

## Locality of Grammatical Relations

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## Course overview

- Introduction (first part of Tuesday):
  - The traditional HPSG architecture
  - Locality of grammatical relations
- Empirical arguments for extending domains of traditionally local grammatical relations for
  - syntactic properties (case, subject-verb agreement, . . . )
  - semantic properties (semantic index)
- General discussion (second part of Saturday)

## Empirical arguments in the literature

syntactic properties

- Bender and Flickinger (1999a,b):
  - Tag questions in English
  - Richard phenomenon
- Höhle (1994, 1995, 1997):
  - complementizer agreement in Eastern Dutch dialects
  - agreement in gapless relative clauses in German
  - case assignment in English *for-to* infinitives
- Meurers (1999, 2000):
  - Apparently non-local case assignment and agreement in German
- Przepiórkowski (1999):
  - Raising across prepositions in Polish
  - Case agreement with numeral phrases in Polish

## Empirical arguments in the literature

semantic properties

- Baxter (1999) and Johnston (1999): English Purpose Infinitives
- Levine (2000): English *tough* constructions
- Kolliaou and Alexopoulou (1999): Information Structure Instantiation Constraint for link values of Clitic Left Dislocation phenomenon in Greek

## Related arguments in the literature

relations between co-dependents within head domain

Semantic:

- Kiss (2001): determining quantifier scope in German using ARG-ST

Syntactic:

- Przepiórkowski (1999): case assignment on ARG-ST

Morphosyntactic:

- Kathol (1999): agreement phenomena based on new AGR architecture. (Kathol's new AGR setup forms the basis of Bender and Flickinger 1999a,b and is used as supportive evidence in Meurers 1999).

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## HPSG grammars from a linguistic perspective

From a linguistic perspective, an HPSG grammar consists of

- a lexicon licensing **basic words**
- lexical rules licensing **derived words**
- immediate dominance (ID) schemata licensing **constituent structure**
- linear precedence (LP) statements constraining **word order**
- a set of implicational grammatical principles expressing **generalizations about linguistic objects**

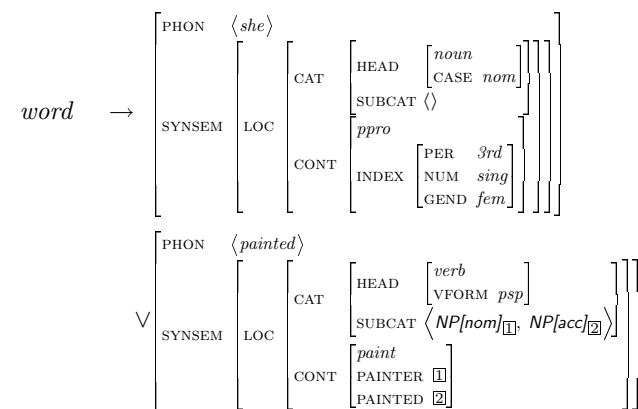
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## The HPSG paradigm and the issue of locality

- The main building blocks of HPSG grammars (Pollard and Sag, 1994)
  - from a linguistic perspective
  - from a formal perspective
- Locality of grammatical relations in HPSG

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## Basic lexicon



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## Lexical Rules

A passive lexical rule (based on Pollard and Sag, 1987, p.215):

$$\left[ \begin{array}{l} \text{SYNSEM|LOC|CAT} \\ \text{HEAD} \left[ \begin{array}{l} \textit{verb} \\ \text{VFORM } \textit{psp} \end{array} \right] \\ \text{SUBCAT} \langle \text{NP}_{\boxed{1}}, \text{NP}_{\boxed{2}} \rangle \oplus \boxed{3} \end{array} \right] \mapsto \left[ \begin{array}{l} \text{SYNSEM|LOC|CAT} \\ \text{HEAD} \left[ \begin{array}{l} \textit{verb} \\ \text{VFORM } \textit{pas} \end{array} \right] \\ \text{SUBCAT} \langle \text{NP}_{\boxed{2}} \rangle \oplus \boxed{3} \oplus \langle \langle \text{PP}[\textit{by}_{\boxed{1}}] \rangle \rangle \end{array} \right]$$

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## General grammatical principles

Example 1: The Head-Feature Principle (Pollard and Sag, 1994, p.399)

$$\left[ \begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{headed-struct} \end{array} \right] \rightarrow \left[ \begin{array}{l} \text{SYNSEM|LOC|CAT|HEAD} \\ \text{DTRS|HEAD-DTR|SYNSEM|LOC|CAT|HEAD} \end{array} \right] \boxed{1}$$

Example 2: The Clausal Rel Prohibition (Pollard and Sag, 1994, p.401)

$$\left[ \begin{array}{l} \textit{synsem} \\ \text{LOC|CAT} \left[ \begin{array}{l} \text{HEAD } \textit{verb} \\ \text{SUBCAT} \langle \rangle \end{array} \right] \end{array} \right] \rightarrow \left[ \text{NONLOC|INHER|REL } \{ \} \right]$$

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## ID Schemata and LP Statements

### ID Schemata

Example: The Head-Complement Schema (Pollard and Sag, 1994, p.402)

$$\left[ \begin{array}{l} \textit{phrase} \\ \text{DTRS } \textit{headed-structure} \end{array} \right] \rightarrow \left[ \begin{array}{l} \text{SYNSEM|LOC|CAT|SUBCAT } \langle \textit{synsem} \rangle \\ \text{DTRS} \left[ \begin{array}{l} \textit{head-comp-struct} \\ \text{HEAD-DTR } \textit{word} \end{array} \right] \end{array} \right] \\ \vee \dots$$

### LP Statements

Example: A restriction on the linearization of indefinite NPs in the German Mittelfeld (based on Lenerz, 1977; cf. also topol. fields in Kathol, 2000)

$$\text{NP}[\textit{dat}] < \text{NP}[\textit{acc}, \textit{indef}]$$

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## HPSG grammars from a formal perspective

From a formal perspective (SRL, King 1989, 1994), a grammar consists of:

- The signature as declaration of the linguistic ontology
  - type hierarchy (which kind of objects exist)
  - appropriateness conditions (which objects have which properties)
- The theory constraining the domain
  - A theory is a set of description language statements, the constraints.
  - A linguistic object is grammatical (admissible with respect to a theory) iff it satisfies each of the descriptions in the theory and so does each of its substructures.

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## More on theories in the formal sense

A theory is a set of description language statements, the constraints, which single out the grammatical objects from the ungrammatical ones.

- The description language statements consist of:
  - type assignment, path equality
  - conjunction, disjunction, negation
- Most of the theory – Lexicon, ID Schemata, and Principles – is already expressed using such statements.
- Other components can be formalized on this logical basis: LP statements (Richter and Sailer, 1995), Lexical Rules (Meurers, 1995, to appear)
- An extension of SRL including relations and explicit quantification is provided in RSRL (Richter 1997, 1999, Richter et al. 1999).

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- local to a lexically extended head domain:
  - argument attraction: coherence (Germanic), restructuring (Romance)
  - control phenomena: raising and equi
- not generally local to a domain:
  - topicalization
    - \* filler↔gap (SLASH)
  - *wh*-questions
    - \* filler↔gap (SLASH)
    - \* *wh*-word↔*wh*-phrase (QUE)
  - relative clauses
    - \* filler↔gap (SLASH)
    - \* relative pronoun↔relative phrase (REL)
  - binding (principle C)
    - \* binder↔referring expression (recursive o-command definition)
  - interpretation of quantifiers
    - \* occurrence↔interpretation (QSTORE, RETRIEVED)
- extraposition? (cf. Kathol and Pollard, 1995; Keller, 1994, 1995; Kiss, 1998)

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## Locality of grammatical relations in HPSG

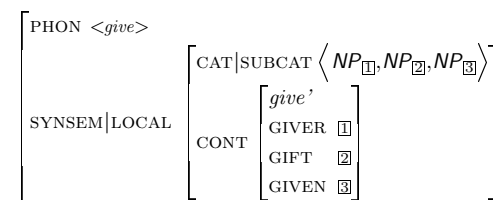
- local to lexical head of head domain:
  - binding (principles A and B): local o-command expressed in terms of properties only present in lexical head of head domain
- local to part of head domain, between lexical head and realized dependent:
  - syntactic properties of dependent:
    - \* government<sup>1</sup> phenomena: case assignment, . . .
    - \* agreement<sup>2</sup> phenomena: subject-verb agreement, . . .
- local to entire head domain:
  - semantic properties (relations, roles and indices):
    - \* argument realization
    - \* modifier realization
  - syntactic head properties of lexical head: selection

<sup>1</sup>government: A head selects properties of its complement which are not properties of the head itself. 14

<sup>2</sup>agreement: Two elements in a head domain exhibit the same morphological properties.

## Valence in HPSG

The subcategorization requirements of a verb are represented on the SUBCAT list and realized along the head projection. Sketch of a lexical entry:

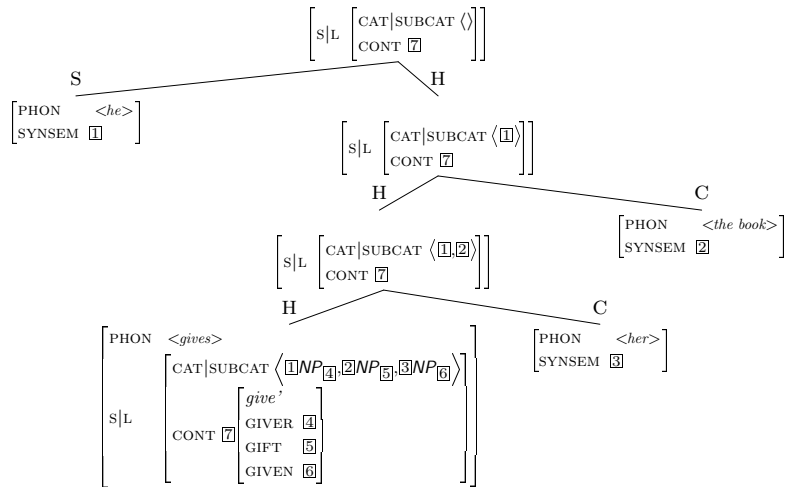


Each subcategorization requirement (e.g., *NP* above) is only a partial representation of the realized argument; it does not include information on:

- phonological or morphological realization
- lexical or phrasal nature of the argument
- internal constituent structure of the argument
- makes head domains the essential domains for local grammatical relations (government, agreement)

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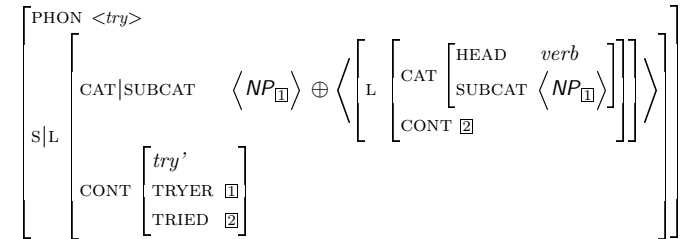
### Valence percolation in the tree



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### Lexically extended head domains for semantic index only: Equi

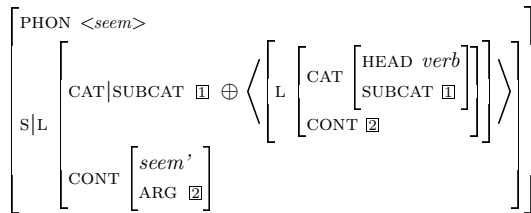
- Semantic co-indexing of the subject valence requirement of the subject control equi verb with the subject of the verbal complement.
- The subject is assigned a semantic role by the subject control equi verb.



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### Lexically extended head domains: Raising

- The subject valence requirement of the subject raising verb is identified with the subject of the verbal complement.
- The subject is not assigned a semantic role by the raising verb.



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### Guiding questions

#### What?

- Which properties need to be accessible/visible?
  - syntactic: case, agreement, . . . ; semantic: index, . . .
- For which elements is a particular property visible?
  - only of subjects, of all arguments, of all dependents

#### Which domain?

- How far is a particular property visible?
  - only in lexical head
  - between lexical head and realized element
  - entire head domain
  - sequence of multiple head domains
  - no generally restricted domain

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## Guiding questions (cont.)

### When?

- When does the property become visible in which of the domains?
  - presence of a trigger: lexical or constructional
  - always

### Theoretical interpretation

- Which representations and percolation principles should be used to make these properties visible?
- How are the representations integrated into the grammatical relations once they are visible?

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