



Ling 566
Nov 23, 2021
Auxiliaries

Announcement: HW7

- 12.4 (reviewed in class) is very similar to 12.2
- 12.2 was already included in HW6
- 12.4 has been removed from HW7 :)

Overview

- What are auxiliaries?
- General properties of auxiliaries
- Lexical type/lexical entries for auxiliaries
- Reading questions
- Next time: NICE properties (lexical rules)

What Auxiliaries Are

- Sometimes called “helping verbs,” (English) auxiliaries are little words that come before the main verb of a sentence, including forms of *be*, *have*, *do*, *can*, *could*, *may*, *might*, *must*, *shall*, *should*, *will*, and *would*
- Cross-linguistically, they tend to be involved in the expression of time, necessity, possibility, permission, and obligation, as well as such things as negation, affirmation, and questioning

Some Basic Facts about Eng. Auxiliaries

- They are optional
Pat tapdanced. Pat can tapdance. Pat is tapdancing.
- They precede any non-auxiliary verbs
**Pat tapdance can. *Pat tapdancing is.*
- They determine the form of the following verb
**Pat can tapdancing. *Pat is tapdance.*
- When they co-occur, their order is fixed
*Pat must be tapdancing. *Pat is musting tapdance.*
- Auxiliaries of any given type cannot iterate
**Pat could should tapdance.*

A Little History

- Chomsky's first book, *Syntactic Structures* (1957), contained a detailed analysis of the English system of auxiliary verbs
- It showed how formal analysis could reveal subtle generalizations
- The power of Chomsky's analysis of auxiliaries was one of the early selling points for transformational grammar
 - Especially, his unified treatment of auxiliary *do*
- So it's a challenge to any theory of grammar to deal with the same phenomena

Two Approaches to Analyzing Auxiliaries

- Treat auxiliaries as a special category, and formulate specialized transformations sensitive to their presence
- Assimilate their properties to existing types as much as possible, and elaborate the lexicon to handle what is special about them
- We adopt the latter, treating auxiliaries as a subtype of *srv-lxm*

Consequences of *mauxv-lxm* a Subtype of *srv-lxm*

- Auxiliaries should express one-place predicates
- Auxiliaries should allow non-referential subjects (dummy *there*, *it*, and idiom chunks)
- Passivization of the main verb (the auxiliary's complement) should preserve truth conditions
- Are these borne out?

Why call auxiliaries verbs?

- *be*, *have*, and *do* exhibit verbal inflections (tense, agreement)
- *be*, *have*, and *do* can all appear as main verbs (that is, as the only verb in a sentence)
 - Their inflections are the same in main and auxiliary uses
 - *be* exhibits auxiliary behavior, even in its main verb uses
- Modals (*can*, *might*, *will*, etc.) don't inflect, but they occur in environments requiring a finite verb with no (other) finite verb around.

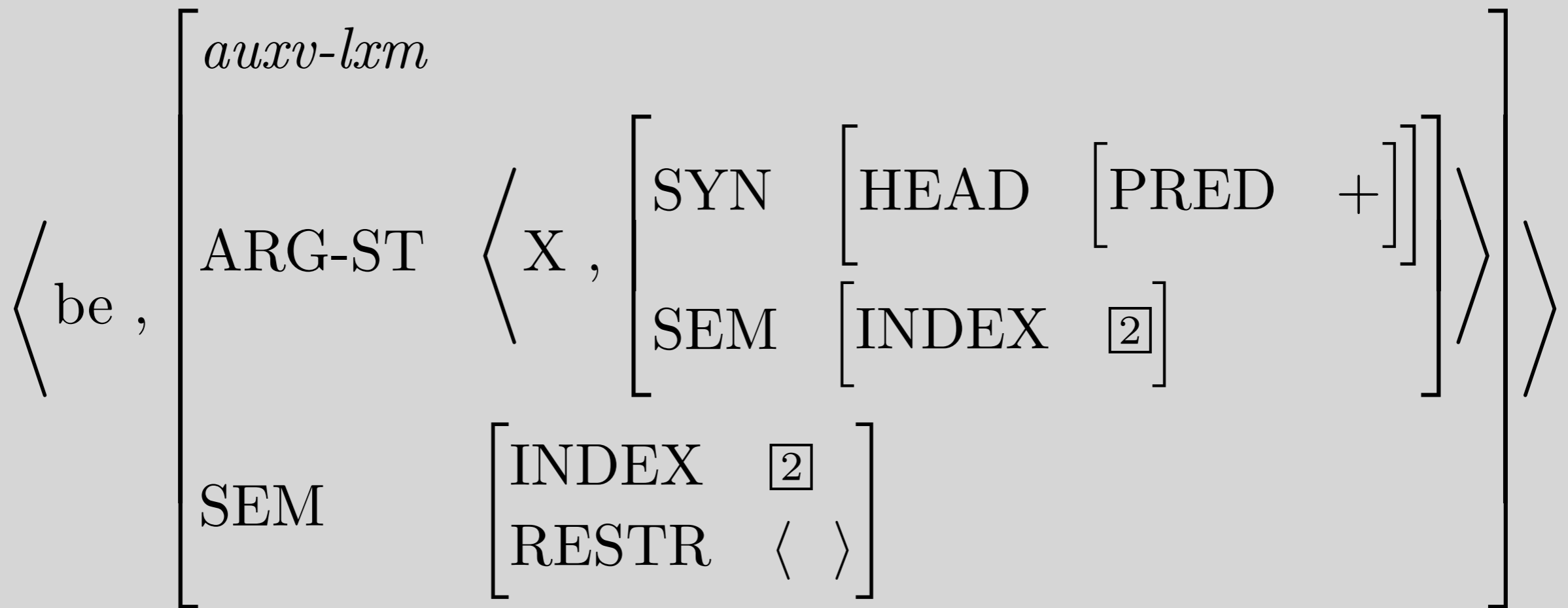
What's special about auxiliaries?

- Unlike other subject-raising verbs we have looked at, their complements aren't introduced by *to*
- The modals and *do* have defective paradigms
- There are restrictions on the ordering and iterability of auxiliaries
- They have a set of special characteristics known as the NICE properties.

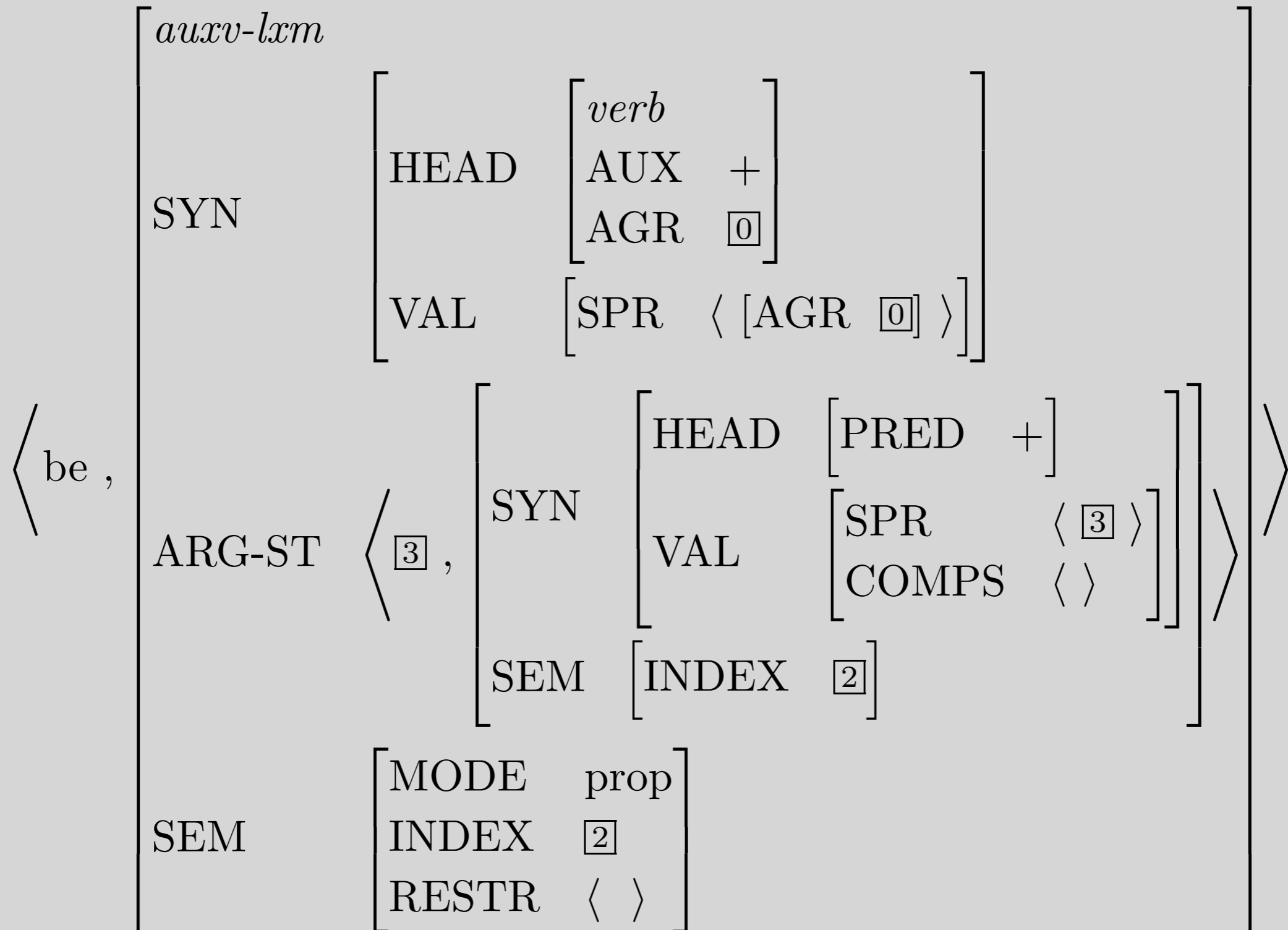
Some Type Constraints

TYPE	FEATURES/CONSTRAINTS	IST
<i>verb-lxm</i>	$\left[\begin{array}{l} \text{SYN} \quad \left[\text{HEAD} \quad \left[\begin{array}{l} \textit{verb} \\ \text{AUX} \quad / \quad - \end{array} \right] \right] \\ \text{ARG-ST} \quad \langle [\text{HEAD} \textit{nominal}] , \dots \rangle \\ \text{SEM} \quad \left[\text{MODE} \quad \textit{prop} \right] \end{array} \right]$	<i>infl-lxm</i>
<i>srv-lxm</i>	$\left[\text{ARG-ST} \quad \left\langle \boxed{1} , \left[\begin{array}{l} \text{SPR} \quad \langle \boxed{1} \rangle \\ \text{COMPS} \quad \langle \rangle \end{array} \right] \right\rangle \right]$	<i>verb-lxm</i>
<i>ic-srv-lxm</i>	$\left[\begin{array}{l} \text{ARG-ST} \quad \left\langle \text{X} , \left[\begin{array}{l} \text{VP} \\ \text{INF} \quad + \\ \text{INDEX} \quad s \end{array} \right] \right\rangle \\ \text{SEM} \quad \left[\text{RESTR} \quad \left\langle [\text{ARG} \quad s] \right\rangle \right] \end{array} \right]$	<i>srv-lxm</i>
<i>auxv-lxm</i>	$\left[\text{SYN} \quad \left[\text{HEAD} \quad \left[\text{AUX} \quad + \right] \right] \right]$	<i>srv-lxm</i>

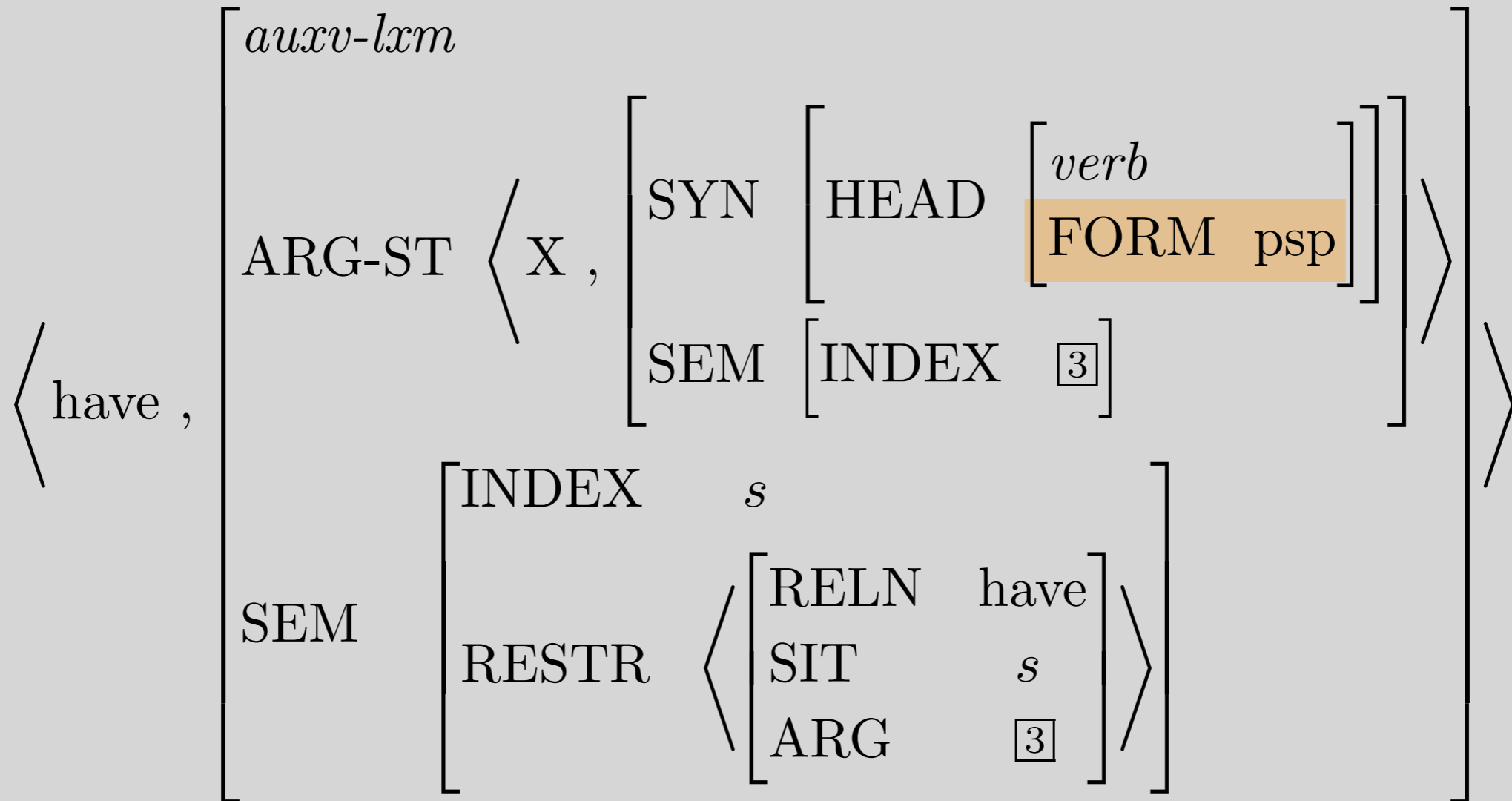
A Lexical Entry for *be*



The Entry for *be*, with Inherited Information

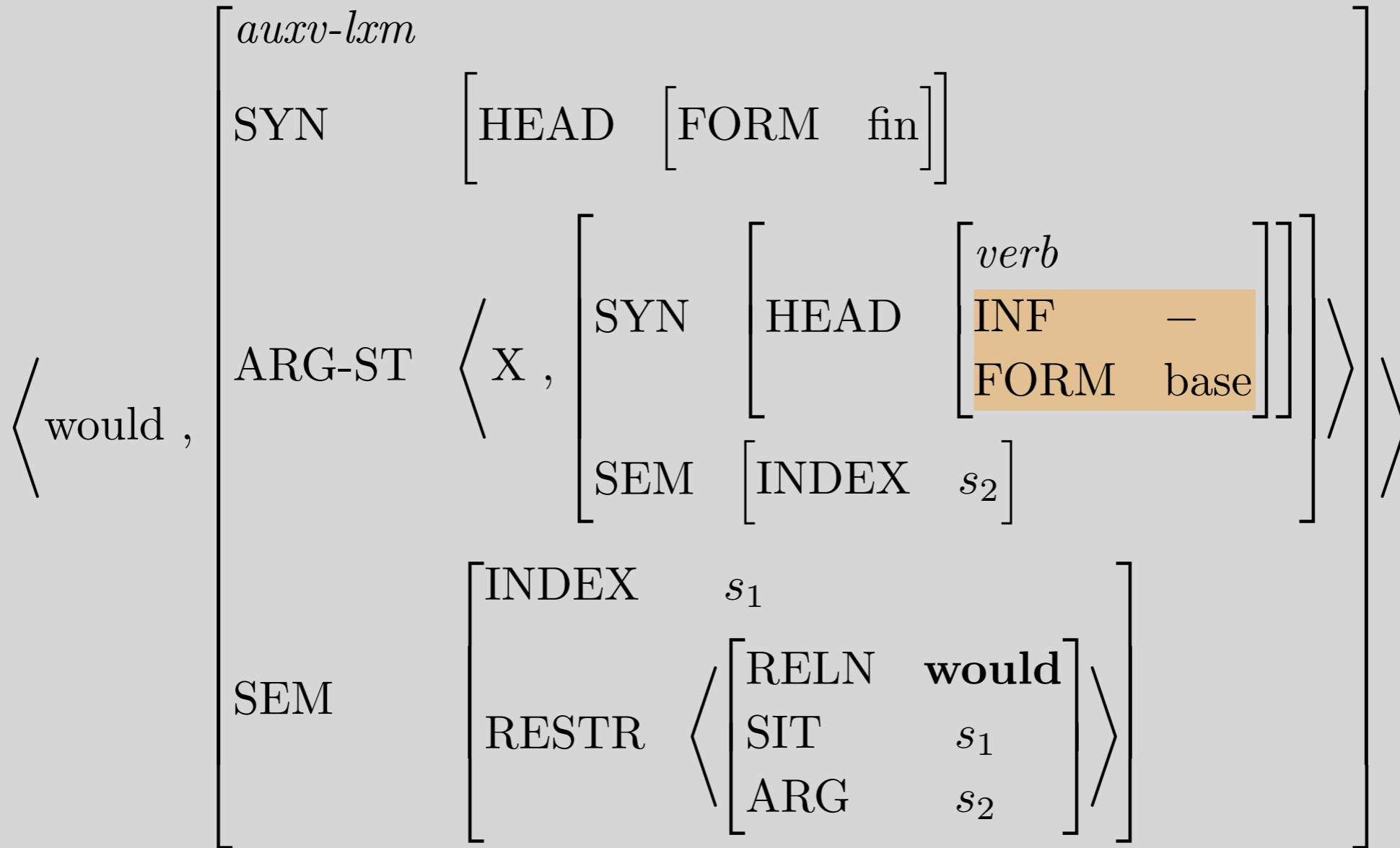


Entry for *have*



- Note the FORM restriction on the complement VP
- What accounts for the analogous FORM restriction on verbs following *be*?

Lexical Entry for a Modal



- Note the restriction on the form of the complement VP
- What inflectional lexical rules apply to this lexeme?

Accounting for the Basic Facts Cited Earlier

- **Optionality of auxiliaries:**
As raising verbs, their subjects and complements go together.
- **Auxiliaries precede non-auxiliary verbs:**
Auxiliaries are heads, and complements follow heads in English.
- **Auxiliaries determine the form of the following verb:**
This is built into their lexical entries.
- **When auxiliaries co-occur, their order is fixed:**
Different explanations for different combinations; see next slide.
- **Non-iterability of auxiliaries:**
Ditto.

Accounting for Restrictions on Order and Iterability

- **Order**

- Modals are finite, and all auxiliaries take non-finite complements. Hence, modals must come first.
- Stative verbs (like *own*) don't have present participles, and auxiliary *have* is stative. Hence, **Pat is having tapdanced*.

- **Iterability**

- Auxiliary *be* is also stative, so **Pat is being tapdancing*.
- Modals must be finite, and their complements must be base, so **Pat can should tapdance*.
- **Pat has had tapdanced* can be ruled out in various ways, e.g. stipulating that auxiliary *have* has no past participle.

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W Using semantics to explain lack of iterability:

Seems iffy; would rather call it syntax

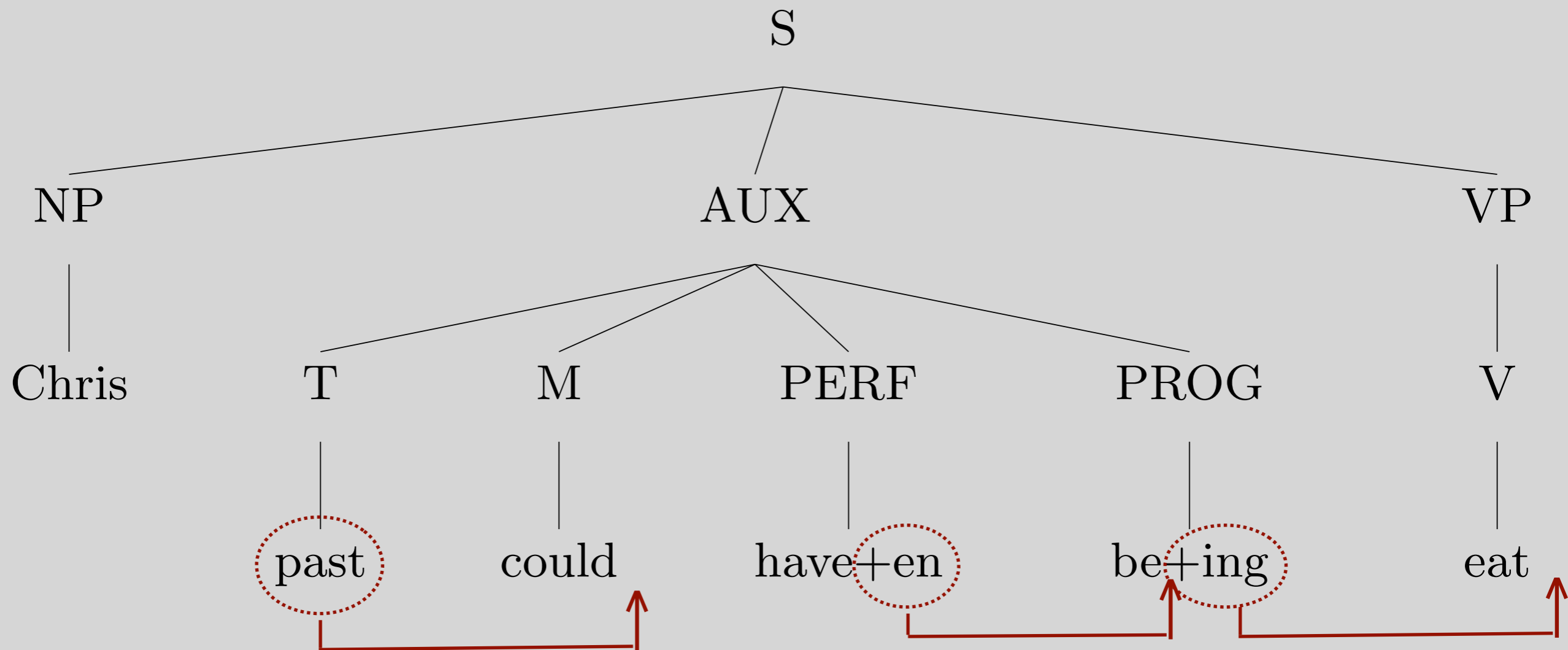
Seems squishy; but so is that data

Seems about right

None of the above

Sketch of Chomsky's Old Analysis

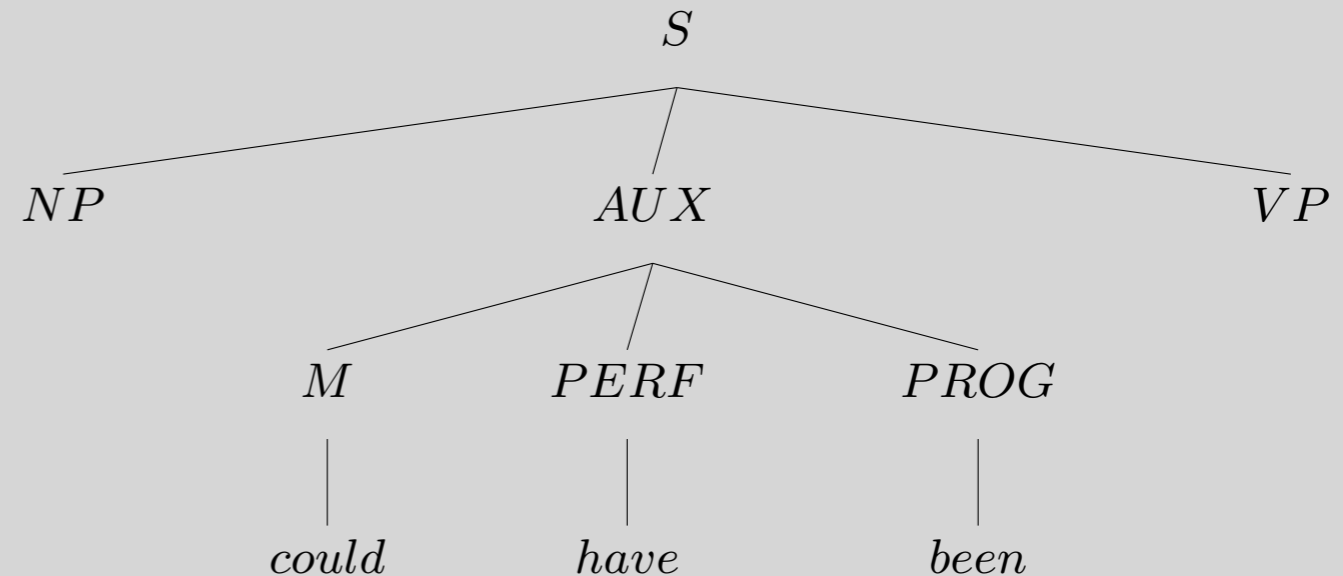
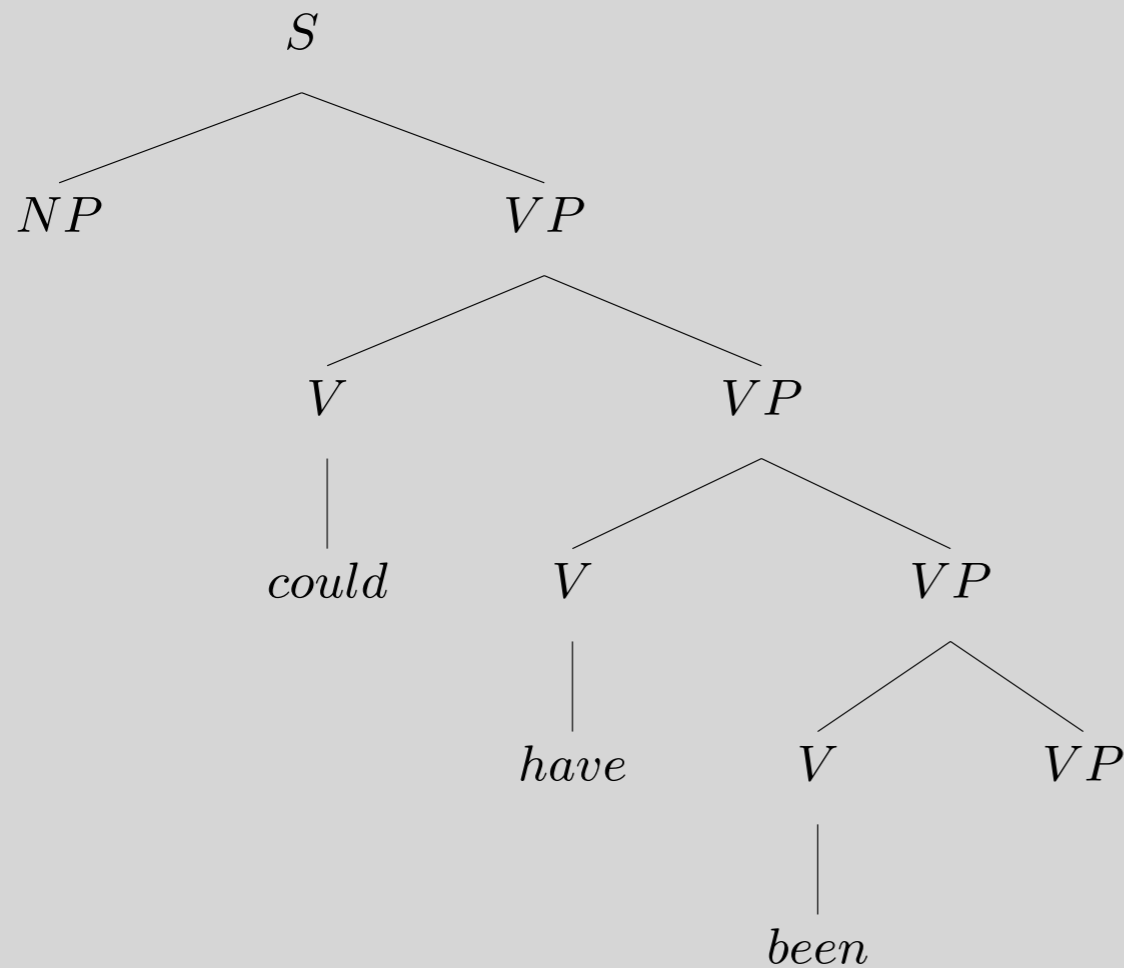
$S \rightarrow NP \text{ AUX } VP$
 $AUX \rightarrow T(M)(PERF)(PROG)$



How this Analysis Handles the Basic Facts

- **Optionality of auxiliaries:**
Stipulated in the phrase structure rule (with parentheses)
- **Auxiliaries precede non-auxiliary verbs:**
Built into the phrase structure rule, with AUX before VP
- **Auxiliaries determine the form of the following verb:**
Inflections are inserted with the auxiliaries and moved onto the following verb transformationally.
- **When auxiliaries co-occur, their order is fixed:**
Stipulated in the phrase structure rule for AUX
- **Non-iterability of auxiliaries:**
Ditto.

The two analyses assign very different trees



- *could have been* *VP*, *have been* *VP*, and *been* *VP* are all constituents
- *could have been* is not a constituent

- *could have been* *VP*, *have been* *VP*, and *been* *VP* are not constituents
- *could have been* is a constituent

Ellipsis and Constituency

- Consider:

Pat couldn't have been eating garlic, but Chris could have been

Pat couldn't have been eating garlic, but Chris could have

Pat couldn't have been eating garlic, but Chris could

- On the nested analysis, the missing material is a (VP) constituent in each case
- On the flat analysis, the missing material is never a constituent
- This argues for our analysis over the old transformational one.

Our Analysis of Auxiliaries So Far

- Auxiliaries are subject-raising verbs
- Most basic distributional facts about them can be handled through selectional restrictions between auxiliaries and their complements (that is, as ARG-ST constraints)
- Auxiliaries are identified via a HEAD feature AUX, which we have not yet put to use

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W How do you feel atop HPSG mountain?

Beautiful view, so glad to
be up here

Satisfying hike, but
hiking around up here is
hard too

Can only see the trees in
front of my face

Too tired to know

Other

Reading Questions

- Could you elaborate more on why we are having two new subtypes of *srv-lxm*?

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<i>auxv-lxm</i>	$\left[\text{SYN} \quad \left[\text{HEAD} \quad \left[\text{AUX} \quad + \right] \right] \right]$	<i>srv-lxm</i>

Reading Questions

- I am confused as to why the lexical entry for do is semantically empty. I could imagine a situation where do has a RESTR predication with a SIT, a DOER, and a thing being done. How does our semantically empty analysis of do account for sentences like "I do"?
- On page 397, it is stated that “The semantics of auxiliary have, unlike that of be, is not vacuous. The form of the complement and the meaning are, in fact, what distinguish have from other auxiliary verbs in English.” I was wondering in what ways have is different from other auxiliary verbs and what “the form of the complement and the meaning” have to do with it?

Reading Questions

- How does our grammar treat progressive be in sentences like "You are being ridiculous." referring to a temporary behavior? Do we not consider be a stative verb in such situation, and consider it an action verb meaning behaving?

Reading Questions

- Since the Past-Tense Verb Lexical Rule is undefined for will, how does the past tense semantic information get added to would in instances such as 'Pat would dance in her youth.' ? Does the F_PAST function have a would -> would entry?

Reading Questions

- It feels as though HEAD has become less important as the quarter progresses, although what it ensures with regards to agreement is still crucial to the function of our grammar. Would it be fair to say that HEAD values are primarily important for agreement? If we didn't need to account for agreement, would we still need HEAD?

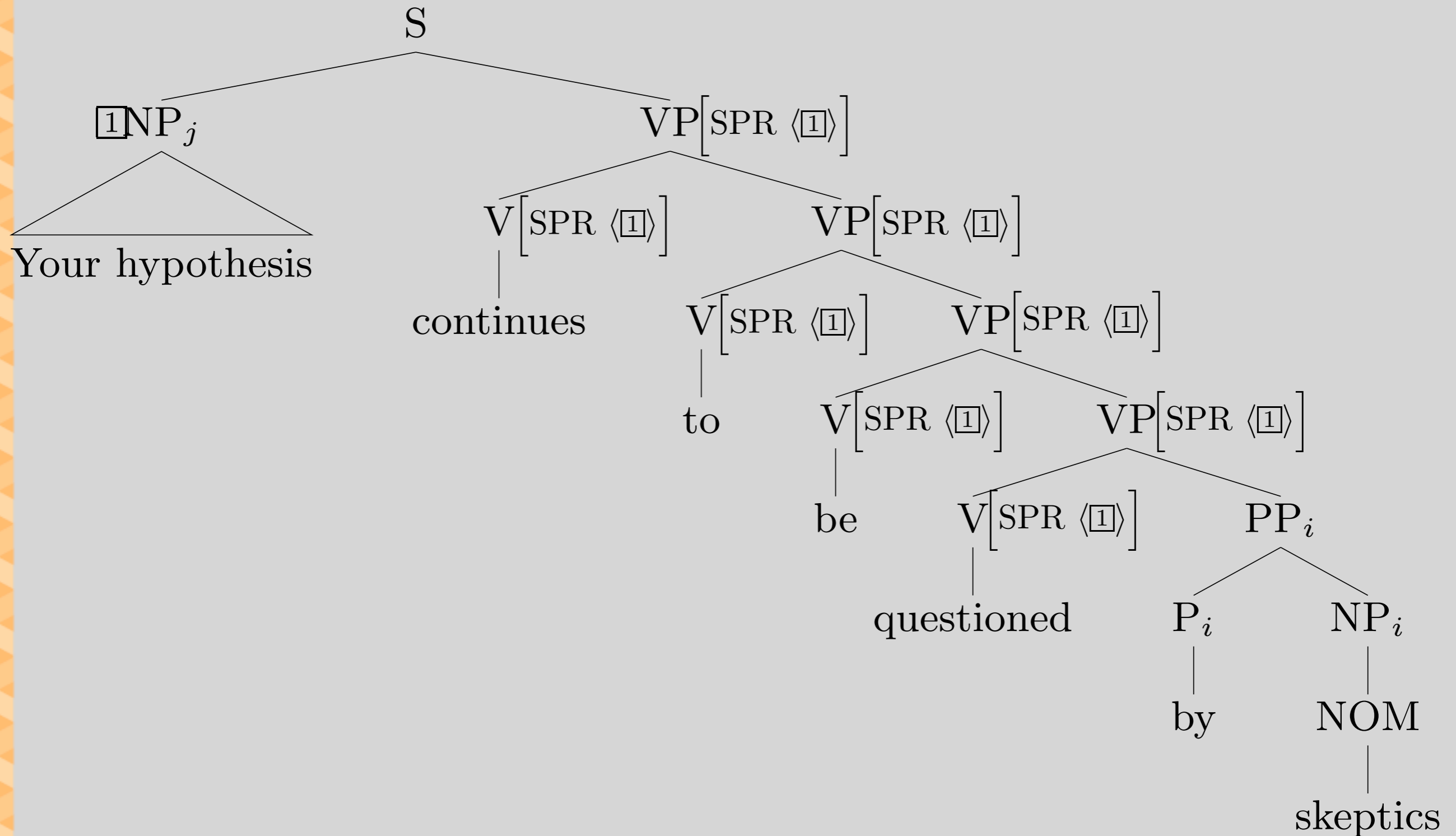
Reading Questions

- In verb-lxm, we have PRED, INF, AUX and FORM. It is bit overwhelming to see the verb-lxm, a brief review to each of them (PRED, INF, AUX and FORM) would be great help.

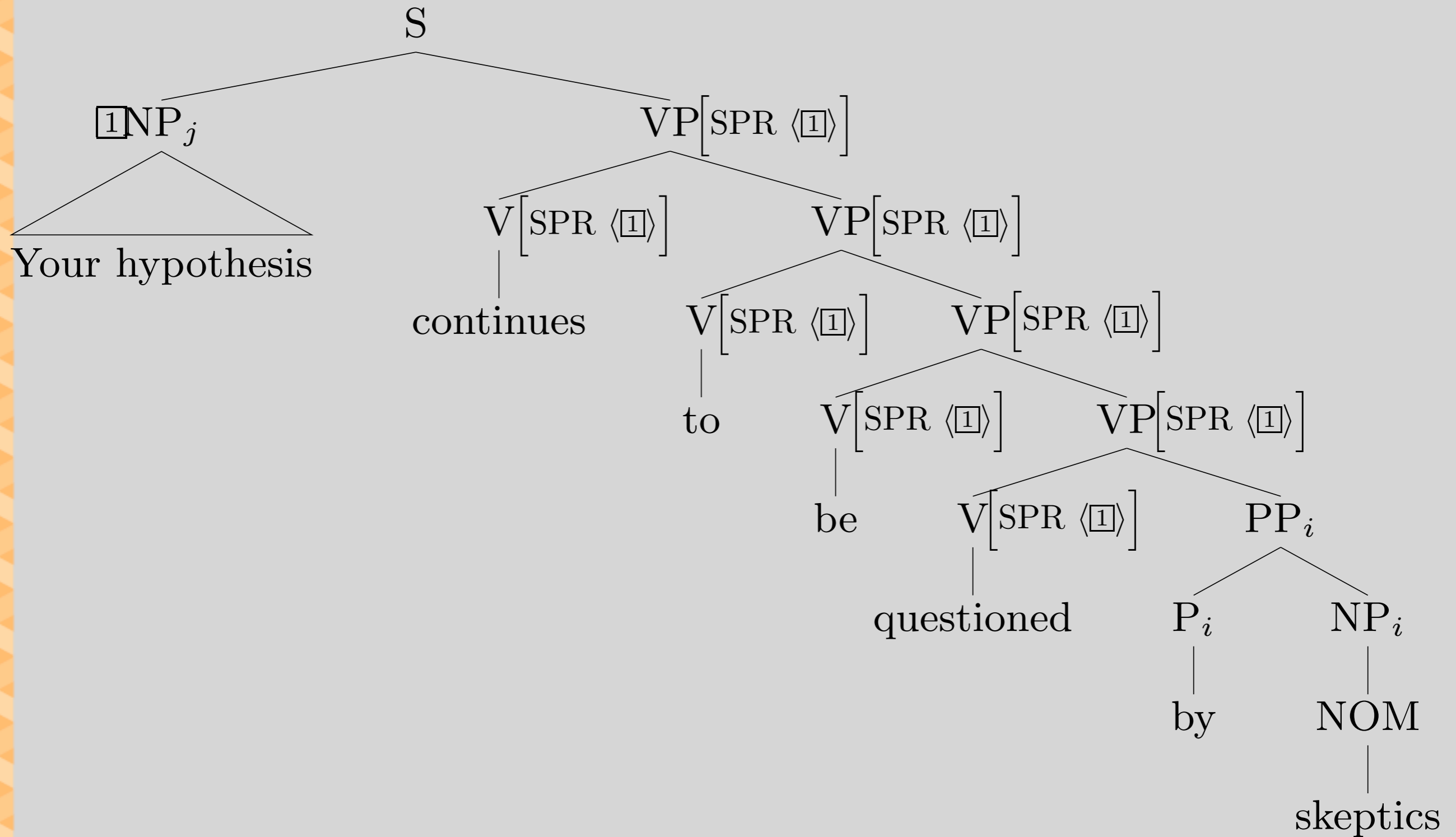
Reading Questions

- We've described what we're building as a "grammar fragment" instead of a full grammar, because we can't capture all of the intricacies in one single quarter. What's the motivation behind the ordering of these extra bits we're learning at the end? I.e. are they building towards something, or is it more to just fill in big gaps and the ordering is less important at this stage?

Office Hours Question



Is the RESTR value the same on all of those [1]s?



Why isn't the RESTR inside [1] in the S's RESTR 9 times?

