Scrambling in German – Extraction into the *Mittelfeld*

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Abstract

German is a language with a relatively free word order. During the last few years considerable efforts have been made in all syntactic frameworks to explain so-called scrambling phenomena.

In the following paper, I deal with some tough cases of German word order which cannot be described by assuming flat sentence structures or word order domains. The phenomena discussed are PP complements of nouns and adjectives, which can appear separated from their heads in the German *Mittelfeld*, and stranded prepositions. The similarity to fronting of these elements is used to explain these phenomena by a generalized version of the head-filler schema used in the standard HPSG framework.

Subject Areas: Nontransformational syntax of German, HPSG

1 Introduction

There are two basic ideas how to describe scrambling in languages with relatively free constituent order in certain syntactic domains. Firstly, one can assume that a kind of movement takes place, i.e., there is a position in a string where something is missing (a trace) and there is a corresponding position at another location in the string where the missing constituent appears. The alternative is to allow constituents to appear in any order in some particular domain. This domain usually is the domain of the head of a phrase. In HPSG [4], order variation is commonly associated with ordering variations among sister constituents in a flat structure.

This concept was extended by Mike Reape [6] to allow for complex domain formation operations which—in his approach—are driven by a feature called UNIONED. In the combination of signs, a functor can specify the UNIONED value of its arguments. The functor is either the head in a head-complement structure or the adjunct in a head-adjunct structure. If one allows adjuncts to domain-union with their heads, the fact that adjuncts can appear at any position between complements in the *Mittelfeld* can be accounted for.

In the following, I will give an account that employs both word order domains and the NONLOCAL-mechanism provided by HPSG. I will not use the UNIONED-feature suggested by Reape since it can be shown that the clause union phenomena which Reape describes with domain-union can be accounted for with argument attraction along the lines of Hinrichs and Nakazawa [1].

2 Phenomena

The German main sentence is partitioned into at least four topological fields: *Vorfeld*, *linke Satzklammer* (finite verb), *Mittelfeld* and *rechte Satzklammer* or *Verbalkomplex* (verb cluster). Sentences with a verb in second position are assumed to be derived from sentences with verb-initial position by fronting of one constituent. It is possible to front almost all kinds of constituents. In (1) for instance, the indirect object is fronted.

(1) [Dem Mann]$_i$ hat die Frau   _$_i$ das Buch gegegeben.
    The man   has the woman   the book   given
    'The woman has given the book to the man.'

The fronted element can be extracted from an arbitrarily deep level.

(2) a. [Von Maria] habe ich [ein Bild _$_i$] ins   Photoalbum geklebt.
       of Maria   have I   a picture   into the album   sticked
       'I have sticked a picture of Maria into the album.'

    b. [Dagegen]$_i$ hat Hans [ein Argument _$_i$] vorgebracht.
       against this has Hans   an argument   advanced
       'Hans has advanced an argument against this.'

    c. [Auf seinen Sohn]$_i$ war Karl gestern   sehr [_$_i$ stolz].
       of his son   was Karl yesterday very   proud
       'Karl was very proud of his son yesterday.'

Whereas the fronting of one constituent is usually explained by HPSG's NON-LOCAL mechanism, the free order of the complements of the verb in the *Mittelfeld* is standardly explained by allowing the complements of one head to appear in an arbitrary order. The restrictions on this order are factored out of the dominance rules. The restrictions for complements of verbs are very weak, so in (3) all permutations of the complements of *geben* are allowed.

(3) Deshalb   gab   der Mann der Frau   das Buch.
    Therefore gave the man   the woman the book
    'Therefore the man gave the book to the woman.'

(4b) shows that preposition stranding is possible in certain cases.

(4) a. Hans hat ein Argument dagegen   vorgebracht.
       Hans has an argument   against this advanced
       'Hans has advanced an argument against this.'

    b. [Da]$_i$ hat Hans ein Argument [gegen _$_i$] vorgebracht.
       this   has Hans an argument   against   advanced

However, as the examples in (5) show, preposition stranding in general is ungrammatical. The stranding is restricted to very few cases where so-called R-pronouns [7] are extracted from the preposition.

(5) a. * [Diesen Vorschlag]$_i$ hat Hans ein Argument [gegen _$_i$] vorgebracht.
       this proposal   has Hans an argument   against   advanced

    All these frontable elements can appear disconnected from their heads in non-canonical positions in the *Mittelfeld*.

(6) a. , daß [von Michael Hanson]$_i$ jetzt nur noch [wenige Bilder $_{-i}$]
       that   of Michael Hanson   now   only   few pictures
       veröffentlicht werden.
       published   are
       'that only few pictures of Michael Hanson are published.'

    b. Deshalb   hat Hans [dagegen]$_i$ [ein Argument $_{-i}$] vorgebracht.
       Therefore has Hans against-this an argument   advanced
       'Therefore Hans has advanced an argument against this.'

    c. Ich weiß, daß Karl [auf seinen Sohn]$_i$ gestern   sehr [$_{-i}$ stolz] war.
       I   know that Karl of his son   yesterday very   proud was
       'I know that Karl was very proud of his son yesterday.'

    d. Deshalb   hat Karl [da]$_i$ [ein Argument [gegen $_{-i}$]] vorgebracht.
       Therefore has Karl this an argument   against   advanced
       'Therefore Karl has advanced an argument against this.'

The sentences in (6) are not accounted for by the standard HPSG approach. The elements that are scrambled into the *Mittelfeld* are not complements of a verb but rather complements of nouns, prepositions or adjectives. In the following, I will argue that all these sentences can be analyzed as instances of leftward movement by means of the NONLOC-mechanism provided by HPSG.

3 The Analysis

3.1 Schemata and Domain Formation

Instead of having 2 or 3 schemata for combining heads with their complements like Pollard and Sag [4], I use only one very general head-complement schema. It admits exactly one complement in the COMP-DTRS list, which leads to binary branching structures. It is clear that it would not be of much use to be able to order the head daughter and the members of the COMP-DTRS list with respect to each other because this would not be sufficient to account for the scrambling of complements (see sentence (3)).

    To allow for scrambling, complements are inserted into the domain of their heads by the following implication:

$$\begin{bmatrix} \text{DTRS} & \begin{bmatrix} \textit{head-complement-structure} \end{bmatrix} \\ \textit{phrasal-sign} \end{bmatrix} \Rightarrow \begin{bmatrix} \text{DTRS} & \begin{bmatrix} \text{HEAD-DTR|DOM} & \boxed{1} \\ \text{COMP-DTRS} & \boxed{2} \end{bmatrix} \\ \text{DOM} & \boxed{1} \bigcirc \boxed{2} \end{bmatrix} \quad (7)$$

The $\bigcirc$ is the *shuffle* relation as used by Reape [6]. The *shuffle* relation holds between three lists A, B, and C iff C contains all elements of A and B and the order of the elements of A and the order of elements of B is preserved in C. So if a and b are elements of A and a precedes b in A it has to precede b in C too.

    The PHON value of a phrasal sign is the concatenation of the PHON values of its domain elements.

$$\begin{bmatrix} \textit{phrasal-sign} \end{bmatrix} \Rightarrow \begin{bmatrix} \text{PHON} & \boxed{1} \oplus \ldots \oplus \boxed{n} \\ \text{DOM} & \left\langle \begin{bmatrix} \text{PHON} & \boxed{1} \\ \textit{sign} \end{bmatrix}, \ldots, \begin{bmatrix} \text{PHON} & \boxed{n} \\ \textit{sign} \end{bmatrix} \right\rangle \end{bmatrix} \quad (8)$$

In (8) ⊕ corresponds to the *append* relation.

The positioning of one constituent in the *Vorfeld* is usually accounted for by a head-filler schema which is similar to schema 6 of Pollard and Sag [4].

3.2 Stranded Prepositions

For the stranded preposition *gegen*, I assume the lexical entry in (9), which is generated by a lexical rule from the lexical entry for the preposition *gegen*.

$$
\begin{bmatrix}
\text{PHON} & \langle\ gegen\ \rangle \\[2ex]
\text{SYNSEM} & \begin{bmatrix}
\text{LOC} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{PFORM}\ gegen \\ prep \end{bmatrix} \\ \text{SUBCAT}\ \langle\rangle \end{bmatrix} \end{bmatrix} \\[4ex]
\text{NONLOC} & \begin{bmatrix} \text{INHER}|\text{SLASH}\ \langle\ R\text{-}PRONOUN\ \rangle \end{bmatrix}
\end{bmatrix} \\[2ex]
lexical\text{-}sign
\end{bmatrix}
\tag{9}
$$
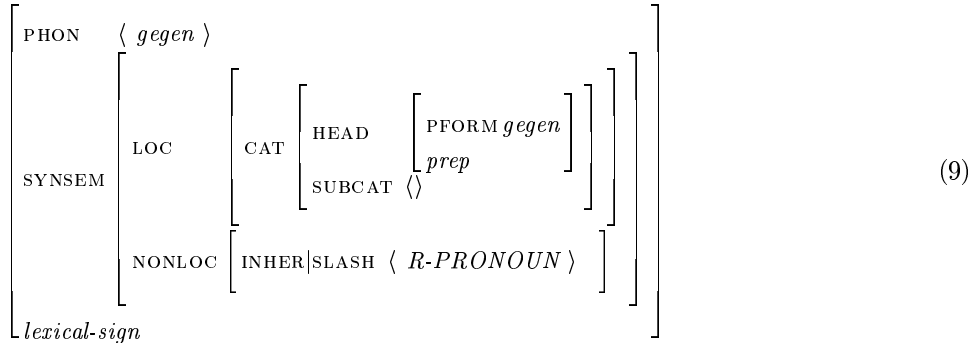
The LOCAL value of an R-pronoun is contained in the SLASH list (I assume the value of SLASH to be a list rather then a set for German, since there are no parasitic gaps in German. Sets as used in [4] would only complicate the NONLOCAL mechanism in a grammar for German.) and can percolate to the top of a finite verbal projection where it can be bound in filler position. Note that *da* is never a complement of *gegen*. It is either contained in the word (*dagegen*) or it is an element of the SLASH list.

As the output description of the preposition stranding lexical rule further instantiates the extracted element and therefore only allows for the extraction of R-pronouns, the difference between (4b) and (5a) is explained.
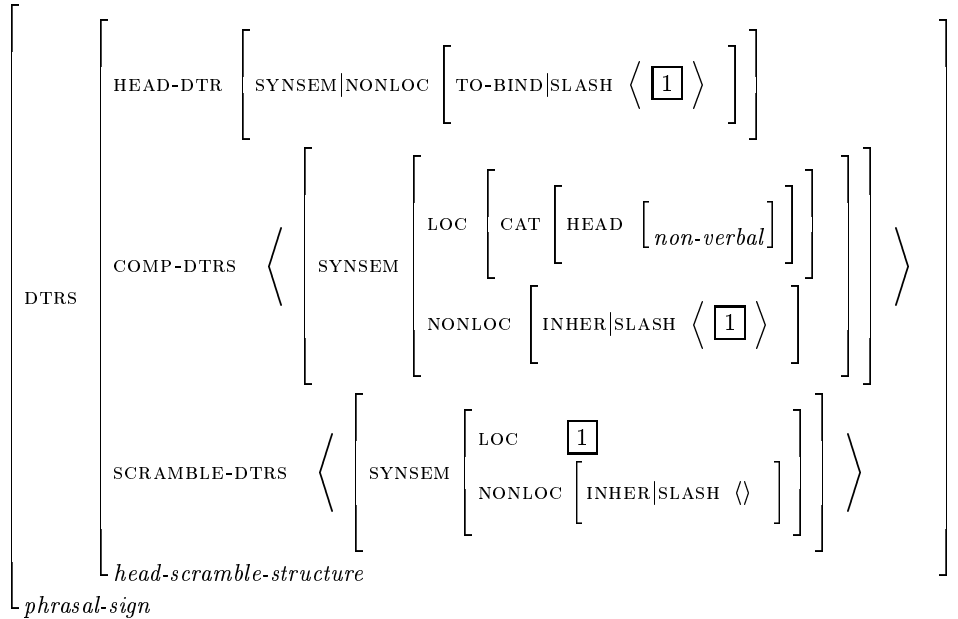
3.3 The SLASH-Embedding Schema

The sentences in (6) have in common that a member of a nonverbal complement's SLASH list appears together with this complement in the domain of the verb. This can be accounted for by schema 1. In this schema, the valence of the head daughter is reduced by one element, specifically the element given as the value of the COMP-DTRS list. This complement has a non-empty SLASH list. One element of the SLASH list is identical to the LOCAL value of the SCRAMBLE-DTR (⟦1⟧). This element of the SLASH list of the complement daughter is bound by the NONLOCAL-feature principle because the TO-BIND|SLASH value of the head daughter is ⟦1⟧. The scramble and the complement daughter are inserted into the domain of the head daughter by another implicational constraint.

4 Conclusion

A unified account for scrambling in German was given. Both stranded preposition and the scrambling of PPs into the *Mittelfeld* have been explained by the same schema. The proposed scrambling schema is superior to both slash-to-argument attraction and domain union analyses by Kasper, Pollard and Levine [5], which are discussed in the full version of the paper [2]. In the full version of the paper, an account with binary branching structures is given.

The schema is part of an implemented fragment of German [3]. The fragment covers several types of word order phenomena for instance partial verb phrase fronting,

Schema 1 (SLASH-Embedding Schema)

$$
\begin{bmatrix}
\begin{bmatrix}
\text{HEAD-DTR} & \left[\text{SYNSEM}|\text{NONLOC}\left[\text{TO-BIND}|\text{SLASH}\ \left\langle \boxed{1} \right\rangle\right]\right] \\[2em]
\text{DTRS} & \begin{bmatrix}
\text{COMP-DTRS} & \left\langle \left[\text{SYNSEM}\begin{bmatrix}\text{LOC}\left[\text{CAT}\left[\text{HEAD}\ [\textit{non-verbal}]\right]\right] \\ \text{NONLOC}\left[\text{INHER}|\text{SLASH}\ \left\langle \boxed{1} \right\rangle\right]\end{bmatrix}\right]\right\rangle \\[3em]
\text{SCRAMBLE-DTRS} & \left\langle\left[\text{SYNSEM}\begin{bmatrix}\text{LOC}\ \boxed{1} \\ \text{NONLOC}\left[\text{INHER}|\text{SLASH}\ \langle\rangle\right]\end{bmatrix}\right]\right\rangle \\[1em]
\multicolumn{2}{l}{\textit{head-scramble-structure}}
\end{bmatrix}
\end{bmatrix} \\
\textit{phrasal-sign}
\end{bmatrix}
$$

auxiliary flip, scrambling in coherent constructions, free appearance of adjuncts in the *Mittelfeld*.

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