Ling 566
Nov 19, 2015

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," 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*

- 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

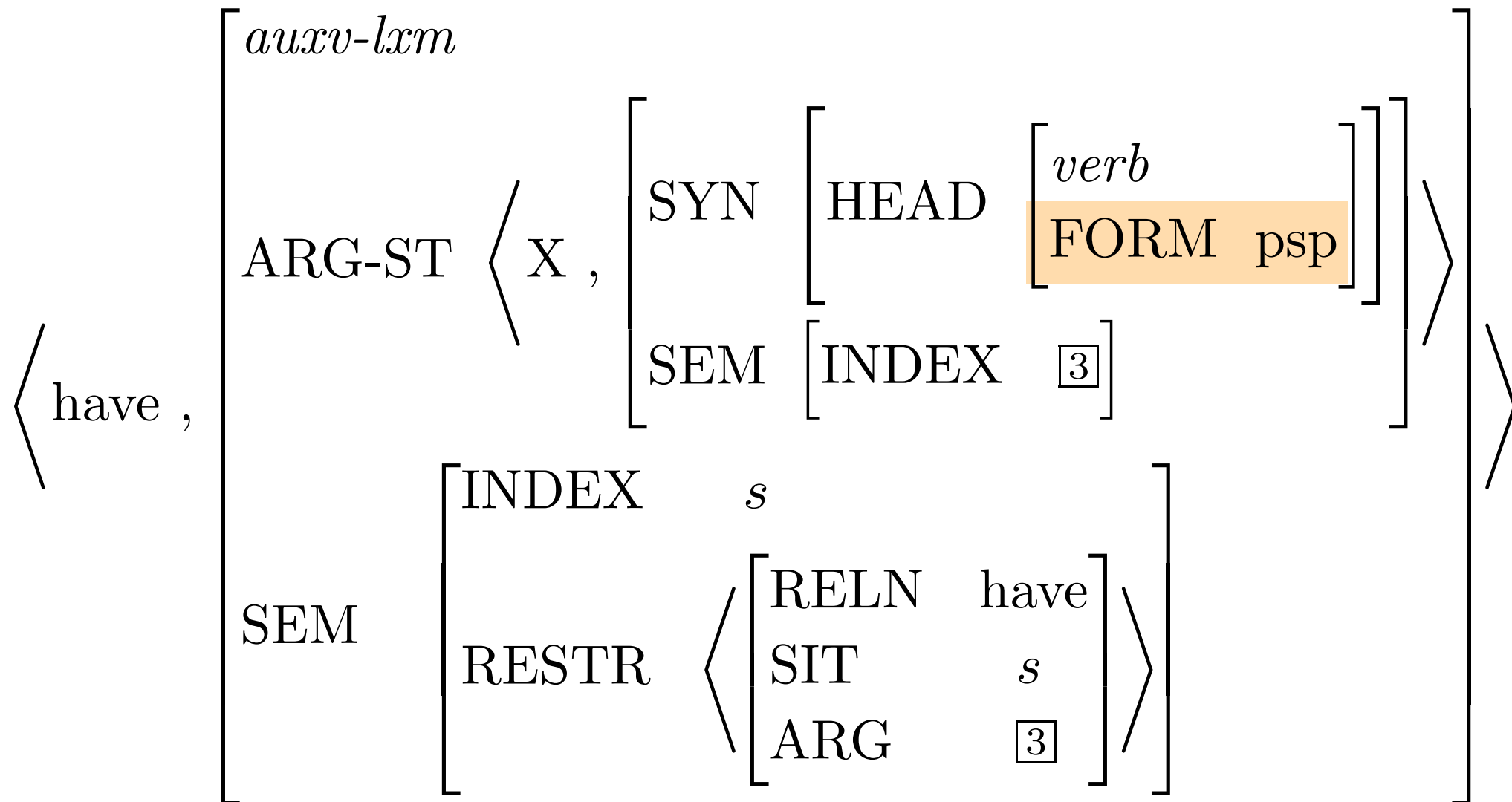| TYPE	FEATURES/CONSTRAINTS	IST
verb-lxm	$\begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} verb \\ \text{AUX} & / - \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} & \langle\, [\text{HEAD } nominal]\,,\, ... \,\rangle \\ \text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} \end{bmatrix}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

$$
\left\langle \text{be} , \begin{bmatrix} \textit{auxv-lxm} \\[6pt] \text{ARG-ST} \quad \left\langle \text{X} , \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{PRED} & + \end{bmatrix} \end{bmatrix} \\[6pt] \text{SEM} & \begin{bmatrix} \text{INDEX} & \boxed{2} \end{bmatrix} \end{bmatrix} \right\rangle \\[12pt] \text{SEM} \quad \begin{bmatrix} \text{INDEX} & \boxed{2} \\ \text{RESTR} & \langle \ \rangle \end{bmatrix} \end{bmatrix} \right\rangle
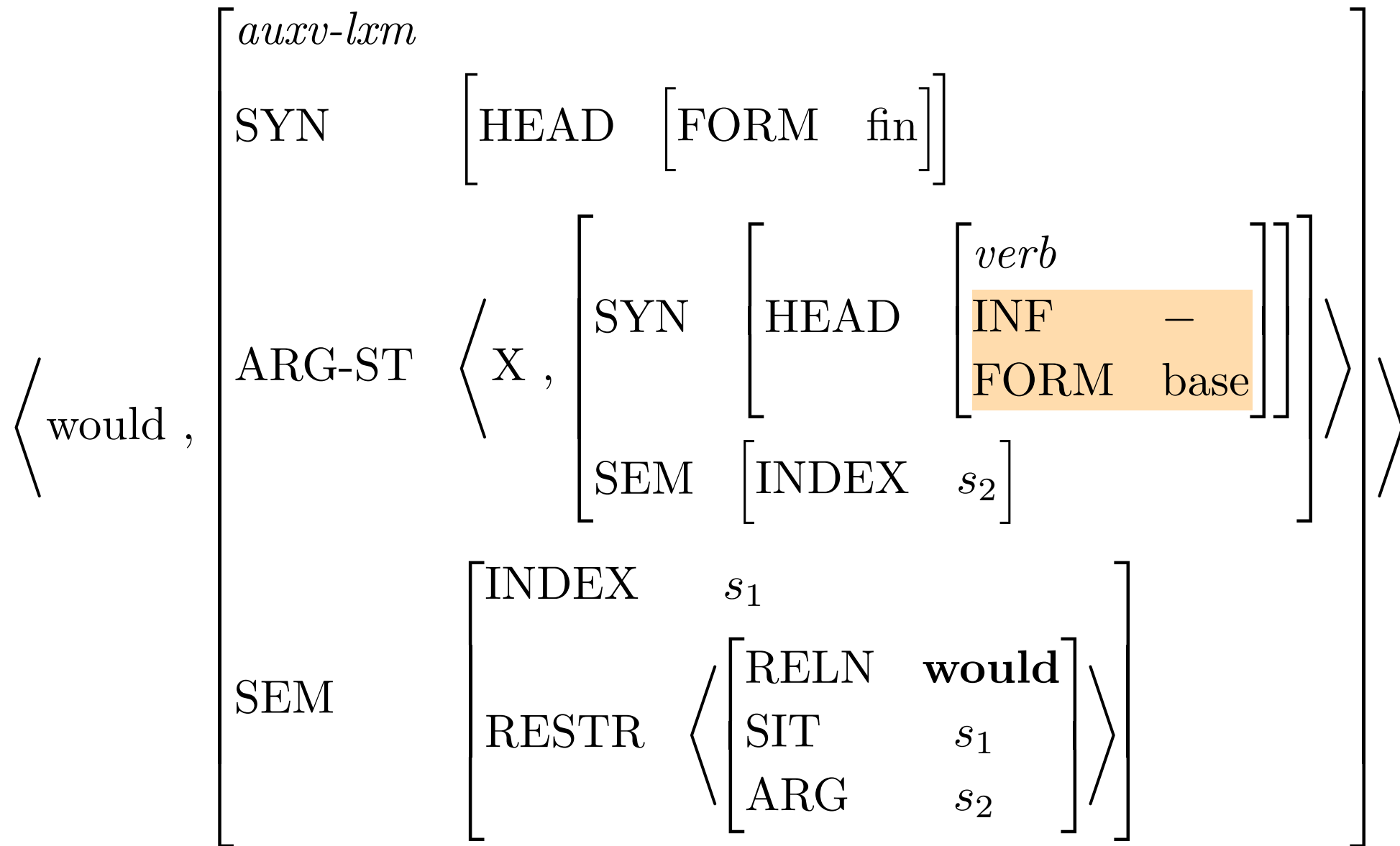$$

The Entry for *be*, with Inherited Information

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

Entry for *have*

$$
\left\langle \text{have} , \begin{bmatrix} \textit{auxv-lxm} \\[2pt] \text{ARG-ST} \left\langle \text{X} , \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{verb} \\ \text{FORM} & \text{psp} \end{bmatrix} \end{bmatrix} \\[10pt] \text{SEM} & \begin{bmatrix} \text{INDEX} & \boxed{3} \end{bmatrix} \end{bmatrix} \right\rangle \\[30pt] \text{SEM} \begin{bmatrix} \text{INDEX} & s \\[6pt] \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \text{have} \\ \text{SIT} & s \\ \text{ARG} & \boxed{3} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

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

Lexical Entry for a Modal

$$
\left\langle \text{would} , \begin{bmatrix} \textit{auxv-lxm} \\[4pt] \text{SYN} \quad \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{FORM} & \text{fin} \end{bmatrix} \end{bmatrix} \\[12pt] \text{ARG-ST} \quad \left\langle \text{X} , \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{verb} \\ \text{INF} & - \\ \text{FORM} & \text{base} \end{bmatrix} \end{bmatrix} \\[8pt] \text{SEM} & \begin{bmatrix} \text{INDEX} & s_2 \end{bmatrix} \end{bmatrix} \right\rangle \\[20pt] \text{SEM} \quad \begin{bmatrix} \text{INDEX} & s_1 \\[6pt] \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \textbf{would} \\ \text{SIT} & s_1 \\ \text{ARG} & s_2 \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix} \right\rangle
$$

- 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

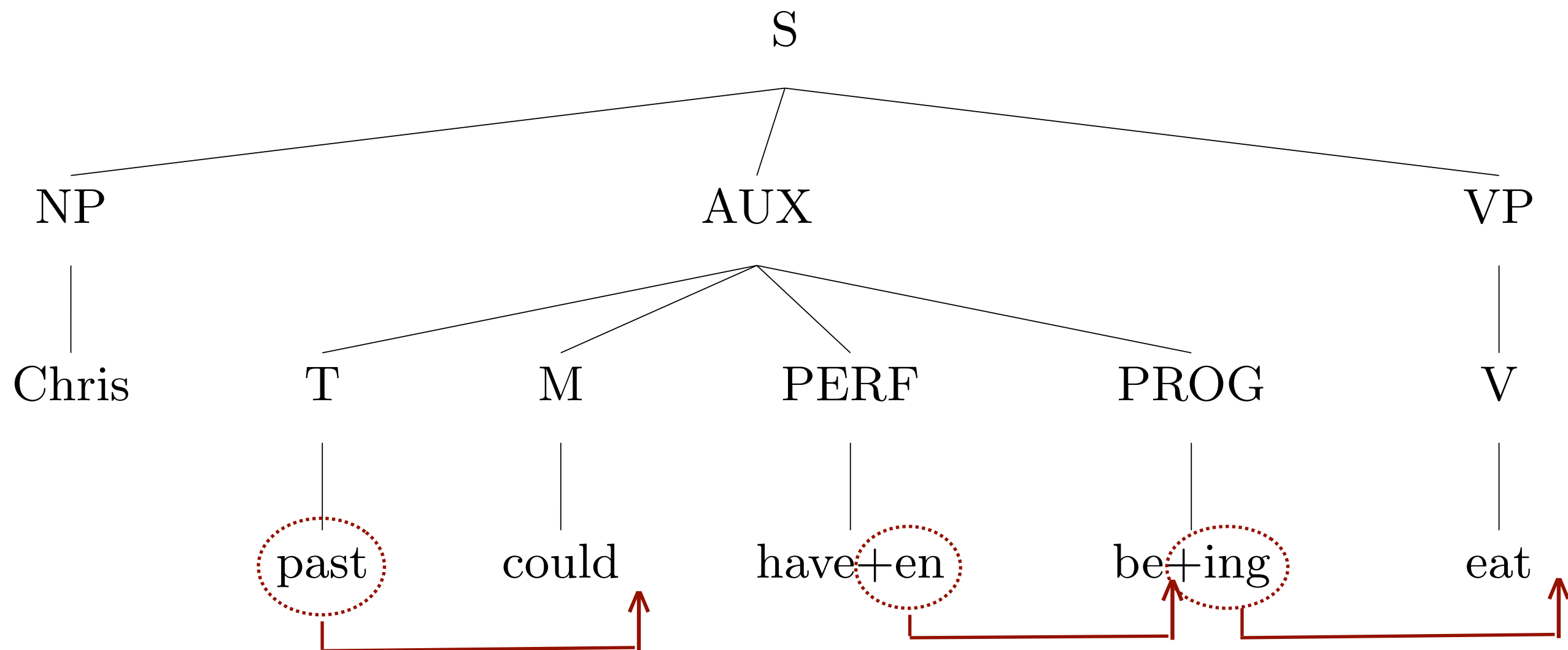$$S \rightarrow NP \; AUX \; VP$$
$$AUX \rightarrow T(M)(PERF)(PROG)$$

Sketch of Chomsky's Old Analysis

$$S \rightarrow NP \ AUX \ VP$$
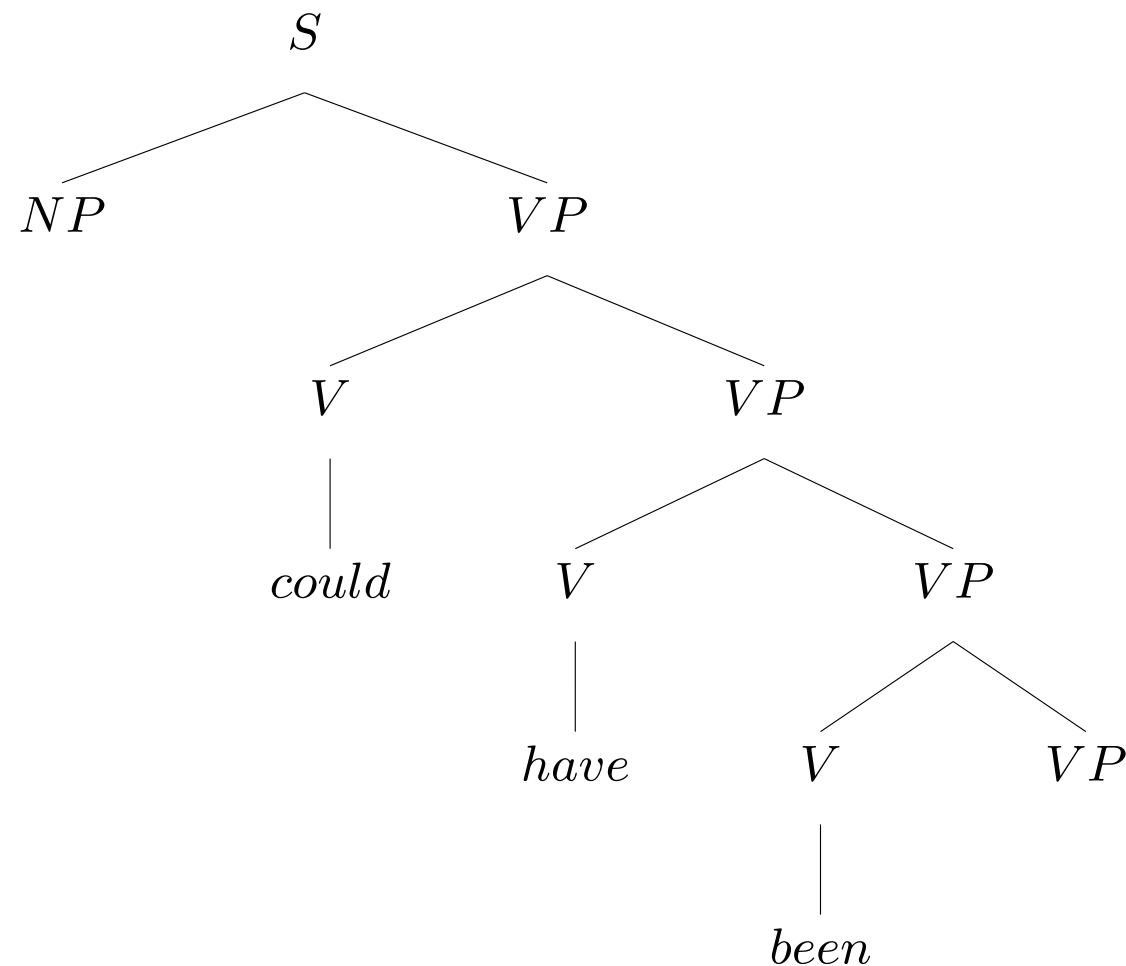$$AUX \rightarrow T(M)(PERF)(PROG)$$
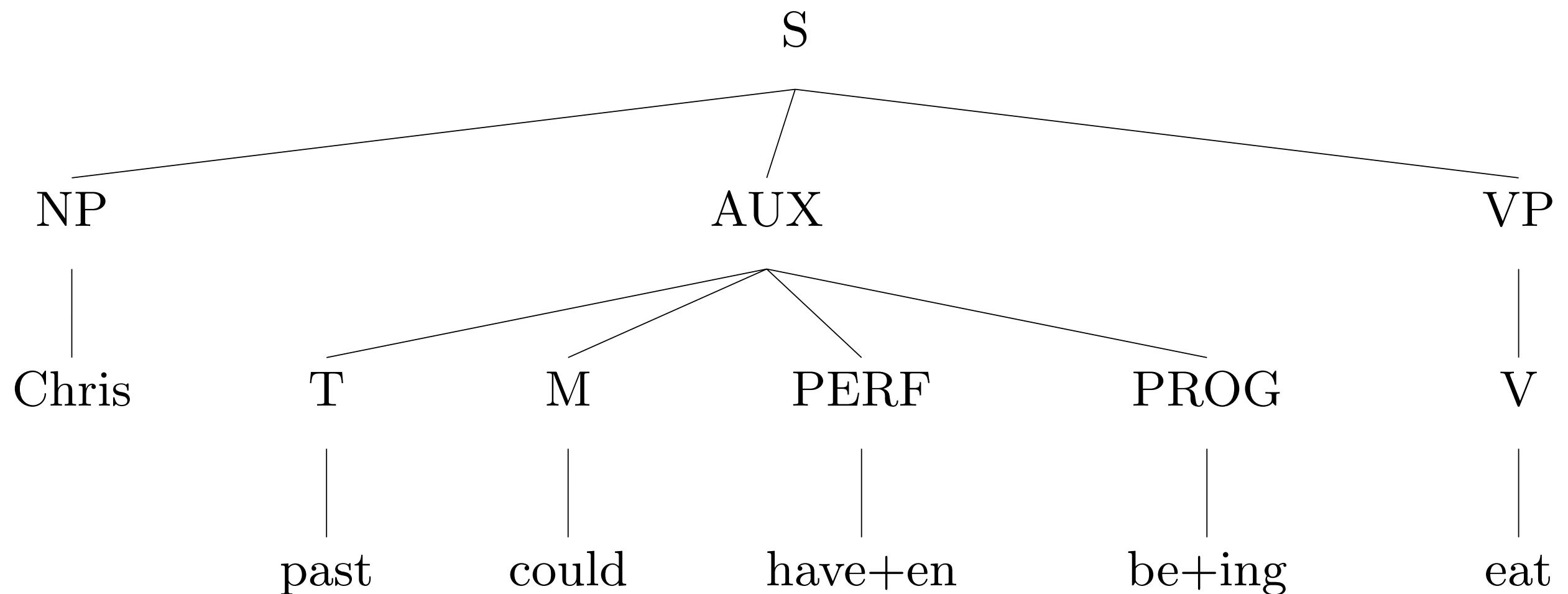
Sketch of Chomsky's Old Analysis

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

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        VP
            |      /    \
         could   V        VP
                 |      /    \
              have     V       VP
                       |
                     been
```

```
                    S
              /      |      \
            NP      AUX        VP
                 /   |   \
                M   PERF  PROG
                |    |     |
             could have  been
```

- *could have been* VP,
  have been VP, and *been* VP
  are all constituents

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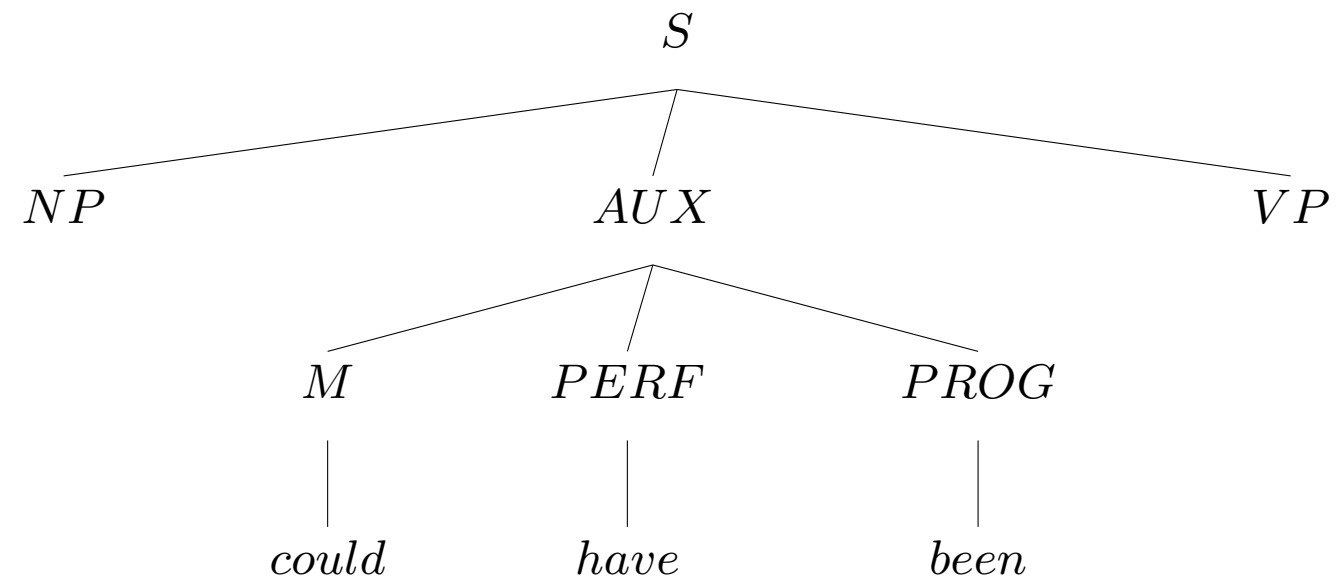
- *could have been* VP,
  have been VP, and *been* VP
  are not constituents

- *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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HW6 question

- For 11.4 A & B, is it enough to simply list the constraints or should we draw them out in a feature structure? Additionally, do we need to say where each constraint came from (i.e. from supertype vs. lexical rule)?

A. What constraints are imposed on the lexical sequences that result from applying the 3rd-Singular Verb Lexical Rule to this entry (including those that involve inheritance of constraints from the entry's supertypes)?

B. What constraints are imposed on lexical sequences that result from applying the Extraposition Lexical Rule to your answer to part (A)?

Reading questions

- How do adverbs modify auxiliaries? I don't see any restrictions in our grammar so far which would prevent any adverb from modifying an auxiliary. The meaning of the sentence "She may well do that" is quite different from "She may do that well." However "She may quickly go there" and "She may go there quickly" seem to have the same semantics where the adverb modifies the FORM base verb.

Reading questions

- What does it mean for a verb to iterate? As in: "Auxiliaries (of any given type) cannot iterate"?

- I am wondering if the example below is grammatical or not. If it is grammatical, how this combination would affect the ARG-ST of might and continue?

There might continue to be no easy answer to the dilemma.

Reading questions

- The text mentions two possible approaches to prevent licensing *Stevie has had traveled.*:

- 1. Perfective have as exception to Past-Participle Lexical Rule

- 2. Semantic explanation (i.e. redundancy of iterating)

- Are there some other factors surrounding iteration of perfective have that discourage a clear choice as presented in the previous analyses of co-occurrence constrains on auxiliaries? In the absence of a specific restriction, does this mean the grammar would actually still license (24)?

Reading questions

- I am curious how the lexical entry for "be" accounts for cases where there are two "be"s, like the following:

  (i) *The circle was being drawn*

- How do the two "be"s interact, and what rules out examples like (ii)? (my intent with (ii) is to reverse the forms of each complement of a "be")

  (ii) **The circle was been drawing*

Reading questions

- Since each verb will have a lexical entry for each meaning/usage it can have, why isn't there a way to make these different forms inherit from a common lexical entry that represents the original verb if some parts of the entry are going to be redundant (i.e look for, look at, look after will all inherit from a higher lexical entry "look") ?

- It looks [AUX +] is used to indicate the lexical sequence is an auxiliary verb. If this is correct, why do not we use a notation like "instanceof (auxv-lxm)" to indicate this?

Reading questions

- In (15) on 397, the SEM value is given for the auxiliary have. In it, we give have a new index value which, since have is a head daughter, will end up being the index value of the whole sentence. This is confusing to me, since it seems like that makes the stated meaning of the sentence be the aspect of the main verb. For the non-auxiliary SRVs, it made sense, since the continuing is obviously the central meaning of Pat continues to dance. But, at least to me, the dancing is the central meaning in Pat has danced, rather than the has-ness of Pat's dancing. More generally, why do we so readily give semantics for aspect when we have so swiftly swept the problems of tense under the rug?

Reading questions

- Also, completely unrelated to the above, I'm curious about the form of do mentioned in footnote 8 on page 402 ("Do sit down!", "Do be careful!", etc). What sort of thing is this do? It's clearly not an auxiliary do, but it doesn't seem to behave the same way as a regular verb would. Will we touch on this later, or is it outside the scope of this book?

- In the past I've heard of "light verbs" (that cannot undergo inversion). How does HPSG handle these?

Reading questions

- As the grammar doesn't allow the modals in the past-tense, what happens to modal pairs like can/could? In the sentence 'I can run', the past form is clearly 'I could run', isn't it?

- The relationship between the "past" and "present" form of modals is considered a relevant distinction in other syntactic frameworks. What does the theory gain from assuming these pairs are unrelated? And are they treated this way due to semantic concerns or for capturing a larger syntactic generalization?

- When it says "assume that the Fpast...is undefined for will, shall..." is that the same thing as mapping to an identity as shown in (18)? If not, why not, and what does that mean if you try to run the word through Fpast anyway?

Reading questions

- I'm having the same trouble I think some other people are with the assumption modal pairs are unrelated in Modern English, specifically the can/could alternation. I agree with the other two, will/would and shall/should, as I get no past tense reading for either would or should. However, I don't see how could is not a past tense form of can. Does the decision to treat them as entirely separate then mean that we have two entries for can, one of which is a modal and one of which is a regular verb whose past tense form just happens to be the same as the modal could?

Reading questions

- I know that the footnote says that pairs such as will/would, shall/should are "unrelated to the grammar of Modern English," but I still think there is a case for saying that some modals should have past tense semantics in their RESTR list. How do we get the predictions in 1-4 without licensing modals with past tense semantics?

  We thought she would/could go.

  *We thought she will/can/must go.

  (When we were young) we would/could go to the mall every day after school.

  (*When we were young) we will/can/must go to the mall every day after school.