
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) sideways 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 τ AFTER BILL STOLE PG

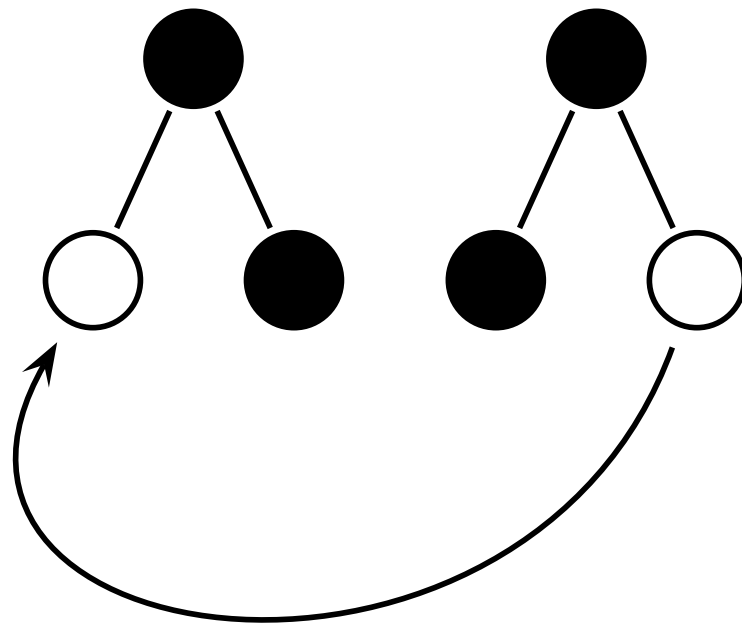
- Involve one element (which book) saturating two theta-positions (read t, stole pg):
 - similar: control, ATB movement
- This element c-commands both theta-positions, which are independent of each other:
 - similar: ATB movement

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 sideways 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; ...)



Sideward Mvt & PGs

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

- 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]_i DID JOHN [[READ [WHICH BOOK]_i] [AFTER BILL STOLE [WHICH BOOK]_i]]

- 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 `sidewards 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:

JOHN [[READ [THIS BOOK]_i] [AFTER BILL STOLE ~~[THIS BOOK]_i]]~~

How does it all work?

[WHICH BOOK]_i DID JOHN [[READ [~~WHICH BOOK~~]_t] [AFTER BILL STOLE [~~WHICH BOOK~~]_t]]

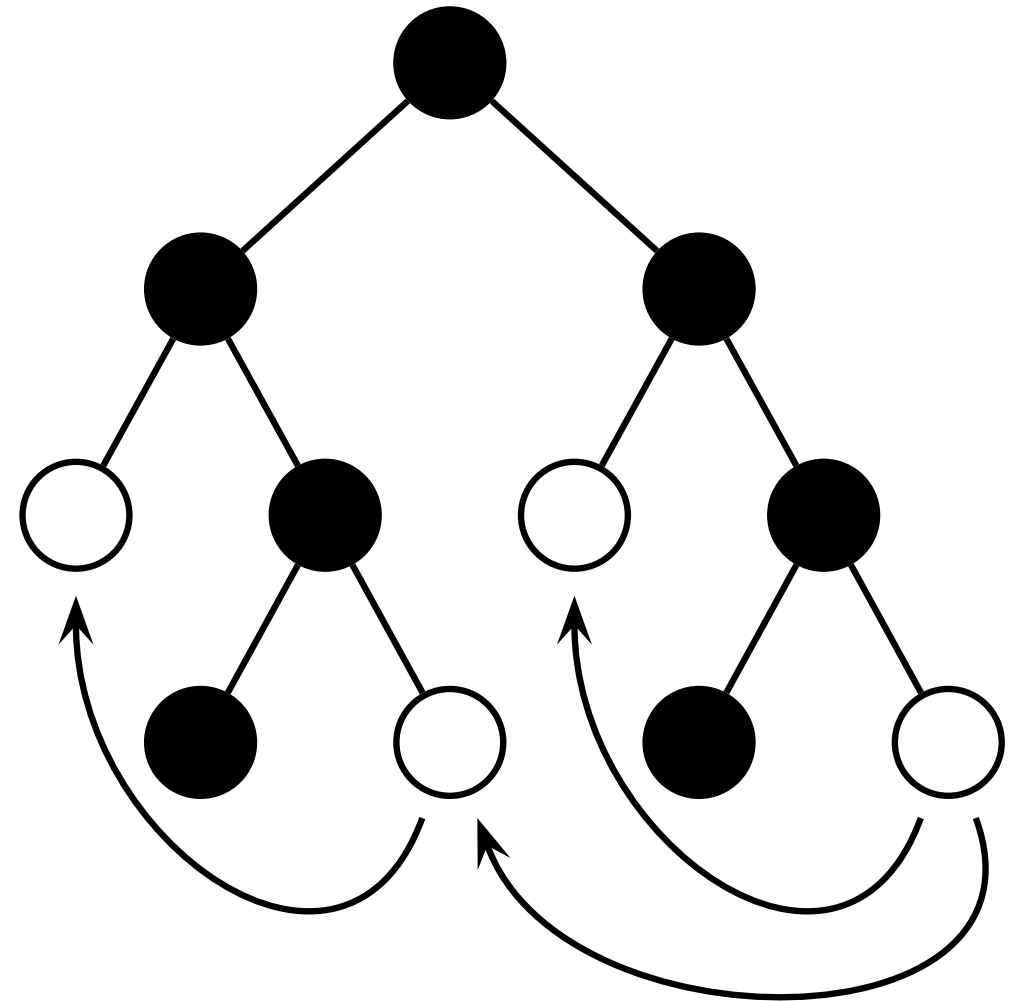
VS

* JOHN [[READ [THIS BOOK]_i] [AFTER BILL STOLE [~~THIS BOOK~~]_t]]

- 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

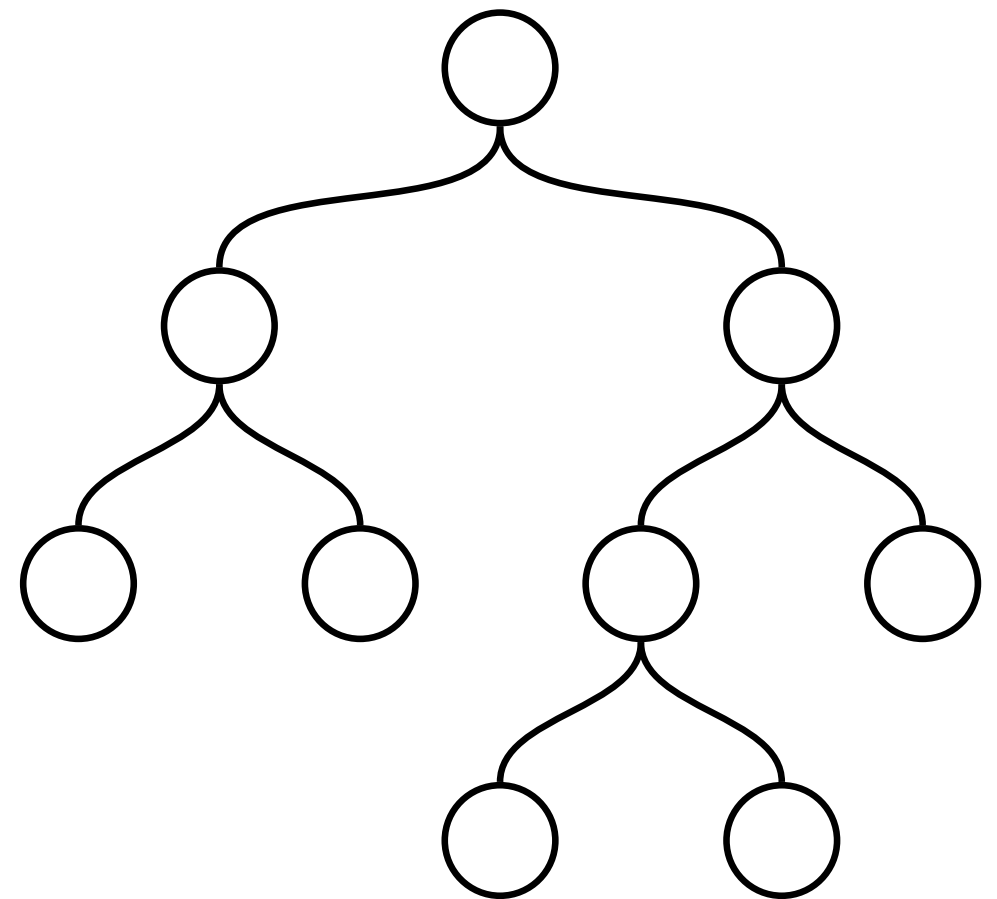
Ruling Out Chains

- Disconnected 'sideways movement chains' are filtered out at Spell-out
- neither top link can be deleted, as neither c-commands the other



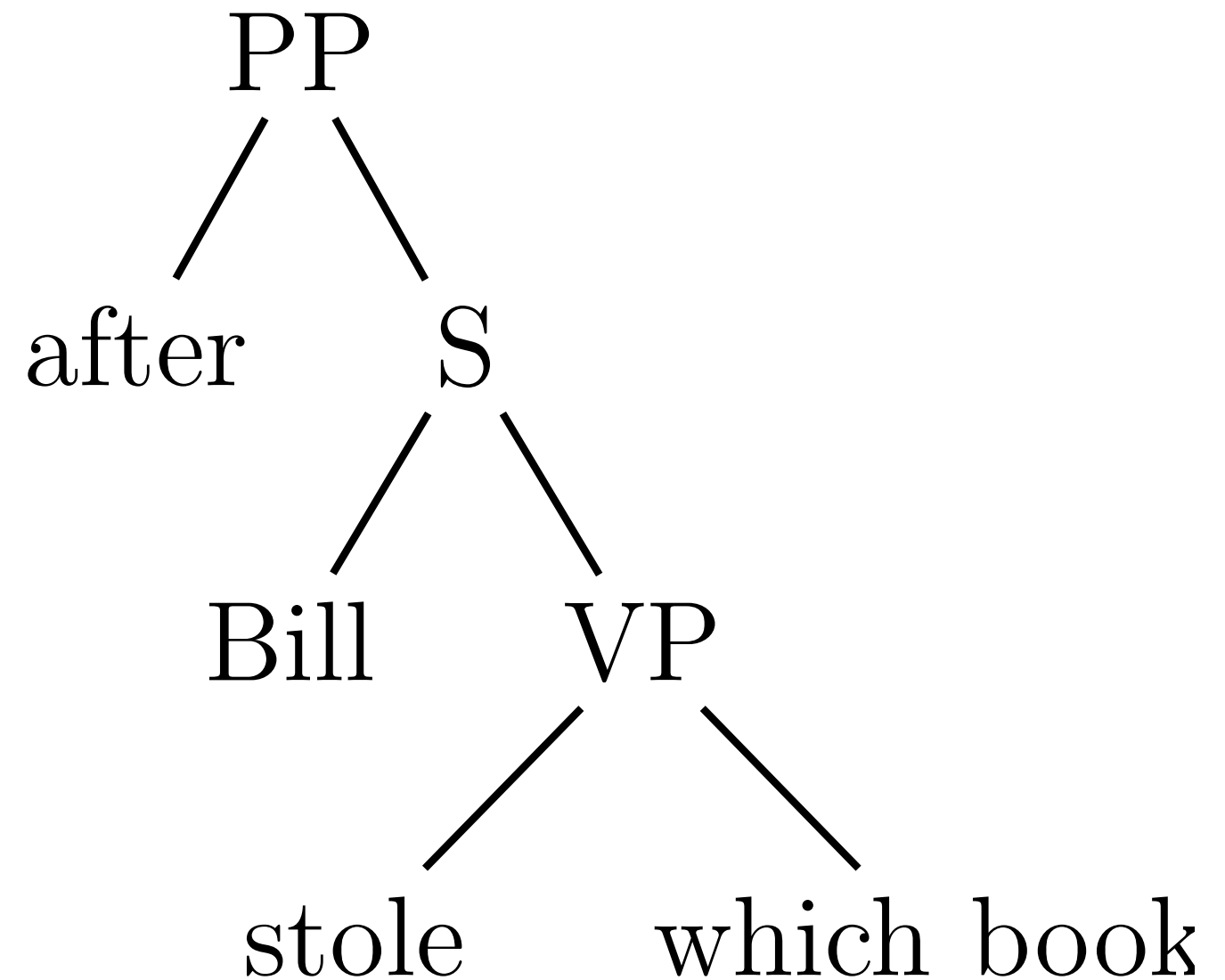
ATB Movement

- The conditions on sidwards movement conspire to permit only *tree-shaped* chains
- This is exactly the shape of chains formed by ATB movement:
 - multiple sources
 - single target



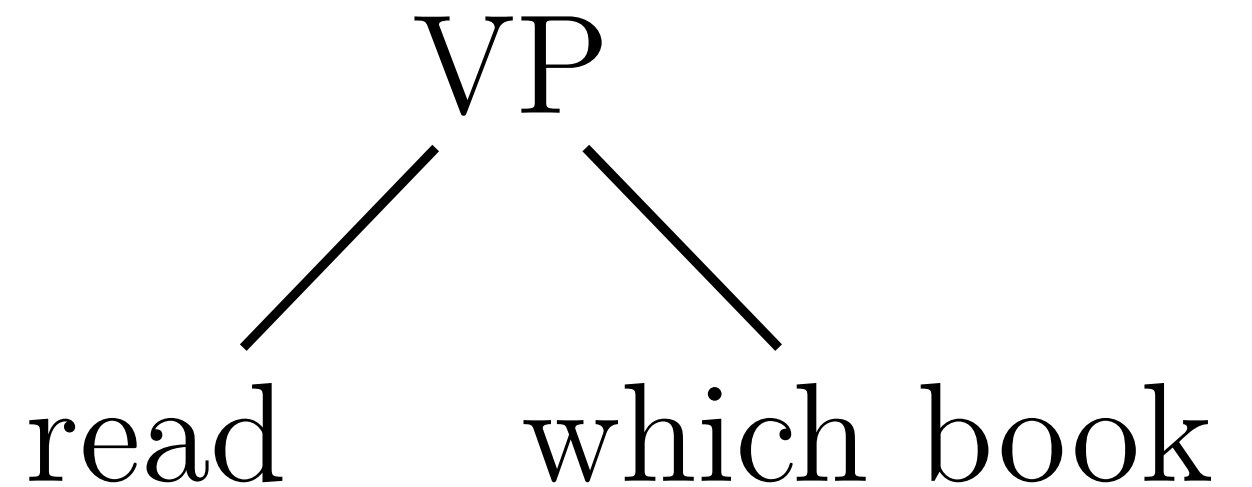
PGs via ATB

- Derive: AFTER BILL STOLE
WHICH BOOK



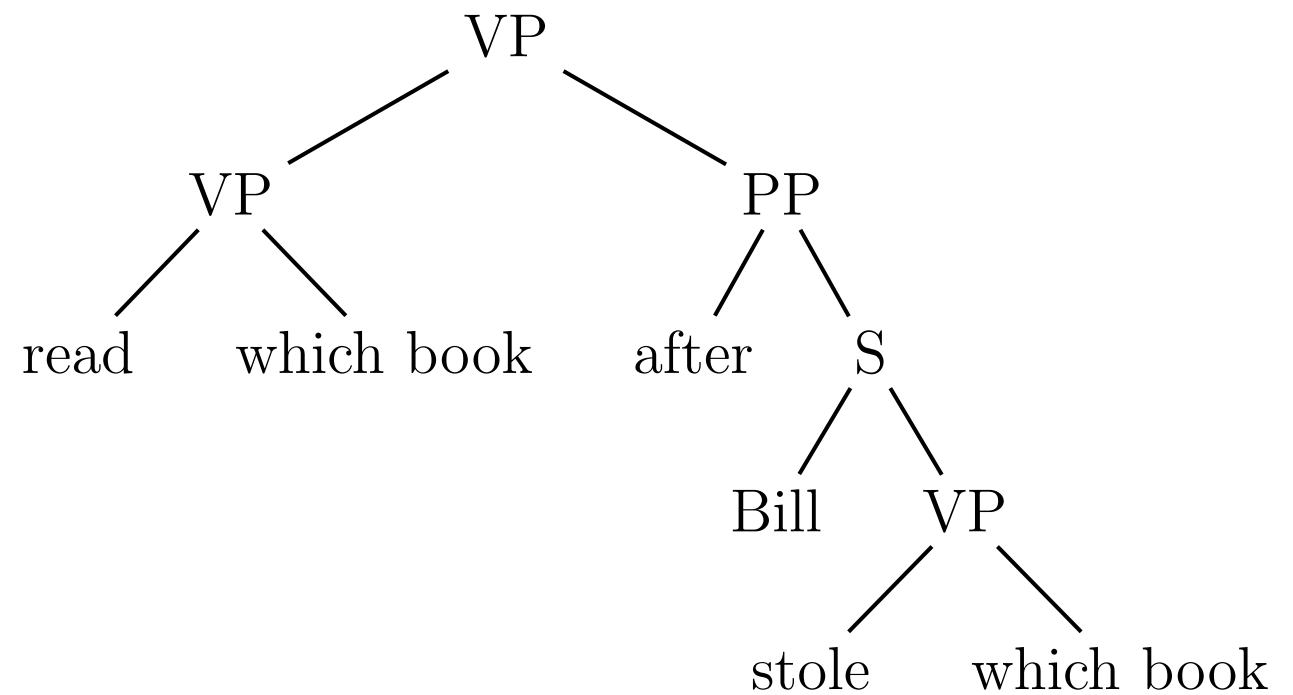
PGs via ATB

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



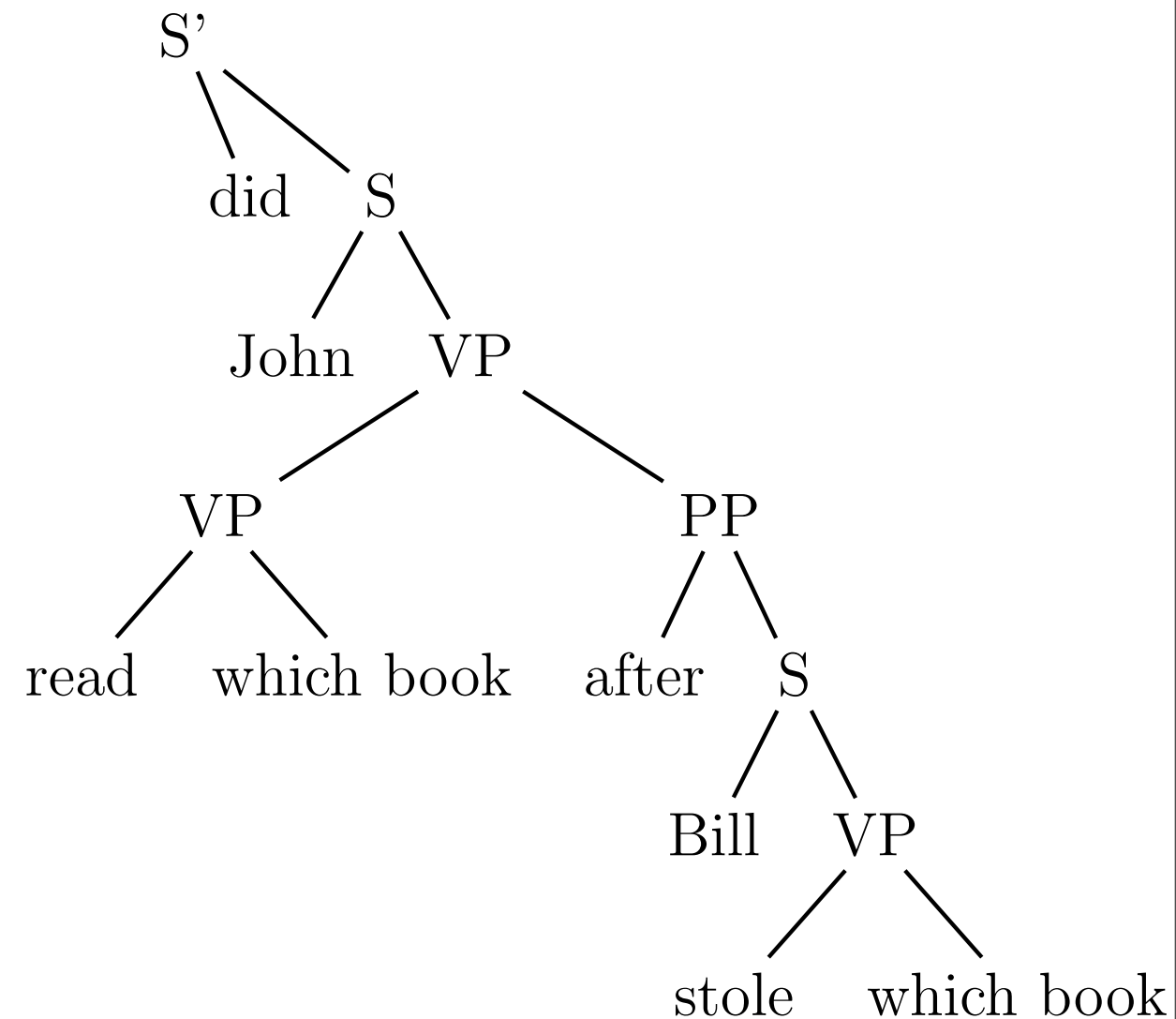
PGs via ATB

- Derive: AFTER BILL STOLE
WHICH BOOK
- Derive: READ WHICH BOOK
- Merge together



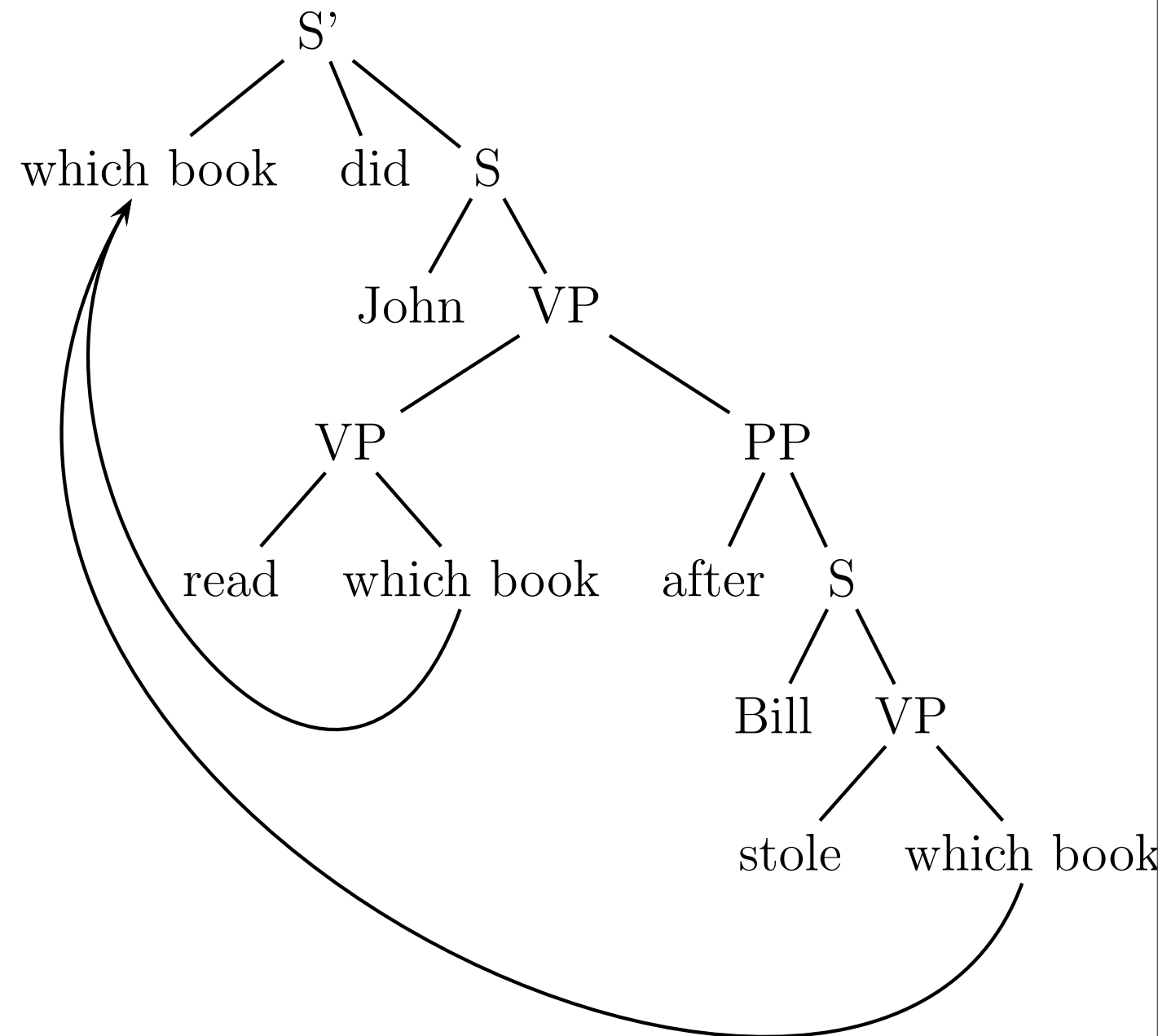
PGs via ATB

- Derive: AFTER BILL STOLE
WHICH BOOK
- Derive: READ WHICH BOOK
- Merge together
- Continue deriving structure



PGs via ATB

- Derive: **AFTER BILL STOLE**
WHICH BOOK
- Derive: **READ WHICH BOOK**
- Merge together
- Continue deriving structure
- ATB move both instances of **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

$$VP \rightarrow V NP$$

$$VP^{NP} \rightarrow V$$

$$S' \rightarrow NP S^{NP}$$

$$X^\alpha \rightarrow Y Z^\alpha$$

$$X^\alpha \rightarrow Y^\alpha Z$$

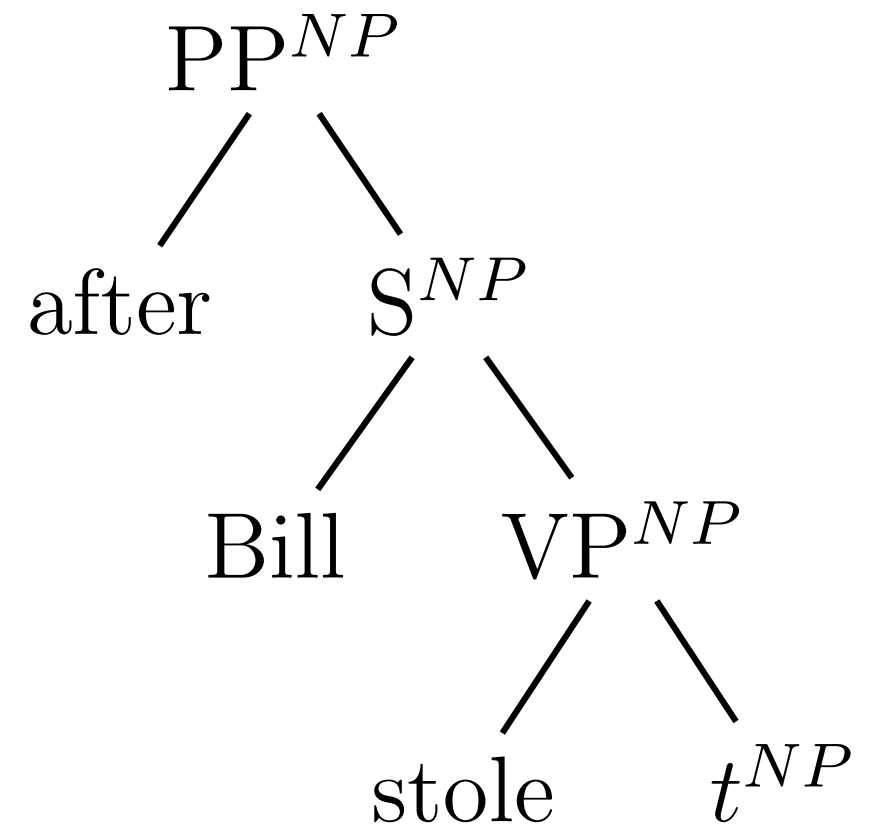
$$X^\alpha \rightarrow Y^\alpha Z^\alpha$$

Slash-features as... Traces

- 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

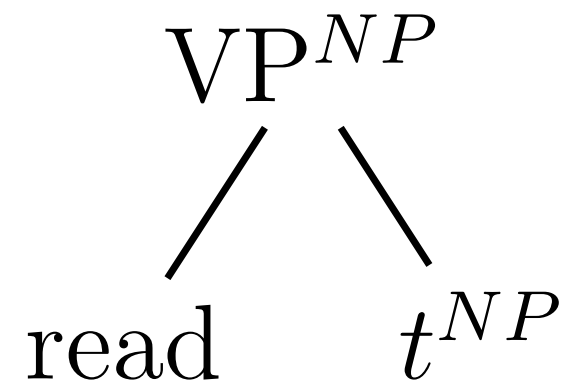
PGs via Traces

- Derive: AFTER BILL STOLE T



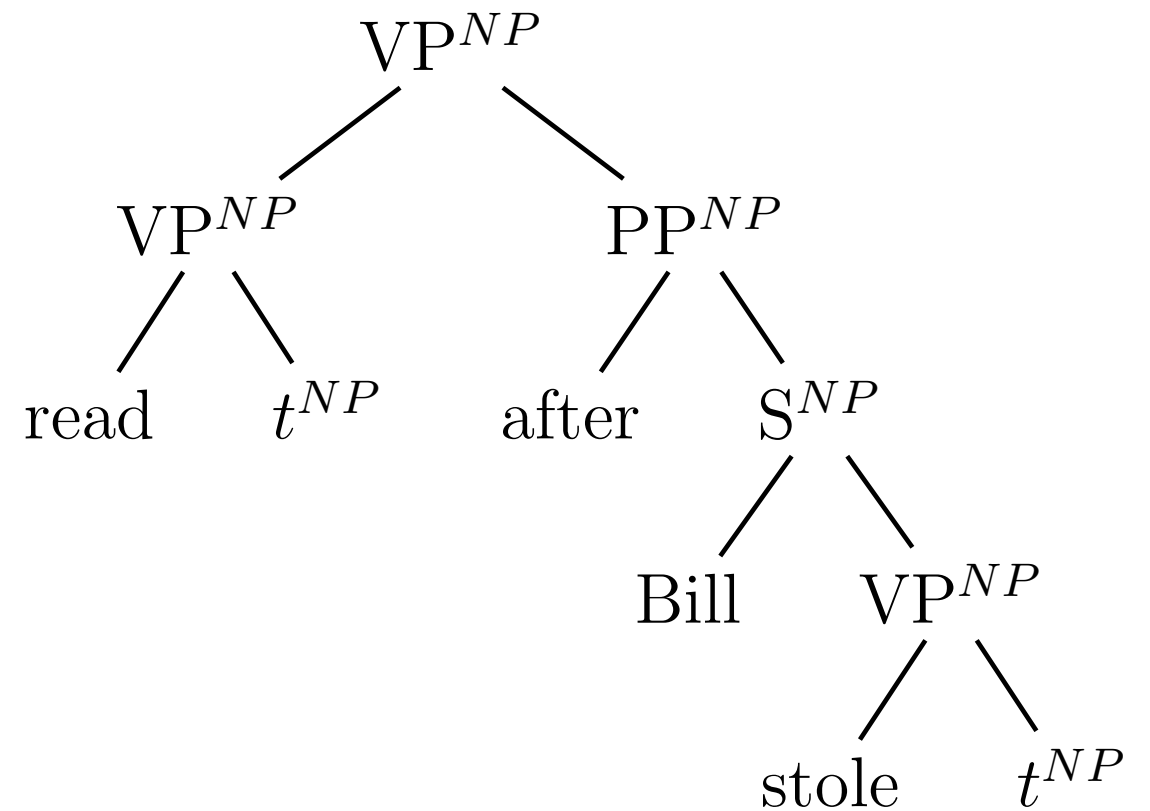
PGs via Traces

- Derive: AFTER BILL STOLE T
- Derive: READ T



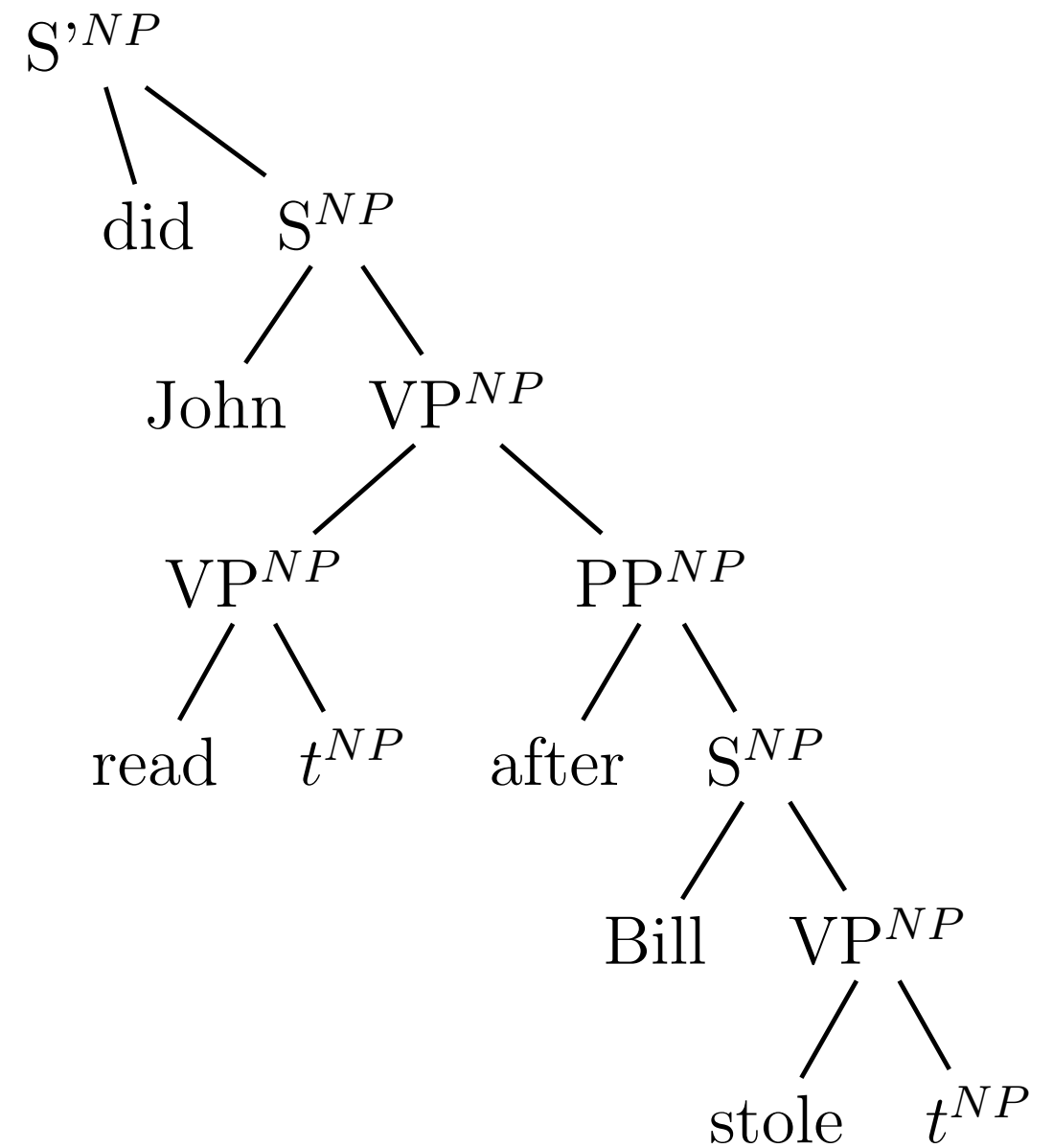
PGs via Traces

- Derive: **AFTER BILL STOLE T**
- Derive: **READ T**
- Merge together



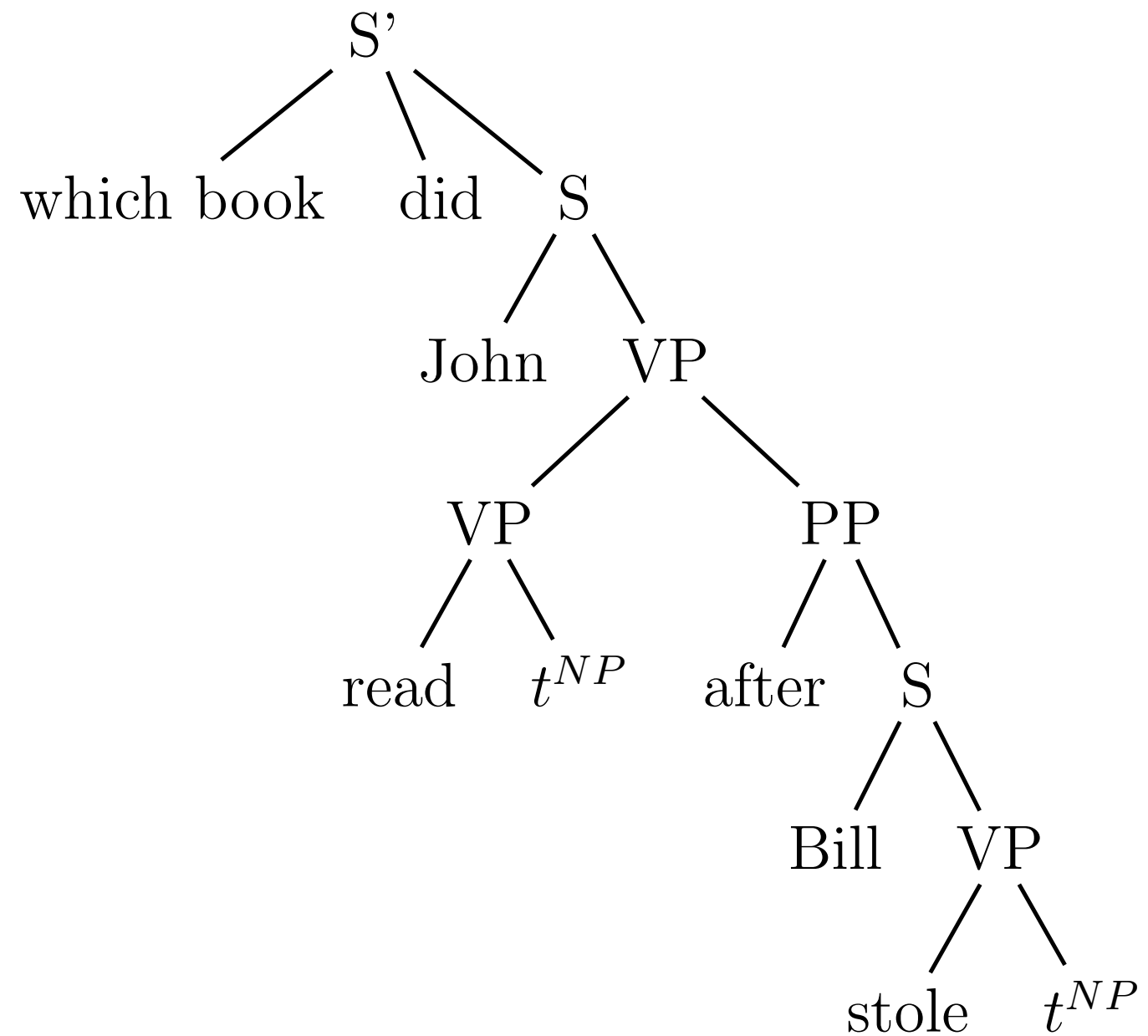
PGs via Traces

- 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

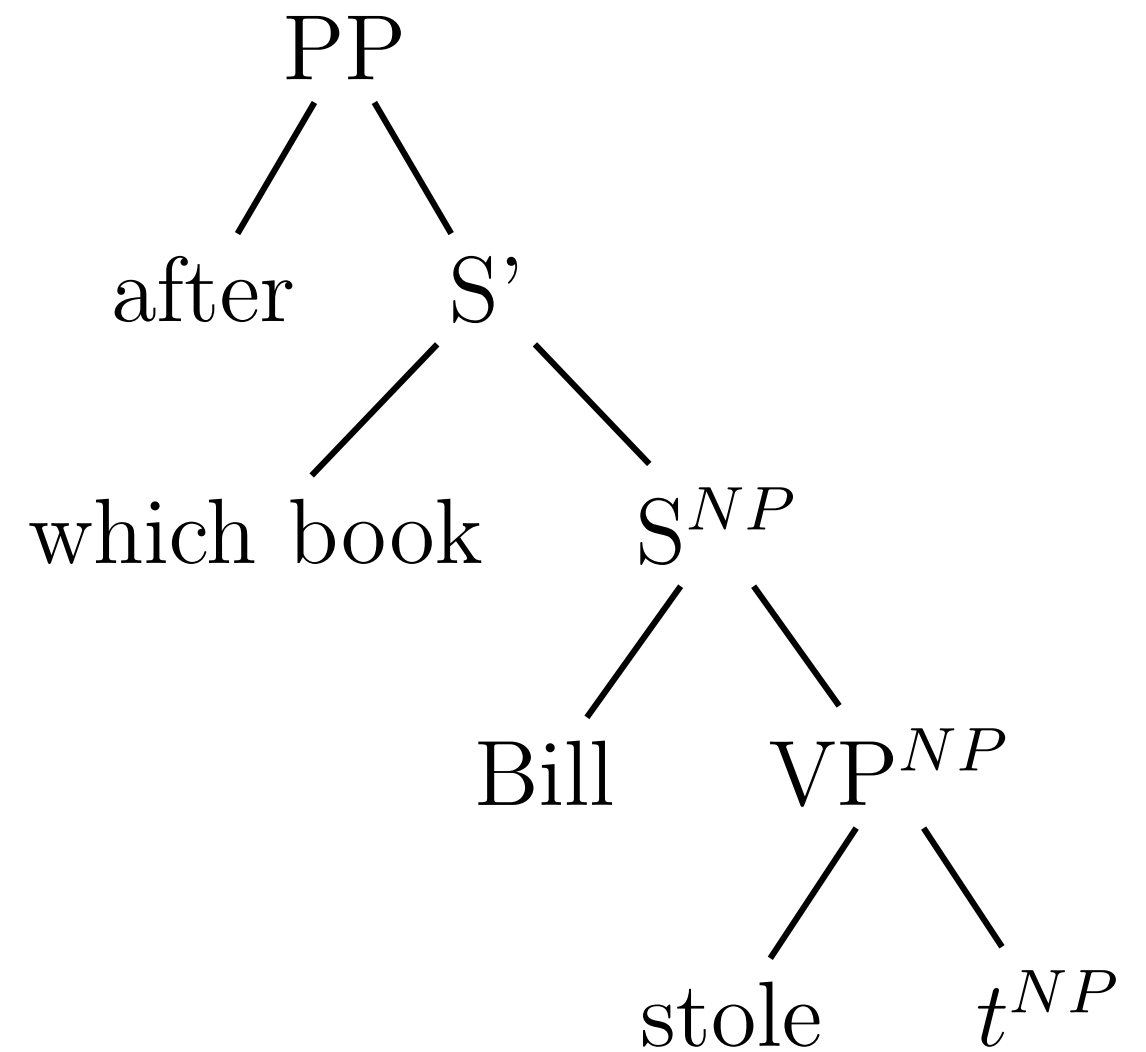
- In PGs, one of the traces is `exceptional', in that it cannot normally occur:
 - *Which book did [John [[buy the car] [after Bill stole t]]]?
- In order to account for the observed asymmetry between traces, Nunes moves from numerations (multi-sets of trees), to lexical sub-arrays (a recursive data structure; $LSA := \text{Multiset of Tree} \mid \text{Multiset of LSA}$)
- 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

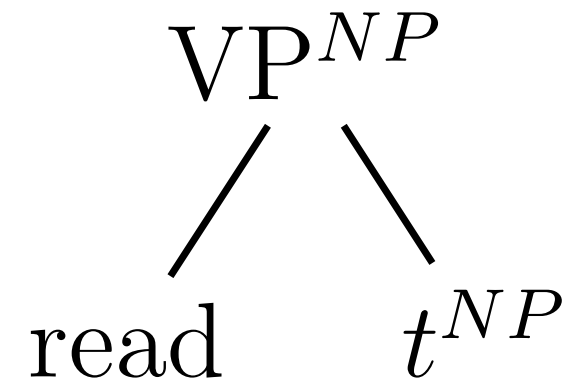
PGs via Parasitic Traces

- Derive: **AFTER BILL STOLE T**



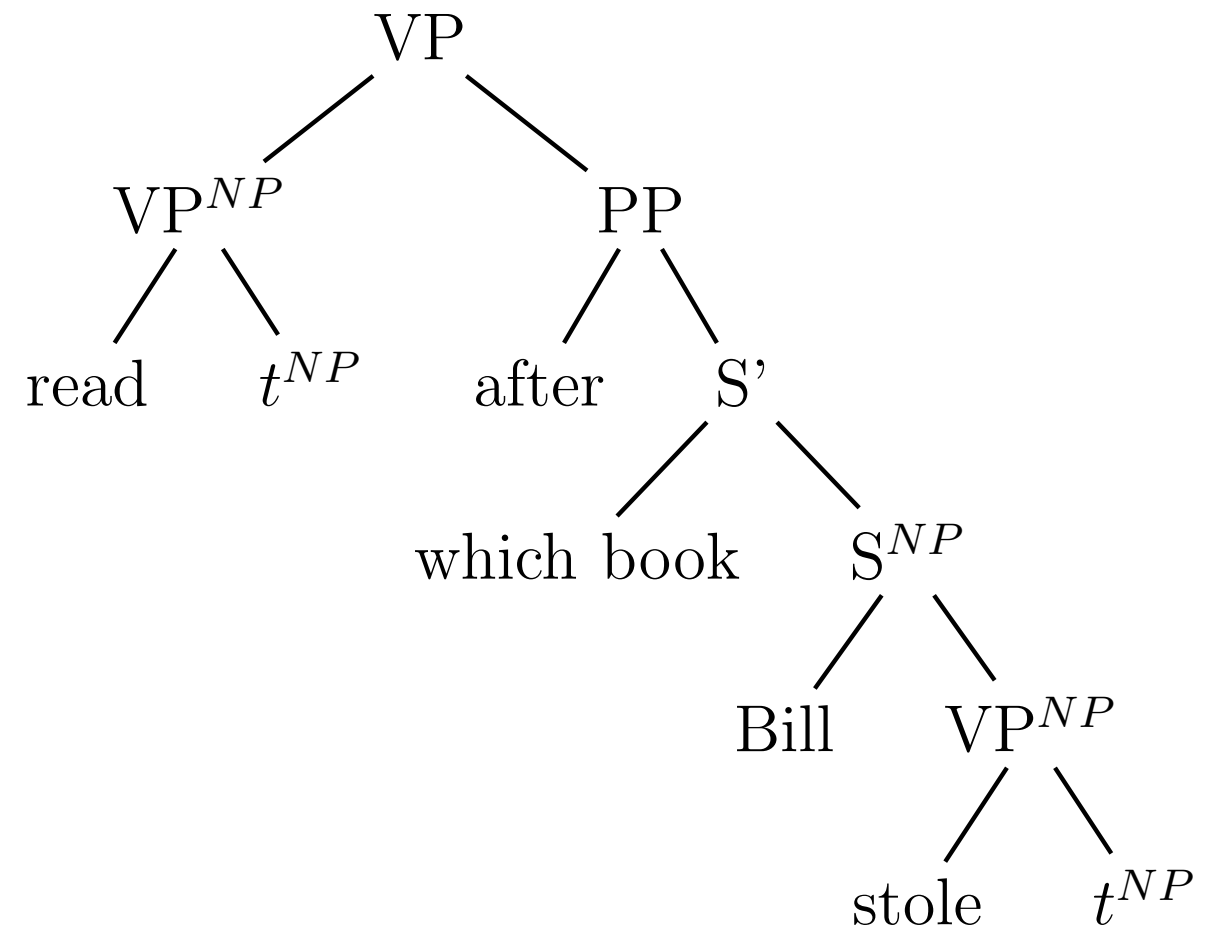
PGs via Parasitic Traces

- Derive: **AFTER BILL STOLE T**
- Derive: **READ T**



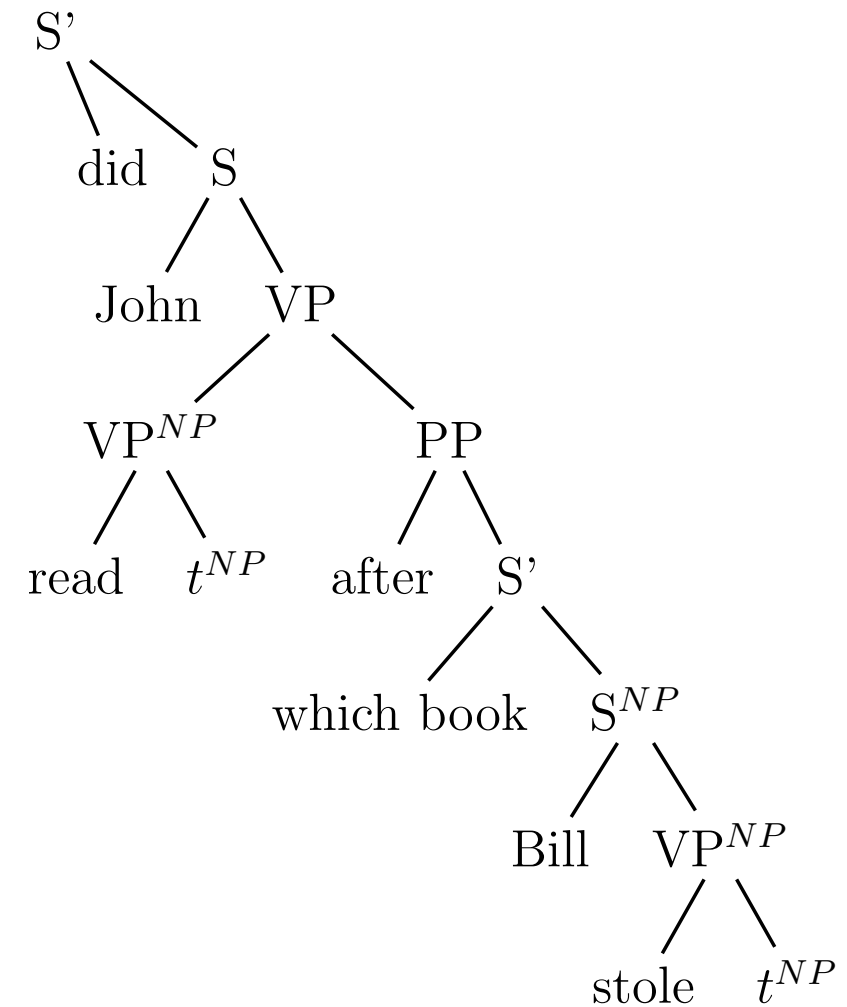
PGs via Parasitic Traces

- Derive: **AFTER BILL STOLE T**
- Derive: **READ T**
- Merge together



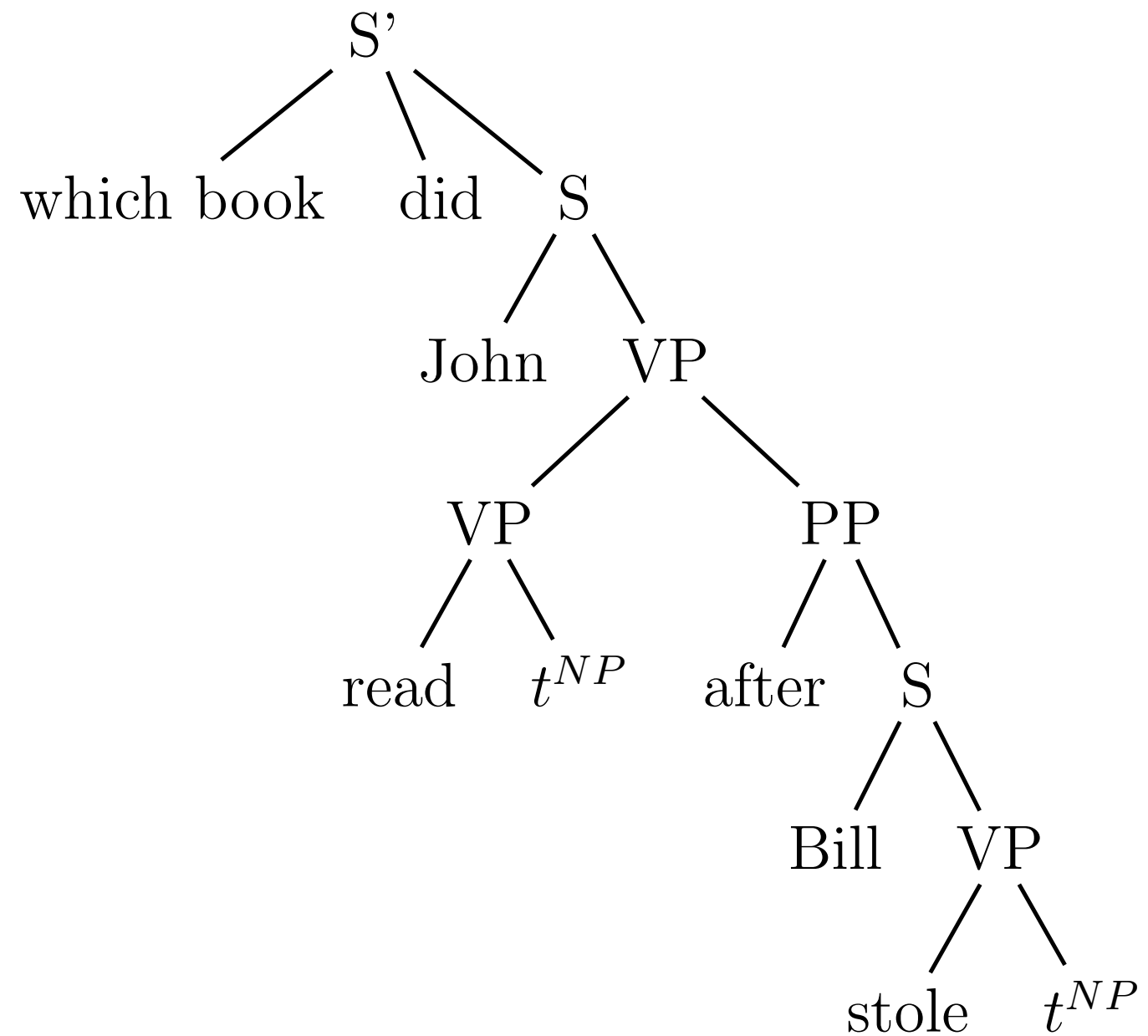
PGs via Parasitic Traces

- Derive: **AFTER BILL STOLE T**
- Derive: **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