Ling 566
Nov 17, 2016

Auxiliaries

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 Making *auxv-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.
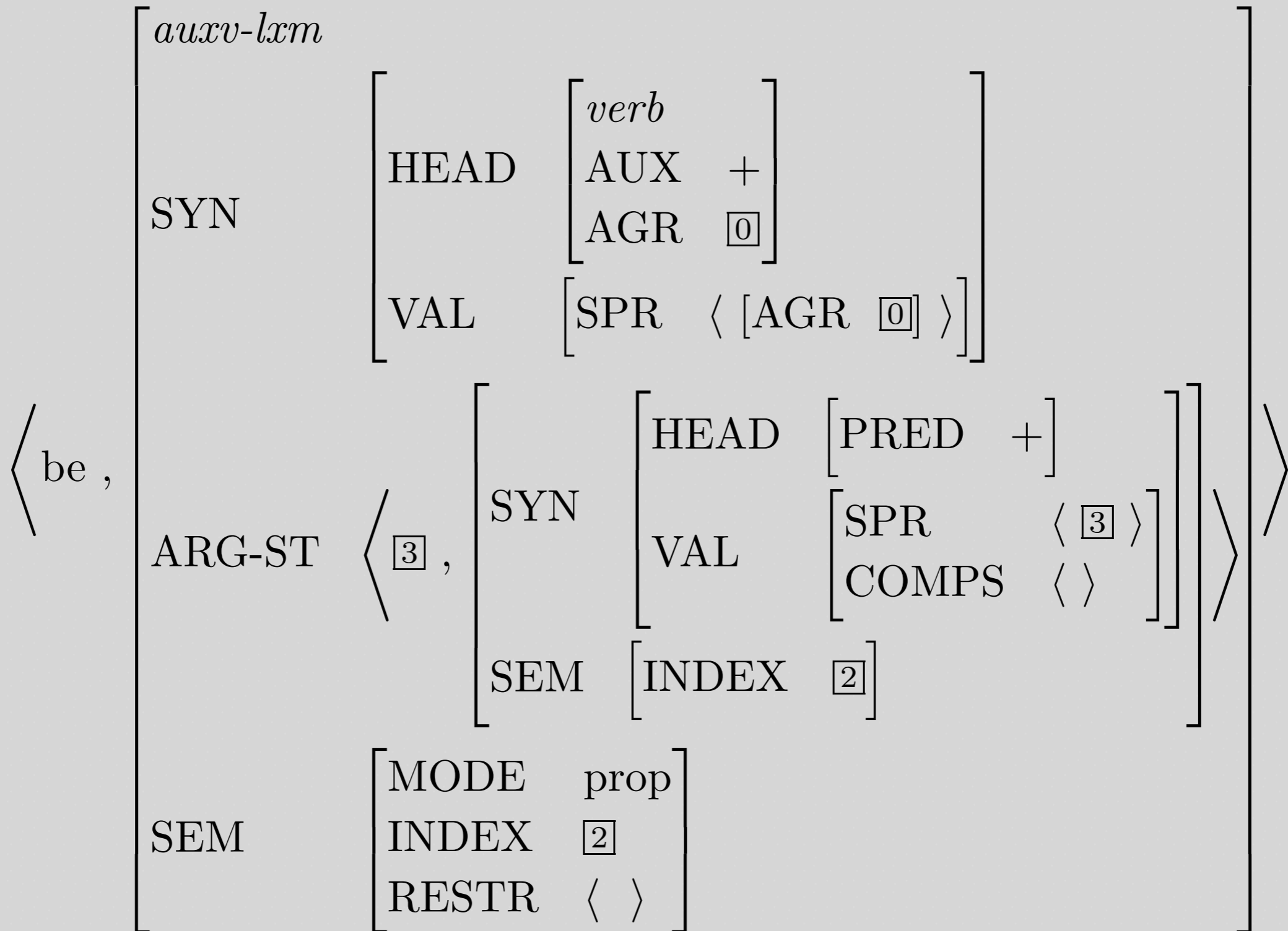
What's special about auxiliaries?

- 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.
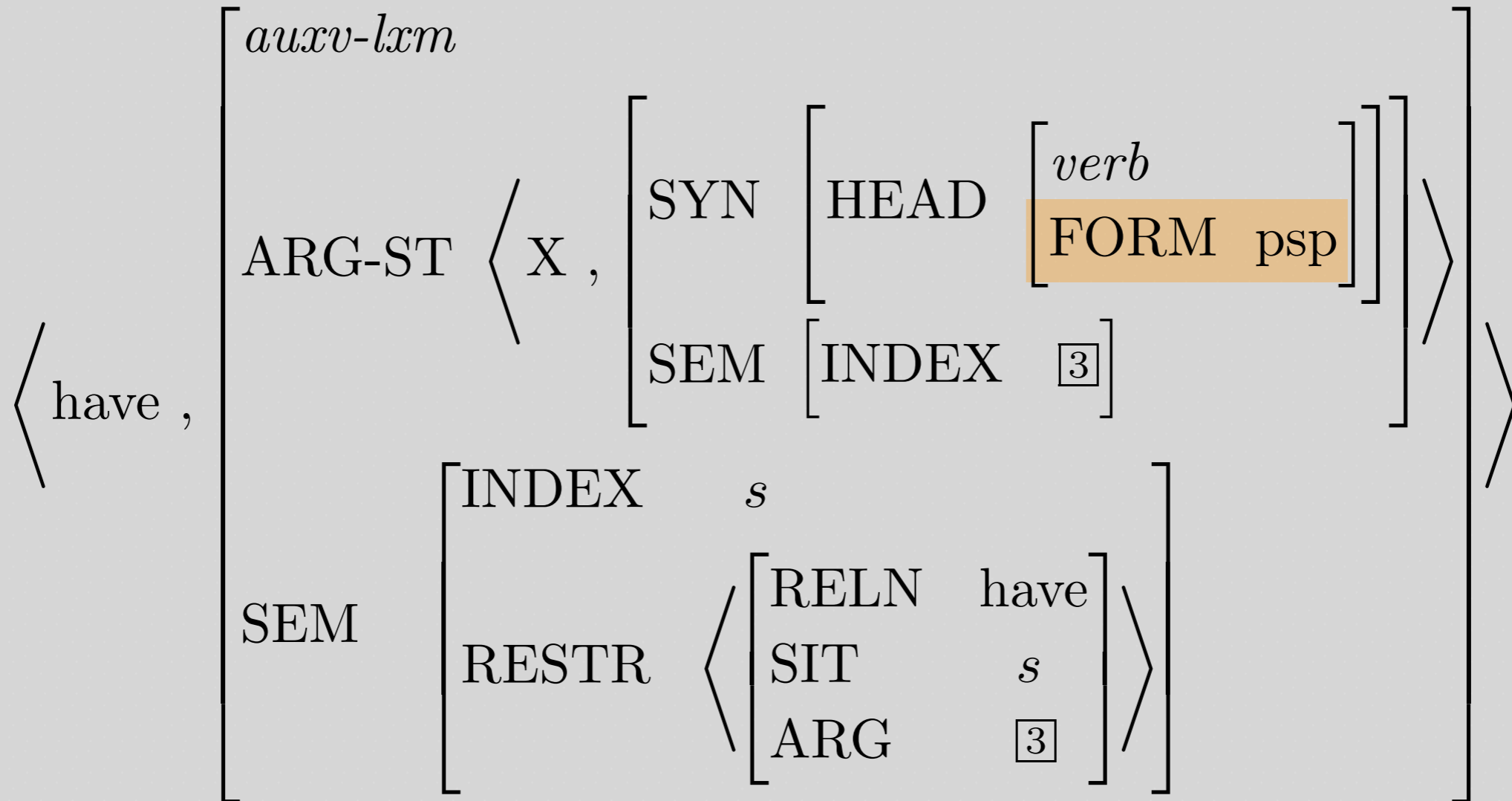
Some Type Constraints

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

A Lexical Entry for *be*

$$\left\langle \text{be} , \begin{bmatrix} \textit{auxv-lxm} \\ \\ \text{ARG-ST} \quad \left\langle \text{X} , \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{PRED} & + \end{bmatrix} \end{bmatrix} \\ \text{SEM} & \begin{bmatrix} \text{INDEX} & \boxed{2} \end{bmatrix} \end{bmatrix} \right\rangle \\ \\ \text{SEM} \quad \begin{bmatrix} \text{INDEX} & \boxed{2} \\ \text{RESTR} & \langle \ \rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

The Entry for *be*, with Inherited Information

$$
\left\langle \text{be} \,,\,
\begin{bmatrix}
\textit{auxv-lxm} \\[4pt]
\text{SYN} &
\begin{bmatrix}
\text{HEAD} &
\begin{bmatrix}
\textit{verb} \\
\text{AUX} & + \\
\text{AGR} & \boxed{0}
\end{bmatrix} \\[20pt]
\text{VAL} &
\begin{bmatrix}
\text{SPR} & \langle\, [\text{AGR } \boxed{0}]\, \rangle
\end{bmatrix}
\end{bmatrix} \\[50pt]
\text{ARG-ST} &
\left\langle \boxed{3} \,,\,
\begin{bmatrix}
\text{SYN} &
\begin{bmatrix}
\text{HEAD} & [\text{PRED} \quad +] \\[10pt]
\text{VAL} &
\begin{bmatrix}
\text{SPR} & \langle\, \boxed{3}\, \rangle \\
\text{COMPS} & \langle\, \rangle
\end{bmatrix}
\end{bmatrix} \\[20pt]
\text{SEM} & [\text{INDEX} \quad \boxed{2}]
\end{bmatrix}
\right\rangle \\[50pt]
\text{SEM} &
\begin{bmatrix}
\text{MODE} & \text{prop} \\
\text{INDEX} & \boxed{2} \\
\text{RESTR} & \langle\, \rangle
\end{bmatrix}
\end{bmatrix}
\right\rangle
$$

Entry for *have*

$$
\left\langle \text{have}, \begin{bmatrix} \textit{auxv-lxm} \\ \text{ARG-ST} \left\langle \text{X}, \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{verb} \\ \boxed{\text{FORM} \quad \text{psp}} \end{bmatrix} \end{bmatrix} \\ \text{SEM} & \begin{bmatrix} \text{INDEX} & \boxed{3} \end{bmatrix} \end{bmatrix} \right\rangle \\ \text{SEM} \begin{bmatrix} \text{INDEX} & s \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \text{have} \\ \text{SIT} & s \\ \text{ARG} & \boxed{3} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

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

Lexical Entry for a Modal

$$
\left\langle \text{would} \, , \begin{bmatrix} \textit{auxv-lxm} \\[4pt] \text{SYN} \quad \begin{bmatrix} \text{HEAD} \quad \begin{bmatrix} \text{FORM} \quad \text{fin} \end{bmatrix} \end{bmatrix} \\[12pt] \text{ARG-ST} \quad \left\langle \text{X} \, , \begin{bmatrix} \text{SYN} \quad \begin{bmatrix} \text{HEAD} \quad \begin{bmatrix} \textit{verb} \\ \text{INF} \quad - \\ \text{FORM} \quad \text{base} \end{bmatrix} \end{bmatrix} \\[12pt] \text{SEM} \quad \begin{bmatrix} \text{INDEX} \quad s_2 \end{bmatrix} \end{bmatrix} \right\rangle \\[20pt] \text{SEM} \quad \begin{bmatrix} \text{INDEX} \quad s_1 \\[8pt] \text{RESTR} \quad \left\langle \begin{bmatrix} \text{RELN} \quad \textbf{would} \\ \text{SIT} \quad s_1 \\ \text{ARG} \quad s_2 \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

- 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.

Sketch of Chomsky's Old Analysis

$$S \rightarrow NP \ AUX \ VP$$
$$AUX \rightarrow T(M)(PERF)(PROG)$$
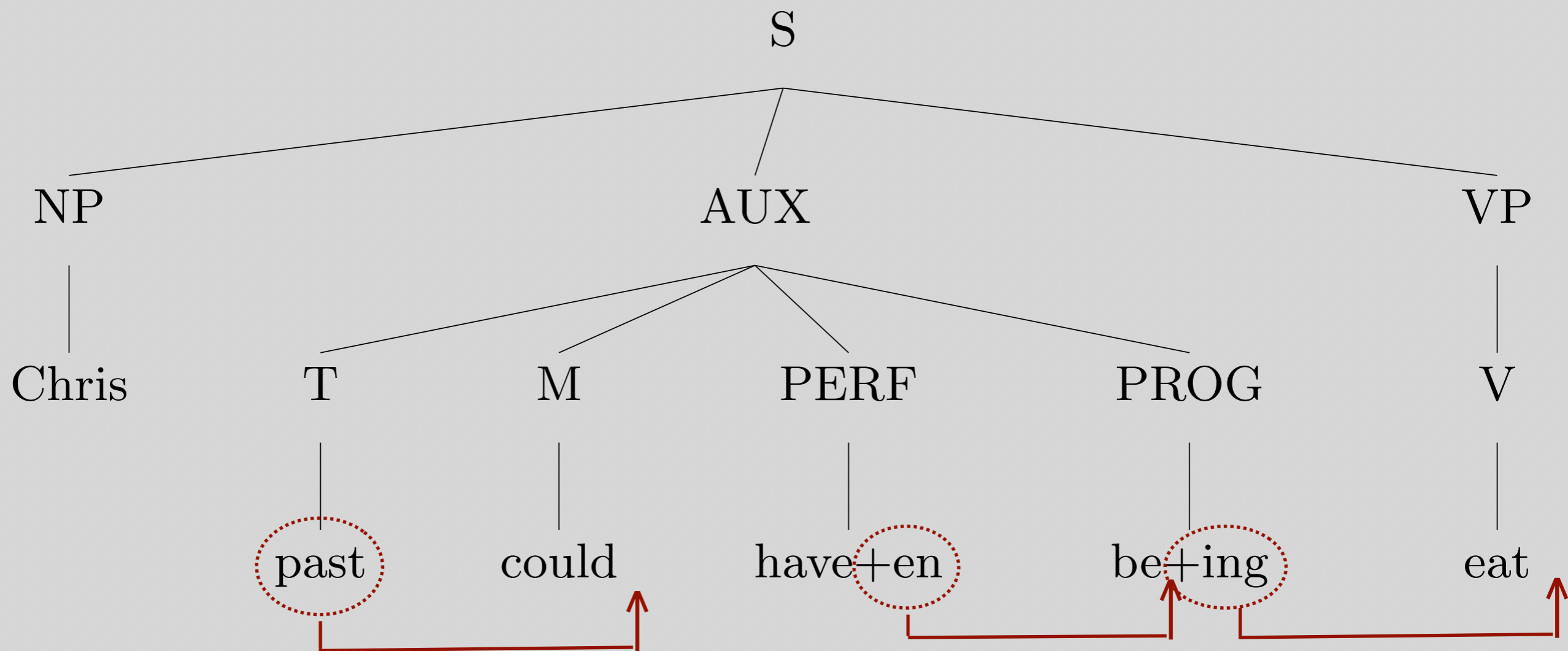
How this Analysis Handles the Basic Facts

- 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

S
- NP
- VP
  - V
    - could
  - VP
    - V
      - have
    - VP
      - V
        - been
      - VP

S
- NP
- AUX
  - M
    - could
  - PERF
    - have
  - PROG
    - been
- VP
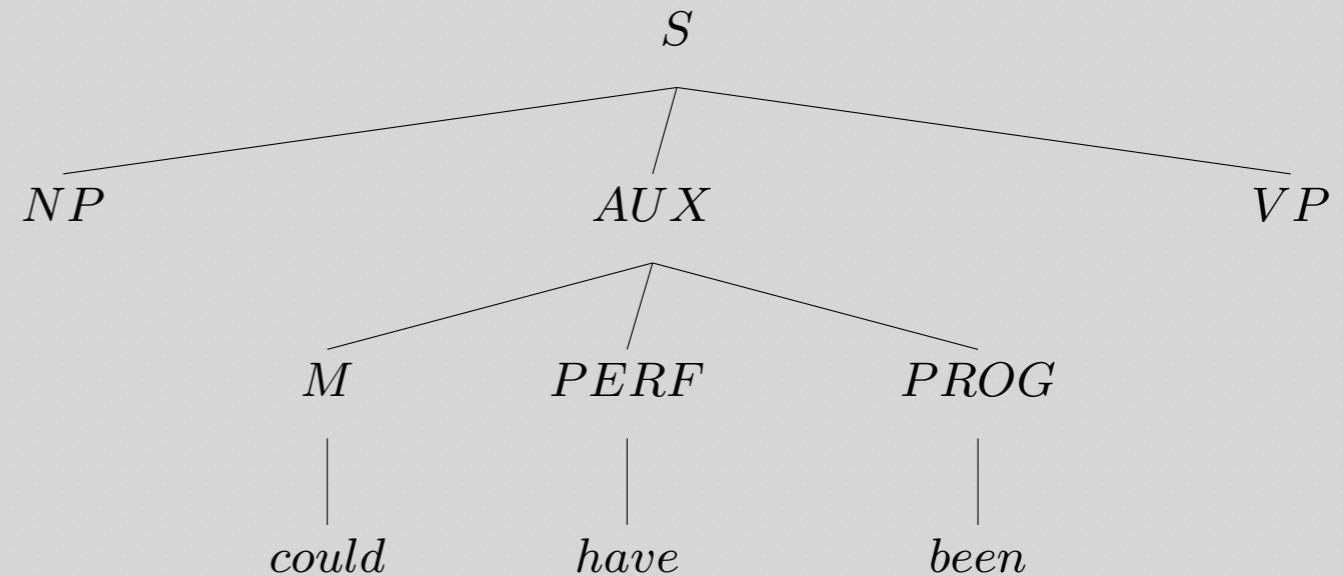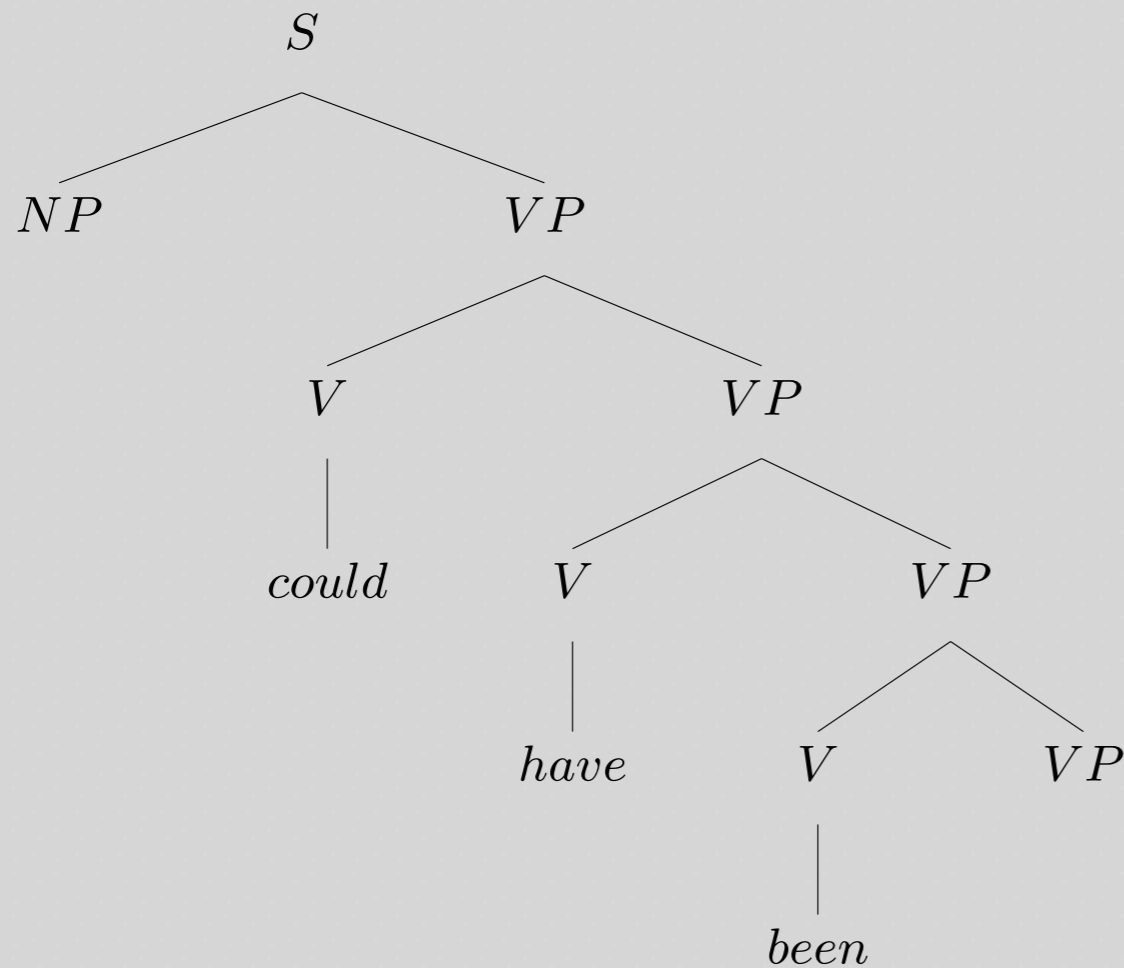
- *could have been* VP, *have been* VP, and *been* VP are all constituents
- *could have been* is not a constituent

- *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

Overview

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- Reading questions

- Next time: NICE properties (lexical rules)

Reading Questions

- So at the beginning of the chapter, it talks about there being two ways to analyze auxiliaries -- you can posit a new thing called AUX that has its own rewrite rules, or you can analyze auxiliaries as verbs. The book says that we are doing option two, but then we go on to define a subtype of verb-lxm that takes certain arguments, which feels a lot like option one. What is the difference between these two approaches, and how is it that we are still using the second one?

Reading Questions

- p.399 says that to prevent past-tense modal forms, we assume the function F_past is undefined for modals. Does this mean the morphological function in a lexical rule (the stuff under the carpet) can cause a sentence to be rejected by the grammar?

- In this section we make a few more assumptions about what's under the carpet of morphology by pushing our explanation for why affixes don't attach to modals under there as well. I know it's out of the scope of this text, but do these issues of morphology get more attention with respect to HPSG later?

Reading Questions

- 1) *I do go to the store sometimes*

- 2) *I did go to the store sometimes*

- These sentences do have different meanings, and the only thing that changes is the FORM of "do." How do we explain the the semantic difference? Where does it come from, if not the aux verb "do?" Am I missing something?

Reading Questions

- If *do* makes no semantic contribution, that means that the sentence *I did go to the store yesterday* has the same semantics as *I went to the store yesterday*, correct?

- Also, in the footnote (8), it says that the (non-finite) *do* in imperatives like *Do sit down* is a different *do*. What about the *do* in imperatives like *Don't go!*? Is it like the do in *Do go*, or like the *do* in *I did go to the store*?

Reading Questions

- Also building on Masha's question about the semantic contributions of *do* -- in her example, *I did go to the store*, vs *I went to the store*, it seems like these two sentences have the same truth conditions, but I would read them differently. *I did go to the store* seems more like it's putting emphasis on the *did* so it could be in response to a sentence like, *You didn't go to the store!* Is this just a pragmatics thing, and something that we can't really capture with the semantics in our grammar?

Reading Questions

- Does English not have future tense? Is this why we have weirdnesses like:

  - *I can / I will be able to*

  - *I must / I will have to*

- I was trying to work out why modals don't work in what I'd thought of as future tense... but *will* is just another modal, and modals don't iterate, yes?
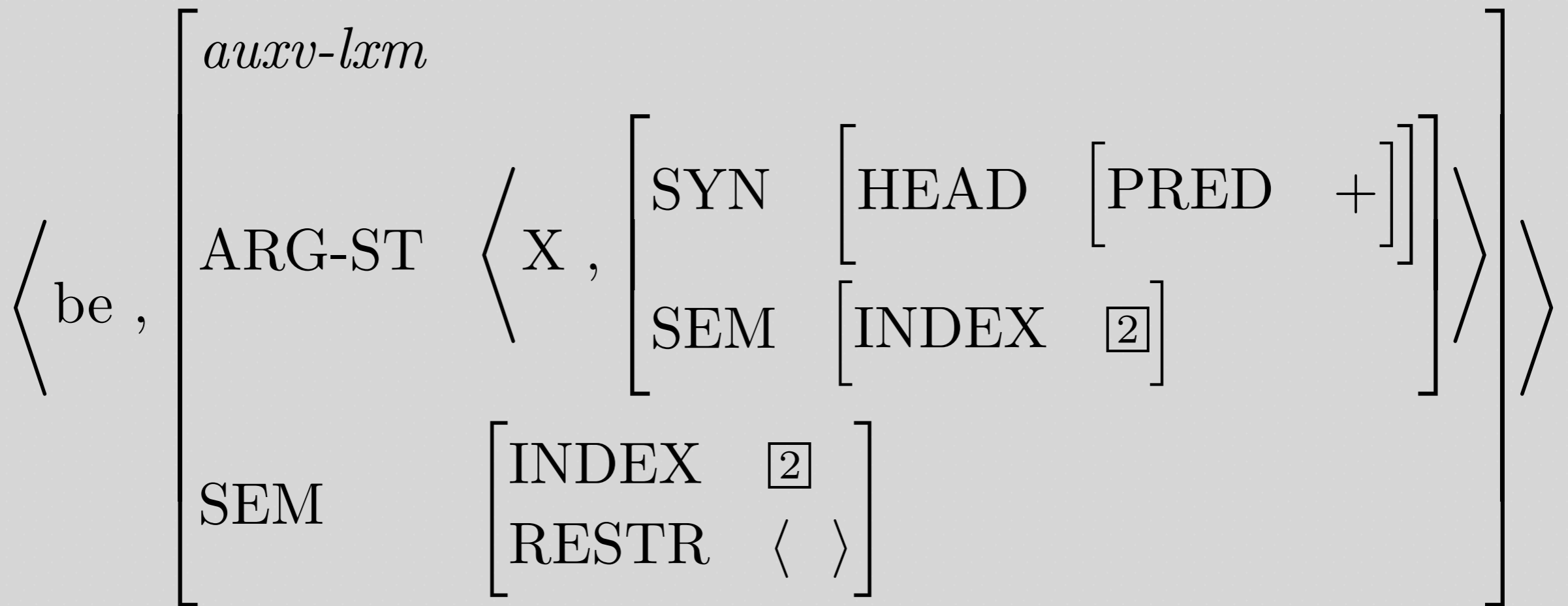
Reading Questions

- How do we account for double-modal dialects?

- On pg. 396, the type *verb-lxm* is shown as non-defeasibly PRED -. Is that a typo? On the next page, *be*, an aux-lxm, is PRED +.

Some Type Constraints

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

A Lexical Entry for *be*

$$\left\langle \text{be} , \begin{bmatrix} \textit{auxv-lxm} \\[2em] \text{ARG-ST} \quad \left\langle \text{X} , \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{PRED} & + \end{bmatrix} \end{bmatrix} \\[1em] \text{SEM} & \begin{bmatrix} \text{INDEX} & \boxed{2} \end{bmatrix} \end{bmatrix} \right\rangle \\[3em] \text{SEM} \quad \begin{bmatrix} \text{INDEX} & \boxed{2} \\ \text{RESTR} & \langle \ \rangle \end{bmatrix} \end{bmatrix} \right\rangle$$

Reading Questions

- What is it about temporal semantics that makes tense more difficult to show than aspect & mood, since these latter two (or rather, the RESTR lists thereof) can apparently be shown quite trivially?

- Is there any formalized constraint for representing that a word introduces a "state"? For example, the semantics behind *being* or *owning* or *knowing*? What are some options for modeling the semantics of stative verbs? Is there anything more complex going on that prevents us from, say, simply having a STATIVE +/- feature in the SEM feature structure?

Reading Questions

- Poulson, Laurie. 2011. Meta-modeling of Tense and Aspect in a Cross-linguistic Grammar Engineering Platform. UW Working Papers in Linguistics, vol 28.

- http://depts.washington.edu/uwwpl/editions/vol28.html