Chapter 14 (especially 14.4-14.5)

Long Distance Dependencies, continued
Where We Are

• filler-gap structures:

  *The solution to this problem, nobody understood*____
  *That problem is easy to understand*____

• The feature GAP encodes information about missing constituents

• Modified ARP allows arguments that should be on the COMPS list to show up in the GAP list

• GAP values are passed up the tree by the GAP Principle
Where We Are (continued)

• The feature STOP-GAP signals where GAP passing should stop

• The Head-Filler Rule matches a filler to a GAP and (via STOP-GAP) empties GAP

• Lexical entries for *easy*-adjectives require a gap in the complement, coindex the subject with the gap, and (via STOP-GAP) empty GAP on the mother
The Revised ARP

\[
\begin{bmatrix}
\text{SYN} & \text{VAL} & \text{SPR} \\
\text{GAP} & \text{COMPS} & A \\
\text{ARG-ST} & A & B & C
\end{bmatrix}
\]

- \(\ominus\) is a kind of list subtraction, but:
  - it’s not always defined, and
  - when defined, it’s not always unique

- The ARP now says the non-SPR arguments are distributed between COMPS and GAP.
The GAP Principle

A local subtree $\Phi$ satisfies the GAP Principle with respect to a headed rule $\rho$ if and only if $\Phi$ satisfies:

\[
\text{GAP} \ (A_1 \oplus \ldots \oplus A_n) \ominus A_0
\]

\[
\text{GAP} \ A_1 \ldots H \text{STOP-GAP} A_0 \ldots \text{GAP} A_n
\]
The Head-Filler Rule

\[
[\text{phrase}] \rightarrow \boxed{1} \begin{bmatrix} \text{GAP} & \langle \rangle \end{bmatrix} \quad \begin{bmatrix}
\text{HEAD} & \begin{bmatrix} \text{verb} \\
\text{FORM} & \text{fin} \end{bmatrix} \\
\text{VAL} & \begin{bmatrix} \text{SPR} \\
\text{COMPS} & \langle \rangle \end{bmatrix} \\
\text{STOP-GAP} & \langle 1 \rangle \\
\text{GAP} & \langle 1 \rangle 
\end{bmatrix}
\]
The Lexical Entry for *easy*

\[
\langle \text{easy} , \rangle \quad \left[ \begin{array}{c}
\text{adj-lxm} \\
\text{SYN} \\
\text{ARG-ST}
\end{array} \right.
\]

\[
\left. \begin{array}{c}
\text{STOP-GAP} \quad \langle \Box \rangle \\
\text{VP} \\
\text{NP}_i \\
\text{INF} + \\
\text{GAP} \quad \langle \Box \text{NP}_i , \ldots \rangle
\end{array} \right] \quad \langle \rangle
\]
On to New Material....

- Sentences with subject gaps
- Gaps in coordinate constructions
Subject Gaps

• The ARP revision only allowed missing complements.

• But gaps occur in subject position, too:

  This problem, everyone thought ___ was too easy.

• We handle these via a lexical rule that, in effect, moves the contents of the SPR list into the GAP list
The Subject Extraction Lexical Rule

\[
\begin{align*}
\text{INPUT} & : \langle X , \begin{array}{c}
\text{SYN} \\
\text{ARG-ST} \ [A]
\end{array} \begin{array}{c}
\text{VAL} \\
\text{HEAD}
\end{array} \begin{array}{c}
\text{FORM} \ [\text{fin}]
\end{array} \begin{array}{c}
\text{verb}
\end{array} \begin{array}{c}
\langle Z \rangle
\end{array} \rangle \\
\text{OUTPUT} & : \langle Y , \begin{array}{c}
\text{SYN} \\
\text{ARG-ST} \ [A] \langle[1 , \ldots ]\rangle
\end{array} \begin{array}{c}
\text{VAL} \\
\text{GAP} \ [\langle 1 \rangle]
\end{array} \langle[1 \langle 1 \rangle]\rangle \rangle
\end{align*}
\]

- Note: This nothing about the phonology, because the default for \textit{pi-rules} is to leave the phonology unchanged.
A Lexical Sequence This Licenses

- Note that the ARP is satisfied
A Tree with a Subject Gap

```
S
  [GAP ⟨ ⟩]
  
NP
  [GAP ⟨ ⟩]
  
  Kim
  
VP
  [GAP ⟨ NP ⟩]
  
  V
  [GAP ⟨ ⟩]
  
  know
  
  V
  [GAP ⟨ NP ⟩]
  
  NP
  [GAP ⟨ ⟩]
  
  likes

likes Dana
```
Island Constraints

• There are configurations that block filler-gap dependencies, sometimes called “islands”
• Trying to explain them has been a central topic of syntactic research since the mid 1960s
• We’ll look at just one, Ross’s so-called “Coordinate Structure Constraint”
• Loose statement of the constraint: a constituent outside a coordinate structure cannot be the filler for a gap inside the coordinate structure.
Coordinate Structure Constraint Examples

*This problem, nobody finished the extra credit and____
*This problem, nobody finished____ and the extra credit.
*This problem, nobody finished ___ and started the extra credit.
*This problem, nobody started the extra credit and finished____

• But notice:

This problem, everybody started____ and nobody finished ____
The Coordinate Structure Constraint

• In a coordinate structure,
  • no conjunct can be a gap (conjunct constraint), and
  • no gap can be contained in a conjunct if its filler is outside of that conjunct (element constraint)

• …..unless each conjunct has a gap that is paired with the same filler (across-the-board exception)
These observations cry out for explanation

- In our analysis, the conjunct constraint is an immediate consequence: individual conjuncts are not on the ARG-ST list of any word, so they can’t be put on the GAP list.

- The element constraint and ATB exception suggest that GAP is one of those features (along with VAL and FORM) that must agree across conjuncts.

- Note: There is no ATB exception to the conjunct constraint.

   *This problem, you can compare only____ and____.*
Our Coordination Rule, so far

- Recall that we have tinkered with what must agree across conjuncts at various times.
- Now we’ll add GAP to the things that conjuncts must share.
Our Final Coordination Rule

\[
\begin{bmatrix}
\text{FORM} & 1 \\
\text{VAL} & 0 \\
\text{GAP} & A \\
\text{IND} & s_0
\end{bmatrix} \rightarrow
\begin{bmatrix}
\text{FORM} & 1 \\
\text{VAL} & 0 \\
\text{GAP} & A \\
\text{IND} & s_0
\end{bmatrix} \ldots
\begin{bmatrix}
\text{FORM} & 1 \\
\text{VAL} & 0 \\
\text{GAP} & A \\
\text{IND} & s_{n-1}
\end{bmatrix}
\begin{bmatrix}
\text{HEAD} & \text{conj} \\
\text{IND} & s_0 \\
\text{RESTR} & \langle \text{ARGS} \langle s_1 \ldots s_n \rangle \rangle
\end{bmatrix}
\begin{bmatrix}
\text{FORM} & 1 \\
\text{VAL} & 0 \\
\text{GAP} & A \\
\text{IND} & s_n
\end{bmatrix}
\]

- We’ve just added GAP to all the conjuncts and the mother.
- This makes the conjuncts all have the same gap (if any)
- Why do we need it on the mother?
Closing Remarks on LDDs

• This is a huge topic; we’ve only scratched the surface
  • There are many more kinds of LDDs, which would require additional grammar rules
  • There are also more island constraints, which also need to be explained
• Our account of the coordinate structure constraint (based on ideas of Gazdar) is a step in the right direction, but it would be nice to explain why certain features must agree across conjuncts.