Introduction to HPSG
Class 2: Constituent Order Variation & Complex Predicates

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Outline

- Lexical Regularities
- Constituent Order
- Complex Predicates

The Lexicon

- lexicalization →
  enormous reduction of the number of dominance schemata

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  enormous reduction of the number of dominance schemata
- but very complex lexical entries
- structuring and classification →
  capturing of generalizations & avoidance of redundancies
- type hierarchies and lexical rules

The Complexitiy of a Lexical Entry of a Count Noun

$$
\begin{bmatrix}
\text{PHON} \; \langle \; \textit{Frau} \; \rangle \\[2mm]
\text{CAT}
\begin{bmatrix}
\text{HEAD} & \begin{bmatrix} \textit{noun} \end{bmatrix} \\[1mm]
\text{SUBCAT} & \langle \; \text{DET} \; \rangle \\[1mm]
\ldots & \ldots
\end{bmatrix} \\[6mm]
\text{CONT}
\begin{bmatrix}
\text{IND} & \boxed{1}\begin{bmatrix} \text{PER} & \textit{3} \\ \text{GEN} & \textit{fem} \end{bmatrix} \\[4mm]
\text{RELS} & \left\langle \begin{bmatrix} \text{INST} & \boxed{1} \\ \textit{frau} \end{bmatrix} \right\rangle
\end{bmatrix} \\[6mm]
\ldots \quad \ldots
\end{bmatrix}
$$
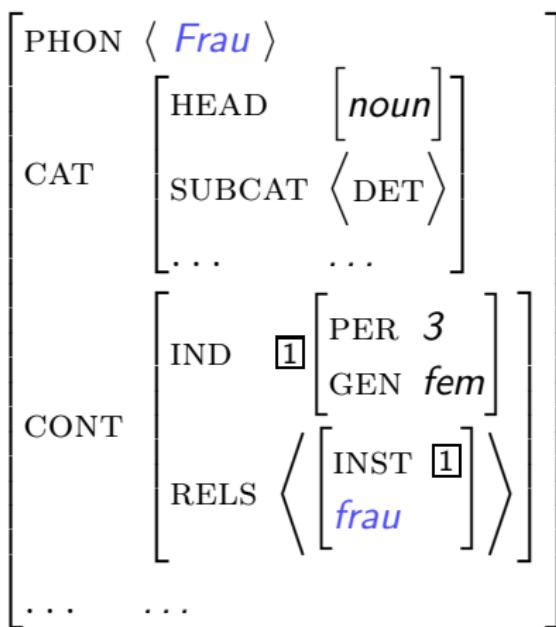
Only a very small part of this is idiosyncratic.

Partitioning of the Information

a. all nouns

$$\begin{bmatrix} \text{CAT|HEAD } \textit{noun} \\ \text{CONT } \textit{nom-obj} \end{bmatrix}$$

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$$\begin{bmatrix} \text{CAT}|\text{HEAD } \textit{noun} \\ \text{CONT } \textit{nom-obj} \end{bmatrix}$$

b. all referential non-pronominal Ns taking a determiner (in addition to a)

$$\begin{bmatrix} \text{CAT}|\text{SUBCAT } \left\langle \text{DET} \right\rangle \\ \text{CONT } \begin{bmatrix} \text{IND} & \boxed{1}\begin{bmatrix} \text{PER } \textit{3} \end{bmatrix} \\ \text{RELS } \left\langle \begin{bmatrix} \text{INST } \boxed{1} \\ \textit{psoa} \end{bmatrix}, \dots \right\rangle \end{bmatrix} \end{bmatrix}$$

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c. all feminine nouns (in addition to a)

$$\begin{bmatrix} \text{CONT|IND|GEN } \textit{fem} \end{bmatrix}$$

The Complexity of a Lexical Entry for a Verb

helf- (Lexical entry (root)):
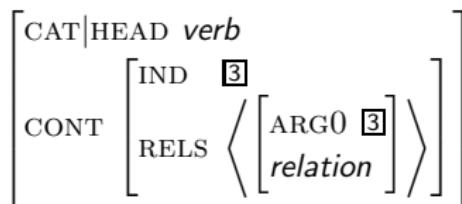
$$
\begin{bmatrix}
\text{PHON} & \langle \textit{ helf } \rangle \\[2mm]
\text{CAT} & \begin{bmatrix}
\text{HEAD} & \textit{verb} \\
\text{SUBCAT} & \left\langle \text{NP}[\textit{nom}]_{\boxed{1}},\ \text{NP}[\textit{dat}]_{\boxed{2}} \right\rangle
\end{bmatrix} \\[8mm]
\text{CONT} & \begin{bmatrix}
\text{IND} & \boxed{3} \\[2mm]
\text{RELS} & \left\langle \begin{bmatrix}
\text{ARG0} & \boxed{3} \\
\text{ARG1} & \boxed{1} \\
\text{ARG2} & \boxed{2} \\
\textit{helfen}
\end{bmatrix} \right\rangle
\end{bmatrix}
\end{bmatrix}
$$

Partitioning of the Information

a. all verbs

$$
\begin{bmatrix}
\text{CAT}|\text{HEAD } \textit{verb} \\[2ex]
\text{CONT} \begin{bmatrix}
\text{IND} \quad \boxed{3} \\[1ex]
\text{RELS} \quad \left\langle \begin{bmatrix} \text{ARG0} \ \boxed{3} \\ \textit{relation} \end{bmatrix} \right\rangle
\end{bmatrix}
\end{bmatrix}
$$

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\end{bmatrix}
\end{bmatrix}
$$

b. bivalent verbs with a dative object (in addition to a)

$$
\begin{bmatrix} \text{CAT}|\text{SUBCAT } \left\langle \text{NP}[\textit{nom}],\ \text{NP}[\textit{dat}] \right\rangle \end{bmatrix}
$$
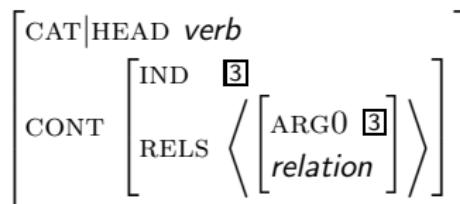
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b. bivalent verbs with a dative object (in addition to a)

$$\begin{bmatrix} \text{CAT}|\text{SUBCAT } \left\langle \text{NP}[\textit{nom}], \text{NP}[\textit{dat}] \right\rangle \end{bmatrix}$$

c. all bivalent verbs with ARG1 and ARG2 (in addition to a)

$$\begin{bmatrix} \text{CAT}|\text{SUBCAT } \left\langle \begin{bmatrix} \text{CONT}|\text{IND } \boxed{1} \end{bmatrix}, \begin{bmatrix} \text{CONT}|\text{IND } \boxed{2} \end{bmatrix} \right\rangle \\ \text{CONT } \begin{bmatrix} \text{RELS } \left\langle \begin{bmatrix} \text{ARG1 } \boxed{1} \\ \text{ARG2 } \boxed{2} \\ \textit{arg1-arg2-rel} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix}$$

Part of a Possible Type Hierarchy
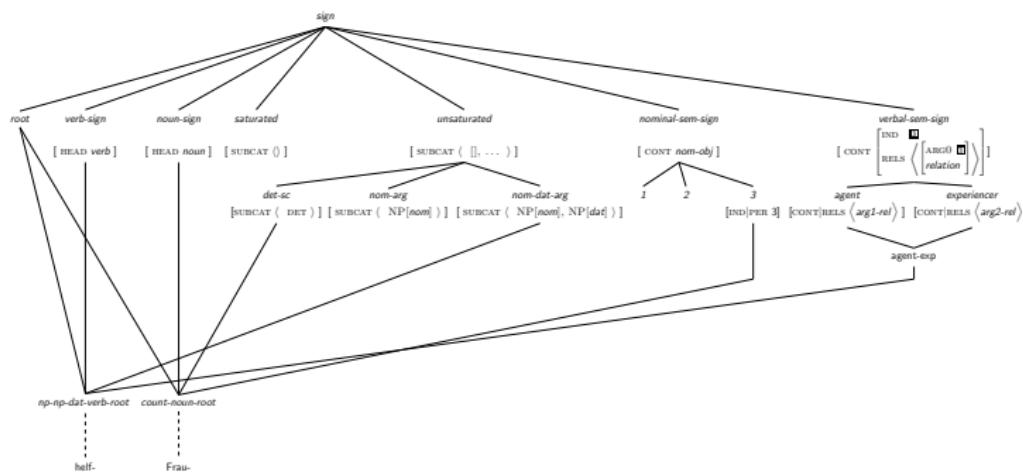
- appropriate paths have to be added:
  [SUBCAT ⟨⟩] is a shorthand for [CAT|SUBCAT ⟨⟩]

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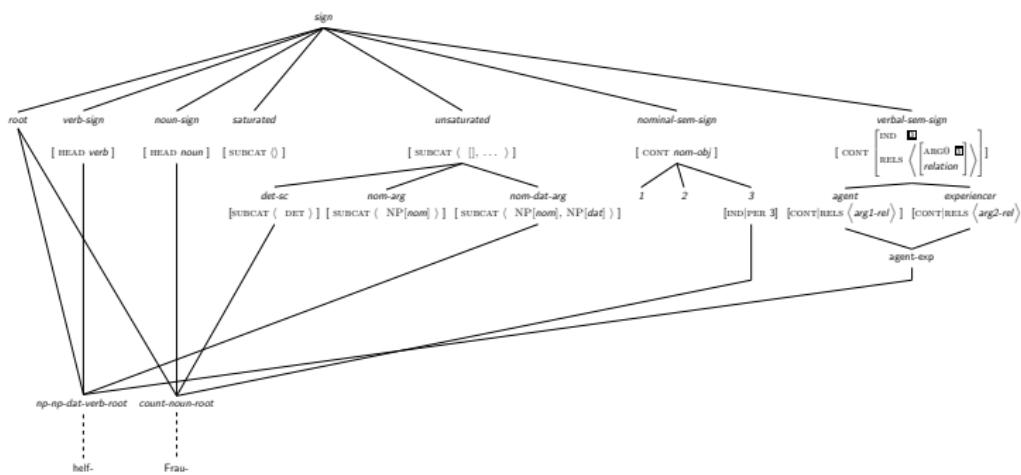
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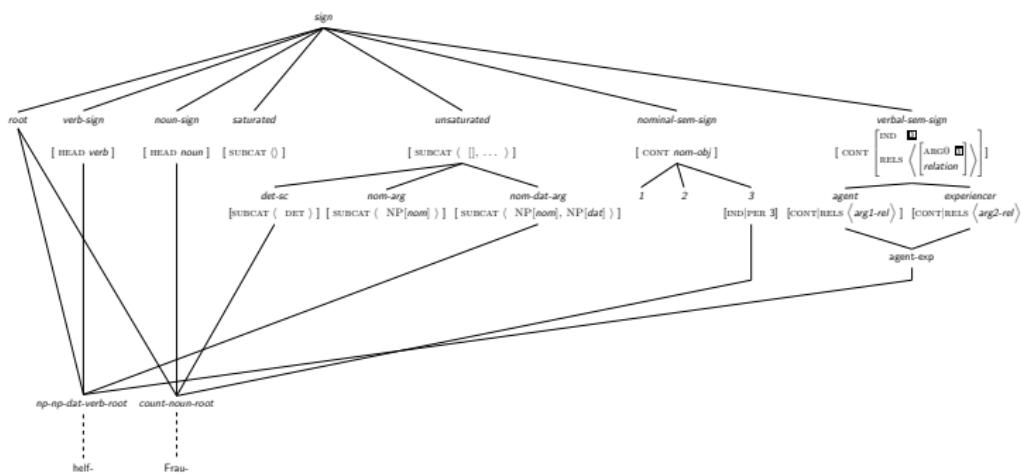
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- Instances are connected via dashed lines.

Examples for Lexical Items

$$\begin{bmatrix} \text{PHON } \langle \textit{ Frau } \rangle \\ \text{CONT}|\text{RELS } \langle \textit{ frau } \rangle \\ \textit{count-noun-root} \end{bmatrix}$$

$$\begin{bmatrix} \text{PHON } \quad \langle \textit{ helf } \rangle \\ \text{CONT}|\text{RELS } \langle \textit{ helfen } \rangle \\ \textit{np-np-dat-verb-root} \end{bmatrix}$$

Horizontal and Vertical Generalizations

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  but this would not capture the fact that *kick* and *kicked* are related in
  the same way as *love* and *loved*.
- Remark: There are proposals in the literature to treat passive by
  inheritance, but this does not extend to Yucatec Maya (Müller, 2006b).

Lexical Rules

- Instead of inheritance we use lexical rules.
  Jackendoff (1975), Williams (1981), Bresnan (1982),
  Shieber, Uszkoreit, Pereira, Robinson and Tyson (1983),
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- Example passive:
  A lexical rule relates a stem to the corresponding passive form.

- There are different conceptions of lexical rules:
  Meta Level Lexical Rules (MLR) vs.
  Description Level Lexical Rules (DLR)
  See Meurers, 2000 for a detailed discussion.

Lexical Rule for the Passive

Lexical Rule for the passive:

$$
\begin{bmatrix}
\text{CAT} & \begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}], \text{NP}[\textit{acc}]_{\boxed{1}} \right\rangle \oplus \boxed{A} \end{bmatrix} \\
\textit{stem}
\end{bmatrix} \mapsto
$$

$$
\begin{bmatrix}
\text{CAT} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{VFORM} & \textit{passiv-part} \end{bmatrix} \\ \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}]_{\boxed{1}} \right\rangle \oplus \boxed{A} \end{bmatrix} \\
\textit{word}
\end{bmatrix}
$$

(1)   a.   The man beats the dog.
   b.   The dog was beaten.

Conventions for the Interpretation of Lexical Rules

- Information that is not mentioned in the output,
  is carried over from the input.
- Example: Passive preserves meaning.
  The CONT values of input and output are identical.
  Linking information is preserved:

Active:

$$\begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}]_{\boxed{1}}, \text{NP}[\textit{acc}]_{\boxed{2}} \right\rangle \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \text{IND} & \boxed{3} \\ \text{RELS} & \left\langle \begin{bmatrix} \text{ARG0} & \boxed{3} \\ \text{ARG1} & \boxed{1} \\ \text{ARG2} & \boxed{2} \\ \textit{beat} & \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix}$$

Passive:

$$\begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}]_{\boxed{2}} \right\rangle \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \text{IND} & \boxed{3} \\ \text{RELS} & \left\langle \begin{bmatrix} \text{ARG0} & \boxed{3} \\ \text{ARG1} & \boxed{1} \\ \text{ARG2} & \boxed{2} \\ \textit{beat} & \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix}$$
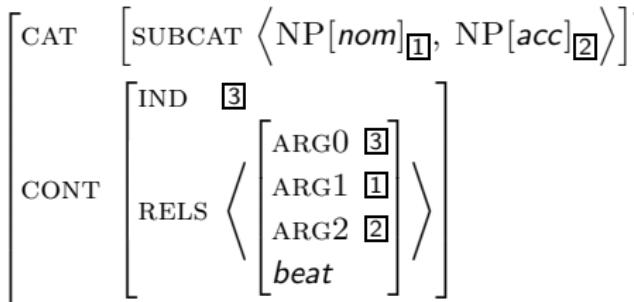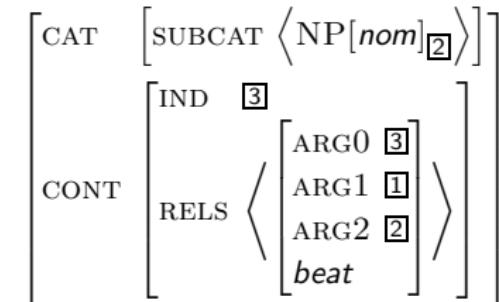
- Convention can be implemented by explicit structure sharing or
  by the use of defaults (Lascarides and Copestake, 1999).

The Lexical Rule for the Passive in a Different Notation

$$\begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD}|\text{VFORM} & \textit{passiv-part} \\ \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}]_{\boxed{1}} \right\rangle \oplus \boxed{A} \end{bmatrix} \\[4ex] \text{LEX-DTR} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}], \text{NP}[\textit{acc}]_{\boxed{1}} \right\rangle \oplus \boxed{A} \end{bmatrix} \\[3ex] \textit{stem} \end{bmatrix} \\[6ex] \textit{acc-passive-lexical-rule} \end{bmatrix}$$

• like a unary projection, but restricted to the lexicon

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$$
\begin{bmatrix}
\text{CAT} & \begin{bmatrix} \text{HEAD|VFORM} & \textit{passiv-part} \\ \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}]_{\boxed{1}} \right\rangle \oplus \boxed{A} \end{bmatrix} \\[2em]
\text{LEX-DTR} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}], \ \text{NP}[\textit{acc}]_{\boxed{1}} \right\rangle \oplus \boxed{A} \end{bmatrix} \\[1.5em] \textit{stem} & \end{bmatrix} \\[3em]
\textit{acc-passive-lexical-rule} &
\end{bmatrix}
$$

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- *word* $\succ$ *acc-passive-lexical-rule*

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\text{LEX-DTR} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \textit{verb} \\ \text{SUBCAT} & \left\langle \text{NP}[\textit{nom}], \text{NP}[\textit{acc}]_{\boxed{1}} \right\rangle \oplus \boxed{A} \end{bmatrix} \\ \textit{stem} \end{bmatrix} \\
\textit{acc-passive-lexical-rule}
\end{bmatrix}
$$

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- *word* $\succ$ *acc-passive-lexical-rule*
- Since lexical rules are typed,
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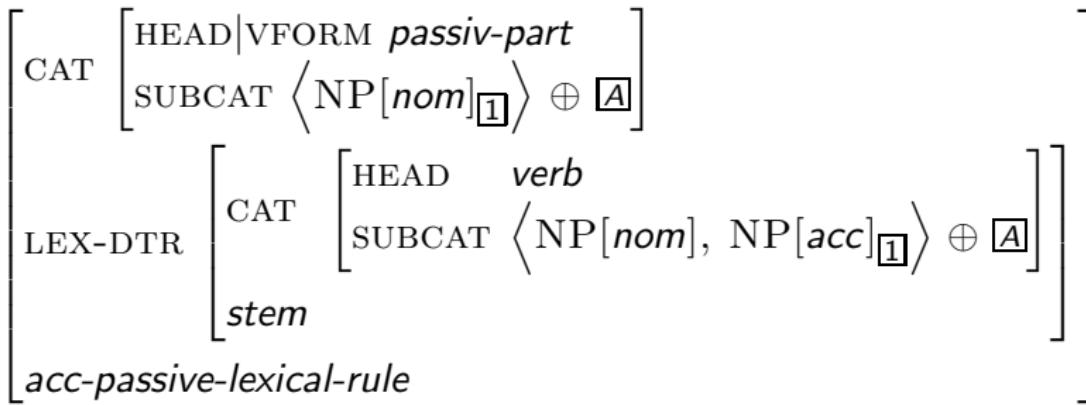
$$
\begin{bmatrix}
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- like a unary projection, but restricted to the lexicon
- *word* $\succ$ *acc-passive-lexical-rule*
- Since lexical rules are typed,
  we can capture generalizations over lexical rules.
- This form of lexical rule is fully integrated into the HPSG formalism.

The Lexical Rule for the Passive with Morphology
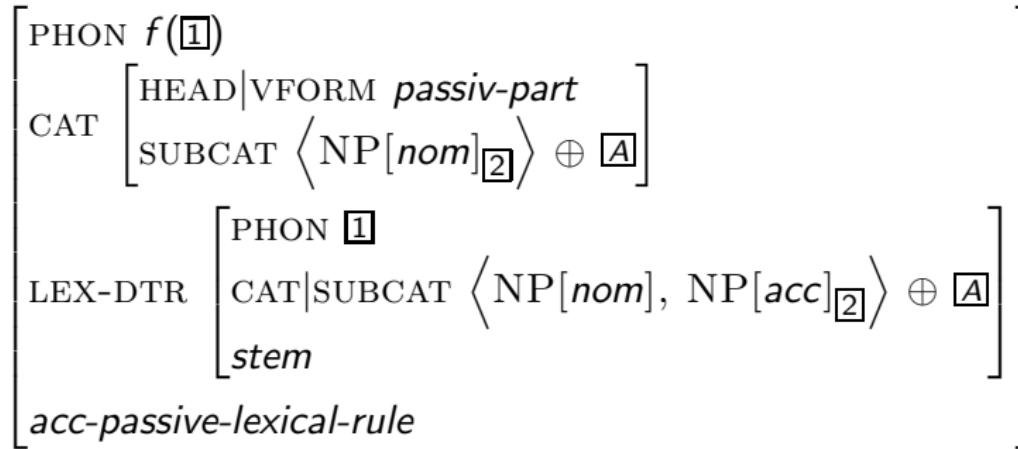
$$
\begin{bmatrix}
\text{PHON } f(\boxed{1}) \\[2mm]
\text{CAT } \begin{bmatrix} \text{HEAD|VFORM } \textit{passiv-part} \\ \text{SUBCAT } \left\langle \text{NP}[\textit{nom}]_{\boxed{2}} \right\rangle \oplus \boxed{A} \end{bmatrix} \\[6mm]
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- f is a function that returns the passive form that corresponds to the PHON value of the LEX-DTR ($kick \rightarrow kicked$)

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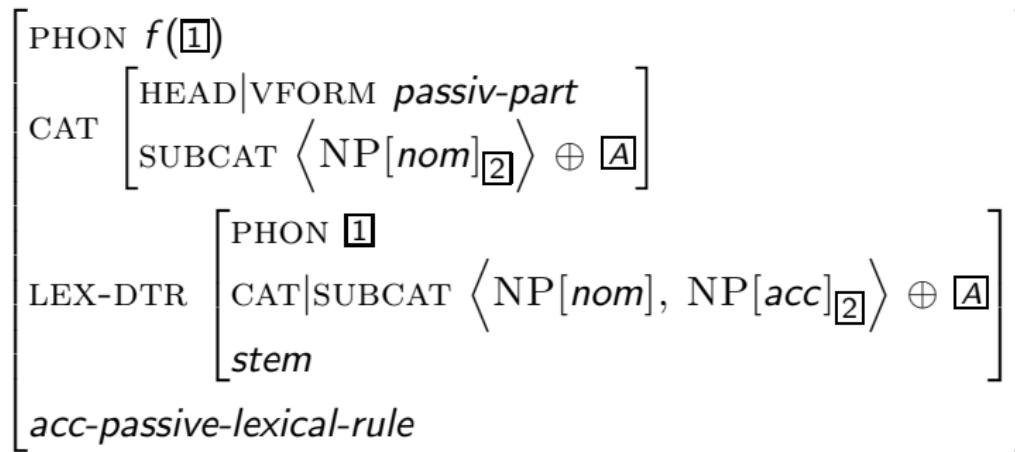
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- f is a function that returns the passive form that corresponds to the PHON value of the LEX-DTR ($kick \rightarrow kicked$)
- Alternative: Head Affix Structures
  (similar to binary branching structures in syntax)

Head Affix Structures vs. Lexical Rules

• Lexical Rules
  (Orgun, 1996; Riehemann, 1998; Ackerman and Webelhuth, 1998; Koenig, 1999; Müller, 2002)

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- Sometimes it is regarded as an advantage that lexical rules make the stipulation of hundreds of empty affixes for zero inflection and conversion unnecessary.
- Subtractive morphemes are not needed in an LR-based approach.
- Some languages have affixal material that realizes more than one argument (Crysmann, 2002, Chapter 2.1.1.4 and p. 169–171).

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Constituent Order: Binary vs. Flat Structures

- We used binary branching structures in Class 1.

  head-argument-phrase $\Rightarrow$

  $$\begin{bmatrix} \text{CAT} | \text{SUBCAT} \boxed{A} \\ \text{HEAD-DTR} | \text{CAT} | \text{SUBCAT} \boxed{A} \oplus \left\langle \boxed{1} \right\rangle \\ \text{NON-HEAD-DTRS} \left\langle \boxed{1} \right\rangle \end{bmatrix}$$
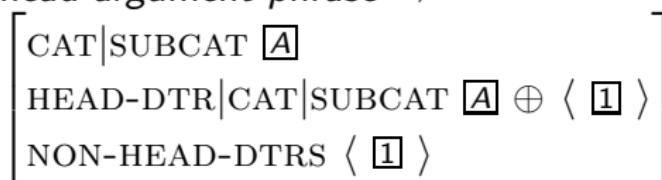
  We will argue for binary branching structures for German shortly.

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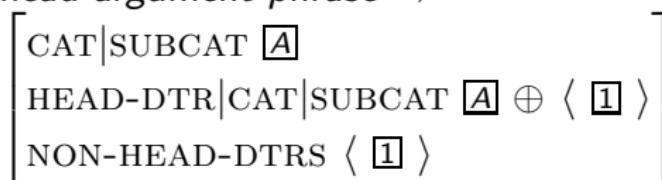
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- However, binary branching is not the only option.
  For languages like English a flat VP is assumed.

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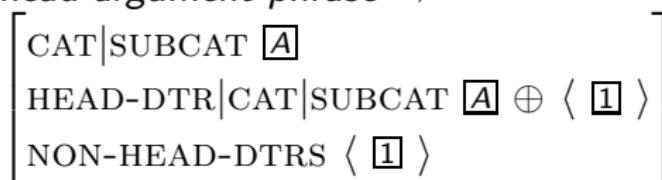
  We will argue for binary branching structures for German shortly.

- However, binary branching is not the only option.
  For languages like English a flat VP is assumed.

- The subject is represented separately
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Constituent Order: Binary vs. Flat Structures

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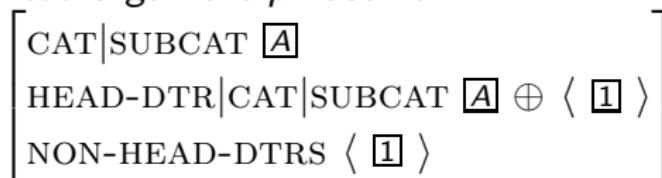
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- The subject is represented separately
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  The other arguments are represented under COMPS.

- Elements in COMPS are combined with their head in one go.

Constituent Order: Binary vs. Flat Structures

- The following head argument schema licenses VPs, that is, projections of a head that include the head and all its arguments except the specifier.

  head-complement-phrase $\Rightarrow$

$$\begin{bmatrix} \text{CAT}|\text{COMPS } \langle \rangle \\ \text{HEAD-DTR}|\text{CAT}|\text{COMPS } \boxed{A} \\ \text{NON-HEAD-DTRS } \boxed{A} \end{bmatrix}$$

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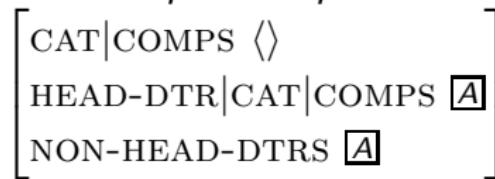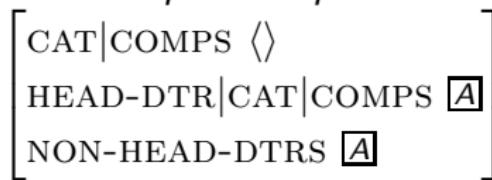
- Haegeman's argument for binary branching on the basis of learnability
  (1994) is flawed.
  Children have semantic clues.
  On innateness and learnability see Tomasello, 2003; Dąbrowska, 2004.

The English Clause
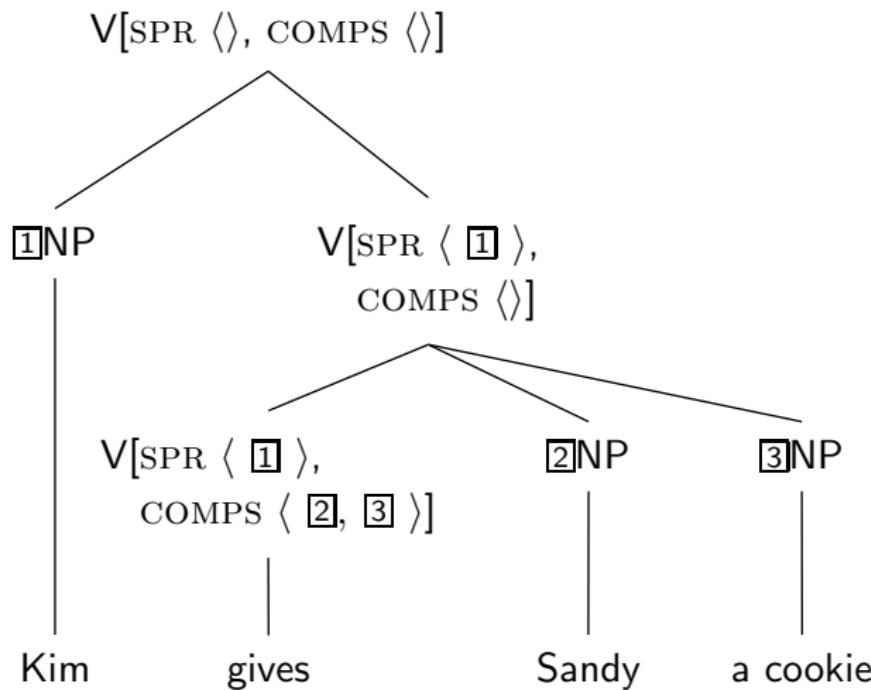
V[SPR ⟨⟩, COMPS ⟨⟩]

1NP   V[SPR ⟨ 1 ⟩,
              COMPS ⟨⟩]

V[SPR ⟨ 1 ⟩,   2NP   3NP
   COMPS ⟨ 2, 3 ⟩]

Kim   gives   Sandy   a cookie

Argument-Structure/Valency Mappings: English

- A list valued feature ARGUMENT-STRUCTURE is used for the representation of arguments independent of their function as subject or complement.

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- English: The subject is VP-external, both for finite and nonfinite verbs.

- All arguments but the subject are mapped from ARG-ST to COMPS:
  gives:

$$
\begin{bmatrix}
\text{SPR} & \left\langle\; \boxed{1} \;\right\rangle \\
\text{COMPS} & \boxed{A} \\
\text{ARG-ST} & \left\langle \boxed{1}\text{NP}[\textit{nom}] \right\rangle \oplus \boxed{A}\; \left\langle \text{NP}[\textit{acc}],\; \text{NP}[\textit{acc}] \right\rangle
\end{bmatrix}
$$

  Linking is done with reference to ARG-ST.

Argument-Structure/Valency Mappings: German

- German: There is no distinction between subject and other arguments for finite verbs.
  (Much discussed topic: Haider, 1982; Grewendorf, 1983; Kratzer, 1984; Webelhuth, 1985; Sternefeld, 1985; Scherpenisse, 1986; Fanselow, 1987; Grewendorf, 1988; Dürscheid, 1989; Webelhuth, 1990; Oppenrieder, 1991; Wilder, 1991; Haider, 1993; Grewendorf, 1993; Frey, 1993; Lenerz, 1994; Meinunger, 2000)

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- All arguments are mapped from ARG-ST to COMPS:
  gibt (*gives*, finite Form):

$$\begin{bmatrix} \text{SPR} & \langle\rangle \\ \text{COMPS} & \boxed{A} \\ \text{ARG-ST} & \boxed{A}\left\langle \text{NP}[\textit{nom}], \text{NP}[\textit{acc}], \text{NP}[\textit{dat}] \right\rangle \end{bmatrix}$$

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- How do we account for the serialization of arguments?

- How do we account for the verb position?

Relatively Free Constituent Order

- Arguments can be serialized in almost any order:

    (2) a. weil   der Mann der Frau   das Buch gibt
            because the man   the woman the book gives
            'because the man gives the book to the woman'

         b. weil der Mann das Buch der Frau gibt

         c. weil das Buch der Mann der Frau gibt

         d. weil das Buch der Frau der Mann gibt

         e. weil der Frau der Mann das Buch gibt

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- (2b–f) require a different prosody and a more restrictive context than
  (2a) (Höhle, 1982).

Adjuncts in the Mittelfeld

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Adjuncts in the Mittelfeld

- In addition to the arguments, adjuncts may be serialized in the Mittelfeld.
- These can be placed at arbitrary positions between the arguments:

  (3) a. weil   morgen   der Mann das Buch   der Frau gibt
      because tomorrow the man   the woman the book gives
      'because the man gives the book to the woman tomorrow'

      b. weil der Mann morgen das Buch der Frau gibt

      c. weil der Mann das Buch morgen der Frau gibt

      d. weil der Mann das Buch der Frau morgen gibt

Scopal Adjuncts

- scopal adjuncts may not be reordered without changing the meaning:

  (4) a. weil   er absichtlich   nicht lacht
          because he deliberately not   laughs
          'because he deliberately does not laugh'

      b. weil   er nicht absichtlich   lacht
          because he not   deliberately laughs
          'because he does not laugh deliberately'

Binary Branching Structures

- Sentences like (5) are unproblematic:

  (5)   weil   [der Mann [das Buch [der Frau   gibt]]]
        because the man   the book the woman gives

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- The integration of adjuncts is straightforward as well:

  (6) a. weil [morgen [der Mann [das Buch [der Frau gibt]]]]
       b. weil [der Mann [morgen [das Buch [der Frau gibt]]]]
       c. weil [der Mann [das Buch [morgen [der Frau gibt]]]]
       d. weil [der Mann [das Buch [der Frau [morgen gibt]]]]

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       c. weil [der Mann [das Buch [morgen [der Frau gibt]]]]
       d. weil [der Mann [das Buch [der Frau [morgen gibt]]]]

- The difference in meaning in (7) follows from the difference in embedding:

  (7) a. weil er [absichtlich [nicht lacht]]
       b. weil er [nicht [absichtlich lacht]]

Permutation of Arguments in the Mittelfeld

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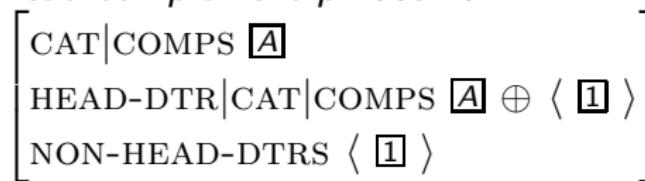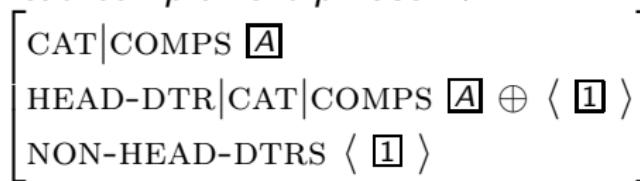
- Generalization of the Head-Argument-Schema:
  Instead of *append* ($\oplus$) we use *delete* ($\ominus$).
  $\ominus$ removes one element from a list.

The Head-Argument-Schema

- old:

  head-complement-phrase ⇒

  $$\begin{bmatrix} \text{CAT}|\text{COMPS } \boxed{A} \\ \text{HEAD-DTR}|\text{CAT}|\text{COMPS } \boxed{A} \oplus \langle \boxed{1} \rangle \\ \text{NON-HEAD-DTRS } \langle \boxed{1} \rangle \end{bmatrix}$$

- new:

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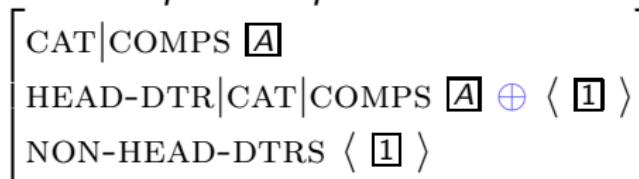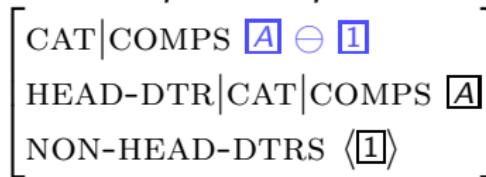
Example: Normal Order

(8) a. weil   jeder   das Buch kennt
       because everybody the book knows
    b. weil das Buch jeder kennt
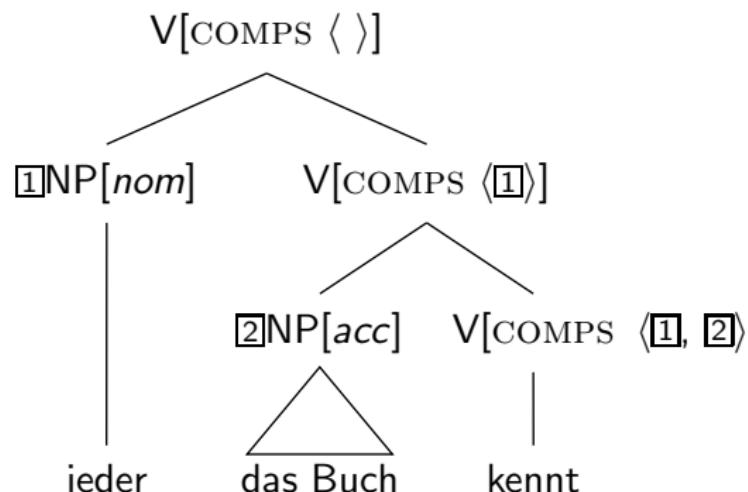
```
                    V[COMPS ⟨ ⟩]
                   /            \
          1 NP[nom]          V[COMPS ⟨1⟩]
              |             /            \
              |      2 NP[acc]      V[COMPS ⟨1, 2⟩]
              |          /\              |
            jeder   das Buch           kennt
```

Example: Reordering
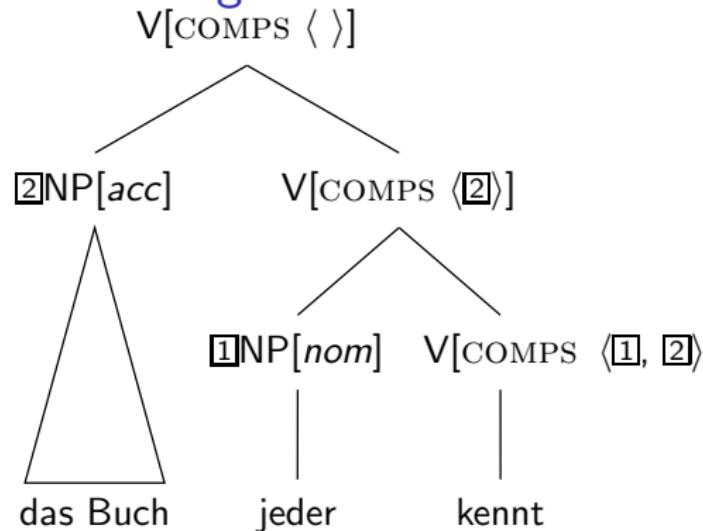
The difference is the order in which the elements in COMPS get saturated.

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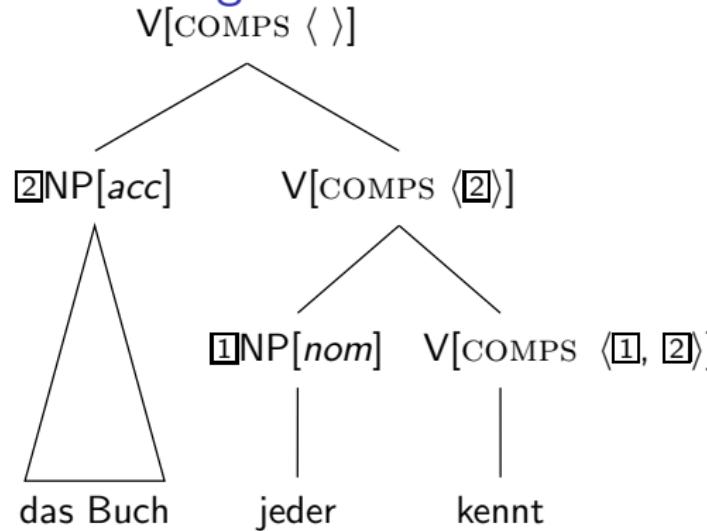
The difference is the order in which the elements in COMPS get saturated.

See Gunji, 1986 for similar suggestions for Japanese.

See Fanselow, 2001 for an aequivalent suggestion in the Minimalist Program.

Demo: Grammar 9

(9) a. daß der Mann   der Frau   das Buch   gibt
      that the man$_{nom}$ the woman$_{dat}$ the book$_{acc}$ gives

   b. daß der Mann   das Buch   der Frau   gibt
      that the man$_{nom}$ the book$_{acc}$ the woman$_{dat}$ gives

   c. daß der Mann   der Frau   das Buch   morgen   gibt
      that the man$_{nom}$ the woman$_{dat}$ the book$_{acc}$ tomorrow gives

   d. daß der Mann   der Frau   morgen   das Buch   gibt
      that the man$_{nom}$ the woman$_{dat}$ tomorrow the book$_{acc}$ gives

   e. daß er oft   nicht lacht
      that he often not   laughs

   f. daß er nicht oft   lacht
   that he not   often laughs

Verb Placement

```
                    S
          ┌─────────┴─────────┐
       V ⟨ S ⟩              S
          │          ┌───────┴───────┐
          V         NP              V'
          │          │          ┌────┴────┐
          │          │         NP         V
          │          │          │          │
       kennt_k      er        ihn       [ _ ]_k
```
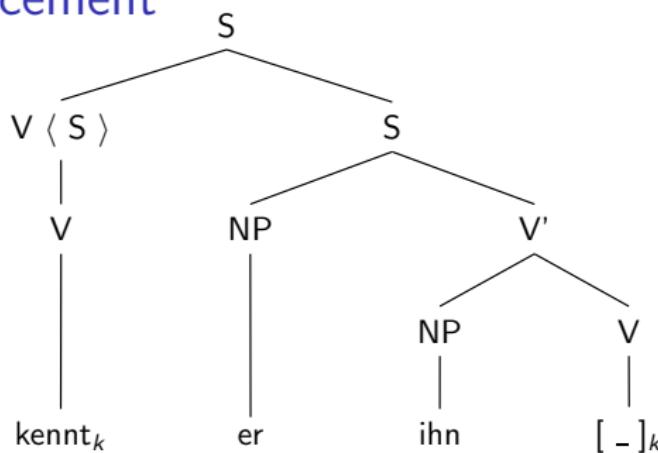
- A trace takes the position of the finite verb in verb-initial sentences.

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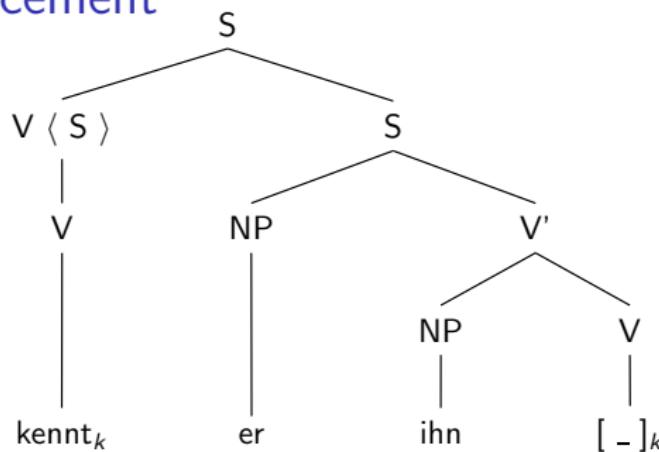
```
                    S
            ┌───────┴───────┐
        V ⟨ S ⟩             S
          │           ┌─────┴─────┐
          V          NP           V'
          │           │      ┌────┴────┐
          │           │     NP         V
          │           │      │         │
       kennt_k       er     ihn      [ _ ]_k
```

- A trace takes the position of the finite verb in verb-initial sentences.
- A special form of the verb is in initial position.
  It selects the projection of the empty verb.

Verb Placement
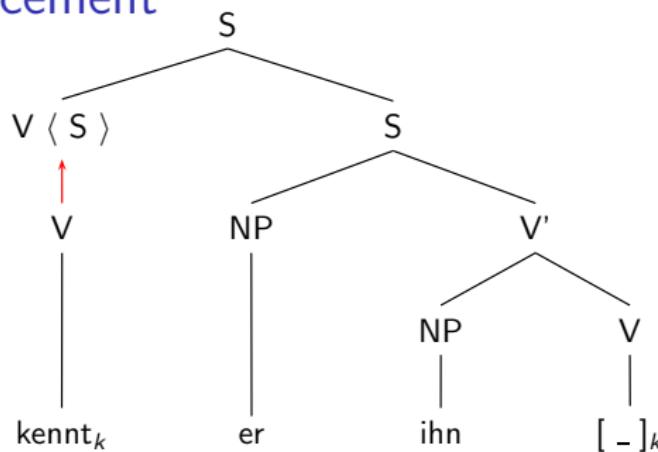
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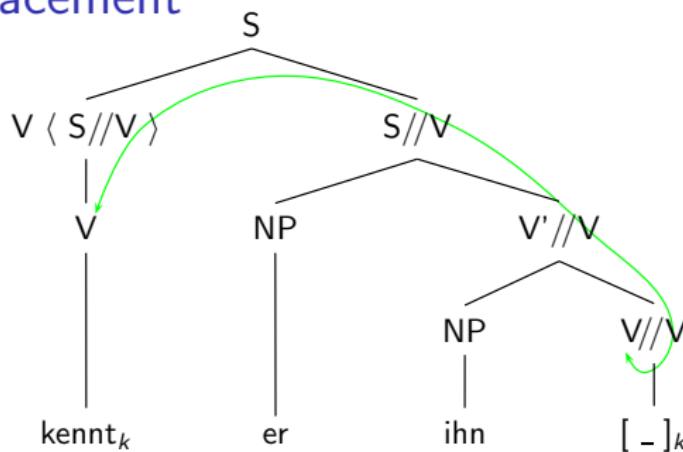
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- A special form of the verb is in initial position.
  It selects the projection of the empty verb.
- The special lexical item is licensed by a lexical rule.
- Connection between verb and trace is established by percolation.

Demo: Grammar 9

(10) Gibt der Mann   der Frau   das Buch.
      gives the man$_{nom}$ the woman$_{dat}$ the book$_{acc}$

Languages with Very Free Constituent Order/Word Order

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- One important area of application is coordination:
  Crysmann, 2001, 2002, 2003a; Beavers and Sag, 2004

Linearization Domains and Discontinuous Constituents
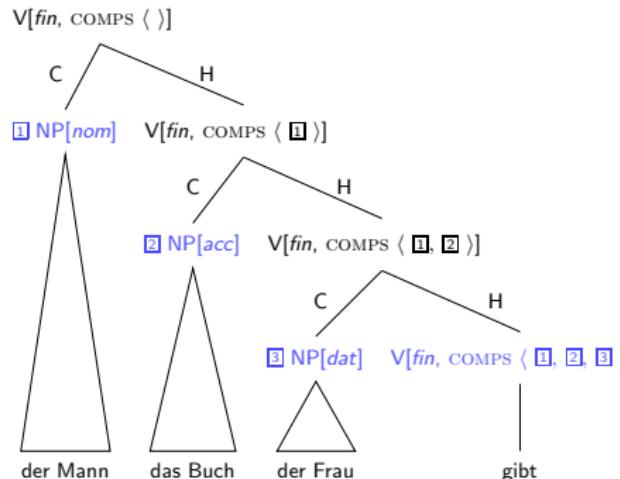
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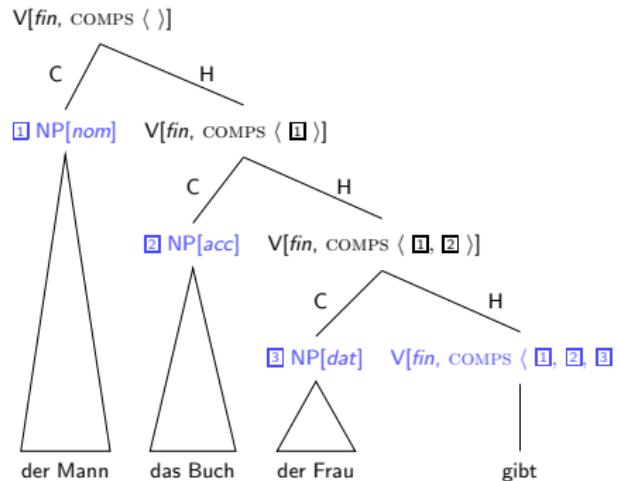
- blue nodes are inserted into a list: the linearization domain
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# Linearization Domains and Discontinuous Constituents
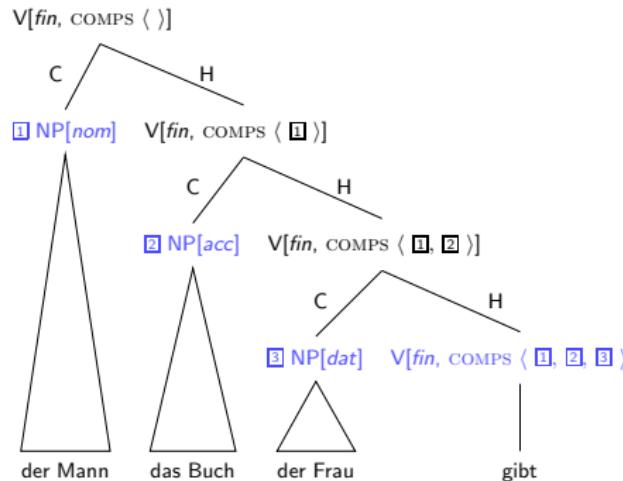
- blue nodes are inserted into a list: the linearization domain
- The permutation of elements in such domains is restricted by linearization rules
- Linearization domains are head domains ↔ Scrambling is local

Representation of Lexical Heads

$$
\begin{bmatrix}
\text{PHON} & \boxed{1} \\
\text{SYNSEM} & \boxed{2} \\
\\
\text{DOM} & \left\langle
\begin{bmatrix}
\text{PHON} & \boxed{1} \\
\text{SYNSEM} & \boxed{2} \\
\text{DOM} & \langle \rangle \\
\textit{word}
\end{bmatrix}
\right\rangle \\
\\
\textit{word}
\end{bmatrix}
$$
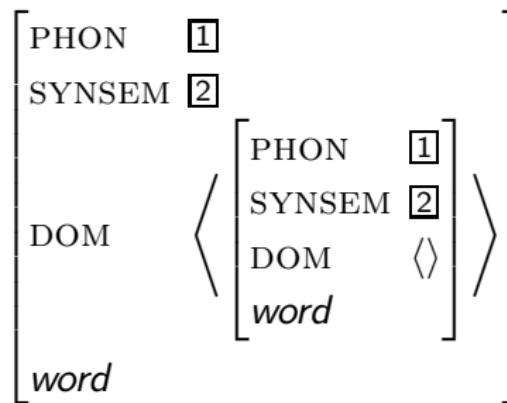
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\\
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\\
\textit{word}
\end{bmatrix}
$$
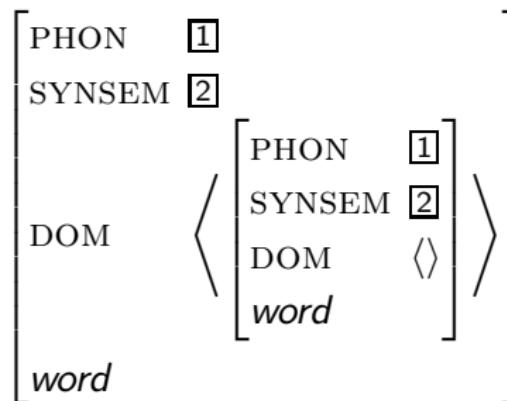
- Every head contains a description of it in its constituent order domain.
- Adjunct and complement daughters are inserted into this list and are ordered relative to the head.

Domain Formation
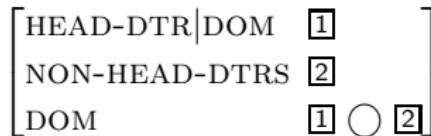
- All non-head daughters are inserted into the domain of the head:

$$\begin{bmatrix} \text{HEAD-DTR}|\text{DOM} & \boxed{1} \\ \text{NON-HEAD-DTRS} & \boxed{2} \\ \text{DOM} & \boxed{1} \bigcirc \boxed{2} \end{bmatrix}$$

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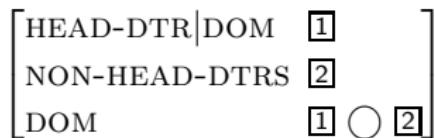
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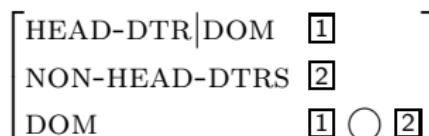
- Domain elements can be ordered freely provided no LP constraint is violated.

- 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 in A and the order of the elements in B is preserved in C.

$$\langle\, a,\, b\,\rangle \bigcirc \langle\, c,\, d\,\rangle = \langle\, a,\, b,\, c,\, d\,\rangle \,\vee$$
$$\langle\, a,\, c,\, b,\, d\,\rangle \,\vee$$
$$\langle\, a,\, c,\, d,\, b\,\rangle \,\vee$$
$$\langle\, c,\, a,\, b,\, d\,\rangle \,\vee$$
$$\langle\, c,\, a,\, d,\, b\,\rangle \,\vee$$
$$\langle\, c,\, d,\, a,\, b\,\rangle$$

PHON Computation

- Domain elements are ordered in surface order.
- $\rightarrow$ computation of the PHON value is simple concatenation

$$\begin{bmatrix} \text{PHON} & \boxed{A1} \oplus \ldots \oplus \boxed{An} \\ \\ \text{DOM} & \left\langle \begin{bmatrix} \text{PHON} & \boxed{A1} \\ sign \end{bmatrix}, \ldots, \begin{bmatrix} \text{PHON} & \boxed{An} \\ sign \end{bmatrix} \right\rangle \\ \\ phrase & \end{bmatrix}$$

Continuous Constituents

V[*fin*, COMPS ⟨ ⟩,
  DOM ⟨ *der Mann, das Buch, der Frau, gibt* ⟩]

    C   H

①NP[*nom*] V[*fin*, COMPS ⟨ ① ⟩,
                DOM ⟨ *das Buch, der Frau, gibt* ⟩]

          C   H

      ②NP[*acc*] V[*fin*, COMPS ⟨ ①, ② ⟩,
                        DOM ⟨ *der Frau, gibt* ⟩]

                C   H

            ③NP[*dat*] V[*fin*, COMPS ⟨ ①, ②, ③ ⟩,
                            DOM ⟨ *gibt* ⟩]

der Mann   das Buch   der Frau   gibt
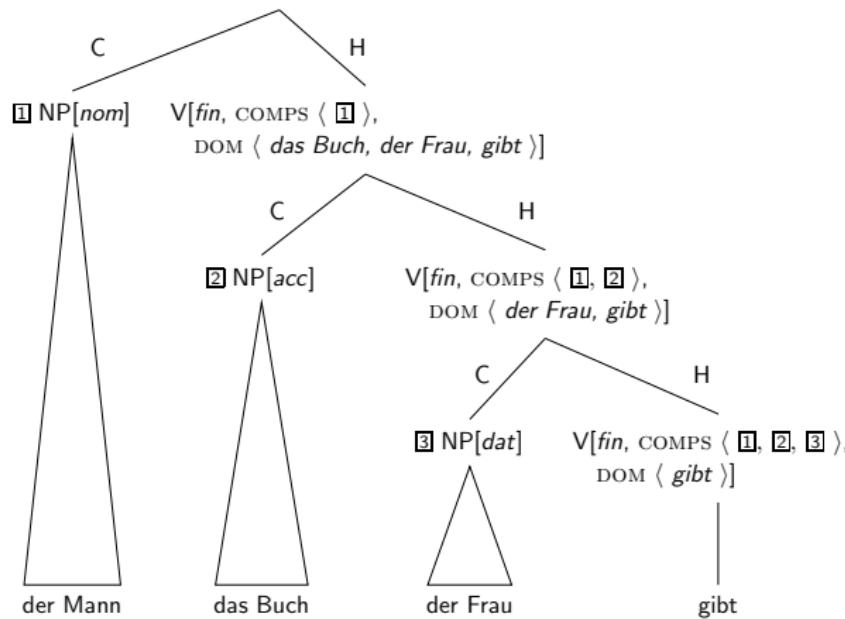
Discontinuous Constituents / Order in the Mittelfeld
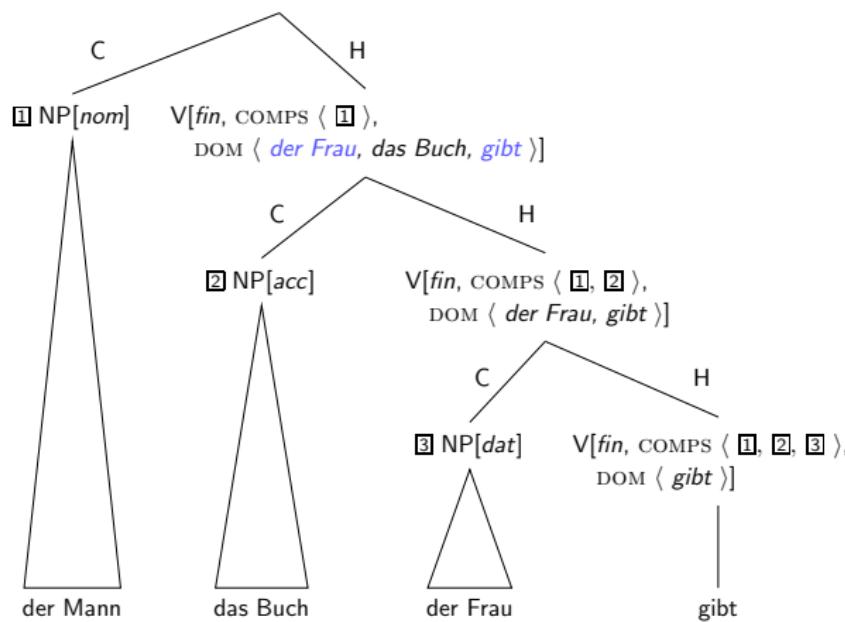
Discontinuous Constituents / Verb Position

V[*fin*, COMPS ⟨ ⟩,
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C   H

① NP[*nom*]   V[*fin*, COMPS ⟨ ① ⟩,
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C   H

② NP[*acc*]   V[*fin*, COMPS ⟨ ①, ② ⟩,
       DOM ⟨ *gibt, der Frau* ⟩]

C   H

③ NP[*dat*]   V[*fin*, COMPS ⟨ ①, ②, ③ ⟩,
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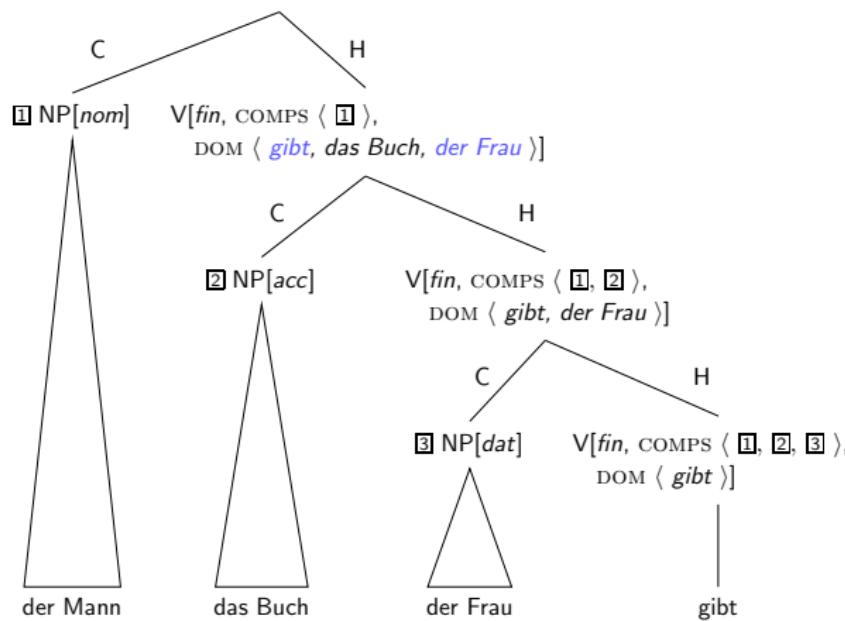
Verb Position with Constituents in Surface Order
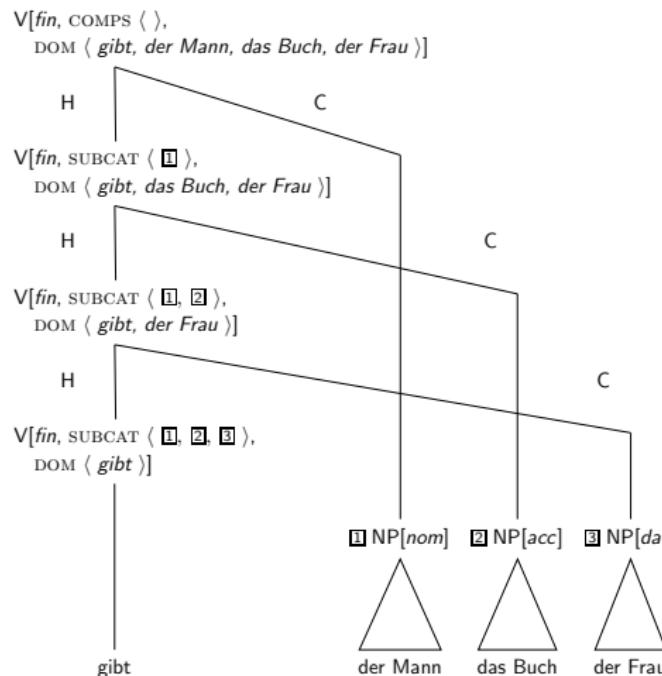
V[*fin*, COMPS ⟨ ⟩,
  DOM ⟨ *gibt, der Mann, das Buch, der Frau* ⟩]

H   C

V[*fin*, SUBCAT ⟨ 1 ⟩,
  DOM ⟨ *gibt, das Buch, der Frau* ⟩]

H   C

V[*fin*, SUBCAT ⟨ 1, 2 ⟩,
  DOM ⟨ *gibt, der Frau* ⟩]

H   C

V[*fin*, SUBCAT ⟨ 1, 2, 3 ⟩,
  DOM ⟨ *gibt* ⟩]

1 NP[*nom*]   2 NP[*acc*]   3 NP[*dat*]

gibt   *der Mann*   *das Buch*   *der Frau*

A Remark

- The dominance structures of all the sentences in (11) are identical:

  (11) a. der Mann der Frau das Buch gibt.
           the man the woman the book gives

       b. der Mann das Buch der Frau gibt.
           the man the book the woman gives

       c. Gibt der Mann das Buch der Frau.
           gives the man the book the woman

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- Demo!

Outline

- Lexical Regularities
- Constituent Order
- Complex Predicates

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- We will look at German verbal complexes.

The German Verbal Complex

- Certain verbs have to or may form a topological unit (Bech, 1955):

  (12) weil   er ihm das Buch zu lesen versprochen hat
        because he him the book to read promised   has
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- The finite verb may be separated from the remaining complex,
  but in our analysis, there is a trace that is part of the verbal complex:

  (13) a. Hat er ihm das Buch zu lesen versprochen?
          has he him the book to read promised
          'Did he promise him to read the book?'

      b. Das Buch hat er ihm zu lesen versprochen.
          the book has he him to read promised
          'He promised him to read the book.'

Coherent and Incoherent Constructions

- Forming a verbal complex is not the only option:

  (14) a. weil   er ihm das Buch zu lesen versprochen hat
            because he him the book to read promised   has
            'because he promised him to read the book'

        b. weil   er ihm   versprochen hat, das Buch zu lesen
            because he promised has   him the book to read
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  (14a) is called the coherent construction and
  (14b) is the incoherent construction.

- All verbs governing participles or bare infinitives have to form a verbal complex.

Coherent and Incoherent Constructions

- There are also obligatorily coherent verbs that govern *zu* infinitives:

  (15) a. weil   er das Buch zu lesen scheint
            because he the book to read seems
            'because he seems to read the book'

        b. * weil   er scheint das Buch zu lesen
            because he seems   the book to read

  But most verbs taking *zu* infinitives allow for both coherent and
  incoherent constructions.

Permutation of Arguments

Arguments of complex forming verbs do not have to be realized adjacent to their verbs:

(16) weil   es ihm jemand   zu lesen versprochen hat (Haider, 1990)
      because it him somebody to read promised   has

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  - remote passive possible with the coherent construction

The Subject of Nonfinite Verbs

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- Of course subjects behave differently from objects in projections of nonfinite verbs.
- Kiss (1992; 1995a): the subject of nonfinite verbs is represented as a HEAD feature.

finite Form *hilft* ('to help'):

$$\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{SUBJ} & \langle \rangle \\ \text{VFORM} & \textit{fin} \\ \textit{verb} \end{bmatrix} \\ \text{COMPS} & \left\langle \text{NP}[\textit{nom}], \text{NP}[\textit{dat}] \right\rangle \end{bmatrix}$$

nonfinite Form *helfen*:

$$\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{SUBJ} & \left\langle \text{NP}[\textit{nom}] \right\rangle \\ \text{VFORM} & \textit{bse} \\ \textit{verb} \end{bmatrix} \\ \text{COMPS} & \left\langle \text{NP}[\textit{dat}] \right\rangle \end{bmatrix}$$

The Lexical Entry for Obligatorily Coherent Verbs

(17) *müssen* ('must' finite, obligatorily coherent):

$$\left[\text{COMPS } \boxed{A} \oplus \boxed{B} \oplus \langle \text{ V}[bse, \text{LEX+}, \text{SUBJ } \boxed{A}, \text{COMPS } \boxed{B}]\rangle \right]$$

[LEX +] describes word like clusters.

No non-verbal arguments have been combined with the embedded infinitive.

Thus we can ensure that the bare verb is combined with *scheinen*. (18a), but not (18b).

(18) a. weil   er ihr das Märchen [erzählen muß]
          because he her the fairytale tell   must
          'because he must tell her the fairytale'

      b. weil   er [[ihr das Märchen erzählen] muß]]
          because he her the fairytale tell   must

The Predicate Complex Schema

- Elements from the verbal cluster may not be reordered as normal
  arguments may.

  (19) * daß das Buch lesen niemand wird
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- A separate schema for predicate complexes:
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$$\begin{bmatrix} \text{CAT|COMPS} & \boxed{A} \\ \text{HEAD-DTR} & \begin{bmatrix} \text{CAT|COMPS } \boxed{A} \oplus \langle\, \boxed{1}\, \rangle \end{bmatrix} \\ \text{NONHEAD-DTRS} & \langle\, \boxed{1}\, \rangle \end{bmatrix}$$

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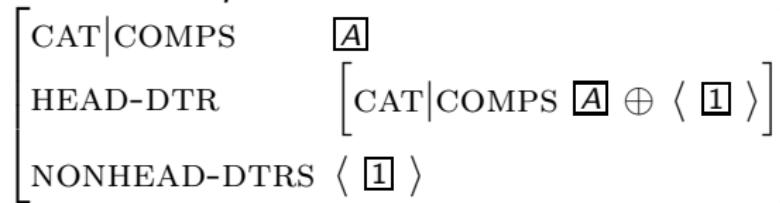
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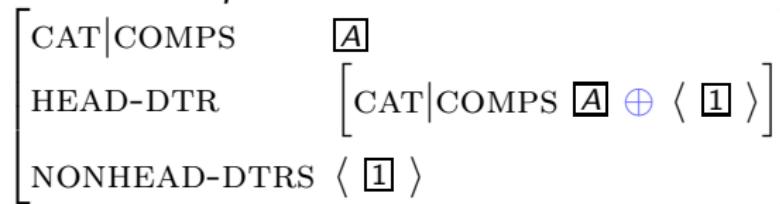
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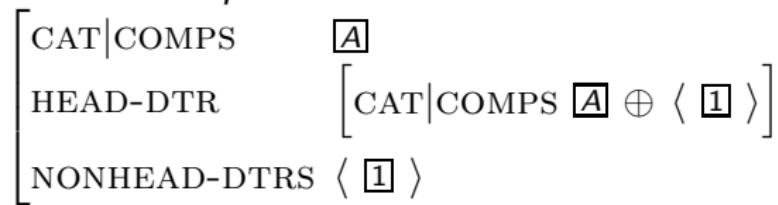
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- The difference is that we use ⊕ instead of ⊖.

Analysis of the Verbal Complex

$$\begin{bmatrix} \text{HEAD} & \boxed{1} \\ \text{COMPS} & \boxed{A} \oplus \boxed{B} \end{bmatrix}$$

CL   H

$$\boxed{2}\begin{bmatrix} \text{LOC} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{SUBJ} & \boxed{A}\langle \text{ NP}[\textit{nom}] \rangle \\ \text{VFORM} & \textit{bse} \\ \textit{verb} \end{bmatrix} \\ \text{COMPS} & \boxed{B}\langle \text{ NP}[\textit{acc}], \text{ NP}[\textit{dat}] \rangle \end{bmatrix} \end{bmatrix}$$

erzählen

$$\begin{bmatrix} \text{HEAD} & \boxed{1}\begin{bmatrix} \text{SUBJ} & \langle \ \rangle \\ \text{VFORM} & \textit{fin} \\ \textit{verb} \end{bmatrix} \\ \text{COMPS} & \boxed{A} \oplus \boxed{B} \oplus \langle \ \boxed{2} \ \rangle \end{bmatrix}$$

muß

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(20) weil   es ihm jemand   zu lesen versprochen hat (Haider, 1990)
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The account for such reorderings follows from what we have:
zu lesen, *versprochen*, and *hat* form a verbal complex.

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Accounting for the Ungrammatical Cases

- The constraints formalized so far do not rule out the following:

  (21) a. * daß lesen er den Aufsatz wird
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- Exclusion by specification of the LEX value of the daughter:
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Head Complement Phrases are [LEX−].

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- Totally free ordering of words/constituents is accounted for by linearization domains.
- Argument attraction is the key mechanism for the analysis of complex predicates.

Is Movement Needed for Scope?

No!

On the contrary:
Kiss, 2001 showed that Frey's treatment of quantifiers (1993) yields spurious ambiguities.

Alternative HPSG Proposals

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  - variable branching
    (Crysmann, 2003b; Kiss and Wesche, 1991; Schmidt, Rieder and Theofilidis, 1996).
- Some proposals have been quite influential in the HPSG literature:
  Reape, 1991, 1992, 1994; Pollard, Kasper and Levine, 1992, 1994; Kathol and Pollard, 1995; Kathol, 1995, 2000; Müller, 1995, 1997a, 1999, 2002; Richter and Sailer, 1999; **?**; Penn, 1999; Crysmann, 2001, 2002, 2003a; Beavers and Sag, 2004
- Hence we discuss them here.
  For a detailed discussion see Müller, 2004, 2005a,b.

Flat Structures
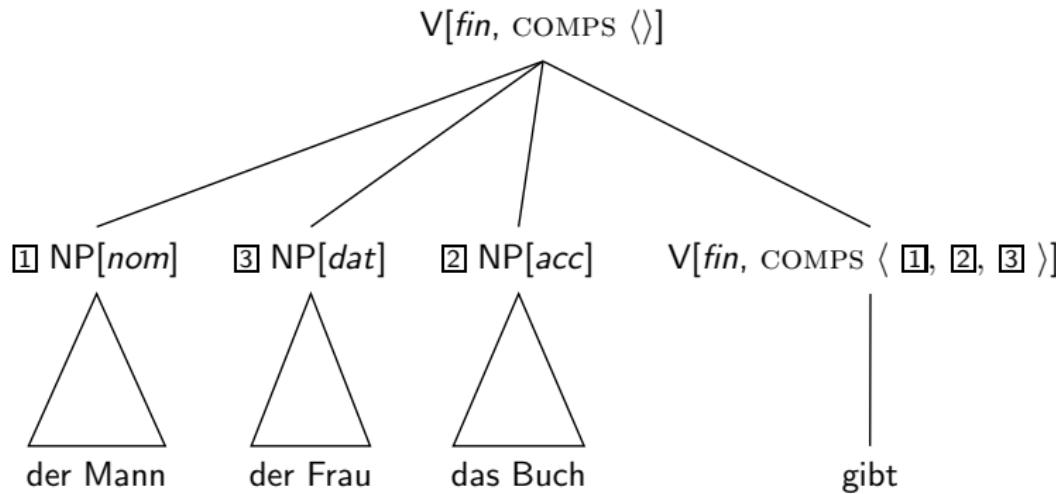
- Complements are daughters in the same local tree →
  Hence, barring further constraints, all permutations are allowed.
- Verb-initial and verb-final orders are just alternative ordering
  possibilities.

Problemes with Flat Structures: Adjuncts

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- Relational constraints are very powerful!
- Approaches that do without them have to be preferred.

Problems with Flat Structures: Multiple Frontings

Sentences like (22) can be explained with an empty head:

(22) a. [Nichts] [mit   derartigen   Entstehungstheorien] hat es natürlich zu
         nothing with those.kinds.of creation.theories   has it of.course to
         tun, wenn . . .[1]
         do   when
         'Of course it has nothing to do with that kind of creation theory when . . .'

    b. [Zum   zweiten Mal] [die Weltmeisterschaft] errang Clark 1965 . . .[2]
        to.the second time the world.championship won   Clark 1965
        'Clark won the world championships for the second time in 1965.'

No satisfying explanation without empty head.

---

[1] K. Fleischmann, *Verbstellung und Relieftheorie*, München, 1973, p. 72. quoted from (van de Velde, 1978, p. 135).

[2] (Beneš, 1971, p. 162)

Problems of Linearization Approaches

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- Topological field models fail, since multiple frontings require a new Mittelfeld, right sentence bracket, and Nachfeld embedded in the Vorfeld.

  (23) a. [$_{VF}$ [$_{MF}$ Den Atem] [$_{RS}$ an]] hielt die ganze Judenheit.[3]

       b. [$_{VF}$ [$_{MF}$ Wieder] [$_{RS}$ an]] treten auch die beiden Sozialdemokraten.[4]

       c. [$_{VF}$ [$_{RS}$ Los] [$_{NF}$ damit]] geht es schon am   15. April.[5]
              PART   there.with went it already at.the 15 April
          'It already started on April the 15th.'

  See Müller To Appear; 2007

[3]Lion Feuchtwanger, *Jud Süß*, p. 276, quoted from Grubačić, 1965, p. 56.
[4]taz, bremen, 24.05.2004, S. 21
[5]taz, 01.03.2002, S. 8.

Problems of Linearization Approaches: Incomplete Category Fronting

- Impossible to explain why both dative objects and accusative objects can be fronted with the verb:

  (24) a. Den Wählern erzählen sollte man diese Geschichte nicht.
         the voters$_{dat}$ tell should one$_{nom}$ these stories$_{acc}$ not

     b. Märchen erzählen sollte man den Wählern nicht.
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- with COMPS list ⟨ NP[*nom*], NP[*acc*], NP[*dat*] ⟩ we can analyze (24a) only
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  combination with the dative object.

- Kathol (2000): no order for objects in the COMPS list
  Sentences in (24) can be analyzed, but we had spurious ambiguities for (25):

  (25) daß er den Wählern Märchen erzählt
     that he$_{nom}$ the voters$_{dat}$ fairy.tales$_{acc}$ tells

Incomplete Category Fronting

- The sentences in (26) are unproblematic for our proposal:

  (26) a. Den Wählern erzählen sollte man   diese Geschichte nicht.
           the voters$_{dat}$ tell   should one$_{nom}$ these stories$_{acc}$ not

       b. Märchen   erzählen sollte man   den Wählern nicht.
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  order.

- Note regarding GB: If we want to account for ICF as remnant movement
  (Webelhuth and den Besten, 1987; Thiersch, 1986), we get problems with
  unbound traces in the Vorfeld.
  Appart from this there are empirical problems:
  Haider, 1993; De Kuthy, 2002; De Kuthy and Meurers, 2001; Fanselow, 2002

Variable Branching

- Crysmann (2003b), Kiss and Wesche (1991) und Schmidt et al. (1996)
  Variable Branching:

  (27) a. [[[Gibt er] dem Mann] das Buch]?
              gives he the man   the book
           'Does he give the man the book?'

      b. [Hat [er [dem Mann [das Buch gegeben]]]]?
          has he the man   the book given

- no empty head

- no explanation for apparently multiple frontings

Optional Coherence

versuch- (control verb, optionally coherent):

$$\left[\text{COMPS} \ \left\langle \ \text{NP}[\textit{str}]_{\boxed{1}} \ \right\rangle \oplus \boxed{A} \oplus \left\langle \ \text{V}[\textit{inf}, \ \text{SUBJ} \ \left\langle \ \text{NP}[\textit{str}]_{\boxed{1}} \ \right\rangle, \ \text{COMPS} \ \boxed{A} \ ] \ \right\rangle \right]$$

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- *versuchen* is a control verb: the index of its subject is identified with the subject index of the embedded verb.

- The LEX value of the embedded verb is not specified →
  both values are possible.

- If it is '+', we get the coherent construction,
  if it is '−', we get the incoherent construction.

Fronting

Parts from the left periphery of the verbal complex including non-verbal material may be placed in front of the finite verb:

(28) a. weil   er ihr das Märchen erzählen müssen wird.
        because he her the fairytale tell   must will
        'because he will have to tell her the fairytale'

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   b. Erzählen wird er ihr das Märchen erzählen müssen.
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    b. Erzählen wird er ihr das Märchen erzählen müssen.
       tell   will he her the fairytale tell   must

    c. Erzählen müssen wird er ihr das Märchen erzählen müssen.
       tell   must   will he her the fairytale tell   must

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        tell   will he her the fairytale tell   must

   c.   Erzählen müssen wird er ihr das Märchen erzählen müssen.
        tell   must   will he her the fairytale tell   must

   d.   Das Märchen erzählen wird er ihr das Märchen erzählen müssen.
        the fairytale tell   will he her the fairytale tell   must

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    c. Erzählen müssen wird er ihr das Märchen erzählen müssen.
       tell   must   will he her the fairytale tell   must

    d. Das Märchen erzählen wird er ihr das Märchen erzählen müssen.
       the fairytale tell   will he her the fairytale tell   must

    e. * Müssen wird er ihr das Märchen erzählen müssen.
       must   will he her the fairytale tell   must

Parts from the middle of the verbal complex may not be fronted.

Partial VP Fronting

- The combination of obligatorily coherent verbs with phrases was sucessfuly excluded, but what about (29b)?

  (29) a. er ihr [[ein Märchen erzählen] muß]]
           he hir a fairytale tell   must

        b. Ein Märchen erzählen wird er ihr müssen.
           a   fairytale tell   will he her must

- No problem if LEX is a feature that is not inside of LOCAL, but under SYNSEM (Müller, 1997b, 1999, 2002; Meurers, 1999). Since only information under LOCAL is shared between trace and filler, the LEX value may differ.

- Structure Preservation Principle of Emonds (1976) does not hold. But this is the case for HPSG grammars anyway, since PHON values differ and DTRS may differ.

Analysis of *Seiner Tochter erzählen wird er das Märchen.*
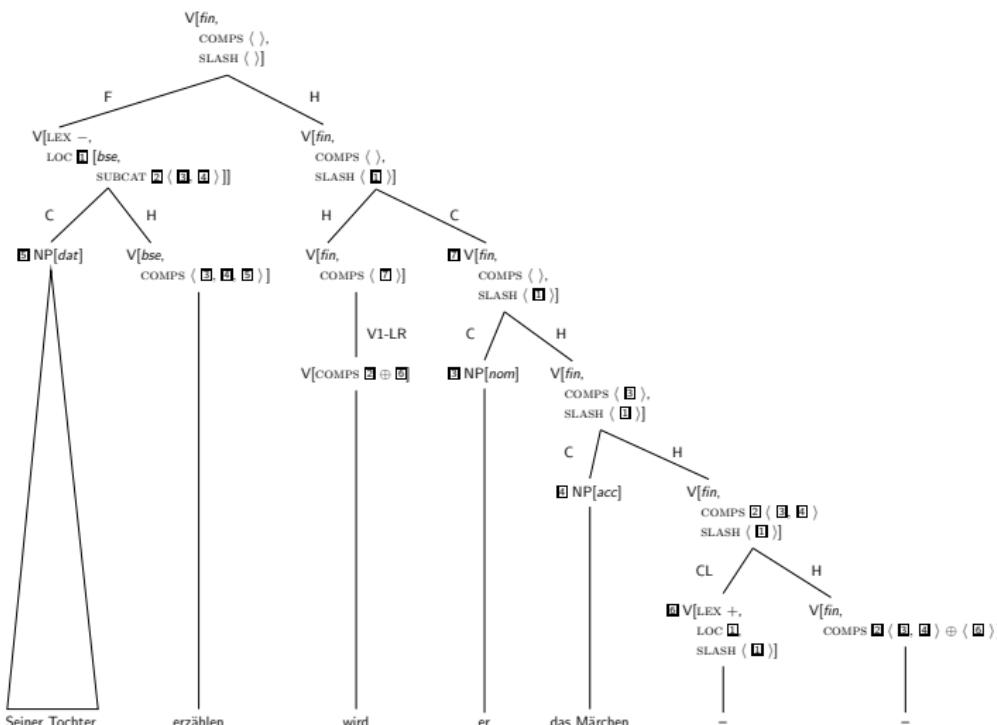
Exclusion of Ungrammatical Cases

- What excludes (30)?

  (30)   * Müssen wird er ihr ein Märchen erzählen.
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  (30) * Müssen wird er ihr ein Märchen erzählen.
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- *wird* selects an infinitive in *bse* form the arguments of which it attracts.
  The attracted elements have to be [LEX−].
  Therefore *erzählen* cannot be attracted → structure in (31) is ruled out.

  (31) * Müssen$_i$ wird$_j$ er ihr ein Märchen [erzählen [_$_i$ _$_j$]].

Exclusion of Ungrammatical Cases

• What excludes (30)?

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(31) * Müssen$_i$ wird$_j$ er ihr ein Märchen [erzählen [_$_i$ _$_j$]].

• The analysis in (32) is excluded, since extraction traces are not allowed
  in head positions:

(32) * Müssen$_i$ wird$_j$ er ihr ein Märchen [[erzählen _$_i$] _$_j$].

The Remote Passive

Accusative objects of embedded verbs can be realized as nominative in passive constructions:

(33) a. weil   er   den Wagen oft   zu reparieren versuchte
        because he$_{nom}$ the car$_{acc}$ often to repair   tried
        'because he often tried to repair the car'

   b. weil   der Wagen oft   zu reparieren versucht wurde.
        because the car$_{nom}$ often to repair   tried   was
        'because many attempts were made to repair the car.'

den Wagen is the object of *reparieren*, but is realized as nominative in (33b).

Explanation: *zu reparieren versucht* acts as a complex verb and is passivized as if it were a simplex verb.

The Remote Passive

- Supporting evidence:
  Remote passive is only possible in coherent constructions:

  (34) a. weil   oft   versucht wurde, den Wagen zu reparieren.
            because often tried   was   the car$_{acc}$ to repair
            'because many attempts were made to repair the car.'

      b. * weil   oft   versucht wurde, der Wagen zu reparieren.
            because often tried   was   the car$_{nom}$ to repair

      c. Den Wagen zu reparieren wurde oft   versucht.
          the car$_{acc}$ to repair   was often tried

      d. * Der Wagen zu reparieren wurde oft   versucht.
          the car$_{nom}$ to repair   was often tried

Remote Passive

(35) a. weil   er   den Wagen oft   zu reparieren versuchte
        because he$_{nom}$ the car$_{acc}$ often to repair   tried
        'because he often tried to repair the car'

   b. weil   der Wagen oft   zu reparieren versucht wurde.
      because the car$_{nom}$ often to repair   tried   was
      'because many attempts were made to repair the car.'

(36) a. *zu reparieren*:
        SUBJ $\langle$ NP[*str*]$_i$ $\rangle$ COMPS $\langle$ NP[*str*]$_j$ $\rangle$

   b. *versucht*:
      COMPS $\langle$ NP[*str*]$_k$ $\rangle \oplus \boxed{A} \oplus \langle$ V[SUBJ $\langle$ NP[*str*]$_k$ $\rangle$, COMPS $\boxed{A}$] $\rangle$

   c. *zu reparieren versucht* (finite):
      COMPS $\langle$ NP[*str*]$_k$, NP[*str*]$_j$ $\rangle$

   d. *zu reparieren versucht wurde* (passive):
      COMPS $\langle$ NP[*str*]$_j$ $\rangle$

Remote Passive vs. Incoherent Constructions

The data explained:

(37) a. weil   oft   versucht wurde, den Wagen zu reparieren.
         because often tried   was   the car_acc to repair
         'because many attempts were made to repair the car.'

   b. * weil   oft   versucht wurde, der Wagen zu reparieren.
        because often tried   was   the car_nom to repair

   c. Den Wagen zu reparieren wurde oft   versucht.
       the car_acc to repair   was   often tried

   d. * Der Wagen zu reparieren wurde oft   versucht.
        the car_nom to repair   was   often tried

The examples in (37) are incoherent constructions $\rightarrow$ Nothing is raised $\rightarrow$ Case is assigned in the VP. $\rightarrow$ Object of *reparieren* gets accusative.

(37a) and (37c) are impersonal passives.

Abeillé, Anne and Godard, Danièle. 2002. The Syntactic Structure of French Auxiliaries. *Language* 78(3), 404–452.

Abeillé, Anne and Godard, Danièle. 2003. Les prédicats complexes. In Danièle Godard (ed.), *Les langues romanes: Problèmes de la phrase simple*, pages 125–184, Paris: Editions du CNRS.

Ackerman, Farrell and Webelhuth, Gert. 1998. *A Theory of Predicates*. CSLI Lecture Notes, No. 76, Stanford, California: CSLI Publications.

Beavers, John and Sag, Ivan A. 2004. Coordinate Ellipsis and Apparent Non-Constituent Coordination. In Stefan Müller (ed.), *Proceedings of the HPSG-2004 Conference, Center for Computational Linguistics, Katholieke Universiteit Leuven*, pages 48–69, Stanford: CSLI Publications. http://cslipublications.stanford.edu/HPSG/5/, 29.10.2004.

Bech, Gunnar. 1955. *Studien über das deutsche Verbum infinitum*. Linguistische Arbeiten, No. 139, Tübingen: Max Niemeyer Verlag.

Beneš, Eduard. 1971. Die Besetzung der ersten Position im deutschen Aussagesatz. In Hugo Moser (ed.), *Fragen der strukturellen Syntax und der kontrastiven Grammatik*, pages 160–182, Düsseldorf: Schwann.

Bouma, Gosse and van Noord, Gertjan. 1998. Word Order Constraints on Verb Clusters German and Dutch. In Hinrichs et al. (1998), pages 43–72. http://www.let.rug.nl/~vannord/papers/, 30.03.98.

Bresnan, Joan. 1982. The Passive in Lexical Theory. In Joan Bresnan (ed.), *The Mental Representation of Grammatical Relations*, MIT Press Series on Cognitive Theory and Mental Representation, pages 3–86, Cambridge: Massachusetts, London: England: The MIT Press.

Copestake, Ann and Briscoe, Ted. 1992. Lexical Rules in a Unification Based Framework. In James Pustejovsky and Sabine Bergler (eds.), *Lexical Semantics and Knowledge Representation*, Lecture Notes in Artificial Intelligence, No. 627, pages 101–119, Berlin: Springer-Verlag. http://www.cl.cam.ac.uk/Research/NL/acquilex/papers.html, 18.08.2002.

Crysmann, Berthold. 2001. Clitics and Coordination in Linear Structure. In Birgit Gerlach and Janet Grijzenhout (eds.), *Clitics in Phonology, Morphology and Syntax*, Linguistik Aktuell / Linguistics Today, No. 36, Amsterdam, Philadelphia: John Benjamins. http://www.coli.uni-sb.de/~crysmann/papers/ClCoord.html, 16.03.2000.

Crysmann, Berthold. 2002. *Constraint-Based Coanalysis: Portuguese Cliticisation and Morphology-Syntax Interaction in HPSG*. Saarbrücken Dissertations in Computational Linguistics and Language Technology, No. 15, Saarbrücken: Deutsches Forschungszentrum für Künstliche Intelligenz und Universität des Saarlandes.

Crysmann, Berthold. 2003a. An Asymmetric Theory of Peripheral Sharing in HPSG: Conjunction Reduction and Coordination of Unlikes. In Gerhard Jäger, Paola Monachesi, Gerald Penn and Shuly Wintner (eds.), *Proceedings of Formal Grammar 2003, Vienna, Austria*, pages 47–62.

$\curvearrowright\curvearrowright\curvearrowleft$

Crysmann, Berthold. 2003b. On the Efficient Implementation of German Verb Placement in HPSG. In *Proceedings of RANLP 2003*, pages 112–116, Borovets, Bulgaria.

De Kuthy, Kordula. 2002. *Discontinuous NPs in German*. Stanford: CSLI Publications.

De Kuthy, Kordula and Meurers, Walt Detmar. 2001. On Partial Constituent Fronting in German. *Journal of Comparative Germanic Linguistics* 3(3), 143–205. http://www.ling.ohio-state.edu/~kdk/papers/dekuthy-meurers-jcgs.html, 19.08.2002.

Dąbrowska, Ewa. 2004. *Language, Mind and Brain: Some Psychological and Neurological Constraints on Theories of Grammar*. Washington, D.C.: Georgetown University Press.

Donohue, Cathryn and Sag, Ivan A. 1999. Domains in Warlpiri. In *Sixth International Conference on HPSG–Abstracts. 04–06 August 1999*, pages 101–106, Edinburgh.

Dowty, David R. 1979. *Word Meaning and Montague Grammar*. Synthese Language Library, No. 7, Dordrecht, Boston, London: D. Reidel Publishing Company.

Dürscheid, Christa. 1989. *Zur Vorfeldbesetzung in deutschen Verbzweit-Strukturen*. FOKUS, No. 1, Trier: Wissenschaftlicher Verlag.

Emonds, Joseph E. 1976. *A Transformational Approach to English Syntax*. New York: Academic Press.

Engelkamp, Judith, Erbach, Gregor and Uszkoreit, Hans. 1992. Handling Linear Precedence Constraints by Unification. In Henry S. Thomson (ed.), *30th Annual Meeting of the Association for Computational Linguistics. Proceedings of the Conference*, pages 201–208, Newark, Delaware: Association for Computational Linguistics.

Fanselow, Gisbert. 1987. *Konfigurationalität*. Studien zur deutschen Grammatik, No. 29, Tübingen: originally Gunter Narr Verlag now Stauffenburg Verlag.

Fanselow, Gisbert. 2001. Features, θ-Roles, and Free Constituent Order. *Linguistic Inquiry* 32(3), 405–437.

Fanselow, Gisbert. 2002. Against Remnant VP-Movement. In Artemis Alexiadou, Elena Anagnostopoulou, Sjef Barbiers and Hans-Martin Gärtner (eds.), *Dimensions of Movement. From Features to Remnants*, Linguistik Aktuell/Linguistics Today, No. 48, pages 91–127, Amsterdam, Philadelphia: John Benjamins Publishing Company.

Flickinger, Daniel P. 1987. *Lexical Rules in the Hierarchical Lexicon*. Ph. D.thesis, Stanford University.

Flickinger, Daniel P., Pollard, Carl J. and Wasow, Thomas. 1985. Structure-Sharing in Lexical Representation. In William C. Mann (ed.), *Proceedings of the Twenty-Third Annual Meeting of the Association for Computational Linguistics*, pages 262–267, Association for Computational Linguistics, Chicago, IL.

Frey, Werner. 1993. *Syntaktische Bedingungen für die semantische Interpretation. Über Bindung, implizite Argumente und Skopus*. studia grammatica XXXV, Berlin: Akademie Verlag.

Geach, Peter Thomas. 1970. A Program for Syntax. *Synthese* 22, 3–17.

Grewendorf, Günther. 1983. Reflexivierungen in deutschen A.c.I.-Konstruktionen – kein transformationsgrammatisches Dilemma mehr. *Groninger Arbeiten zur Germanistischen Linguistik* 23, 120–196.

Grewendorf, Günther. 1988. *Aspekte der deutschen Syntax. Eine Rektions-Bindungs-Analyse*. Studien zur deutschen Grammatik, No. 33, Tübingen: originally Gunter Narr Verlag now Stauffenburg Verlag.

Grewendorf, Günther. 1993. German. A Grammatical Sketch. In Joachim Jacobs, Arnim von Stechow, Wolfgang Sterenfeld and Theo Vennemann (eds.), *Syntax – Ein internationales Handbuch zeitgenössischer Forschung*, volume 9.2 of *Handbücher zur Sprach- und Kommunikationswissenschaft*, pages 1288–1319, Berlin: Walter de Gruyter Verlag.

Grubačić, Emilija. 1965. *Untersuchungen zur Frage der Wortstellung in der deutschen Prosadichtung der letzten Jahrzehnte*. Ph. D.thesis, Philosophische Fakultät, Zagreb.

Gunji, Takao. 1986. Subcategorization and Word Order. In William J. Poser (ed.), *Papers from the Second International Workshop on Japanese Syntax*, pages 1–21, Stanford: CSLI Publications.

Haegeman, Liliane. 1994. *Introduction to Government and Binding Theory*. Blackwell Textbooks in Linguistics, No. 1, Oxford, UK/Cambridge, USA: Blackwell Publishers, second edition.

Haider, Hubert. 1982. Dependenzen und Konfigurationen: Zur deutschen V-Projektion. *Groninger Arbeiten zur Germanistischen Linguistik* 21, 1–60.

Haider, Hubert. 1990. Pro-bleme? In Gisbert Fanselow and Sascha W. Felix (eds.), *Strukturen und Merkmale syntaktischer Kategorien*, Studien zur deutschen Grammatik, No. 39, pages 121–143, Tübingen: originally Gunter Narr Verlag now Stauffenburg Verlag.

Haider, Hubert. 1993. *Deutsche Syntax – generativ. Vorstudien zur Theorie einer projektiven Grammatik*. Tübinger Beiträge zur Linguistik, No. 325, Tübingen: Gunter Narr Verlag.

Hinrichs, Erhard W., Kathol, Andreas and Nakazawa, Tsuneko (eds.). 1998. *Complex Predicates in Nonderivational Syntax*, volume 30 of *Syntax and Semantics*. San Diego: Academic Press.

Hinrichs, Erhard W. and Nakazawa, Tsuneko. 1989a. Flipped out: AUX in German. In *Aspects of German VP Structure*, SfS-Report-01-93, Eberhard-Karls-Universität Tübingen.

Hinrichs, Erhard W. and Nakazawa, Tsuneko. 1989b. Subcategorization and VP Structure in German. In *Aspects of German VP Structure*, SfS-Report-01-93, Eberhard-Karls-Universität Tübingen.

Hinrichs, Erhard W. and Nakazawa, Tsuneko. 1994. Linearizing AUXs in German Verbal Complexes. In Nerbonne et al. (1994), pages 11–38.

Höhle, Tilman N. 1982. Explikation für „normale Betonung" und „normale Wortstellung". In Werner Abraham (ed.),

Satzglieder im Deutschen – Vorschläge zur syntaktischen, semantischen und pragmatischen Fundierung, Studien zur deutschen Grammatik, No. 15, pages 75–153, Tübingen: originally under Gunter Narr Verlag now Stauffenburg Verlag.

Jackendoff, Ray S. 1975. Morphological and Semantic Regularities in the Lexikon. *Language* 51(3), 639–671.

Kasper, Robert T. 1994. Adjuncts in the Mittelfeld. In Nerbonne et al. (1994), pages 39–70.

Kathol, Andreas. 1995. *Linearization-Based German Syntax*. Ph. D. thesis, Ohio State University.

Kathol, Andreas. 1998. Constituency and Linearization of Verbal Complexes. In Hinrichs et al. (1998), pages 221–270.

Kathol, Andreas. 2000. *Linear Syntax*. New York, Oxford: Oxford University Press.

Kathol, Andreas and Pollard, Carl J. 1995. Extraposition via Complex Domain Formation. In *Proceedings of the Thrirty-Third Annual Meeting of the ACL*, Association for Computational Linguistics, Boston. http://linguistics. berkeley.edu/~kathol/Papers/ACL95.ps.gz, 29.06.99.

Kiss, Tibor. 1992. Variable Subkategorisierung. Eine Theorie unpersönlicher Einbettungen im Deutschen. *Linguistische Berichte* 140, 256–293.

Kiss, Tibor. 1995a. *Infinite Komplementation. Neue Studien zum deutschen Verbum infinitum*. Linguistische Arbeiten, No. 333, Tübingen: Max Niemeyer Verlag.

Kiss, Tibor. 1995b. *Merkmale und Repräsentationen*.

Opladen/Wiesbaden: Westdeutscher Verlag.

Kiss, Tibor. 2001. Configurational and Relational Scope Determination in German. In Walt Detmar Meurers and Tibor Kiss (eds.), *Constraint-Based Approaches to Germanic Syntax*, Studies in Constraint-Based Lexicalism, No. 7, pages 141–175, Stanford: CSLI Publications. http://cslipublications.stanford.edu/site/1575863049. html, 18.08.2002.

Kiss, Tibor and Wesche, Birgit. 1991. Verb Order and Head Movement. In Otthein Herzog and Claus-Rainer Rollinger (eds.), *Text Understanding in LILOG*, Lecture Notes in Artificial Intelligence, No. 546, pages 216–242, Berlin Heidelberg New York: Springer-Verlag.

Koenig, Jean-Pierre. 1999. *Lexical Relations*. Stanford Monographs in Linguistics, Stanford: CSLI Publications.

Kratzer, Angelika. 1984. On Deriving Syntactic Differences between German and English.

Krieger, Hans-Ulrich. 1994. Derivation Without Lexical Rules. In C.J. Rupp, Michael A. Rosner and Rod L. Johnson (eds.), *Constraints, Language and Computation*, Computation in Cognitive Science, pages 277–313, London/San Diego/New York: Academic Press.

Krieger, Hans-Ulrich and Nerbonne, John. 1993. Feature-Based Inheritance Networks for Computational Lexicons. In Briscoe, Copestake and de Paiva (eds.), *Inheritance, Defaults, and the Lexicon*, pages 90–136, Cambridge University Press.

Lascarides, Alex and Copestake, Ann. 1999. Default

Representation in Constraint-Based Frameworks. *Computational Linguistics* 25(1), 55–105. http://acl.ldc. upenn.edu/J/J99/J99-1002.pdf, 09.10.2005.

Lebeth, Kai. 1994. Morphosyntaktischer Strukturaufbau – Die Generierung komplexer Verben im HPSG-Lexikon eines Sprachproduktionssystems. Hamburger Arbeitspapiere zur Sprachproduktion – IV Arbeitspapier No. 16, Universität Hamburg, Fachbereich Informatik.

Lenerz, Jürgen. 1994. Pronomenprobleme. In Brigitta Haftka (ed.), *Was determiniert Wortstellungsvariation? Studien zu einem Interaktionsfeld von Grammatik, Pragmatik und Sprachtypologie*, pages 161–174, Opladen: Westdeutscher Verlag.

Manning, Christopher D., Sag, Ivan A. and Iida, Masayo. 1999. The Lexical Integrity of Japanese Causatives. In Robert D. Levine and Georgia M. Green (eds.), *Studies in Contemporary Phrase Structure Grammar*, pages 39–79, Cambridge: Cambridge University Press.

Meinunger, André. 2000. *Syntactic Aspects of Topic and Comment*. Linguistik Aktuell/Linguistics Today, No. 38, Amsterdam, Philadelphia: John Benjamins Publishing Company.

Meurers, Walt Detmar. 1999. German Partial-VP Fronting Revisited. In Gert Webelhuth, Jean-Pierre Koenig and Andreas Kathol (eds.), *Lexical and Constructional Aspects of Linguistic Explanation*, Studies in Constraint-Based Lexicalism, No. 1, pages 129–144, Stanford: CSLI Publications. http://ling.osu.edu/~dm/papers/ hpsg-volume98/pvp-revisited.html, 21.08.98.

Meurers, Walt Detmar. 2000. Lexical Generalizations in the Syntax of German Non-Finite Constructions. Arbeitspapiere des SFB 340 No. 145, Eberhard-Karls-Universität, Tübingen. http://www.ling. ohio-state.edu/~dm/papers/diss.html, 19.08.2002.

Miller, Philip H. and Sag, Ivan A. 1997. French Clitic Movement without Clitics or Movement. *Natural Language and Linguistic Theory* 15(3), 573–639.

Monachesi, Paola. 1998. Italian Restructuring Verbs: A Lexical Analysis. In Hinrichs et al. (1998), pages 313–368.

Müller, Stefan. 1995. Scrambling in German – Extraction into the *Mittelfeld*. In Benjamin K. T'sou and Tom Bong Yeung Lai (eds.), *Proceedings of the tenth Pacific Asia Conference on Language, Information and Computation*, pages 79–83, City University of Hong Kong. http://www.cl.uni-bremen.de/~stefan/Pub/scrambling. html, 04.07.2007.

Müller, Stefan. 1997a. Yet another Paper about Partial Verb Phrase Fronting in German. Research Report RR-97-07, Deutsches Forschungszentrum für Künstliche Intelligenz, Saarbrücken. http://www.cl.uni-bremen.de/~stefan/ Pub/pvp.html, 04.07.2007.

Müller, Stefan. 1997b. Yet another Paper about Partial Verb Phrase Fronting in German. Research Report RR-97-07, Deutsches Forschungszentrum für Künstliche Intelligenz, Saarbrücken. http://www.cl.uni-bremen.de/~stefan/ Pub/pvp.html, 04.07.2007.

Müller, Stefan. 1999. *Deutsche Syntax deklarativ*.

Head-Driven Phrase Structure Grammar für das Deutsche. Linguistische Arbeiten, No. 394, Tübingen: Max Niemeyer Verlag. http://www.cl.uni-bremen.de/~stefan/Pub/hpsg.html, 04.07.2007.

Müller, Stefan. 2002. *Complex Predicates: Verbal Complexes, Resultative Constructions, and Particle Verbs in German*. Studies in Constraint-Based Lexicalism, No. 13, Stanford: CSLI Publications. http://www.cl.uni-bremen.de/~stefan/Pub/complex.html, 04.07.2007.

Müller, Stefan. 2004. Continuous or Discontinuous Constituents? A Comparison between Syntactic Analyses for Constituent Order and Their Processing Systems. *Research on Language and Computation, Special Issue on Linguistic Theory and Grammar Implementation* 2(2), 209–257. http://www.cl.uni-bremen.de/~stefan/Pub/discont.html, 04.07.2007.

Müller, Stefan. 2005a. Zur Analyse der deutschen Satzstruktur. *Linguistische Berichte* 201, 3–39. http://www.cl.uni-bremen.de/~stefan/Pub/satz-lb.html, 04.07.2007.

Müller, Stefan. 2005b. Zur Analyse der scheinbar mehrfachen Vorfeldbesetzung. *Linguistische Berichte* 203, 297–330. http://www.cl.uni-bremen.de/~stefan/Pub/mehr-vf-lb.html, 04.07.2007.

Müller, Stefan. 2006a. Complex Predicates. In Keith Brown (ed.), *The Encyclopedia of Language and Linguistics*, pages 697–704, Oxford: Elsevier Science Publisher B.V. (North-Holland), second edition.

Müller, Stefan. 2006b. Phrasal or Lexical Constructions? *Language* 82(4), 850–883. http://www.cl.uni-bremen.de/~stefan/Pub/phrasal.html, 04.07.2007.

Müller, Stefan. 2007. *Head-Driven Phrase Structure Grammar: Eine Einführung*. Stauffenburg Einführungen, No. 17, Tübingen: Stauffenburg Verlag. http://www.cl.uni-bremen.de/~stefan/Pub/hpsg-lehrbuch.html, 04.07.2007.

Müller, Stefan. To Appear. Elliptical Constructions, Multiple Frontings, and Surface-Based Syntax. In Gerhard Jäger, Paola Monachesi, Gerald Penn and Shuly Wintner (eds.), *Proceedings of Formal Grammar 2004, Nancy*, Stanford: CSLI Publications. http://www.cl.uni-bremen.de/~stefan/Pub/surface.html, 04.07.2007.

Nerbonne, John, Netter, Klaus and Pollard, Carl J. (eds.). 1994. *German in Head-Driven Phrase Structure Grammar*. CSLI Lecture Notes, No. 46, Stanford: CSLI Publications.

Netter, Klaus. 1992. On Non-Head Non-Movement. An HPSG Treatment of Finite Verb Position in German. In Günther Görz (ed.), *Konvens 92. 1. Konferenz „Verarbeitung natürlicher Sprache". Nürnberg 7.–9. Oktober 1992*, Informatik aktuell, pages 218–227, Berlin, Heidelberg, New York: Springer-Verlag. http://www.dfki.de/lt/publications_show.php?id=420, 29.07.2004.

Oppenrieder, Wilhelm. 1991. *Von Subjekten, Sätzen und Subjektsätzen*. Linguistische Arbeiten, No. 241, Tübingen: Max Niemeyer Verlag.

Orgun, Cemil Orhan. 1996. *Sign-Based Morphology and*

Phonology. Ph. D.thesis, University of Califonia, Berkeley.

Penn, Gerald. 1999. Linearization and *WH*-Extraction: Evidence from Serbo-Croatian. In Robert D. Borsley and Adam Przepiórkowski (eds.), *Slavic in Head-Driven Phrase Structure Grammar*, Studies in Constraint-Based Lexicalism, No. 2, pages 149–182, Stanford: CSLI Publications.

Pollard, Carl J. 1996. On Head Non-Movement. In Harry Bunt and Arthur van Horck (eds.), *Discontinuous Constituency*, Natural Language Processing, No. 6, pages 279–305, Berlin, New York: Mouton de Gruyter.

Pollard, Carl J., Kasper, Robert T. and Levine, Robert D. 1992. Linearization Grammar.

Pollard, Carl J., Kasper, Robert T. and Levine, Robert D. 1994. Studies in Constituent Ordering: Toward a Theory of Linearization in Head-Driven Phrase Structure Grammar. ftp://csli-ftp.stanford.edu/linguistics/sag/ linearization-prop.ps.gz, 20.08.2002.

Reape, Mike. 1991. Word Order Variation in Germanic and Parsing. DYANA Report Deliverable R1.1.C, University of Edinburgh.

Reape, Mike. 1992. *A Formal Theory of Word Order: A Case Study in West Germanic*. Ph. D.thesis, University of Edinburgh.

Reape, Mike. 1994. Domain Union and Word Order Variation in German. In Nerbonne et al. (1994), pages 151–198.

Richter, Frank and Sailer, Manfred. 1999. Lexicalizing the left periphery of German finite sentences. In Valia Kordoni

(ed.), *Tübingen Studies in Head-Driven Phrase Structure Grammar*, Arbeitspapiere des SFB 340, No. 132, Volume 1, pages 116–154, Eberhard-Karls-Universität Tübingen. http://www.sfs.nphil.uni-tuebingen.de/~fr/cards/left_ per.html, 19.05.2000.

Riehemann, Susanne Z. 1998. Type-Based Derivational Morphology. *Journal of Comparative Germanic Linguistics* 2, 49–77. http://doors.stanford.edu/~sr/morphology.ps, 18.02.2002.

Scherpenisse, Wim. 1986. *The Connection Between Base Structure and Linearization Restrictions in German and Dutch*, volume 47 of *Europäische Hochschulschriften, Reihe XXI, Linguistik*. Frankfurt/M.: Peter Lang.

Schmidt, Paul, Rieder, Sibylle and Theofilidis, Axel. 1996. Final Documentation of the German LS-GRAM Lingware. Deliverable DC-WP6e (German), IAI, Saarbrücken.

Shieber, Stuart M., Uszkoreit, Hans, Pereira, Fernando, Robinson, Jane and Tyson, Mabry. 1983. The Formalism and Implementation of PATR-II. In *Research on Interactive Acquisition and Use of Knowledge*, pages 39–77, Menlo Park, CA: Artificial Intelligence Center, SRI International.

Sternefeld, Wolfgang. 1985. On Case and Binding Theory. In Jindřich Toman (ed.), *Studies in German Grammar*, Studies in Generative Grammar, No. 21, pages 231–285, Dordrecht: Holland, Cinnaminson: U.S.A.: Foris Publications.

Thiersch, Craig L. 1986. A Note on "Scrambling" in the

German Mittelfeld, VP and X-Bar Theory.

Tomasello, Michael. 2003. *Constructing a Language: A Usage-Based Theory of Language Acquisition*. Cambridge, MA: Harvard University Press.

Uszkoreit, Hans. 1987. *Word Order and Constituent Structure in German*. CSLI Lecture Notes, No. 8, Stanford: CSLI Publications.

van de Velde, Marc. 1978. Zur mehrfachen Vorfeldbesetzung im Deutschen. In Maria-Elisabeth Conte, Anna G. Ramat and Paolo Ramat (eds.), *Wortstellung und Bedeutung*, pages 131–141, Tübingen: Max Niemeyer Verlag.

van Eynde, Frank. 1994. *Auxiliaries and Verbal Affixes—A Monostratal Cross-linguistic Analysis*. Katholieke Universiteit Leuven, Faculteit Letteren, Departement Linguïstiek.

Webelhuth, Gert. 1985. German is Configurational. *The Linguistic Review* 4(3), 203–246.

Webelhuth, Gert. 1990. Diagnostics for Structure. In Günther Grewendorf and Wolfgang Sternefeld (eds.), *Scrambling and Barriers*, Linguistik Aktuell / Linguistics Today, No. 5, pages 41–75, Amsterdam, Philadelphia: John Benjamins Publishing Company.

Webelhuth, Gert and den Besten, Hans. 1987. Remnant Topicalization and the Constituent Structure of VP in the Germanic SOV Languages.

Wilder, Chris. 1991. Small Clauses and Related Objects. *Groninger Arbeiten zur Germanistischen Linguistik* 34, 215–236.

Williams, Edwin. 1981. Argument Structure and Morphology. *The Linguistic Review* 1(1), 81–114.