Eliminating Sideways Movement

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The Main Idea

• What are the structures and operations underlying natural language syntax?

• A case study: Nunes’ (1995) sidewards movement analysis of parasitic gaps

• The punchline: the complex machinery posited by Nunes to account for parasitic gaps is unnecessarily so.
Parasitic Gaps

**WHICH BOOK DID JOHN READ t AFTER BILL STOLE pg**

- Involve one element (which book) saturating two theta-positions (read t, stole pg):
  - similar: control, ATB movement

- This element c-commands both theta-positions, which are independent of each other:
  - similar: ATB movement
The ATB Analysis of PGs

- Enticed by these similarities, some (Williams, 1990; ...) tried to extend their analysis of ATB extraction to PGs.

- As their analyses of ATB movement only worked on conjunctions,
  - they assumed that PGs were conjunctions at some deep level.

- Postal (1993) points out a laundry list of problems with this view.

- Still, it has a certain `naturalness’. Nunes (1995; ...) attempts to rehabilitate this idea using the mechanism of sidewards movement...
Sidewards Movement

- If the basic syntactic object is taken to be a numeration (a multi-set of trees),

- then there is no *a priori* reason why *move* should not be able to apply between trees (Citko, 2005; van Riemsdijk, 2006; ...)

![Diagram of Sidewards Movement](attachment:image.png)
Sideward Mvt & PGs

[WHICH BOOK]$_1$ DID JOHN [[READ [WHICH BOOK]$_1$] [AFTER BILL STOLE [WHICH BOOK]$_1$]]

- First:
  - Derive AFTER BILL STOLE WHICH BOOK

- Second:
  - Copy WHICH BOOK and then merge as the object of READ

- Third:
  - Continue building the structure as normal
Sideward Mvt & PGs

[WHICH BOOK] did John [[read [WHICH BOOK].]] [after Bill stole [WHICH BOOK].]]

• Fourth:
  
  • Copy WHICH BOOK and then remerge in Spec-CP

• Finally:
  
  • Delete all but the highest copy of WHICH BOOK
Assumptions

• ‘Move’ is ‘Copy’ + ‘Merge’

• ‘Copy’ marks elements as being copies (being a copy of something is different from being identical to that thing)

• You can merge a copy into a completely different substructure
Assumptions

- At most one copy of each item can appear in the surface string.

- To ‘fix’ surface strings in which more than one copy appears, you can phonologically delete copies.

- You can only delete a copy when it is part of a (movement) chain with another un-deleted copy.
Construction-Specific Assumptions

- You can merge a copy into a completely different substructure.
- You can only delete a copy when it is part of a (movement) chain with another un-deleted copy.
Construction-Specific Assumptions

• You can merge a copy into a completely different substructure

• Needed to permit `sideways movement’ at all

• This makes syntactic objects forests/multiply rooted trees a.k.a. `numerations’
Construction-Specific Assumptions

• You can only delete a copy when it is part of a (movement) chain with another un-deleted copy

• Here, a `movement chain’ is one in which each position c-commands the next,

• and all links are `copies’ of each other

• This is intended to block sentences like:

   \text{John [[[Read [This Book].]] [After Bill stole [This Book].]]}
How does it all work?

[WHICH BOOK]1 DID JOHN [[READ [WHICH BOOK]1 [AFTER BILL STOLE [WHICH BOOK]1]]

VS

* JOHN [[READ [THIS BOOK]1 [AFTER BILL STOLE [THIS BOOK]1]]

• the facts that only one copy is allowed to appear on the surface,

• and that you can only delete a copy if it is c-commanded by another,

• conspire to permit sideways movement only if the mover ultimately ends up in a position c-commanding all previous positions
Ruling Out Chains

- Disconnected `sideways movement chains’ are filtered out at Spell-out

- neither top link can be deleted, as neither c-commands the other
ATB Movement

- The conditions on sideways movement conspire to permit only tree-shaped chains

- This is exactly the shape of chains formed by ATB movement:
  - multiple sources
  - single target
PGs via ATB

- Derive: **AFTER BILL STOLE WHICH BOOK**
PGs via ATB

- Derive: \textit{AFTER BILL STOLE WHICH BOOK}
- Derive: \textit{READ WHICH BOOK}
PGs via ATB

• Derive: **AFTER BILL STOLE WHICH BOOK**

• Derive: **READ WHICH BOOK**

• Merge together
PGs via ATB

- Derive: **AFTER BILL STOLE WHICH BOOK**

- Derive: **READ WHICH BOOK**

- Merge together

- Continue deriving structure
PGs via ATB

- Derive: \textbf{AFTER BILL STOLE WHICH BOOK}

- Derive: \textbf{READ WHICH BOOK}

- Merge together

- Continue deriving structure

- ATB move both instances of \textbf{WHICH BOOK}
Advantages of ATB

• We have a direct description of the kinds of dependencies we want, ...

• Not an indirect description in terms of an over-permissive syntax reigned in by complex spell-out filters (could be referred to as a `look-ahead’ problem)
Problems with ATB

- Can only ATB move *identical* constituents:
  *How many banks are in Berlin and does the Spree have?*

- Checking whether arbitrarily large structures are identical is a complex operation!

- How is the identity check performed?
ATB as Slash-Feature Percolation

- Gazdar (1981) notes that the slash-feature percolation mechanism of GPSG allows for a straightforward implementation of forking chains; i.e. of ATB-style extraction.

- Importantly, the `identity check' only involves comparing identity of categories; an atomic operation

\[
\begin{align*}
VP & \rightarrow V \ NP \\
VP^{NP} & \rightarrow V \\
S' & \rightarrow NP \ S^{NP} \\
X^{\alpha} & \rightarrow Y \ Z^{\alpha} \\
X^{\alpha} & \rightarrow Y^{\alpha} \ Z \\
X^{\alpha} & \rightarrow Y^{\alpha} \ Z^{\alpha}
\end{align*}
\]
Recent work in minimalism has made use of the GPSG slash-feature percolation mechanism in one form or another (Manzini & Roussou, 2000; Neeleman & van de Koot, 2002; Sternefeld, 2006; Kobele, 2007/08/09a/09b)

It provides a natural perspective on reconstruction asymmetries (Kobele, 2009b):

- Lasnik, 1999; Fox, 2000: An expression can reconstruct into positions in which a copy is present, but not in which a trace is present

- The derivational perspective: a `trace’ is a point in a chain at which the expression has not yet been inserted into the structure
PGs via Traces

• Derive: \textit{AFTER BILL STOLE \textit{T}}
PGs via Traces

- Derive: \textbf{AFTER BILL STOLE T}

- Derive: \textbf{READ T}

\[ \begin{array}{c}
\text{VP}^{NP} \\
\text{read} \\
\end{array} \quad \begin{array}{c}
\text{t}^{NP} \\
\end{array} \]
PGs via Traces

• Derive: **AFTER BILL STOLE T**

• Derive: **READ T**

• Merge together
PGs via Traces

- Derive: **AFTER BILL STOLE T**
- Derive: **READ T**
- Merge together
- Continue deriving structure
PGs via Traces

- Derive: **AFTER BILL STOLE T**

- Derive: **READ T**

- Merge together

- Continue deriving structure

- Insert **WHICH BOOK**, which satisfies the percolated trace dependency
Taking Stock

• The problems with the sideward movement analysis of parasitic gaps are
  • we are forced to give up on the idea that the basic units of syntax are trees
  • and we have a complex `two-step' description of the structures we want;
    • first we overgenerate syntactically
    • then we filter `phonologically'

• The Slash-feature/Trace analysis allows us to eschew use of numerations, and provides a direct description of the desired structures
Reconstructing Parasitism

- In PGs, one of the traces is `exceptional’, in that it cannot normally occur:

  *Which book did [John [[buy the car] [after Bill stole t]]]?*

- In order to account for the observed asymmetry between traces, Nunes moves from numerations (multi-sets of trees), to lexical sub-arrays (a recursive data structure; LSA := Multiset of Tree | Multiset of LSA)

- Recall that we moved to slash-feature percolation to avoid the complicated identity check required by ATB movement

- All we need in order to avoid this computation, however, is for one of the two `moving pieces’ to be a trace!
Reconstructing Parasitism

• If we adopt the view that traces are linked to A-movement, and copies to A-bar movement (not necessary, but compatible),

• then we want to have the slash feature in the `real’ gap, and a copy from the parasitic gap containing PP

• (Some) islands can be circumvented by unifying a moving element within the island with a trace outside the island
PGs via Parasitic Traces

- Derive: \textcolor{red}{AFTER BILL STOLE T}
PGs via Parasitic Traces

- Derive: \textcolor{red}{\textsc{AFTER BILL STOLE T}}

- Derive: \textcolor{red}{\textsc{READ T}}
PGs via Parasitic Traces

- Derive: **AFTER BILL STOLE T**

- Derive: **READ T**

- Merge together
PGs via Parasitic Traces

- Derive: \textbf{AFTER BILL STOLE T}
- Derive: \textbf{READ T}
- Merge together
- Continue deriving structure
PGs via Parasitic Traces

- Derive: **AFTER BILL STOLE T**
- Derive: **READ T**
- Merge together
- Continue deriving structure
- Move **WHICH BOOK**
Conclusions

• The sideways movement theory of parasitic gaps is too complicated for what it is doing

• Slash-feature percolation/Traces allow for a direct description of the very same dependencies described indirectly by the sideways movement theory

• This also allows us to maintain a conservative syntactic ontology: trees, not sets (of sets ...) thereof, are the basic objects of syntactic theory