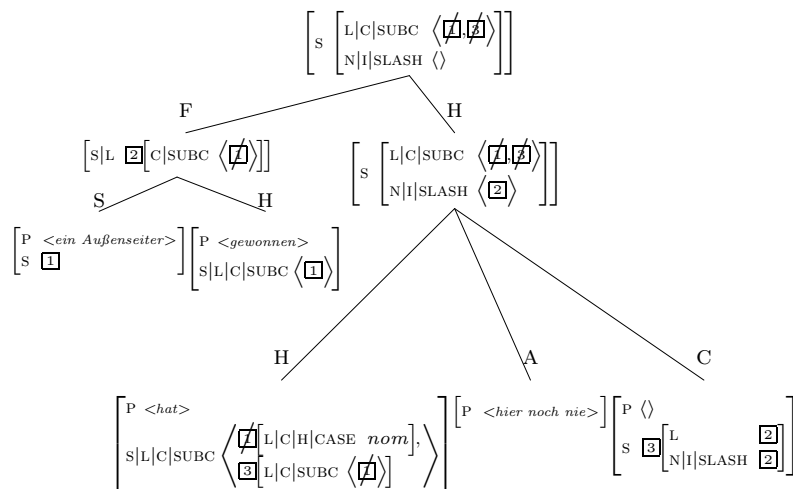


FIGURE 16 An example for nominative case assignment to a spirit

³⁰For the case assignment to work properly it is sufficient to ensure that raised arguments are marked as [RAISED +] as done by the above lexical entries. For explicitness sake, one can additionally specify the following constraint to ensure that realized arguments are always [RAISED -]: $sign \rightarrow [SYNSEM|RAISED -]$

from the very beginning of the paper.³¹ In this example, nominative case has to be assigned to a subject embedded in a fronted non-finite constituent. The fronted constituent [2] consisting of the non-finite verb *gewonnen* and its subject *ein Außenseiter* [1] is related by the standard non-local feature mechanism of HPSG (cf. the SLASH values) to a trace at the extraction site [3].³² The finite verb *hat* selects the trace as its verbal complement, and since *hat* is a subject-to-subject raising verb, it identifies the spirit of the subject [4] of (the trace of) the verbal complement with its own subject requirement.

So how does the case theory we just formulated assign nominative case to the subject fronted as part of the non-finite constituent? The case principle does not apply to [1] on the SUBCAT list of the verb *gewonnen*. This is so since *gewonnen* is the head of a constituent that (via its trace) is selected by the raising verb *hat* which identifies [4] as an argument to be raised further. Note that [1] and [4] differ with respect to their REALIZED value. This exemplifies the motivation for only requiring identity of HEAD values in the negated existential conjunct of the case principle in figure 11.

Zooming in on the other occurrence of a verb, we see that the spirit [4] of the subject occurs as first element on the SUBCAT list of *hat*. Since *hat* is not selected by another raising predicate identifying [4] as an argument to be raised further, the case principle of figure 11 assigns nominative case to [4] as the first element on the SUBCAT list.

To showcase the accusative case assignment, let us return to example (15) on page 11 which is an instance of a sentence in which an AcI verb assigns accusative case to an argument fronted as part of a non-finite complement. Figure 17 shows how this sentence is analyzed under our theory. Parallel to the previous case, the subject requirement [1] on the SUBCAT list of the fronted verb *tanzen* is not assigned nominative case. This time, the fronted constituent is selected by the subject-to-object raising verb *sah*, which raises [1] to become its object. Since *sah* itself is not selected by a raising predicate, our case principle assigns nominative case to its subject and accusative case to [1] as the second element on the SUBCAT list.

1.5 Summary and Outlook

We started our investigation with the observation that for certain non-finite constructions in German it appears to be necessary to ensure non-

³¹To abstract over the nature of verb-second and the structure of the *Mittelfeld* we follow Pollard (1996) in assuming a flat *Mittelfeld* and obtain verb-second by simple linearization in this local tree.

³²Whether a trace-based or a traceless extraction theory is used is irrelevant here.

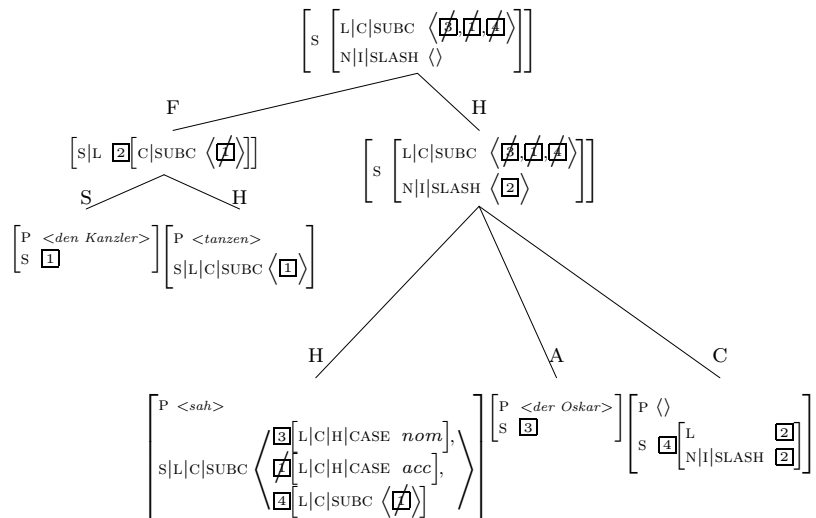


FIGURE 17 An example for accusative case assignment to a spirit

local nominative case assignment and agreement relations. Instead of contemplating a new non-local mechanism for establishing these relations, we observed that such extended relations are only possible when mediated by a lexical element, a raising predicate. This finding was confirmed by an empirical overview of raising constructions covering subject-to-subject raising, AcI constructions analyzed as subject-to-object raising, and stative and agentive passives analyzed either as subject-to-subject or as object-to-subject raising. Taking a closer look at sentences in which several raising constructions interact, we showed that local grammatical relations like case assignment are only established on the highest subcategorization frame to which an argument could be raised. In light of the fact that these raising relations are independently motivated, the remaining question we set out to answer was how already realized subcategorization requirements can be made visible to the traditional raising relations.

In the encoding we proposed as answer to this question, this was accomplished by modifying the traditional Subcategorization Principle of HPSG so as to mark realized complements rather than eliminating them from the list of subcategorization requirements. Since the subcategorization requirements corresponding to already realized arguments, which we referred to as spirits, are represented in the same way as ordinary subcategorization requirements (except for their REALIZED value),

they take part in all grammatical relations without requiring further changes. They can be raised when their verbal head is selected by a raising predicate and they can be assigned case by a version of an HPSG case theory which does not make case assignment directly dependent on syntactic realization.

The encoding is a general and straightforward theoretical rendition of the intuitions behind the spirits. The general nature of the modified subcategorization principle treating all arguments on a par, however, has the disadvantage of eliminating the idea that selection is a local phenomenon which does not in general have access to arguments embedded inside a constituent. A more restrictive alternative respecting this insight, would therefore only introduce spirits of subjects—an option pursued further in Meurers (2000, ch. 10). Making subjects the special case is attractive, as they have independently been argued to be visible from outside the saturated verbal projection. The existence of the linguistic representation we referred to as subject spirits would then essentially follow from the interaction of two independently motivated linguistic observations. First, the observation that (at least certain properties of) subjects are visible when looking at a saturated verbal projection. And second, the existence of raising verbs as a special lexical class of verbs establishing local links to the subject requirements of their verbal complements.

While the formalization we provide of the raising spirits idea can be improved on, the idea of subject spirits appears to be a valuable concept in that it shows that one can reduce the apparently non-local variants of case assignment and subject-verb agreement to an interaction of the traditional local variants of these relations with the raising relations introduced by a well-established lexical class of verbs.

Regarding the case assignment as such, we showed that there are a variety of options for formalizing it. While a single global constraint appears to be most general from a theoretical point of view, the local encoding of case assignment making use of a lexically specified book-keeping feature to mark raised elements is particularly well-suited for implementation purposes.

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