Explaining Some German Extraction Regularities as Context Effects

Detmar Meurers
(joint work with Kordula De Kuthy)

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Introduction

- Two empirical challenges from the grammar of German
  - I. Accounting for *context-effects* on the grammaticality of *NP-PP Split* (De Kuthy 2002)
  - II. Explaining the *definiteness effect* that is observable when subjects occur as part of fronted non-verbal constituents (De Kuthy and Meurers 2003)
- We address these empirical challenges by
  - investigating information structure requirements for partial fronting
    - focus and focus projection
    - connecting focus projection to what can be fronted
  - developing an HPSG account taking as its starting point the approach of Engdahl and Vallduví (1996)

Phenomenon I: NP-PP Split in German

Fronting of a PP

(1) *Über Syntax* hat Sarah [ein Buch] ausgeliehen.
about syntax has Sarah a book borrowed
'Sarah borrowed a book on syntax.'

Fronting of a partial NP

(2) [Ein Buch] hat Sarah *über Syntax* ausgeliehen.
a book has Sarah about syntax borrowed
'Sarah borrowed a book on syntax.'

Lexical restrictions affecting the NP-PP Split

(3) a. * *Über* $Syntax$ hat Sarah [ein Buch] geklaut.
on syntax has Sarah a book stolen
'Sarah stole a book on syntax.'

b. * [Ein Buch] hat Sarah *über Syntax* geklaut.
a book has Sarah about syntax stolen
'Sarah stole a book on syntax.'

Context effects affecting the NP-PP Split

(4) Gestern wurde in der Bibliothek eine Anzahl von Linguistikbüchern geklaut.
Vor allem Semantikbücher verschwanden dabei.
'Yesterday, a number of linguistics books were stolen from the library. Mostly books on semantic disappeared.'

Über Syntax wurde jedoch [nur ein einziges Buch] geklaut.
on syntax was however only one single book stolen
'There was, however, only one book on syntax stolen.'

(5) Gestern war Klaus seit langem mal wieder in der Bibliothek.
'Yesterday, Klaus went to the library.'

[Ein Buch] wollte er dort *über Syntax* ausleihen.
a book wanted he there on syntax borrow
'He wanted to borrow a book on syntax there.'

Accounting for the context effect

To account for the context effects, we

- explore possible focus-background structures of NP-PP split
- develop an information-structure component for HPSG
- formulate constraints on the focus-background structures of NP-PP split which interact with the syntactic account

Information structure in German

Primitives: We assume a division into *focus* and *background*, following the perspective that the new, information-bearing part of the sentence is the central aspect of information structure (cf., e.g., Sgall et al. 1986; Stechow 1981).

Manifestation: German is a so-called intonation language in which focused constituents are signaled by pitch accent (Féry 1993).

- The syllable bearing the pitch accent is called the *focus exponent*.
- Only one syllable is stressed by a pitch accent, but through *focus projection* larger parts of a sentence can be focused.

Pitch accents in German

Narrow Focus

(6) What did Karl give to the child?
a. Karl hat dem Kind [das BUCH\]$_F$ geschenkt.
Karl has the child the book given
'Karl has given the book to the child.'

Multiple focus construction

(7) Who travels where?
a. [GABI/]$_F$ fährt [nach BERLIN\]$_F$.
Gabi travels to Berlin

Topic accent – I-topicalization

(8) Who slept?
a. [GESCHLAFEN/]$_T$ hat [KEINER\]$_F$ von uns, aber . . .
slept has no-one of us but . . .

Focus-background structures of NP-PP split

- Which questions are compatible with which accents in the NP-PP split examples?
- We have investigated:
  - Fronted PPs
    - accent on the partial NP
    - accent on the PP
  - Fronted partial NPs
    - accent on the partial NP
    - accent on the PP
- Based on this empirical investigation we conclude: The split NP and PP cannot both be part of the same focus projection or the background.

Fronted PPs – accent on the NP (I)

Only focus on NP possible

(9) a. What did Sarah borrow about Mozart?
Über Mozart hat Sarah [ein BUCH\]$_F$ ausgeliehen.
about Mozart has Sarah a book borrowed

b. What did Sarah borrow?
[Über Mozart]$_F$ hat Sarah [ein BUCH\]$_F$ ausgeliehen.
about Mozart has Sarah a book borrowed

c. What happened?
[Über Mozart hat Sarah ein BUCH\ ausgeliehen.]$_F$
about Mozart has Sarah a book borrowed

Fronted PPs — accent on the NP (II)

Multiple focus construction and i-topicalization

(10) a. About which composer did Sarah borrow what?
[Über MOZART/]$_F$ hat Sarah [ein BUCH\]$_F$ ausgeliehen.
about Mozart has Sarah a book borrowed

b. What did Sarah borrow about famous composers?
[Über MOZART/]$_T$ hat Sarah [ein BUCH\]$_F$ ausgeliehen.
about Mozart has Sarah a book borrowed

Fronted PPs – accent on the PP

Only focus on PP possible

(11) a. About what did Sarah borrow a book?
[Über MOZART\]$_F$ hat Sarah ein Buch ausgeliehen.
about Mozart has Sarah a book borrowed

b. What did Sarah borrow?
[Über MOZART\]$_F$ hat Sarah [ein Buch]$_F$ ausgeliehen.
about Mozart has Sarah a book borrowed

c. What did Sarah do?
[Über MOZART\]$_F$ hat Sarah [ein Buch ausgeliehen.]$_F$
about Mozart has Sarah a book borrowed

Fronted NPs – accent on the PP

Only focus on PP possible

(12) a. About what did Sarah borrow a book?
Ein Buch hat Sarah [über MOZART\]$_F$ ausgeliehen.
a book has Sarah on Mozart borrowed

b. What did Sarah borrow?
[Ein Buch]$_F$ hat Sarah [über MOZART\]$_F$ ausgeliehen.
a book has Sarah on Mozart borrowed

c. What did Sarah do?
[Ein Buch]$_F$ hat Sarah [über MOZART\ ausgeliehen.]$_F$
a book has Sarah on Mozart borrowed

Fronted NPs – accent on the PP (II)

Multiple focus construction and i-topicalization

(13) a. About which composer did Sarah borrow what?
[Ein BUCH/]$_F$ hat Sarah [über MOZART\]$_F$ ausgeliehen.
a book has Sarah about Mozart borrowed

b. Material about which composer did Sarah borrow?
[Ein BUCH/]$_T$ hat Sarah [über MOZART\]$_F$ ausgeliehen.
a book has Sarah about Mozart borrowed

Fronted NPs – accent on the NP

Only focus on NP possible

(14) a. What did Sarah borrow about Mozart?
[Ein BUCH\]$_F$ hat Sarah über Mozart ausgeliehen.
a book has Sarah about Mozart borrowed

b. What did Sarah borrow?
[Ein BUCH\]$_F$ hat Sarah [über Mozart]$_F$ ausgeliehen.
a book has Sarah about Mozart borrowed

c. What did Sarah do?
[Ein BUCH\]$_F$ hat Sarah [über Mozart ausgeliehen.]$_F$
a book has Sarah about Mozart borrowed

The Specificity Effect

Müller (1996) and others claim that NP-PP split exhibits a specificity effect, a classical restriction on extraction (Fiengo and Higginbotham 1981).

(15) a. * *Über Syntax* hat Karl [**das** Buch] gelesen.
on syntax has Karl the book read
'Karl read the book on syntax.'

b. ?? [**Das** Buch] hat Karl *über Syntax* gelesen.
the book has Karl on syntax read

Counterexamples to the Specificity Effect

Pafel (1993) shows that specificity of NP does not always disallow fronting of an embedded PP.

(16) a. *Über Syntax* hat Karl nur **dieses**, aber nicht **jenes** Buch gelesen.
on syntax has Karl only this but not that book read
'Karl only read this book on syntax and not that one.'

b. [Nur dieses Buch] hat Karl *über Syntax* gelesen.
Only this book has Karl on syntax read
'Karl only read this book on syntax.'

Our idea: Reduce this specificity effect to information structure principles.

The pragmatics of definite determiners

We need to distinguish two classes of definite NPs:

a) Definite NPs which have as antecedent a discoure referent introduced via the utterance of a preceding NP and thus are discourse old or strongly familiar (Roberts 2003) and have to be part of the background of a sentence.

b) Definite NPs which are used deicticly, endophorically or as a semantic definite (i.e., which are weakly familiar, Roberts 2003), which are often not discourse old and can thus be in the focus of a sentence.

a) Definite NPs which refer to entities present in the discourse

(17) Yesterday, I saw an interesting book on syntax at Osiander.
a. Ich habe mir [das Buch über Syntax] heute gekauft.
I have me the book on syntax today bought
'Today, I bought this book on syntax.'

b. # *Über Syntax* habe ich mir [das Buch] heute gekauft.
on syntax have I me the book today bought

The entire definite NP including the embedded PP in (17b) is in the background of the sentence → ungrammaticality expected.

b) Definite NPs which do *not* refer to such present entities

Such NPs can be in the focus of an utterance:

(18) What did you buy at Osiander?
Ich habe mir das Buch über Syntax gekauft, das Du mir letztlich
I have me the book on syntax bought which you me recently
empfohlen hast.
recommended have
'I bought the book on syntax that you recommended to me very recently.'

This supports a definite NP in the focus, with the PP in the background:

(19) What did you borrow on syntax?
Über Syntax habe ich mir [das Buch, das Du mir empfohlen
on syntax have I me the book which you to me recommended
hast,] ausgeliehen.
has borrowed
'On Syntax I borrowed the book that you recommended to me.'

An HPSG analysis

We couch our analysis in the HPSG approach to the information structure-syntax interface developed in De Kuthy (2002), taking Engdahl and Vallduví (1996) as a starting point, but extending it as spelled out here and in the following:

The value of the information structure features

- The values of the INFO-STRUC features are chunks of semantic information.
- The language Ty2 of two-sorted type theory is chosen as the semantic object language, as proposed in Sailer (2000).
- The values of FOCUS and TOPIC in the information structure are lists of Ty2 expressions, called *meaningful expressions*.

Location of information structure in signs

- Information structure as part of *local* objects as assumed by Engdahl and Vallduví (1996) is problematic in connection with unbounded dependencies.
- In long-distance dependencies, only the filler should contribute to the information structure of a sentence, not the trace.
- Information structure as part of *synsem* object would only make sense if it played a role in syntactic selection.
- Conclusion: Information structure should be appropriate for *sign* objects.

$$\begin{bmatrix} \textit{sign} & \\ \text{PHON} & \textit{list} \\ \text{SYNSEM} & \textit{synsem} \\ \text{INFO-STRUC} & \textit{info-struc} \end{bmatrix}$$

Representation of information structure

In the tradition of the *structured meaning* approaches (Stechow 1981; Jacobs 1983; Krifka 1992), the background of a sentence is defined to be that part of the logical form of the sentence which is neither in focus nor in topic.

(20) Peter [[liest ein BUCH.]]$_F$
Peter reads a book

$$\begin{bmatrix} \text{PHON} & \langle \textit{Peter,liest,ein,Buch} \rangle \\ \text{S}|\text{LOC}|\text{CONT}|\text{LF} & \exists x[book'(x) \wedge read'(p,x)] \\ \text{INFO-STRUC} & \begin{bmatrix} \text{FOCUS} & \langle \lambda y \exists x[book'(x) \wedge read'(y,x)] \rangle \\ \text{TOPIC} & \langle\rangle \end{bmatrix} \end{bmatrix}$$

Structured Meaning and Information Structure

Information structure (INFO-STRUC) is represented for unembedded signs.

The components of the semantic representations which a sign can contribute to the topic/focus of the unembedded sign is encoded in STRUCTURED-MEANING.

$$\begin{bmatrix} \textit{sign} & \\ \text{PHON} & \textit{list} \\ \text{SYNSEM} & \textit{synsem} \\ \text{STRUCTURED-MEANING} & \textit{struc-meaning} \end{bmatrix}$$

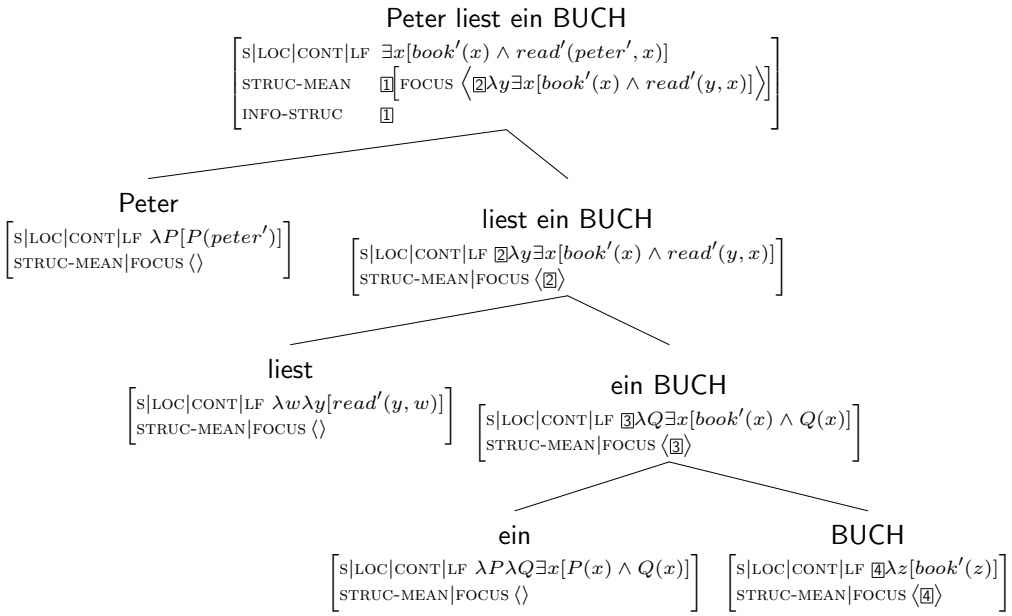
$$\begin{bmatrix} \textit{structured-meaning} & \\ \text{FOCUS} & \textit{list}(\textit{meaningful-expr}) \\ \text{TOPIC} & \textit{list}(\textit{meaningful-expr}) \end{bmatrix}$$

embedded-sign

$$\begin{bmatrix} \textit{unembedded-sign} & \\ \text{INFO-STRUC} & \textit{struc-meaning} \end{bmatrix}$$

$$\textit{unembedded-sign} \rightarrow \begin{bmatrix} \text{INFO-STRUC} & \boxed{1} \\ \text{STRUCTURED-MEANING} & \boxed{1} \end{bmatrix}$$

Example for structured meaning and information structure

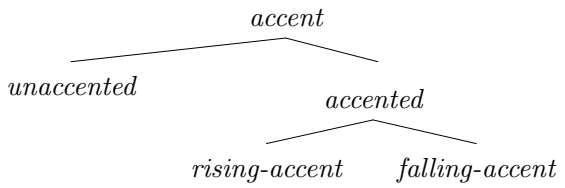


Encoding Accents

To encode whether a word bears an accent or not, we enrich the phonology of signs with the feature ACCENT.

$$\begin{bmatrix} \textit{sign} \\ \text{PHON} & \begin{bmatrix} \text{PHON-STRING} & \textit{list} \\ \text{ACCENT} & \textit{accent} \end{bmatrix} \end{bmatrix}$$

A small type hierarchy specifies the three values for the new attribute:



Relating pitch accents and lexical information structure

$$\textit{word} \rightarrow \begin{bmatrix} \text{PHON}|\text{ACCENT} & \textit{falling-accent} \\ \text{S}|\text{LOC}|\text{CONT}|\text{LF} & 1 \\ \text{STRUC-MEANING} & \begin{bmatrix} \text{FOCUS} & \langle 1 \rangle \\ \text{TOPIC} & \langle\rangle \end{bmatrix} \end{bmatrix}$$

$$\vee \begin{bmatrix} \text{PHON}|\text{ACCENT} & \textit{rising-accent} \\ \text{S}|\text{LOC}|\text{CONT}|\text{LF} & 1 \\ \text{STRUC-MEANING} & \begin{bmatrix} \text{FOCUS} & \langle\rangle \\ \text{TOPIC} & \langle 1 \rangle \end{bmatrix} \vee \begin{bmatrix} \text{FOCUS} & \langle 1 \rangle \\ \text{TOPIC} & \langle\rangle \end{bmatrix} \end{bmatrix}$$

$$\vee \begin{bmatrix} \text{PHON}|\text{ACCENT} & \textit{unaccented} \\ \text{STRUC-MEANING} & \begin{bmatrix} \text{FOCUS} & \langle\rangle \\ \text{TOPIC} & \langle\rangle \end{bmatrix} \end{bmatrix}$$

$$\vee \ldots$$

The information structure of phrases

Focus projection principles define which parts of the sentence can be in the focus given a particular pitch accent placement.

Focus projection in NPs and PPs: If the rightmost constituent in a PP or NP is focused, the entire NP or PP can be.

$$\textit{phrase} \rightarrow \begin{bmatrix} \text{STRUC-MEANING}|\text{FOCUS} & 1 \oplus \textit{collect-focus}(2) \\ \text{HEAD-DTR}|\text{STRUC-MEANING}|\text{FOCUS} & 1 \\ \text{NON-HEAD-DTRS} & 2 \end{bmatrix}$$

$$\vee \begin{bmatrix} \text{PHON}|\text{PHON-STR} & 1 \oplus 2 \\ \text{S}|\text{LOC} & \begin{bmatrix} \text{CAT}|\text{HEAD} & \textit{noun} \vee \textit{prep} \\ \text{CONT}|\text{LF} & 3 \end{bmatrix} \\ \text{STRUC-MEANING}|\text{FOCUS} & \langle 3 \rangle \\ \textit{a-dtr}\left(\begin{bmatrix} \text{PHON}|\text{PHON-STR} & 2 \\ \text{S}|\text{L}|\text{CONT}|\text{LF} & 4 \\ \text{STRUC-MEANING}|\text{FOCUS} & \langle 4 \rangle \end{bmatrix}\right) \end{bmatrix}$$

$$\vee \ldots$$

Footnote for the formally inclined: Relation definitions

$$\textit{collect-focus}(\langle\rangle) := \langle\rangle.$$

$$\textit{collect-focus}\left(\begin{bmatrix}\text{FIRST} & [\text{STRUC-MEANING}|\text{FOCUS}\ \langle \boxed{1} \rangle] \\ \text{REST} & \boxed{2}\end{bmatrix}\right) := \begin{bmatrix}\text{FIRST} & \boxed{1} \\ \text{REST} & \textit{collect-focus}(\boxed{2})\end{bmatrix}.$$

$$\textit{a-dtr}\left(\begin{bmatrix}\text{HEAD-DTR} & \boxed{1}\end{bmatrix}\right) := \boxed{1}.$$

$$\textit{a-dtr}\left(\begin{bmatrix}\text{NON-HEAD-DTRS} & \textit{element}(\boxed{1})\end{bmatrix}\right) := \boxed{1}.$$

$$\textit{element}\left(\begin{bmatrix}\text{FIRST} & \boxed{1}\end{bmatrix}\right) := \boxed{1}.$$

$$\textit{element}\left(\begin{bmatrix}\text{REST} & \boxed{2}\end{bmatrix}\right) := \textit{element}(\boxed{2}).$$

Example analyses: information structure in NP-PP split

(21) a. Was hat Sarah über welchen Komponisten ausgeliehen?

'About which composer did Sarah borrow what?'

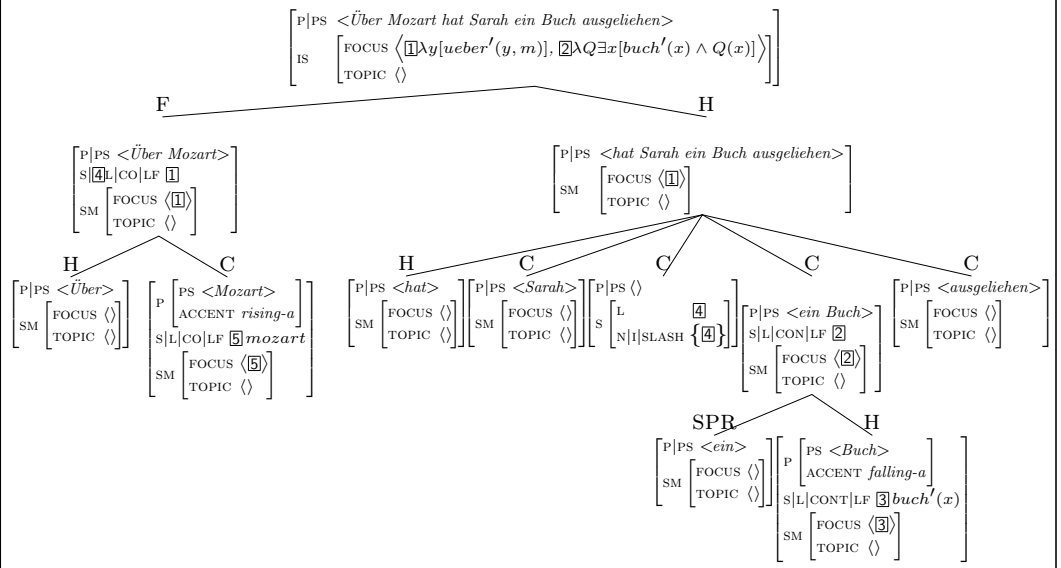
[Über MOZART/]$_F$ hat Sarah [Ein BUCH\]$_F$ ausgeliehen.
about Mozart has Sarah a book borrowed

b. Was hat Sarah über berühmte Komponisten ausgeliehen?

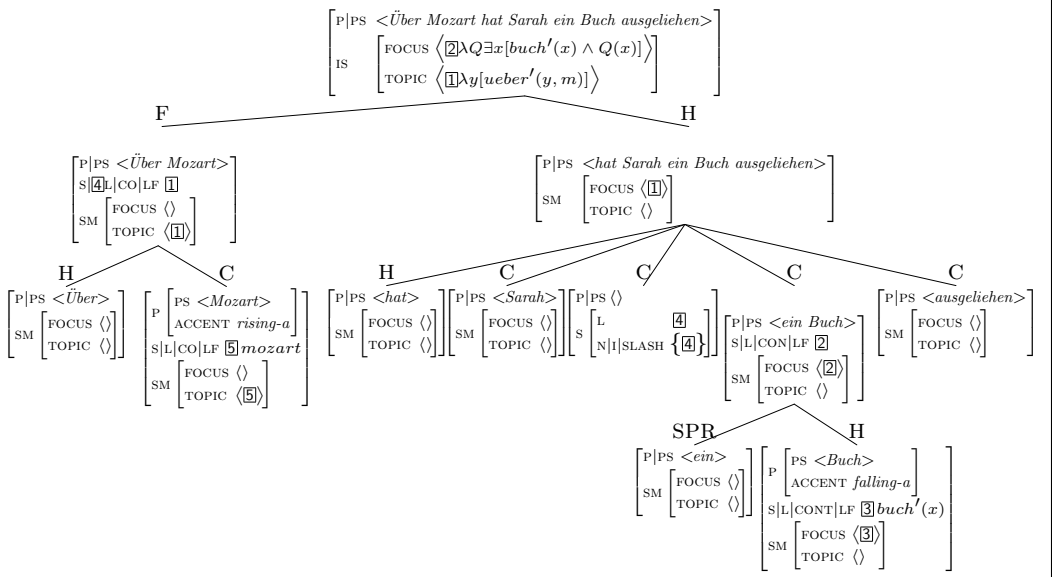
'What did Sarah borrow about famous composers?'

[Über MOZART/]$_T$ hat Sarah [ein BUCH\]$_F$ ausgeliehen.
about Mozart has Sarah a book borrowed

A multiple-focus structure



A topic-focus structure



A context principle

(22) a. What did Sarah borrow?
[Über Mozart]$_F$ hat Sarah [ein BUCH\]$_F$ ausgeliehen.
about Mozart has Sarah a book borrowed

b. What happened?
[Über Mozart hat Sarah ein BUCH\ ausgeliehen.]$_F$
about Mozart has Sarah as book borrowed

A principle: In an utterance, in which a PP occurs separate from an NP, either the PP or the NP must be in the focus or in the topic of the utterance, but they cannot both be part of the topic or the same focus projection.

⇒ This is a construction specific principle which nevertheless establishes a general pattern. Further research is needed to determine whether it can be applied to partial constituents in general.

Phenomenon II: Subjects fronted as part of non-finite VPs

A subject in German can sometimes be realized inside a fronted non-finite verbal constituent (Kratzer 1984, Grewendorf 1989, Haider 1990):

(23) [Ein Außenseiter gewonnen] hat hier noch nie.
a$_{nom}$ outsider won has here still never
'An outsider has never won here yet.'

This option is only available for subjects of raising verbs (Meurers 2000, ch. 10):

(24) [Ein Außenseiter zu gewinnen] <u>scheint</u> hier eigentlich nie.
a$_{nom}$ outsider to win seems here actually never
'An outsider never actually seems to win here.'

(25) * [Ein Außenseiter zu gewinnen] <u>versuchte</u> hier noch nie.
a$_{nom}$ outsider to win tried here actually never
'An outsider never actually tried to win here.'

The definiteness effect

Definite subjects appear to be excluded from this construction (Kratzer 1984):

(26) * [Der Außenseiter gewonnen] hat hier noch nie.
the outsider won has here still never

But there are some rarely noted counterexamples to this definiteness effect:

(27) a. [Die Hände gezittert] haben ihm diesmal nicht. (Höhle 1997, p. 114)
the hands trembled have him this time not
'This time his hands didn't tremble.'

b. [Das Telefon geklingelt] hat hier schon lange nicht mehr.
the telephone rang has here yet long not anymore
'The telephone hasn't been ringing here in a long time.'

Our Idea: Explore the information structure requirements of the construction, since definiteness connects to the familiarity of discourse referents.

Focus projection

The focus exponent in an all-focus sentence normally is one of the arguments of the main verb, but not the subject (Stechow and Uhmann 1986):

(28) Was ist denn hier für eine Aufregung? / What's all the excitement about?
a. ⟦Ein Politiker hat das VOLK belogen.⟧$_F$
a$_{nom}$ politician has the people lied to
b. # ⟦Ein POLITIKER hat das Volk belogen.⟧$_F$
a$_{nom}$ politician has the people lied to

In certain cases the subject *can* be the focus exponent (Uhmann 1991):

(29) Was ist denn hier für ein Lärm? / What's all the noise about?
a. ⟦Ein HUND bellt.⟧$_F$
a$_{nom}$ dog barks
b. ⟦Dem Präsidenten ist ein FEHLER unterlaufen.⟧$_F$
the$_{dat}$ president is a$_{nom}$ mistake crept in
'The president made a mistake.'

Connecting focus projection to possible frontings

The subject of those verbs which allow their subject to be the focus exponent can also be included as part of a fronted verbal constituent:

(30) a. # ⟦Ein POLITIKER hat das Volk belogen.⟧$_F$
a$_{nom}$ politician has the people lied to

b. * [Ein Politiker belogen] hat das Volk noch nie.
a politician lied has the people still never

(31) a. ⟦Ein HUND bellt.⟧$_F$
a$_{nom}$ dog barks

b. [Ein Hund gebellt] hat hier noch nie.
a dog barked has here yet never

(32) a. ⟦Dem Präsidenten ist ein FEHLER unterlaufen.⟧$_F$
the$_{dat}$ president is a$_{nom}$ mistake crept in

b. [Ein Fehler unterlaufen] ist dem Präsidenten bisher noch nie.
an error crept in is the president so far still never

This connection turns out to be a rediscovery: Webelhuth (1990, p. 53)

An information structure requirement for fronted VPs

Webelhuth (1990, p. 53) concludes that we can explain this connection if we assume that a fronted verbal constituent has to be focused.

(33) What has never happened here?
⟦[Ein AUSSENSEITER gewonnen]⟧$_F$ hat hier noch nie.
an outsider won has here yet never

(34) What has never happened to an outsider?
[Ein Außenseiter ⟦GEWONNEN⟧$_F$] hat hier noch nie.

(35) Who has never won here?
[⟦Ein AUSSENSEITER⟧$_F$ gewonnen] hat hier noch nie.

In addition, we observe that *only* the fronted constituent must be focused:

(36) What's all the excitement about?
⟦[Ein AUSSENSEITER gewonnen] hat hier noch nie⟧$_F$

The information structure of phrases revisited

On slide 28 we discussed focus projection for the nominal domain, defining which parts of the sentence can be focus given a particular pitch accent placement.

For the verbal domain, the regularities are known to be influenced by a variety of factors, such as the word order and lexical properties of the verbal head (cf., e.g., Stechow and Uhmann 1986).

Since verbs need to be able to lexically mark which of their arguments can project focus when they are accented, we introduce the boolean-valued feature FOCUS-PROJECTION-POTENTIAL (FPP) for objects of type *synsem*.

Example: *lieben* (love) allows projection from the object but not the subject:

$$\begin{bmatrix} \text{PHON} & \langle \textit{lieben} \rangle \\ \text{ARG-S} & \langle \begin{bmatrix} \text{LOC}|\text{CAT}|\text{HEAD} & \begin{bmatrix} \textit{noun} \\ \text{CASE} \quad \textit{nom} \end{bmatrix} \\ \text{FPP} \quad \textit{minus} \end{bmatrix}, \begin{bmatrix} \text{LOC}|\text{CAT}|\text{HEAD} & \begin{bmatrix} \textit{noun} \\ \text{CASE} \quad \textit{acc} \end{bmatrix} \\ \text{FPP} \quad \textit{plus} \end{bmatrix} \rangle \end{bmatrix}$$

A focus projection principle for the verbal domain

$$\textit{phrase} \rightarrow \begin{bmatrix} \text{STRUC-MEANING}|\text{FOCUS} \ \boxed{1} \oplus \textit{collect-focus}\,(\boxed{2}) \\ \text{HEAD-DTR}|\text{STRUC-MEANING}|\text{FOCUS} \ \boxed{1} \\ \text{NON-HEAD-DTRS} \ \boxed{2} \end{bmatrix}$$

$$\vee \begin{bmatrix} \text{SYNSEM}|\text{LOC} & \begin{bmatrix} \text{CAT}|\text{HEAD} & \textit{verb} \\ \text{CONT}|\text{LF} & \boxed{3} \end{bmatrix} \\ \text{STRUC-MEANING}|\text{FOCUS} & \langle \boxed{3} \rangle \\ \text{NON-HEAD-DTRS} & \langle .., \begin{bmatrix} \text{SYNSEM} & \begin{bmatrix} \text{FPP} \ \textit{plus} \\ \text{LOC}|\text{CONT}|\text{LF} \ \boxed{4} \end{bmatrix} \\ \text{STRUC-MEANING}|\text{FOCUS} & \langle \boxed{4} \rangle \end{bmatrix}, .. \rangle \end{bmatrix}$$

$\vee$ . . .
(cf., focus projection in nominal domain of slide 28, etc.)

A context principle for partial VP fronting

Webelhuth's generalization: In an utterance with a fronted verbal constituent, the entire fronted verb phrase must be in the focus of the utterance (nothing more, nothing less).

Formalization:

$$\begin{bmatrix} \textit{head-filler-phrase} \\ \text{NON-HEAD-DTR}|\text{SYNSEM}|\text{LOC}|\text{CAT}|\text{HEAD}\ \ \textit{verb} \end{bmatrix} \rightarrow$$

$$\begin{bmatrix} \text{INFO-STRUC}|\text{FOCUS}\ \textit{element}(\boxed{1}) \\ \text{NON-HEAD-DTR}\ \begin{bmatrix} \text{STRUC-MEANING}|\text{FOCUS}\ \boxed{1} \\ \text{SYNSEM}|\text{LOC}|\text{CONT}|\text{LF}\ \ \boxed{1} \end{bmatrix} \end{bmatrix}$$

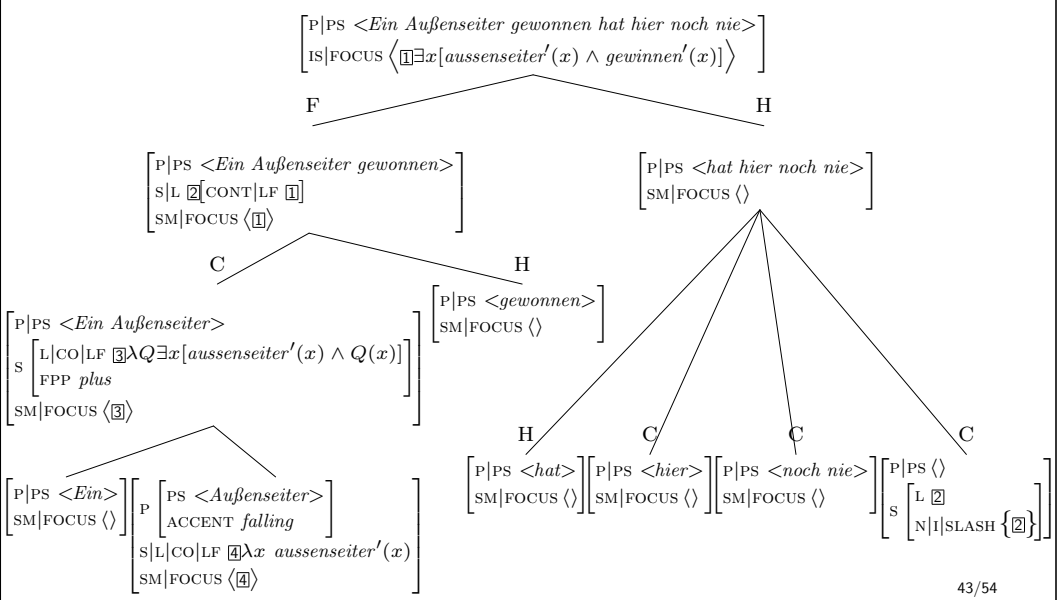
The information structure of partial VP fronting
Example analysis

(37) $[\![$[Ein AUSSENSEITER gewonnen]$]\!]_F$ hat hier noch nie.
an outsider won has here still never
'An outsider has never won here yet.'

The relevant part of the lexical entry of *gewinnen* (to win):

$$\begin{bmatrix} \text{PHON}\ \ \langle \textit{gewinnen} \rangle \\ \text{ARG-S}\ \ \langle \begin{bmatrix} \text{FPP}\ \textit{plus} \\ \text{LOC}|\text{CAT}|\text{HEAD}|\text{CASE}\ \textit{nom} \end{bmatrix} \rangle \end{bmatrix}$$

Sketch of an analysis tree for example (37)



Returning to the definiteness effect

Exactly those definite subjects which can be the focus exponent can also be part of the fronted verbal projection:

(38) a. * [Der Außenseiter gewonnen] hat hier noch nie.
the outsider won has here still never

b. Was ist denn hier für ein Lärm? / What's all the noise here?
$[\![$Der AUSSENSEITER gewinnt.$]\!]_F$
the outsider wins

(39) a. [Die Hände gezittert] haben ihm diesmal nicht. (Höhle 1997, p. 114)
the hands trembled have him this time not

b. Was ist denn hier für eine Aufregung? / What's the matter?
$[\![$Dem Präsidenten zittern die HÄNDE.$]\!]_F$
the$_{dat}$ president tremble the$_{nom}$ hands

Explaining the definiteness effect and its counterexamples

As discussed on slide 18, one can distinguish two classes of definite NPs:

a) Definite NPs which have as antecedent a discoure referent introduced via the utterance of a preceding NP and thus are discourse old and have to be part of the background of a sentence.

b) Definite NPs which are used deicticly, endophorically or as a semantic definite, which are often not discourse old and can thus be in the focus of a sentence.

The counterexamples to the definiteness effect all involve the second type!

Webelhuth's generalization that a fronted verbal constituent has to be focused thus correctly predicts that such a constituent can only contain definite subjects of type b), which can be focused.

Summary

- We have investigated the fronting of subjects as part of a non-finite constituent in German, the so-called definiteness effect excluding definite subjects, and its generally ignored counterexamples.
- We explored the connection between focus projection and the partial fronting cases: the subject of those verbs which allow focus to project from their subject can be included as part of a fronted verbal constituent.
- This is predicted by the fact that fronted verbal constituents in German need to be focused (Webelhuth 1990).
- Building on the information structure setup of De Kuthy (2002), we provided an HPSG theory which encodes the proposed analysis.
- We show that this analysis provides a natural explanation of the definiteness effect. The apparent exceptions to the definiteness effect are predicted by this account since they involve definite noun phrases which can bear focus, allowing them to be part of a fronted verbal constituent.

Appendix: HPSG in a nutshell

An **HPSG grammar** formally consists of

I. the **signature** as declaration of the domain, and

II. the **theory** constraining the domain.

The theory, from a linguistic perspective, consists of

a) a **lexicon**: licensing basic words

b) **lexical rules**: licensing derived words

c) **immediate dominance (ID) schemata**: licensing constituent structure

d) **linear precedence (LP) statements**: constraining word order

e) a set of **grammatical principles**: expressing generalizations about linguistic objects

The signature of an HPSG grammar

The **signature**

- defines the ontology ('declaration of what exists'):
  - which kind of objects are distinguished, and
  - which properties of which objects are modeled.
- consists of
  - the **type hierarchy** (or sort hierarchy) and
  - the **appropriateness conditions**, defining which type has which appropriate attributes (or features) with which appropriate values.

Descriptions

A **description language** and its abbreviating **AVM notation** is used to talk about sets of objects. Descriptions consists of three building blocks:

- **Type** descriptions single out all objects of a particular type, e.g., *word*
- **Attribute-value pairs** describe objects that have a particular property. The attribute must be appropriate for the particular type of object, and the value can be any kind of description, e.g., $\left[\text{SPOUSE } \left[\text{NAME } \textit{mary}\right]\right]$
- **Tags** (structure sharing) to specify **token identity**, e.g.,

$$\begin{bmatrix} \text{SYNSEM|LOC|CAT|HEAD} & \boxed{1} \\ \text{DTRS|HEAD-DTR|SYNSEM|LOC|CAT|HEAD} & \boxed{1} \end{bmatrix}$$

Complex descriptions are obtained through conjunction ($\wedge$), disjunction ($\vee$) and negation ($\neg$). In the AVM notation, conjunction is implicit.

The theory of an HPSG grammar

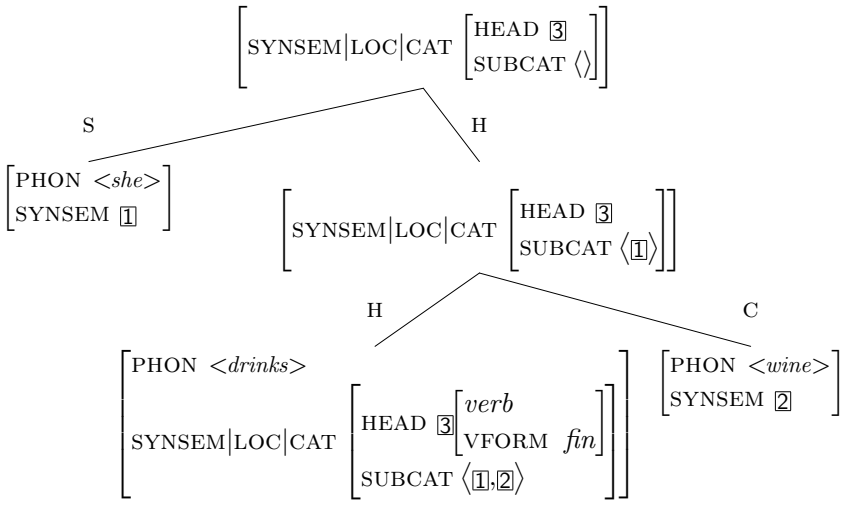
A **theory** is a set of description language statements, often referred to as the constraints.

- The theory singles out a subset of the objects declared in the signature, namely those which are grammatical.
- A linguistic object is admissible with respect to a theory iff it satisfies each of the descriptions in the theory and so does each of its substructures.

Note that *HPSG models* linguistic objects, i.e., *total objects* as they exist in the world, not potentially partial knowledge about the world. Every linguistic object thus is total with respect to the ontology declared in the signature. Formally, the feature structures used as models are required to be

- *totally well-typed*: Every node has all the attributes appropriate for its type and each attributes has an appropriate value.
- *sort-resolved*: Every node is of a maximally specific type.

Sketch of an example analysis



Example lexicon

$$word \longrightarrow \begin{bmatrix} \text{PHON } \textit{<drinks>} \\ \text{SYNSEM|LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{VFORM } \textit{fin} \end{bmatrix} \\ \text{SUBCAT } \left\langle \text{NP}[\textit{nom}]\boxed{1}[\textit{third,sing}],\ \text{NP}[\textit{acc}]\boxed{2} \right\rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \textit{drink'} \\ \text{DRINKER } \boxed{1} \\ \text{DRUNKEN } \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix} \vee$$

$$\begin{bmatrix} \text{PHON } \textit{<she>} \\ \text{SYNSEM|LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{noun} \\ \text{CASE } \textit{nom} \end{bmatrix} \\ \text{SUBCAT } \langle\rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \text{INDEX} \begin{bmatrix} \text{PER } \textit{third} \\ \text{NUM } \textit{sing} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix} \vee$$

$$\begin{bmatrix} \text{PHON } \textit{<wine>} \\ \text{SYNSEM|LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD } \textit{noun} \\ \text{SUBCAT } \langle\rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \text{INDEX} \begin{bmatrix} \text{PER } \textit{third} \\ \text{NUM } \textit{sing} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Immediate Dominance Principle (for English):

$$\begin{bmatrix} \textit{phrase} \\ \text{DTRS} \;\; \textit{headed-struc} \end{bmatrix} \rightarrow \left[\begin{array}{l} \text{SYNSEM}|\text{LOC}|\text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{INV} \;\; - \end{bmatrix} \vee \neg \; \textit{verb} \\ \text{SUBCAT} \langle\rangle \end{bmatrix} \\ \text{DTRS} \begin{bmatrix} \textit{head-comp-struc} \\ \text{HEAD-DTR} \quad \textit{phrase} \\ \text{COMP-DTRS} \left\langle \textit{sign} \right\rangle \end{bmatrix} \end{array}\right] \quad \text{(Head-Subj.)}$$

$$\vee \left[\begin{array}{l} \text{SYNSEM}|\text{LOC}|\text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb} \\ \text{INV} \;\; - \end{bmatrix} \vee \neg \; \textit{verb} \\ \text{SUBCAT} \left\langle \textit{synsem} \right\rangle \end{bmatrix} \\ \text{DTRS} \begin{bmatrix} \textit{head-comps-struc} \\ \text{HEAD-DTR} \quad \textit{word} \end{bmatrix} \end{array}\right] \quad \text{(Head-Comp.)}$$

$$\vee \ldots$$

An example principle: The Head-Feature Principle (HFP)

$$\begin{bmatrix} \textit{phrase} \\ \text{DTRS} \;\; \textit{headed-structure} \end{bmatrix} \rightarrow \begin{bmatrix} \text{SYNSEM}|\text{LOC}|\text{CAT}|\text{HEAD} & \boxed{1} \\ \text{DTRS}|\text{HEAD-DTR}|\text{SYNSEM}|\text{LOC}|\text{CAT}|\text{HEAD} & \boxed{1} \end{bmatrix}$$

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