Topics in Computational Linguistics
— Grammar Engineering —

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http://lingo.stanford.edu/courses/05/ge/
Non-Local (aka Unbounded) Dependencies

(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 _.

- Account for relation between gap and filler by unification of sign;
- use GAP feature to percolate sign through derivation tree;
- gap introduction: put sign of dislocated element into GAP list;
- gap percolation: most phrases accumulate GAP values of daughters;
- gap termination: realize and discharge non-empty GAP value.
Topicalization—Comparison of Tree Topologies

```
S
 /    /
NP  S/NP
 /     /
Det N  NP  VP/NP
 |     /  
Det N  Det N  V
 |     |    |
that cat
 Det N
 the dog

S
 /    /
NP  VP
 /     /
Det N  V  NP
 |     |    |
d Det  N
 chased
 Det  N
 the dog
 Det N
 that cat
```
Gap Introduction (Simplified Version)

Engineering Issues to Consider

- Where should gap introduction take place?
- lexical rules: one per complement position;
- syntactic rule: interleaved with regular applications of head–complement schema;
- moderate extraction out of modifiers:
  (7) ?That cat, the dog barked near.
- how to deal with adjunct extraction:
  (8) Near the cat, the dog barked.
- various constraints on subject extraction:
  (9) Who do you think barked?
Gap Termination—The Filler–Head Construction

Engineering Issues to Consider

- Terminate gap percolation path at top;
- unification ensures constraint satisfaction from gap introduction to gap termination;
- order appropriately with specifier saturation:
  (10) *The dog, that cat, chased.*
- prevent ‘leakage’ of gaps:
  (11) *To, the dog gave the cat.*
- make sure gaps are saturated eventually:
  (12) *the dog gave the cat.*