Chapter 13, Sections 13.1-13.2

Auxiliary Verbs
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
  
  \( \text{Pat tapdanced. Pat can tapdance. Pat is tapdancing.} \)

- They precede any non-auxiliary verbs
  
  *\( \text{Pat tapdance can. Pat tapdancing is.} \)*

- They determine the form of the following verb
  
  *\( \text{Pat can tapdancing. Pat is tapdance.} \)*

- When they co-occur, their order is fixed
  
  \( \text{Pat must be tapdancing. Pat is musting tapdance.} \)

- Auxiliaries of any given type cannot iterate
  
  *\( \text{Pat could should tapdance.} \)*
A Little History


- 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*.
  - The relevant facts, and an analysis, will be covered next time.

- 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, following work of Ross, McCawley, and others in the 1960s and 1970s

• We treat 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, which we’ll discuss next time
## Some Type Constraints

<table>
<thead>
<tr>
<th>TYPE</th>
<th>FEATURES/CONSTRAINTS</th>
<th>IST</th>
</tr>
</thead>
<tbody>
<tr>
<td>verb-lxm</td>
<td>SYN : [HEAD [verb AUX / −]]</td>
<td>infl-lxm</td>
</tr>
<tr>
<td></td>
<td>ARG-ST : [HEAD nominal]...</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SEM : [MODE prop]</td>
<td></td>
</tr>
<tr>
<td>srv-lxm</td>
<td>ARG-ST : [PR COMPS 〈 1 〉]</td>
<td>verb-lxm</td>
</tr>
<tr>
<td>ic-srv-lxm</td>
<td>ARG-ST : [X , [INF INDEX + s]]</td>
<td>srv-lxm</td>
</tr>
<tr>
<td></td>
<td>SEM : [RESTR 〈 [ARG s] 〉]</td>
<td></td>
</tr>
<tr>
<td>auxv-lxm</td>
<td>SYN : [HEAD [AUX +]]</td>
<td>srv-lxm</td>
</tr>
</tbody>
</table>
A Lexical Entry for \textit{be}

\[
\langle \textit{be}, \begin{bmatrix}
\text{auxv-lxm} \\
\text{ARG-ST} \\
\text{SEM}
\end{bmatrix}, \begin{bmatrix}
\text{X} \\
\text{SYN} \\
\text{SEM} \\
\text{INDEX} \\
\text{RESTR}
\end{bmatrix}, \begin{bmatrix}
\text{PRED} \\
\text{INDEX} 2
\end{bmatrix} \rangle
\]
The Entry for \textit{be}, with Inherited Information

\[
\begin{array}{c}
\text{\texttt{auxv-lxm}} \\
\text{\texttt{SYN}} \\
\text{\texttt{ARG-ST}} \\
\text{\texttt{SEM}}
\end{array}
\begin{array}{c}
\begin{bmatrix}
\text{\texttt{HEAD}} \\
\text{\texttt{VAL}}
\end{bmatrix}
\begin{bmatrix}
\text{\texttt{verb}} \\
\text{\texttt{AUX}} + \\
\text{\texttt{AGR}} [0]
\end{bmatrix}
\begin{bmatrix}
\text{\texttt{SPR}} \langle [\text{\texttt{AGR}} [0] \rangle
\end{bmatrix}
\end{array}
\begin{array}{c}
\begin{bmatrix}
\text{\texttt{HEAD}} \\
\text{\texttt{VAL}}
\end{bmatrix}
\begin{bmatrix}
\text{\texttt{PRED}} + \\
\text{\texttt{SPR}} \langle [3] \rangle
\end{bmatrix}
\begin{bmatrix}
\text{\texttt{COMPS}} \langle \rangle
\end{bmatrix}
\end{array}
\begin{array}{c}
\begin{bmatrix}
\text{\texttt{INDEX}} 2
\end{bmatrix}
\begin{bmatrix}
\text{\texttt{INDEX}} 2
\end{bmatrix}
\begin{bmatrix}
\text{\texttt{MODE}} \text{\texttt{prop}}
\end{bmatrix}
\begin{bmatrix}
\text{\texttt{RESTR}} \langle \rangle
\end{bmatrix}
\end{array}
\end{array}
\]
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

\[
\begin{align*}
\langle \text{would}, & \rangle \\
\left[ \begin{array}{c}
\text{auxv-lxm} \\
\text{SYN} & \left[ \begin{array}{c}
\text{HEAD} \\
\text{FORM} & \text{fin}
\end{array} \right]
\end{array} \right] \\
\text{ARG-ST} & \left[ \begin{array}{c}
\langle X, & \rangle \\
\text{SYN} & \left[ \begin{array}{c}
\text{HEAD} & \langle \text{would}, & \rangle \\
\text{INF} & \langle \text{would}, & \rangle \\
\text{FORM} & \langle \text{would}, & \rangle \\
\text{base}
\end{array} \right]
\end{array} \right] \\
\text{SEM} & \left[ \begin{array}{c}
\text{INDEX} & s_1
\end{array} \right]
\end{align*}
\]

- 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 are also their complements’ subjects, so their subjects and complements must be compatible.

• **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

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

\[
S \\
NP \\
\text{Chris} \\
AUX \\
T \text{ M PERF PROG} \\
V \\
past could have+en being+ing eat
\]
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*

- 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 treatment of ellipsis is presented in the next class