Grammar Engineering for Deep Linguistic Processing
SS2010
Lecture 7: Unbounded Dependencies

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Outline

1. Unbounded (or Non-Local) Dependencies
   - Overview
   - Mechanisms
Overview

- Some sentences exhibit phrases that appear “out of place” based on simple head-argument or head-modifier constraints.
- The distance from the position of the “dislocated” phrase to its “natural home” can be quite far (in the limit, unbounded).
- Our grammars need a mechanism for expressing these non-local dependencies.
Examples

(1) *That cat, the dog chased _. 
(2) *That cat, the aardvark believes the dog chased _. 
(3) *That cat, I know the aardvark believes the dog chased _. 
(4) *On that aardvark, you can rely _. 
(5) *That aardvark, you can rely on _. 
(6) *On that aardvark, you can rely on _. 
Mechanisms in the Matrix

- Introduction of the ‘gap’ in SLASH feature
- Percolation of SLASH
- Filling the gap’s requirements
Mechanisms in the Matrix

SLASH introduction
- basic-extracted-subj-phrase
- basic-extracted-comp-phrase
- basic-extracted-adj-phrase

SLASH percolation
- head-valence-phrase

SLASH termination (gap-filling)
- basic-head-filler-phrase
# Mechanisms in the Matrix

<table>
<thead>
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SLASH termination (gap-filling)
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Comparison of Tree Topologies

S

NP

Det N

Det N

Det N

the dog

VP

V

chased

V

NP

Det N

Det N

Det N

that cat

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Comparison of Tree Topologies

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**basic-extracted-comp-phrase**

\[
\text{basic-extracted-comp-phrase} := \text{basic-extracted-arg-phrase} \& \text{head-compositional} \&
\]

\[
[ \text{SYNSEM} \text{canonical-synsem} \&
[ \text{LOCAL.CAT} [ \text{VAL} [ \text{SUBJ} \#\text{subj},
\text{SPR} \#\text{spr},
\text{COMPS} \#\text{comps}],
\text{MC} \#\text{mc} ] ],
\text{HEAD-DTR} [ \text{SYNSEM}
[ \text{LOCAL.CAT} [ \text{VAL} [ \text{SUBJ} \#\text{subj},
\text{SPR} \#\text{spr},
\text{COMPS} \text{gap} \&
[ \text{NON-LOCAL.SLASH} \#\text{slash} ]
. \#\text{comps} > ]],
\text{MC} \#\text{mc}],
\text{NON-LOCAL.SLASH} \#\text{slash} ],
\text{C-CONT} [ \text{RELS} <! !>,
\text{HCONS} <! !> ] ].
\]
head-valence-phrase := head-nexus-phrase &
[ SYNSEM.NON-LOCAL.SLASH #slash,
  HEAD-DTR.SYNSEM.NON-LOCAL.SLASH #slash ].
basic-head-filler-phrase

basic-filler-phrase := binary-phrase & phrasal &
[ SYNSEM [ LOCAL [ CAT [ VAL [ COMPS < >,
SPR < > ],
POSTHEAD + ] ],
NON-LOCAL.SLASH 0-dlist ],
ARGS < [ SYNSEM [ LOCAL #slash & local &
[ CAT.VAL [ SUBJ olist,
COMPS olist,
SPR olist ],
CTXT.ACTIVATED + ],
NON-LOCAL.SLASH 0-dlist ] ],
[ SYNSEM [ LOCAL.CAT [ VAL.COMPS olist ],
NON-LOCAL [ SLASH 1-dlist &
[ LIST [ FIRST #slash,
REST < > & #last ],
LAST #last ],
QUE 0-dlist,

basic-head-filler-phrase := basic-filler-phrase & headed-phrase.
References I