

Ling 566  
Nov 15, 2012  
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 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
<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>

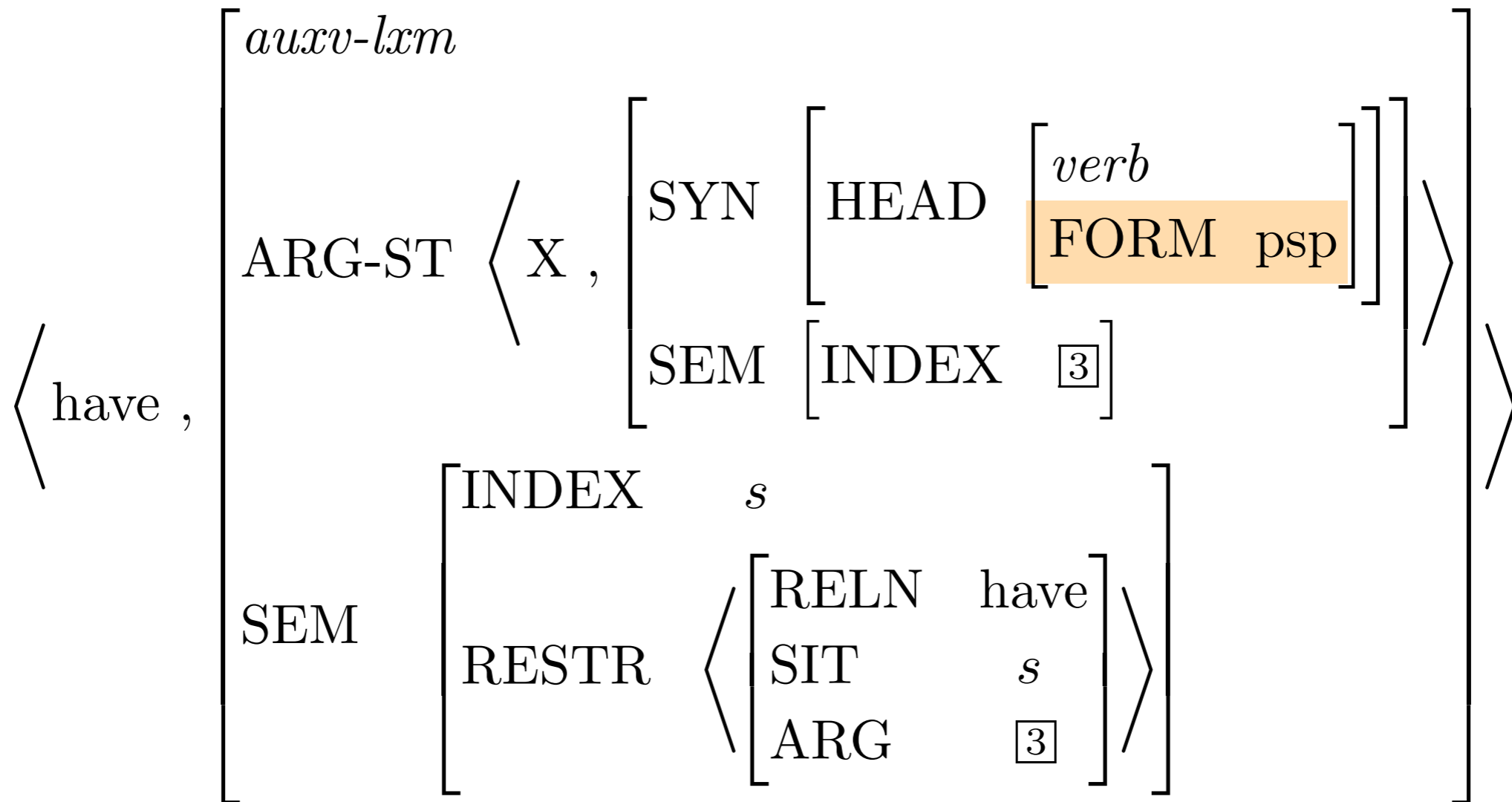
# A Lexical Entry for *be*

$$\left\langle \text{be} , \left[ \begin{array}{l} \text{auxv-lxm} \\ \text{ARG-ST} \left\langle \text{X} , \left[ \begin{array}{l} \text{SYN} \left[ \text{HEAD} \left[ \text{PRED} + \right] \right] \\ \text{SEM} \left[ \text{INDEX} \boxed{2} \right] \end{array} \right] \right\rangle \\ \text{SEM} \left[ \begin{array}{l} \text{INDEX} \boxed{2} \\ \text{RESTR} \langle \rangle \end{array} \right] \end{array} \right] \right\rangle$$

# The Entry for *be*, with Inherited Information

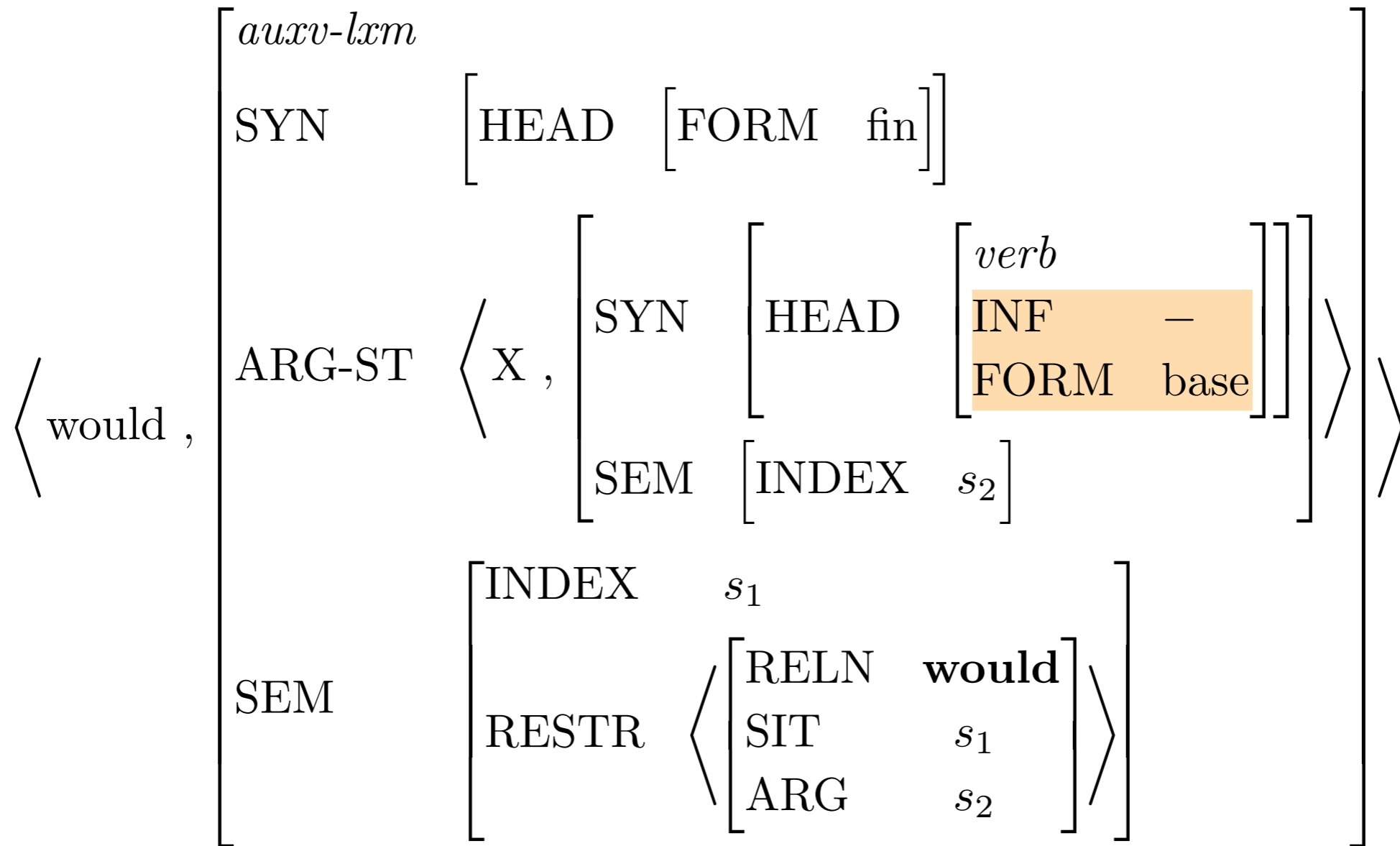
$\langle$ be , $\rangle$	<i>auxv-lxm</i>	
	SYN	$\left[ \begin{array}{l} \text{HEAD} \left[ \begin{array}{l} \textit{verb} \\ \text{AUX} \quad + \\ \text{AGR} \quad \boxed{0} \end{array} \right] \\ \text{VAL} \quad \left[ \text{SPR} \quad \langle [\text{AGR} \quad \boxed{0}] \rangle \right] \end{array}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

# 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**

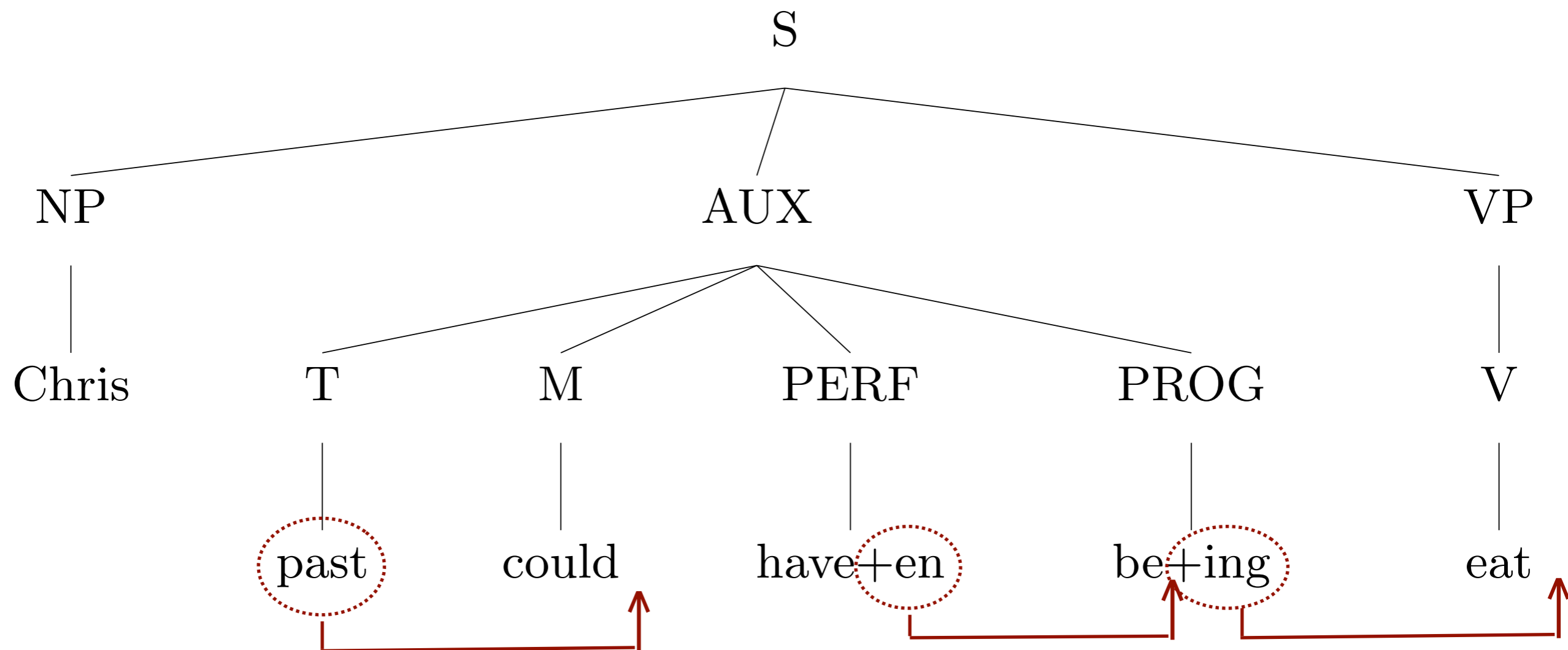
- Modals are finite, and all auxiliaries take non-finite complements. Hence, modals must come first.
- Stative verbs (like *own*) don't have present participles, and auxiliary *have* is stative. Hence, *\*Pat is having tapdanced*.

- **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.

# Sketch of Chomsky's Old Analysis

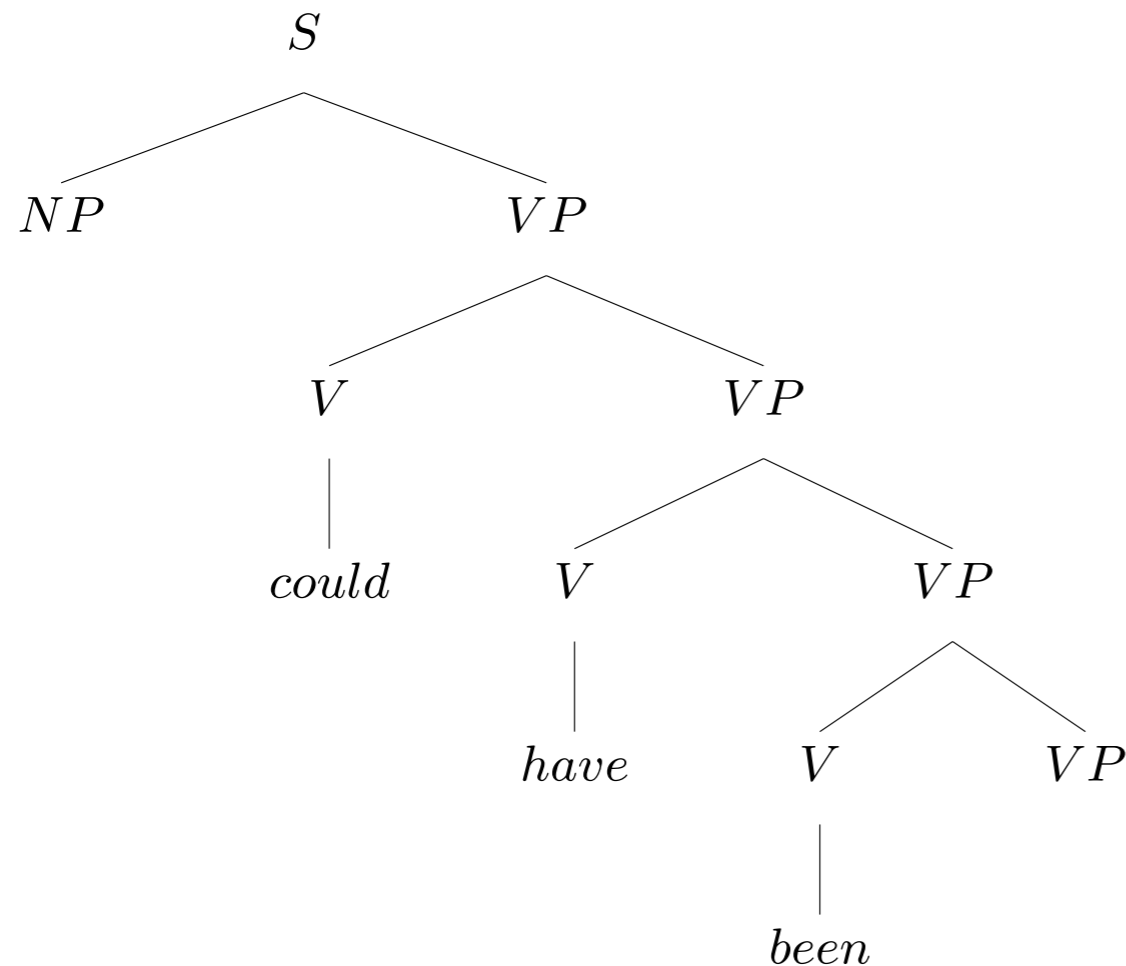
$S \rightarrow NP \text{ AUX VP}$   
 $AUX \rightarrow T(M)(PERF)(PROG)$



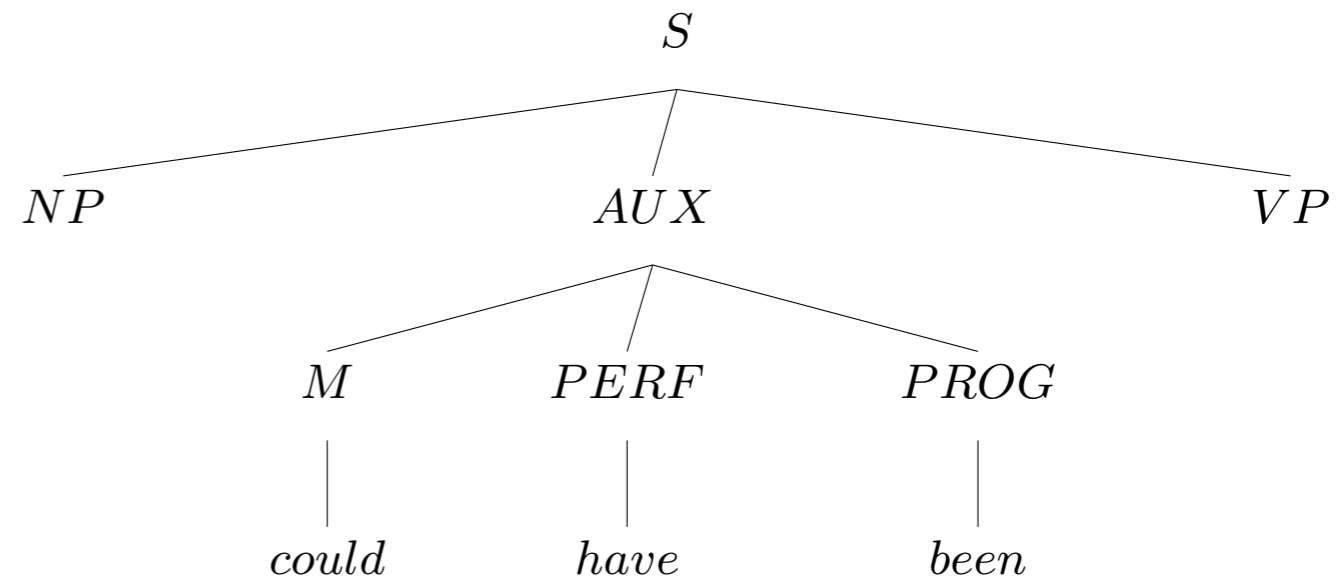
# How this Analysis Handles the Basic Facts

- **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

# Overview

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

# Reading Questions

- For (20) and (21), is it enough to say that owe and know don't have a prp form? Similarly for (24), can't we just say that have doesn't have a psp form?

(20) a. \*Past is owning a house.

(20) b. \*Chris is knowing the answer.

(21) \*Pat is having slept.

(24) \*Stevie has had traveled to Europe.

- How could we deal with this as a semantic generalization? Does anyone do it in HPSG?

# Reading Questions

- Fn 5 (p. 399) says that although would and should were historically past tense of will and shall, these "pairs of forms are unrelated in the grammar of Modern English". How about sequence of tenses in the past? as in *We knew that they would come for us*.
- What about "double modal" constructions? What's the best way to handle those?
- How does HPSG handle "could have, would have, should have"?

# Reading Questions

- Also, as I recall, there's a double infinitive in German in the past tense:

*Ich habe nach Hause gehen müssen.* (I had to go home.).

- How would one formulate this construction?

# Reading Questions

- Is it legit to use the morphological function to block the application of a rule to a certain class of words? (In this case, F\_PAST being undefined for the modals.)
- What's the reason for the difference between F3sg and Fpast? (399) I don't get what we gain by the not defined output for the latter...
- Can't we just say that the future semantics of will and shall is enough to keep them out of the Fpast rule?

# Reading Questions

- Given the theory so far, do we have a way of specifying what a feature CAN'T be? We can specify what it can and what it defaults to, but I don't think we can specify what it can't be, right?

# Reading Questions

- I'm curious what sort of cross-linguistic evidence for AUX, PRED, and INF features are? For instance, if I recall correctly, French auxiliaries behave similarly with respect to INF features. These features felt to me like we might be able to get away without them, instead being an easy fix. Is there any cross-linguistic evidence for these?
- How are auxiliaries the same and different across languages?

# Reading Questions

- Section 13.2 introduces the feature AUX for verb-lxm to distinguish auxiliary verbs from all other verbs. The same section creates a new subtype of srv-lxm, auxv-lxm, for auxiliaries. Do we need to have both AUX and auxv-lxm to distinguish auxiliary verbs?

# Reading Questions

- Are *be* and *do* the only members of *auxv-lxm* that have empty RESTR lists? How do they differ from the other members of *auxv-lxm* (why empty RESTR lists for them and not the others)? Specifically, how do they differ from *have* (the only other 'helping verb')?
- Doesn't *do* mean something in sentences like: *I do trust you. You do love to dance.*

# Reading Questions

- How do you decide if the semantic contribution of an auxiliary is a feature or a predication?
- In the *auxv-lxm* in (15), [RELN have] seems that it would be the same entry for have, as in possess, which is of course another lexical item. I know the roles would be different, but for the purpose of the semantics, wouldn't we want to show that these are two different relationships?

# Reading Questions

- I am not sure I understand the ARG-ST for *ic-srv-lxm* on page 396. More specifically [INF+]. Is there a difference between *I continued reading* vs *I continued to read*? Or is this about something else? What is this [INF+] about here?
- When would we ever get [FORM base, INF -]?
- In the sentence, "*To do that would be unthinkable*", what is the FORM value for "do". According to the book, it must be fin but that looks non-finite to me.

# Reading Questions

- I'm curious about how HPSG would handle non-inverted interrogatives, so for example:
  - a. Will there be dip at the party?*
  - b. There will be dip at the party?*
- Could you say that (a) is the inversion of (b) or does the inversion have to come from the proposition?

# Reading Questions

- Is there a third alternative to (1) new category for AUX v. (2) AUXes as verbs?
- On 393, the book says that the AUX constituent doesn't seem to have a head. I'd like more explanation of what headed versus nonheaded constituents look like/ how they behave differently.

# Reading Questions

- Would it matter if (26b) were grammatical?

*(26b) Pat raked not leaves.*

- How do you tell which verbs in a sentence are auxiliaries?

*She could have had an ice cream cone.*

# Reading Questions

- Also, how do we get the right predictions for:

*\*Stevie has had traveled to China.*

*She will have had eaten all of the cake.*

*She could have had an ice cream cone.*

# Reading Questions

- So in a sentence like:
  - *Gene can do many things.*
- How does *many things* get licensed? Don't both *can* and *do* take only verb complements?