Binding Theory in LTAG

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Overview

- Binding Theory (BT) and its local domains
- Previous work: Condition A
- This proposal: Conditions A, B, C
- Discussion

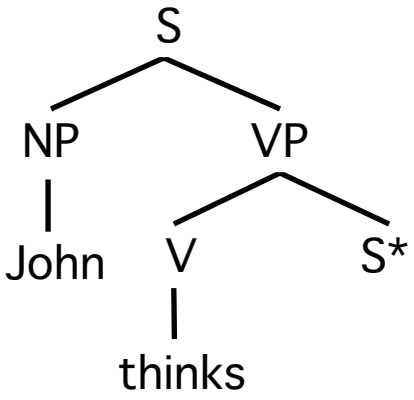
Binding theory: A reminder

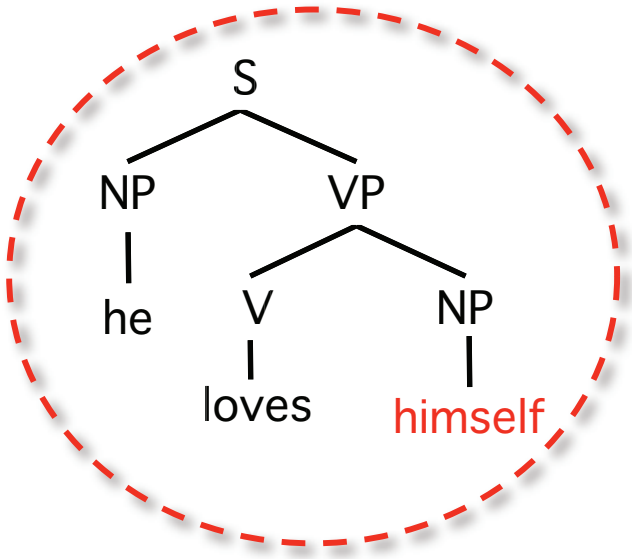
- Condition A: reflexives must be locally bound
  - *John$_j$ thinks [Bill$_b$ likes himself$_{*j\ /\ b\ /\ *[other]}$]*
- Condition B: pronouns must be locally free
  - *John$_j$ thinks [Bill$_b$ likes him$_{j\ /\ *b\ /\ [other]}$]*
- Condition C: full noun phrases must be free
  - **[John$_j$ likes John$_j$]*
  - **John$_j$ thinks [Mary likes John$_j$]*

Binding theory in LTAG

- LTAG's local domain = the verbal elementary tree and its arguments
  - (but not its adjuncts)
- Insight from previous work:
  - LTAG and BT have similar local domains
- This presentation's central point:
  - Too many mismatches between local domains
  - We *can't* reuse LTAG's local domain for binding!

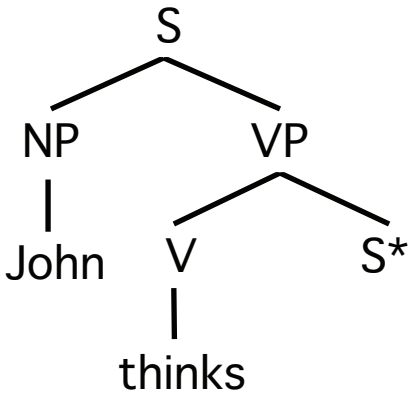
Previous work reused LTAG's local domain

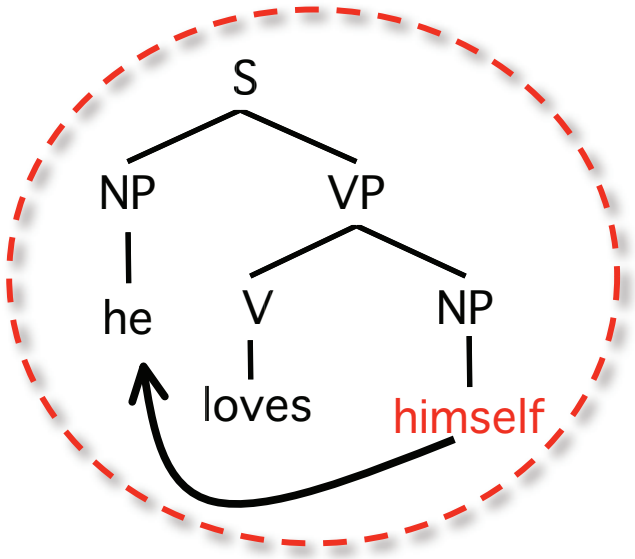




Condition A

Previous work reused LTAG's local domain





Condition A

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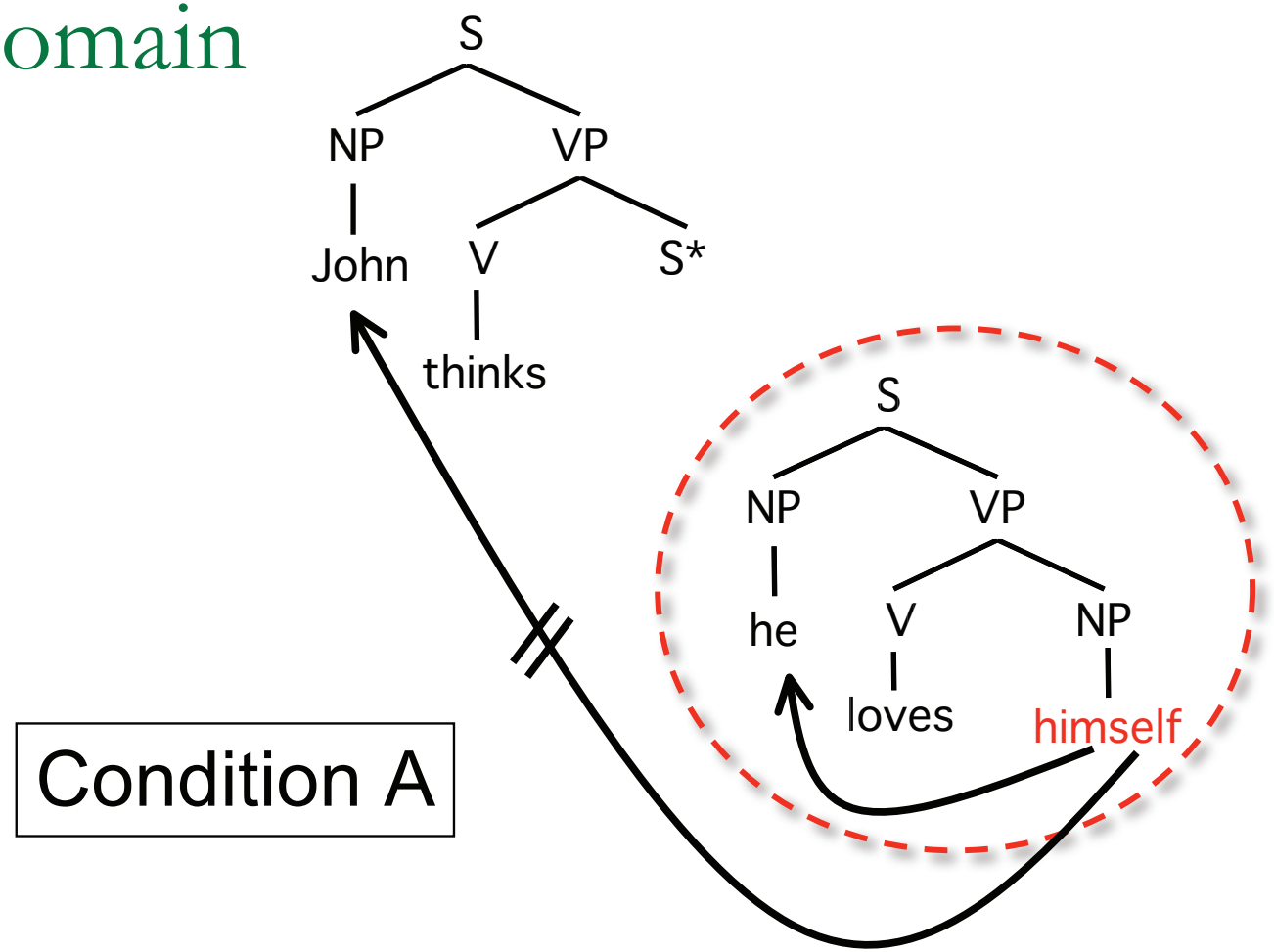

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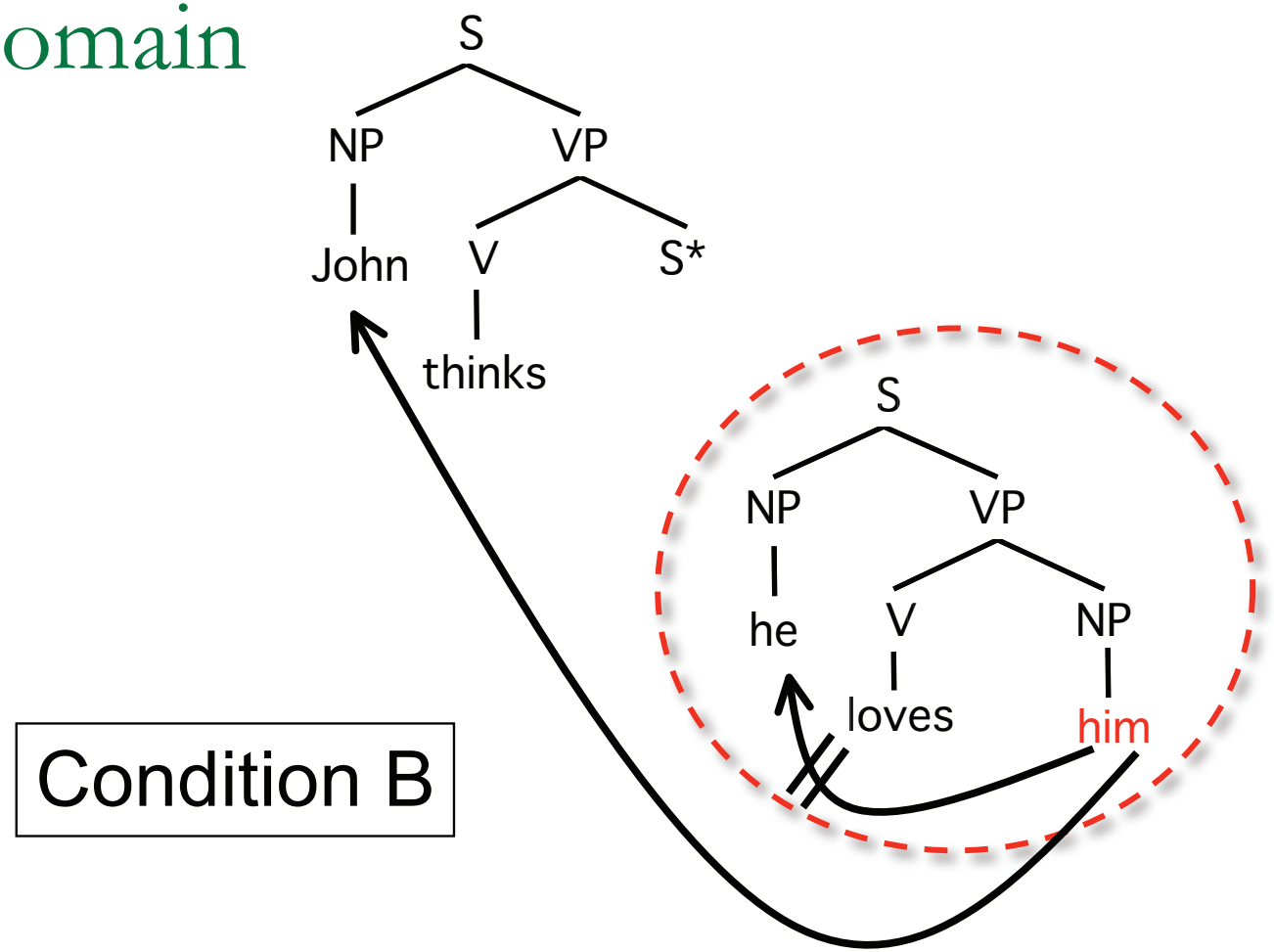
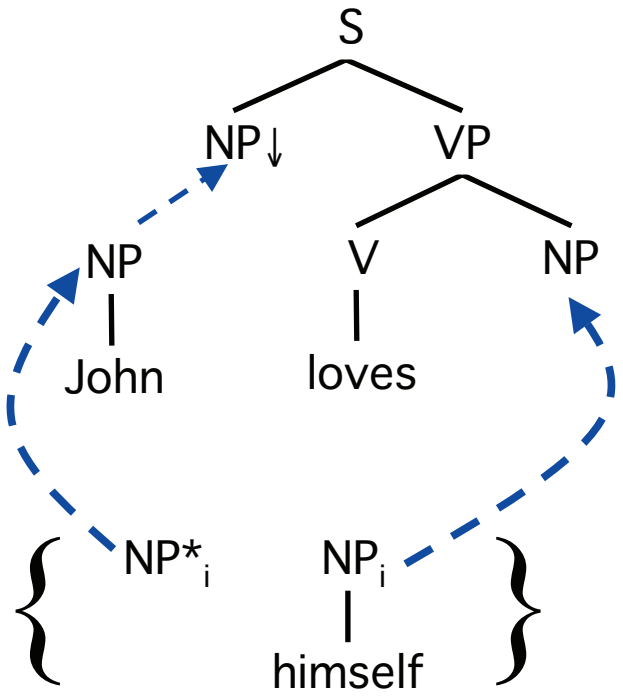


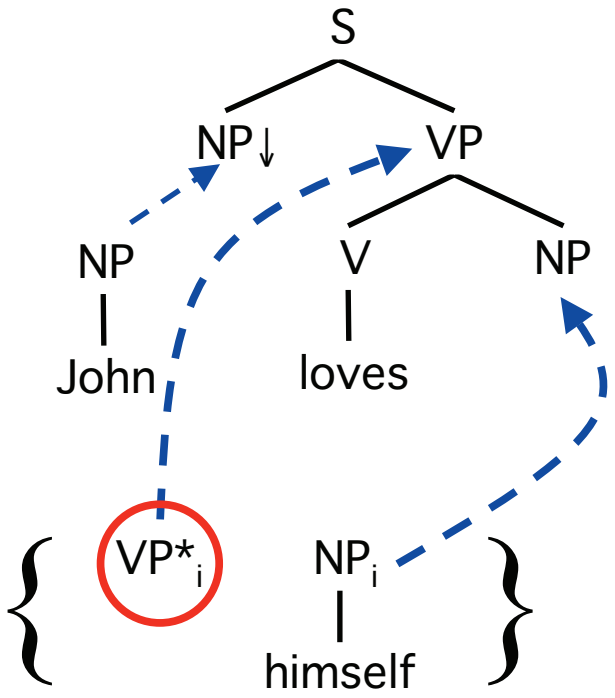
Ryant and Scheffler (2006)

- Only Condition A
- MCTAG set with a degenerate NP tree
- Tree-local MCTAG with flexible composition makes sure that antecedent and reflexive substitute into the same tree



Kallmeyer and Romero (2007)

- Only Condition A
- MCTAG set with a degenerate VP tree
- Tree-local MCTAG ~~with flexible composition~~ makes sure that antecedent and reflexive substitute into the same tree



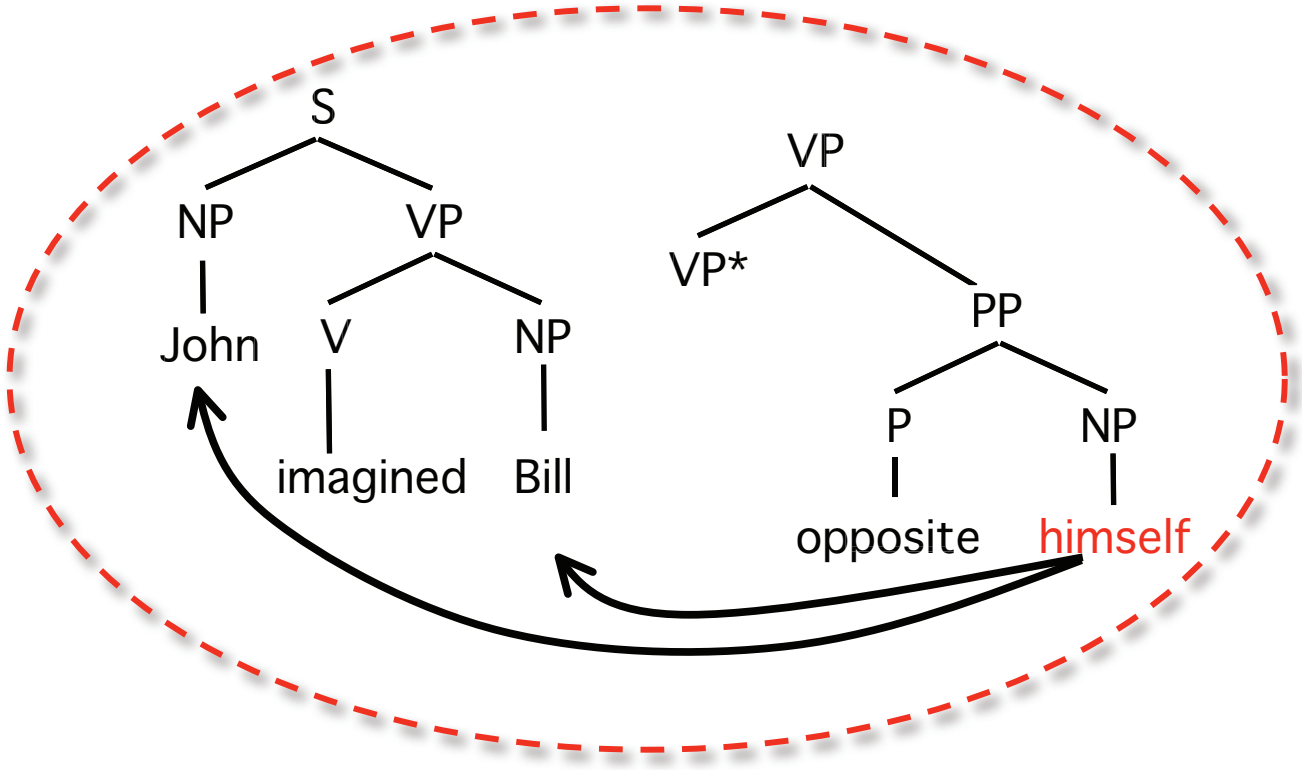
(some features omitted)

Kallmeyer and Romero's claim

"Tree-local MCTAG display exactly the extended domain of locality needed to account for the locality of anaphora binding in a natural way."

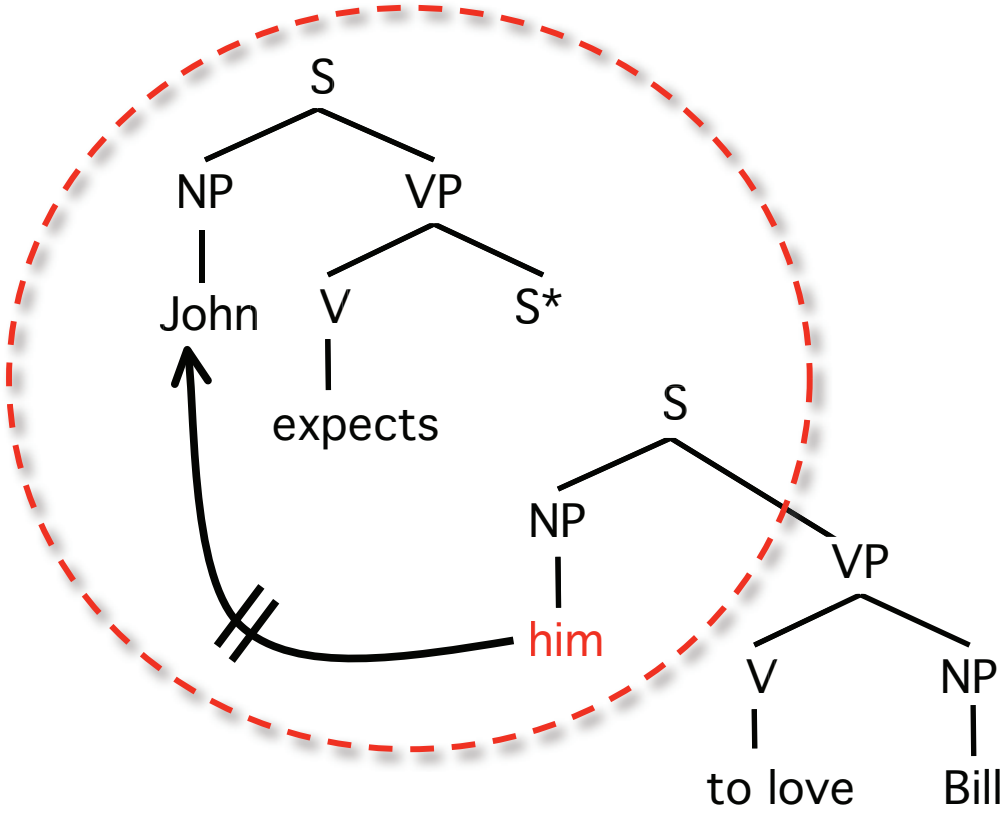
-- Kallmeyer and Romero (2007)

A counterexample



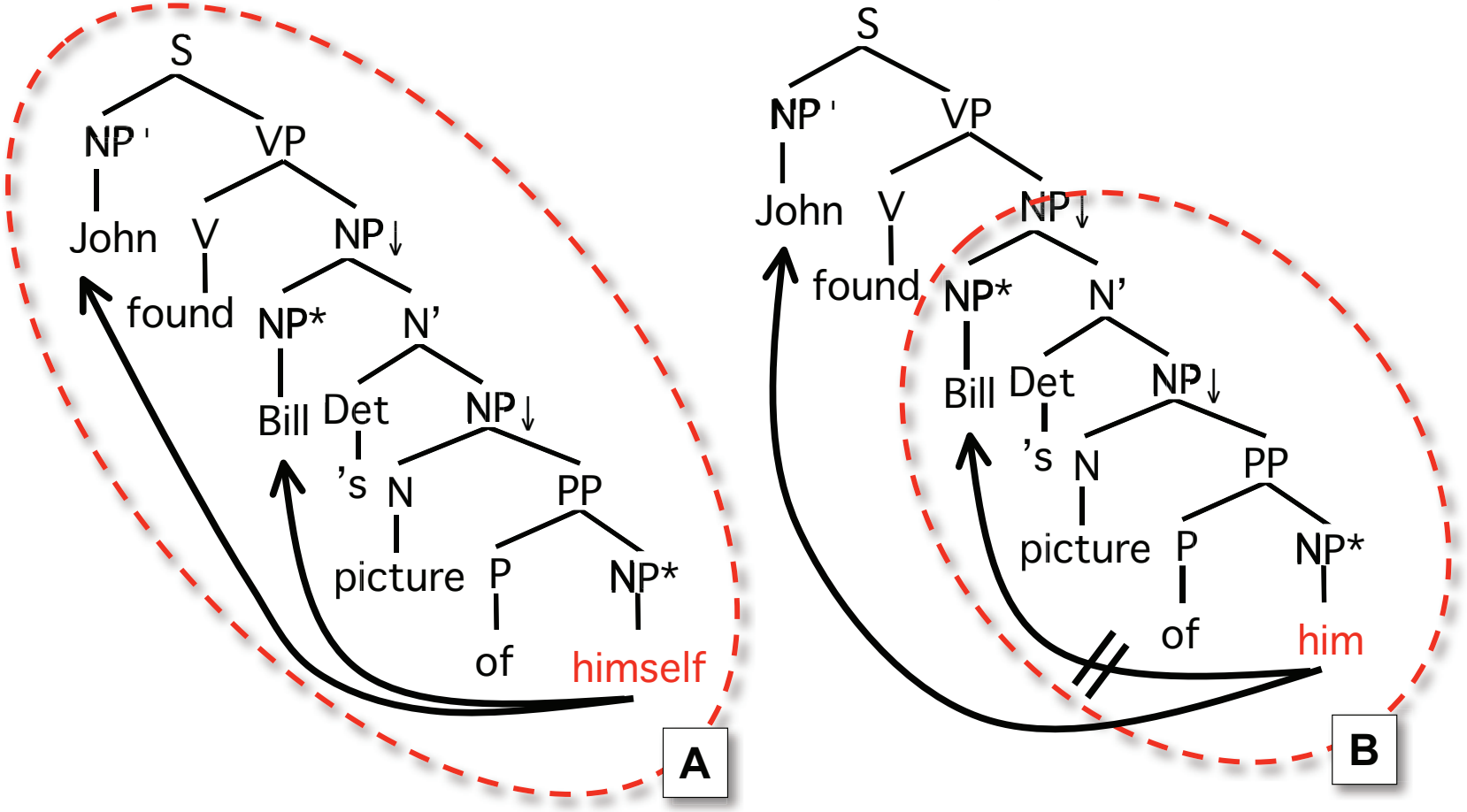
- Cannot be handled by Kallmeyer and Romero (2007)
  - except by flexible composition (which they try to avoid)

ECM: another mismatch of localities



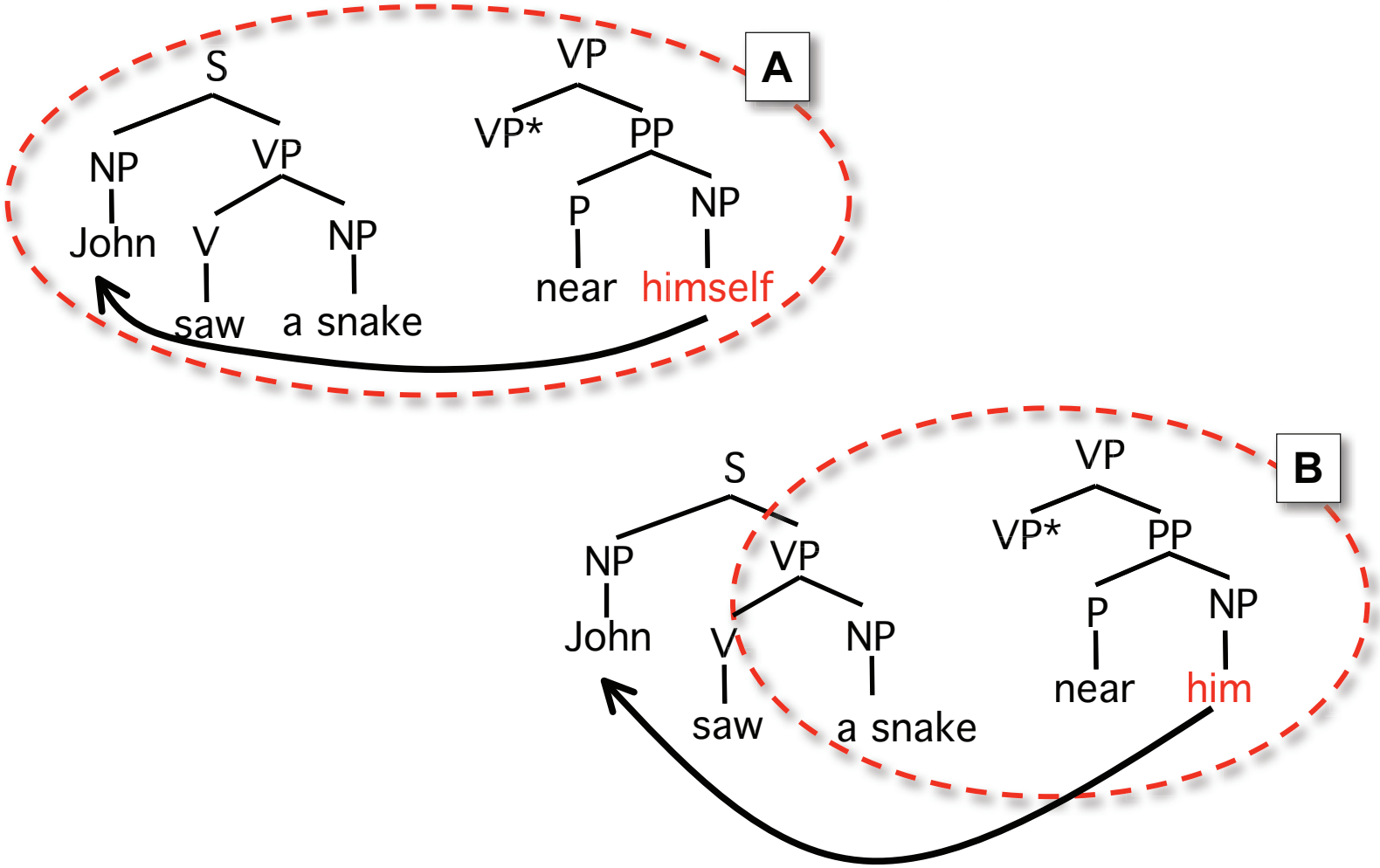
- Can be handled with an extra feature
- No lexical ambiguity needed (unlike R&S 2006)

Mismatches within Binding Theory



Judgments tested experimentally (Keller and Asudeh '01; Runner '03)

Mismatches within Binding Theory



How to encode the other conditions?

- Condition A roughly corresponds to tree-locality
- Condition B = “enforced non-locality”?
- Condition C = ???
  - Need to propagate an unbounded number of potential antecedents

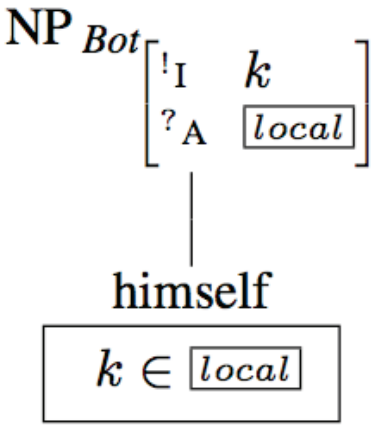
This account in a nutshell

- Every NP receives three items from its environment:
  - a list “A” of local potential antecedents
  - a list “B” of local potential antecedents
  - a list “C” of nonlocal potential antecedents
- Every NP supplies its own individual variable to its environment
- The rest of the grammar is responsible for providing the correct lists to the NP substitution slots

Technical innovation: List-valued features

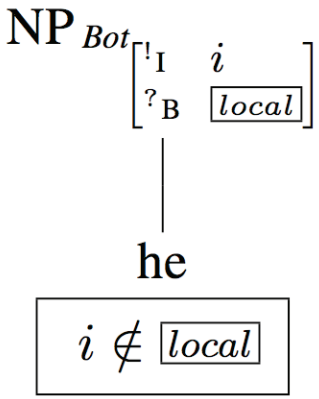
Create a new list from one object	$\langle \boxed{np} \rangle$
Create a new list from two objects	$\langle \boxed{np1}, \boxed{np2} \rangle$
Append an object to the end of a list	$\boxed{list} :: \boxed{np}$

Elementary tree for "himself" (Condition A, simplified)



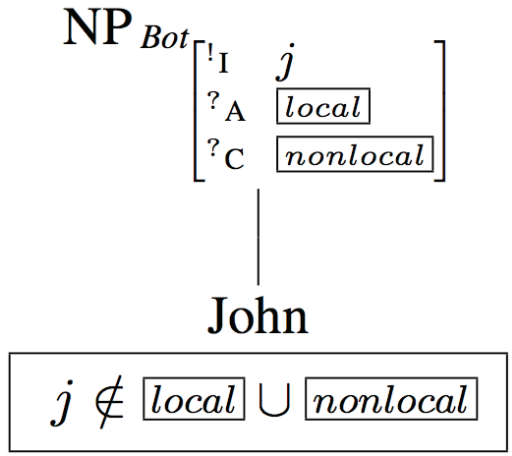
- "A reflexive must be locally bound."

Elementary tree for “he” (Condition B)



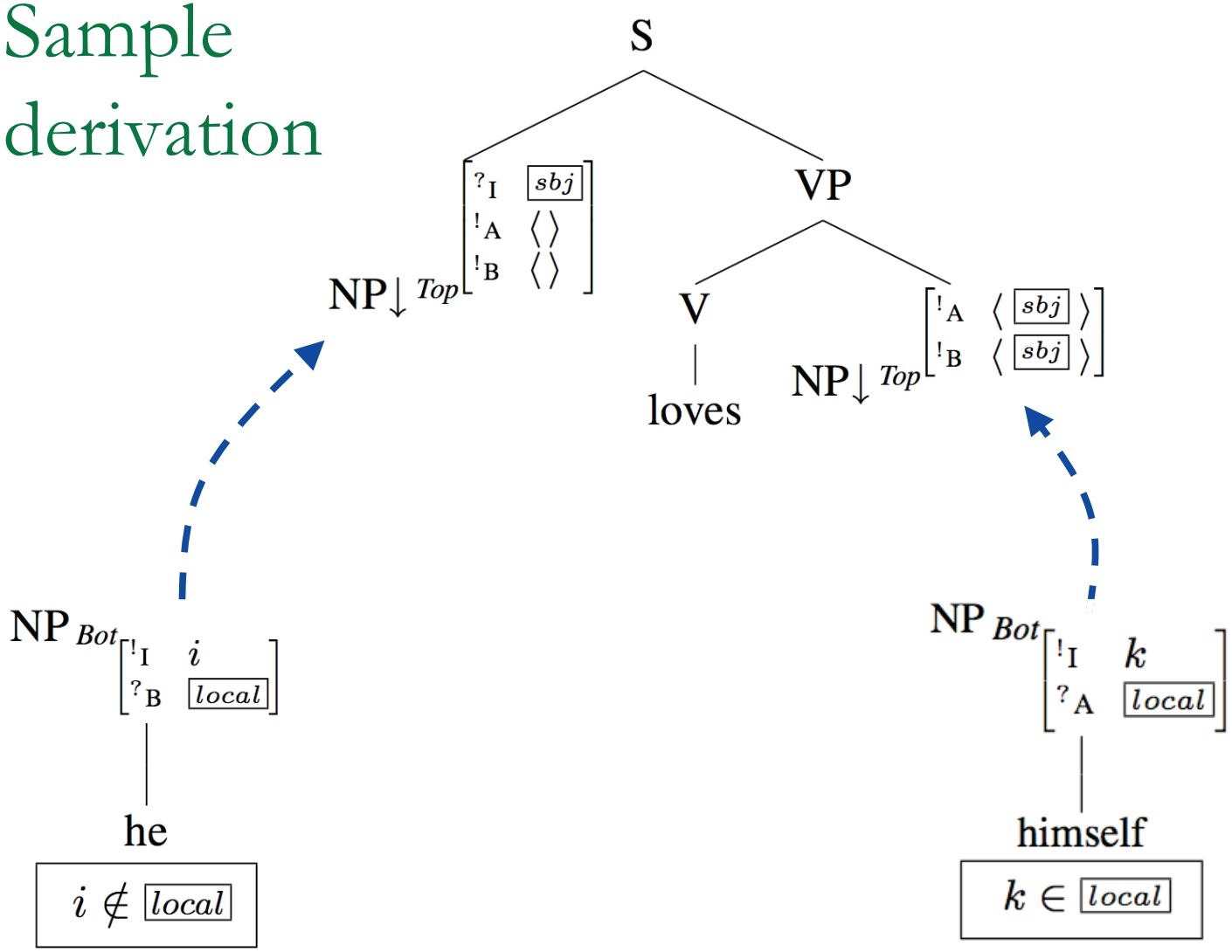
- “A pronoun must be locally free.”

Elementary tree for "John" (Condition C)



- "A full noun phrase must be free."

Sample derivation



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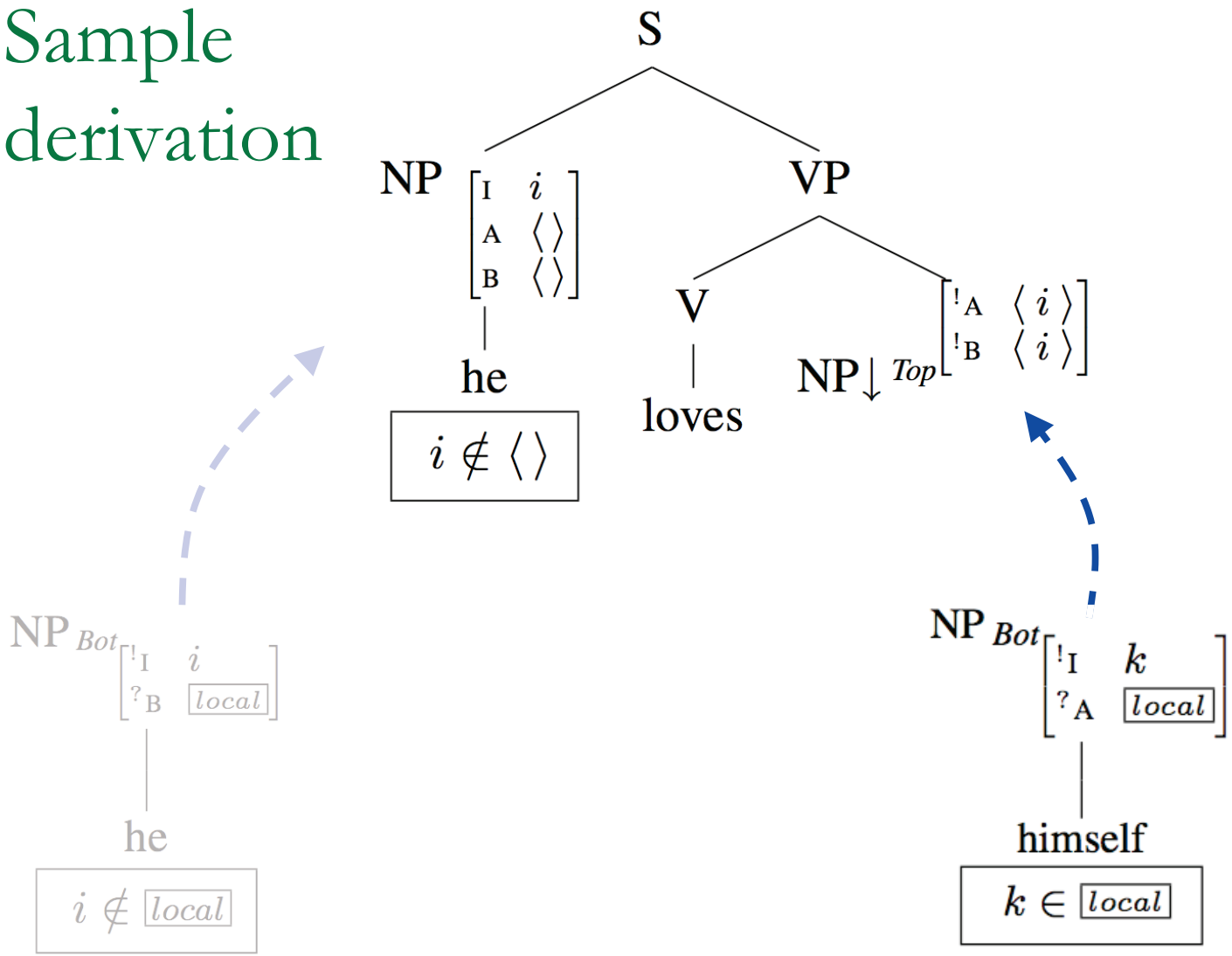

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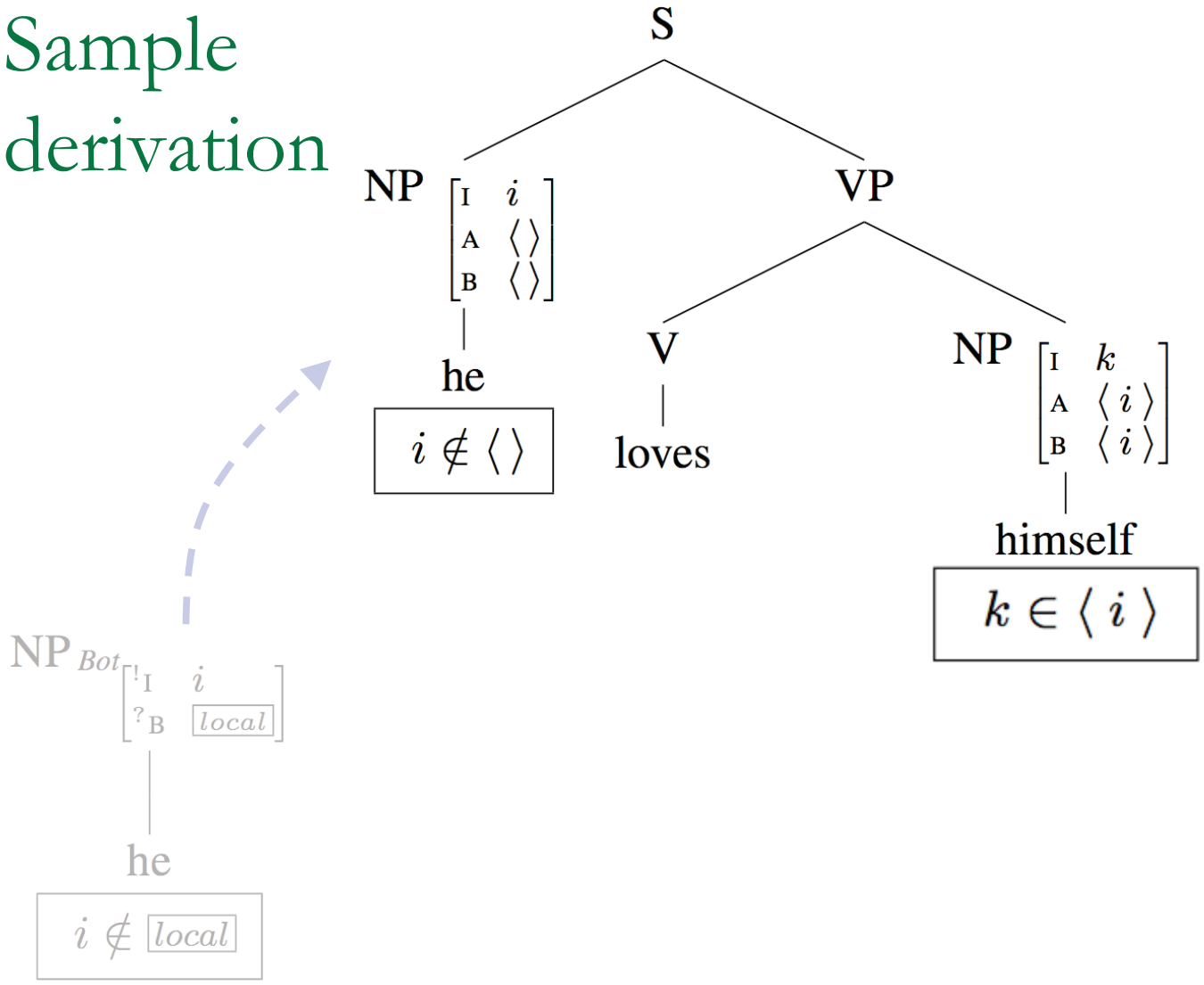

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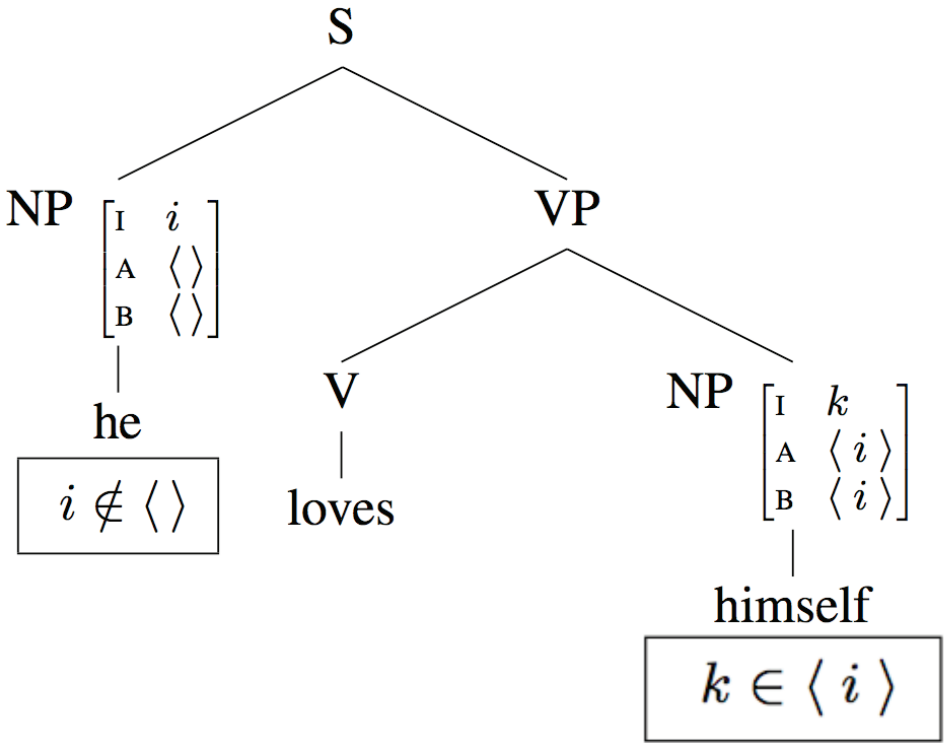
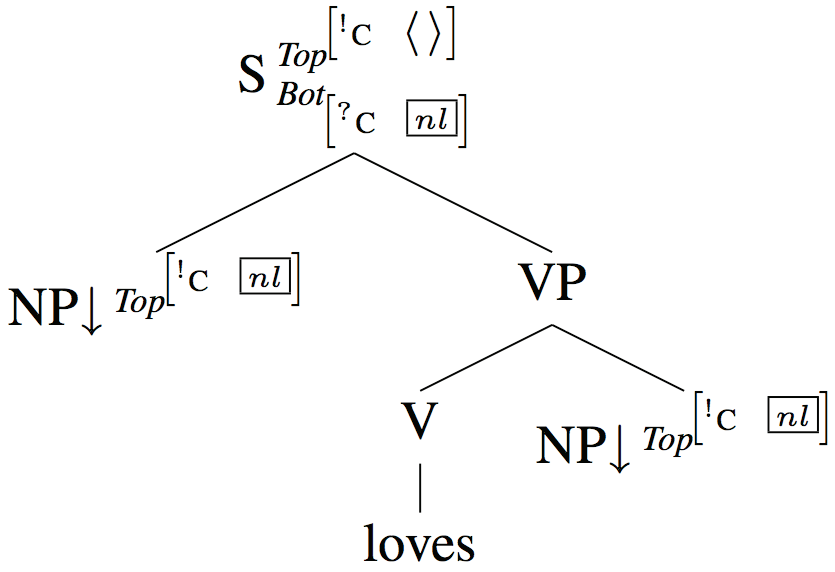
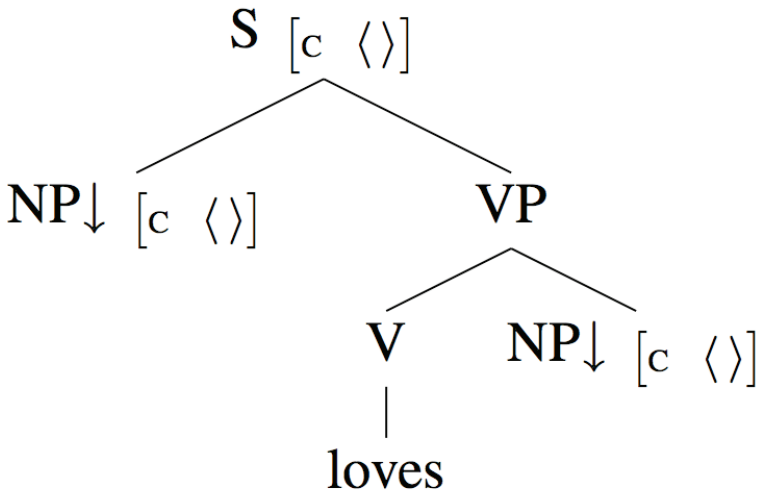


Condition C: the default case



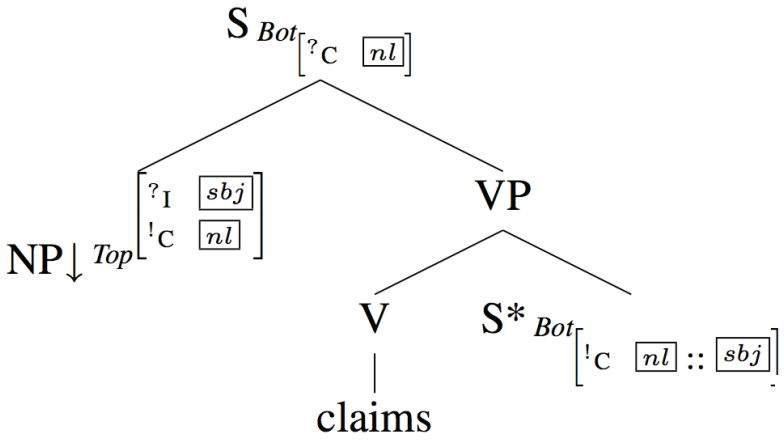
Before...

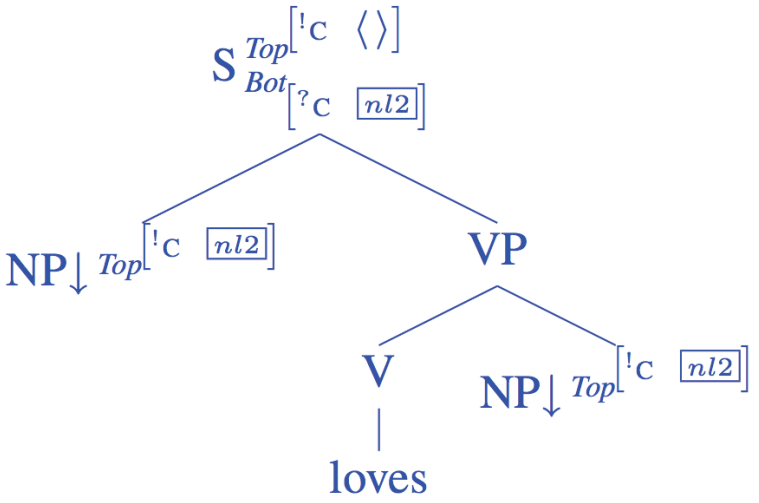
Condition C: the default case



...and after unification of top/bottom features

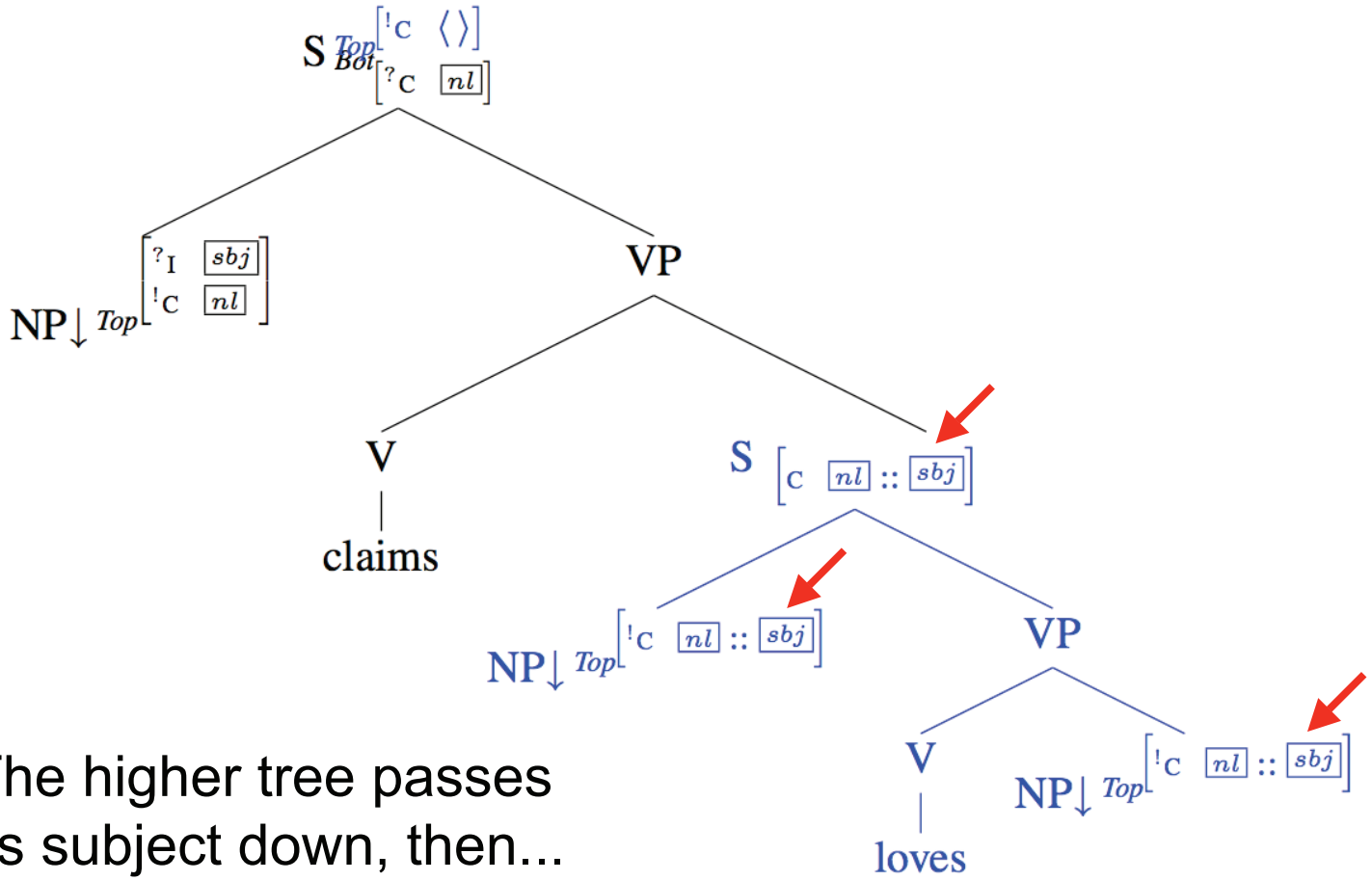
Condition C across clauses





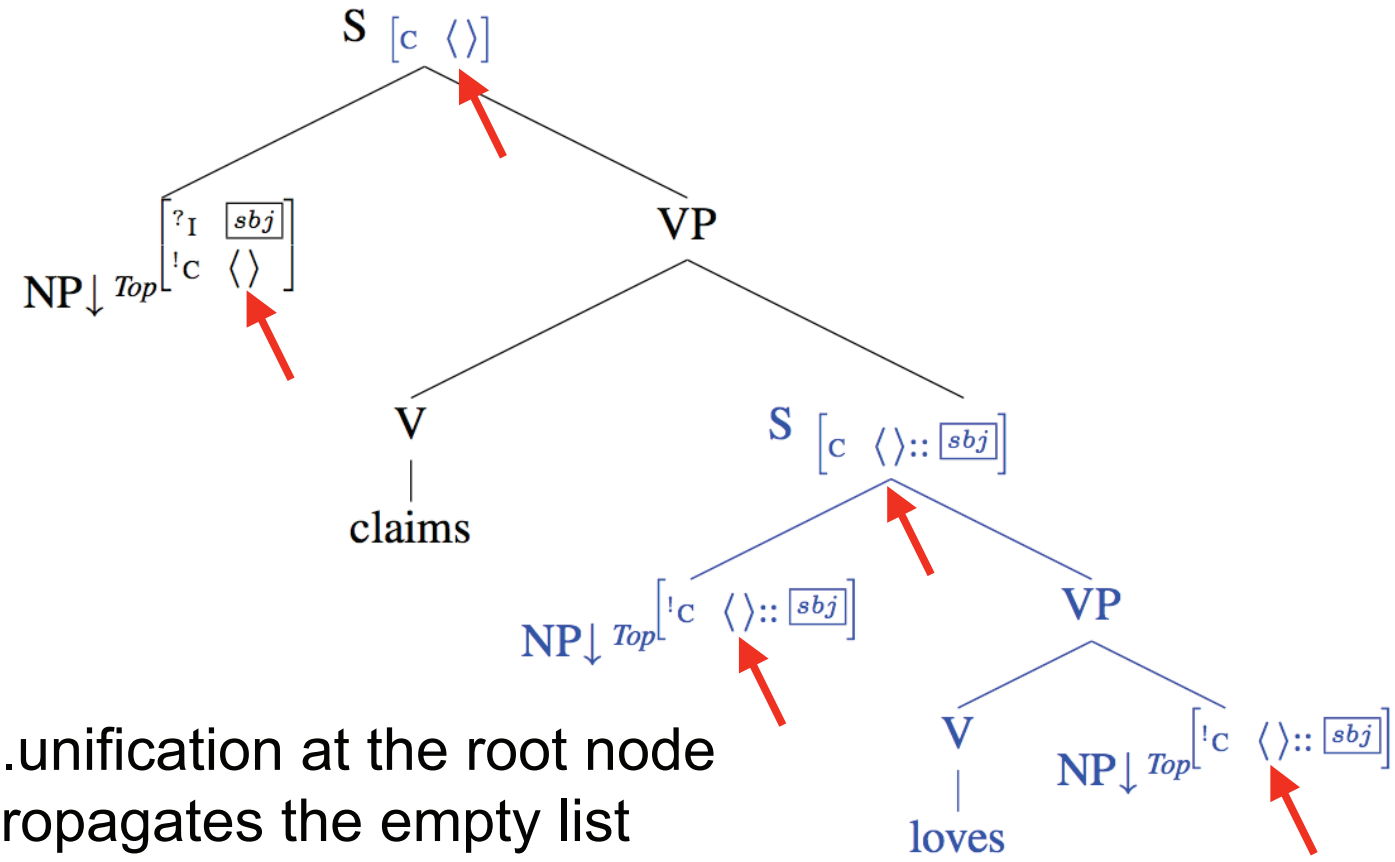
Before putting the trees toge

Condition C across clauses



The higher tree passes its subject down, then...

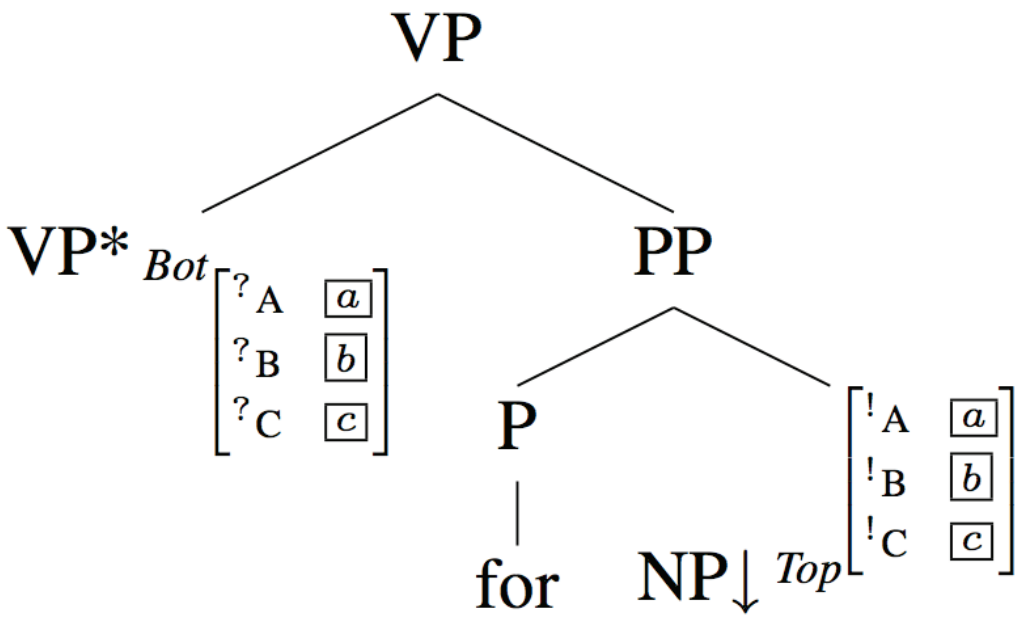
Condition C across clauses



...unification at the root node propagates the empty list

Improvements over previous accounts...

Binding into adjuncts



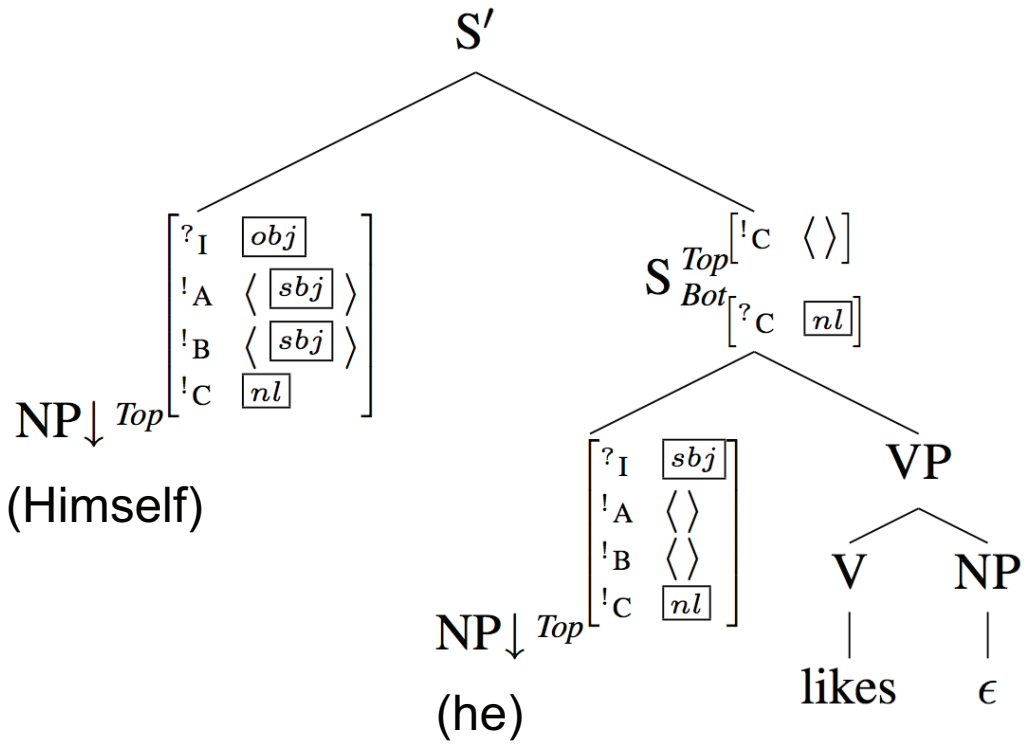
- Just propagate everything!

Mismatches between domains easily encoded

- Non-complementary binding conditions easily handled with separate A and B list features
- No *ad hoc* trees needed for picture NPs (unlike K&R '07)

C-command violations easily encoded

- e.g. extraposition: *"Himself$_i$, he$_i$ likes."*



- No need for separate lexical entry
- Just extrapose subject NP along with its feature structure

Improvements at a glance

- All conditions are implemented
- Higher empirical accuracy
- No lexical ambiguity
- No flexible composition (K&R 2007)
- No syntactically unmotivated degenerate trees (Kallmeyer and Romero, 2008)
- Better integration with anaphora resolution (Branco, 2002)
- No explicit representation of c-command

Issues / Future work

- Unknown complexity of list-valued features
  - Just a decoration on the trees though -- they do not rule out any sentences
- Lack of predictive power
  - How do we constrain possible feature values?
  - Metagrammar?
- Does TAG offer any insights into BT at all?

Thank you.

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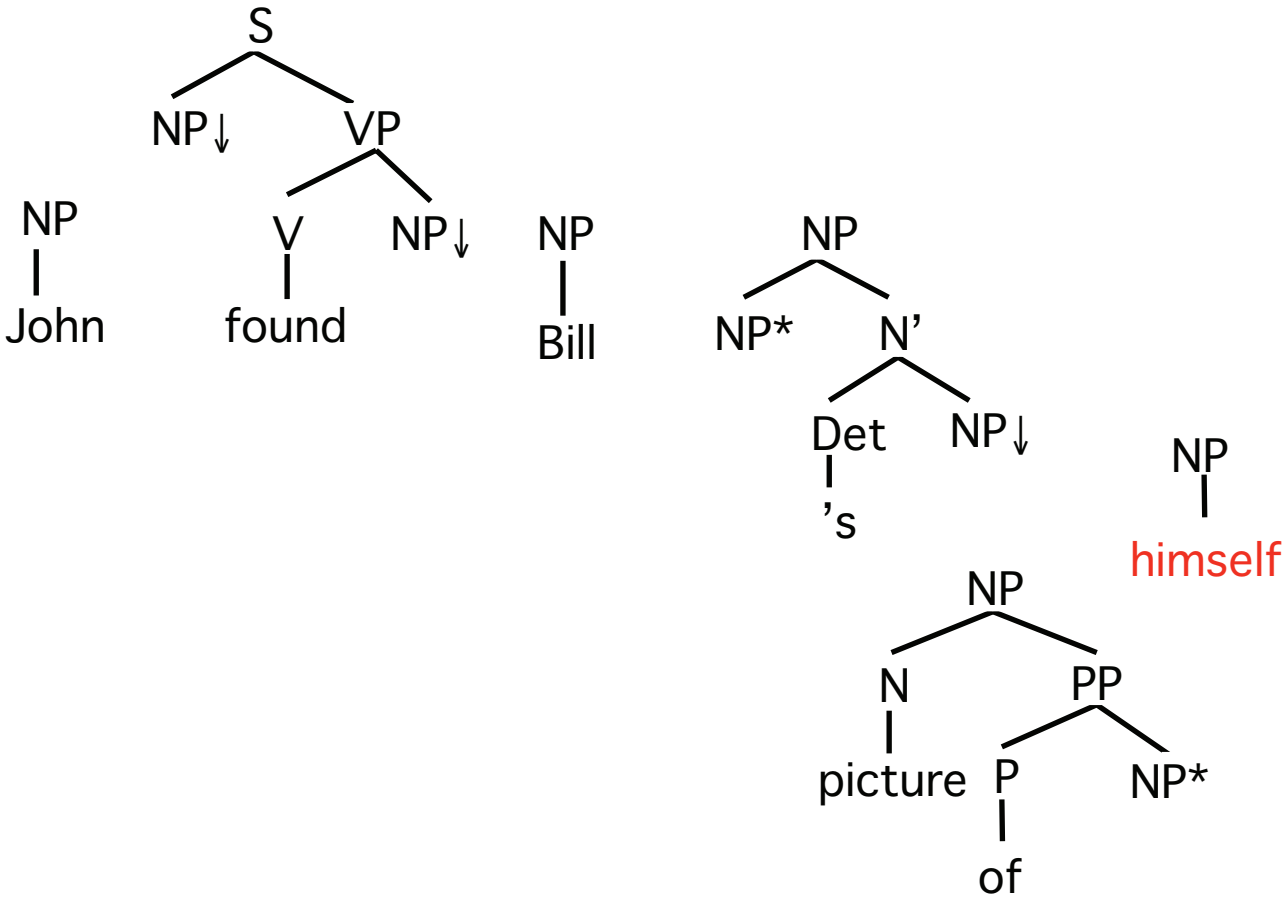
Previous accounts do not interface well with anaphora resolution modules

- Previous accounts: parser delivers a forest of indexed trees
  - *John$_i$ introduced Bill$_k$ to himself$_i$* vs.

    John$_i$ introduced Bill$_k$ to himself$_k$
  - Problem: Anaphora resolution modules are not prepared to compare entire trees (Branco, 2002)
- Our solution outputs a compact set of constraints
  - Following Branco (2002)

The grammar of picture NPs



Missing link problem