Long Distance Dependencies

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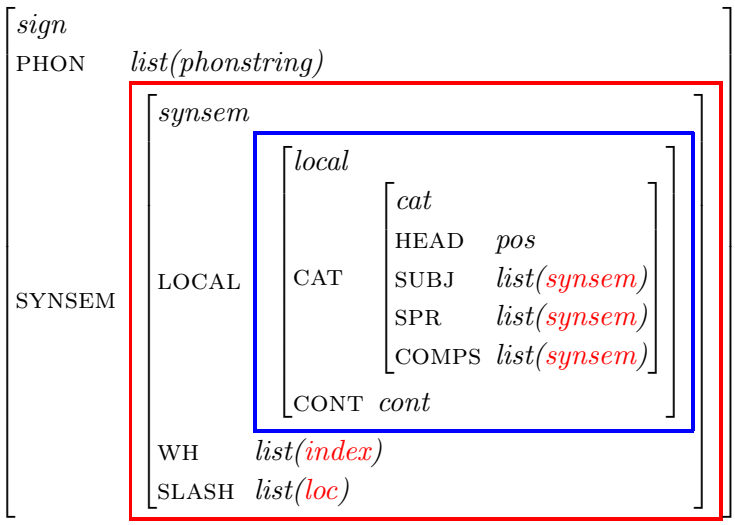
The New Structure of the Sign

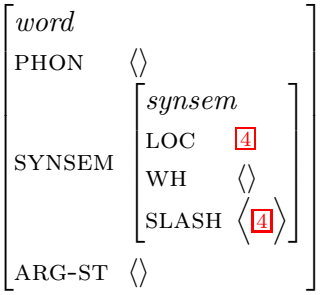


Motivation for this architecture:

1. The syntactic theory of Head-Driven Phrase Structure Grammar (HPSG) is a theory of signs (= words and phrases):
   (a) All syntactic schemas describe *phrases*.
   (b) All the daughters of a *phrase* must be *signs (= words and phrases)*.
2. Selection of arguments (subjects, specifiers, and complements) is not for a whole sign, but for its *synsem*, i.e. the portion in the red square above.
3. Fillers and gaps have token-identical *local* values, i.e. the portion in the blue square above. These values are connected via the value of the non-local attribute SLASH.

The Gap

A gap is phonologically empty and makes its local information also available non-locally. It does so by "putting" its *local* value into SLASH:



In contrast, phonologically overt words have the empty set as the value of the nonlocal feature SLASH. This means that they do not make information about their *local* available further up in the tree:

$$\begin{bmatrix} \textit{word} \\ \text{PHON} \ \langle \textit{phonstring} \rangle \end{bmatrix} \rightarrow \begin{bmatrix} \text{SYNSEM|SLASH} \ \langle\rangle \end{bmatrix}$$

We will also assume the following constraint, which says that a sign contains at most one gap (i.e. an empty SLASH list or a SLASH list with one element in it, which has to be of type *local*):

$$\textit{sign} \rightarrow \left[\text{SYNSEM|SLASH} \ \langle\rangle \vee \left\langle \textit{local} \right\rangle\right]$$

Here is the mechanism through which the information in the gap's SLASH value is made available further up in the tree:

The Slash Inheritance Principle

In every phrase (except for Head-Filler Phrases), the SLASH value of the mother is the union of the SLASH values of the daughters.

Formally:

$$\textit{phrase} \ (\neq \textit{hd-fill-ph}) \rightarrow \begin{bmatrix} \text{SYNSEM|SLASH} & \boxed{L1} \cup \ldots \cup \boxed{L2} \\ \text{DTRS} & \left\langle \begin{bmatrix} \text{SYNSEM|SLASH} & \boxed{L1} \end{bmatrix} \ \ldots \ \begin{bmatrix} \text{SYNSEM|SLASH} & \boxed{L2} \end{bmatrix} \right\rangle \end{bmatrix}$$

A third and final mechanism (besides the gap and the Gap Inheritance Principle) completes the theory of long distance dependencies: a new schema that combines a filler daughter with a head daughter that contains a gap to form a **Head-Filler Phrase**:

HEAD-FILLER PHRASE

$$\begin{bmatrix} \textit{hd-fill-ph} \\ \text{SYNSEM} \begin{bmatrix} \textit{synsem} \\ \text{LOC} \begin{bmatrix} \textit{loc} \\ \text{CAT} \begin{bmatrix} \textit{cat} \\ \text{HEAD} \ \boxed{1} \\ \text{SUBJ} \ \langle\rangle \\ \text{SPR} \ \langle\rangle \\ \text{COMPS} \ \langle\rangle \end{bmatrix} \end{bmatrix} \\ \text{SLASH} \ \langle\rangle \end{bmatrix} \end{bmatrix}$$

FILL

$$\begin{bmatrix} \textit{sign} \\ \text{SYNSEM|LOC} \ \boxed{2} \end{bmatrix}$$

HD

$$\begin{bmatrix} \textit{sign} \\ \text{SYNSEM} \begin{bmatrix} \textit{synsem} \\ \text{LOC} \begin{bmatrix} \textit{loc} \\ \text{CAT} \begin{bmatrix} \textit{cat} \\ \text{HEAD} \ \boxed{1} \begin{bmatrix} \textit{v} \\ \text{VFORM} \ \textit{fin} \end{bmatrix} \\ \text{SUBJ} \ \langle\rangle \\ \text{SPR} \ \langle\rangle \\ \text{COMPS} \ \langle\rangle \end{bmatrix} \end{bmatrix} \\ \text{SLASH} \ \left\langle \boxed{2} \right\rangle \end{bmatrix} \end{bmatrix}$$

Sentences licensed by this schema:

1. Lilly Fido visited.
2. Lilly Fido has visited.
3. Lilly Fido will have been visiting.
4. Her Fido has been speaking to.
5. The letter Fido will give to the cat.
6. Very hungry she is.
7. To Fido I have spoken.
8. Spoken to Fido I have.
9. Fido Lilly thinks that Bo seems to have spoken to.

Exercise 1 Type all the examples above into the online grammar and in each case study the 3 things involved in the long-distance dependendy:

1. The gap
2. The Slash Inheritance Principle
3. The Head-Filler Schema.

Exercise 2 The grammar also licenses the following strings, which is unfortunate, since they are all ungrammatical:

1. *$[_{\text{D}}\text{The}]_i$ Lilly has visited $[_{\text{NP}}\ \_\!\!\__i$ cat].
2. *$[_{\text{ADV}}\text{Very}]_i$ Lilly is $[_{\text{AP}}\ \_\!\!\__i$ hungry].
3. *$[_{\text{NP}}\text{The cat}]_i$ Lilly thinks that $[_{\text{S}}\ \_\!\!\__i$ danced].
4. *$[_{\text{VP}}$ Visits Lilly$]_i$ the cat $[_{\text{VP}}\ \_\!\!\__i]$.

Type the examples above into the online grammar to convince yourself that the grammar accepts them.

Question: What constraints can we add to the grammar to rule out the bad examples while still permitting all the good ones?