

Derivations/Representations vs. English Auxiliaries and Main Verbs

1. English Auxiliary verb system

- (1) **Basic order:** (M) (*have*) (*be*_{prog}) (*be*_{pass})
- (2) **Morphology:**
 1. first element is inflected for agreement and tense
 2. *have* requires past-participial morphology on its successor
 3. progressive *be* requires present-participial morphology on its successor
 4. passive *be* requires past-participial morphology on its successor
- (3) **Negation**
 1. negation is placed after the first present member of the auxiliary series
 2. if no member of the series is present, auxiliary *do* is inflected for person and tense, and negation follows it.
- (4) **Affirmative focus**
 1. the first present member of the auxiliary series is stressed
 2. if no member of the series is present, auxiliary *do* is [may be] inflected for person and tense, and stressed.
- (5) **Subject-aux inversion**
 1. the first present member of the auxiliary series is placed to the left of the subject
 2. if no member of the series is present, auxiliary *do* is inflected for person and tense, and placed to the left of the subject

2. What kind of grammar?

- **Phrase structure grammar? (Constituency, sequences of symbols collectively determined by a predecessor)**

Structure of a PS grammar: (Σ, F) -- (initial symbol, rewrite rules)

How to use one -- the concept derivation:

Write the initial symbol on line 1.

On line 2, rewrite the initial symbol as licensed by a rewrite rule.

Continue until no symbols in the current line can be rewritten by a rewrite rule.

Stop.

- The derivation can be represented graphically as a tree. Eliminating nodes that correspond to non-rewritten symbols yields the familiar *collapsed PS tree* (Lasnik, p. 21).
- Two derivations are equivalent if they include the same rules applied to the same symbols, but possibly in a different order.
- The union of a set of equivalent derivations is a Phrase Marker.

Quiz question: Do we need such a concept in a bottom-to-top Merge grammar?

Side comment: Members of a PM that contain only one non-terminal are called monostrings. Lasnik and Kupin proposed a theory of PS in which the important object is the subset of a PM composed of all and only its monostrings (a reduced phrase marker).

3. Beyond PS rules

PS grammars encode "top-to-bottom" transmission of information.

- Sideways transmission of information, of the sort seen in morphology of the English auxiliary system is not insightfully encodable by PS rules. (Example: the next verb after auxiliary *have*, *whatever it is*, must have the morpheme *-en* in it.)
- Long-distance upwards transmission of information, of the sort seen in *wh*-movement, is also not insightfully encodable by PS rules. [Slash/gap features instantiate the controversial claim that this sort of transmission of information does not exist.]
- Nor is "last resort" use of a morpheme, e.g. English auxiliary *do*.
- Nor is information lost due to other processes, e.g. selectional information about the *logical* subject of a passive sentence (*per Syntactic Structures/Aspects*).

4. Syntactic Structures: basics and quiz questions

- Surprising structure for the clause.
- ObSep 1 and 2: operates on *consider foolish John, put away it*
- Number Transformation: subject-verb agreement
- The "Auxiliary Transformation" is better known as... Why does it insert "#"?
- What does the Word Boundary Transformation (21) do?
- Which rules of (12)-(25) are crucially ordered? Do we see opacity (so to speak)?

5. Aux in Syntactic Structures

A structural change conspiracy in SS:

"As it stands, the transformational treatment of negation is somewhat simpler than any alternative treatment within phrase structure. The advantage of the transformational treatment (over inclusion of negatives in the kernel) would become much clearer if we could find other cases in which the same formulations (i.e. [(6)]...) are required for independent reasons. But in fact there are such cases." (SS pp. 62-3)

(6) Structural change for T_{not} , T_A , T_q

$$\left\{ \begin{array}{l} \text{NP} - \text{C} - \quad \text{V} \dots \\ \text{NP} - \text{C} + \text{M} \quad \dots \\ \text{NP} - \text{C} + \textit{have} \dots \\ \text{NP} - \text{C} + \textit{be} \dots \end{array} \right\}$$

On the other hand:

"One other point deserves some mention before we leave the topic of English transformations. At the outset of §5 we noted that the rule for conjunction provides a useful criterion for constituent analysis in the sense that this rule is greatly simplified if constituents are set up in a certain way. Now we are interpreting this rule as a transformation. There are many other cases in which the behavior of a sentence under transformations provides valuable, even compelling evidence as to its constituent structure." (SS, p. 81)

Emonds' (1970, 1976) proposal (simplified as in Jackendoff 1972, pp. 76 ff)

- (7) **PS rules**
- $S \rightarrow \text{Comp NP Aux VP}$
 - $\text{Aux} \rightarrow \text{Tense} - (\text{Modal})$
 - $\text{VP} \rightarrow (\text{have en}) (\text{be ing}) \text{V} \dots$

[**Note:** Emonds (1970; 1976), following Ross, actually assumes an articulated structure for the auxiliary verbs *have*, etc. in which the affix is the auxiliary's first object and a VP headed by the next verb is the second object.]

(8) *have/be raising* (obligatory)

$$\text{X} - \text{Tense} - \left\{ \begin{array}{l} \text{have} \\ \text{be} \end{array} \right\} - \text{Y}$$

$$\begin{array}{cccc} 1 & 2 & 3 & 4 \Rightarrow \\ 1 & 2 + 3 & & 4 \end{array}$$

(9) **Subject/Aux inversion**

$$\text{Comp} - \text{NP} - \text{Aux} - \text{VP}$$

$$\begin{array}{cccc} 1 & 2 & 3 & 4 \Rightarrow \\ 3+1 & 2 & & 4 \end{array}$$

Emonds (1976) for real, slightly simplified as discussed above

(10) **PS rules**

- a. $S \rightarrow \text{Comp NP Aux VP}$
 b. $\text{AUX} \rightarrow \left\{ \begin{array}{l} \left[\pm \text{TENSE} \right] \\ \left[\pm \text{PAST} \right] \\ \text{Modal} \end{array} \right\}$
 c. $\text{VP} \rightarrow (\text{have en}) (\text{be ing}) \text{V} \dots$

(11) **Do Insertion (oblig)**

- $X - \text{TENSE} - Z$
 $1 \quad 2 \quad 3 \Rightarrow$
 $1 \quad 2+[\text{V } do] \quad 3$

(12) **Verb raising (oblig)**

- $X + \text{TENSE} - [\text{V } do] - Y - \left\{ \begin{array}{l} \text{be} - \emptyset \\ \text{have} - \text{en} \end{array} \right\} - Z$
 $1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \Rightarrow$
 $1 \quad 2 \quad 5 \quad 4 \quad \emptyset \quad 6$
 [where Y does not dominate V]

(13) **Do deletion (oblig)**

- $X - [\text{V } do] - \text{VP} + Y$
 $1 \quad 2 \quad 3 \Rightarrow$
 $1 \quad \emptyset \quad 3$
 [where *do* is not contrastively stressed]

(14) **Affix Movement (oblig)**

- $X - \text{TENSE} - Y - \text{V} - Z$
 $1 \quad 2 \quad 3 \quad 4 \quad 5 \Rightarrow$
 $1 \quad \emptyset \quad 3 \quad 4+2 \quad 5$

Note how the theory models:

- no *do* in the presence of *have* or *be* (oblig *do* replacement by *have/be*)
 - obligatory *do* in the presence of stress or negation (oblig *do* deletion following *do* replacement, when unstressed and immediately preceding VP)
 - uniform behavior of *have, be, do, modals* under SAI (SAI follows *do* replacement)
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6. Lasnik (1981) "Restricting the Theory of Transformations"

(15) **PS rules**

a. $S \rightarrow NP \text{ Aux VP}$

b. $\text{Aux} \rightarrow \begin{bmatrix} + \text{affix} \\ - \text{aspect} \end{bmatrix} \begin{bmatrix} +v \\ -n \\ +aux \\ +modal \end{bmatrix}$

c. $\text{VP} \rightarrow (\text{neg}) (\text{perfect}) (\text{progressive}) (\text{passive}) \begin{bmatrix} +v \\ -n \end{bmatrix} \dots$

d. $\text{perfect} \rightarrow \begin{bmatrix} +v \\ -n \\ +aux \\ -modal \\ +have \end{bmatrix} \begin{bmatrix} +affix \\ +aspect \\ +EN \end{bmatrix}$

e. $\text{progressive} \rightarrow \begin{bmatrix} +v \\ -n \\ +aux \\ -modal \\ -have \end{bmatrix} \begin{bmatrix} +affix \\ +aspect \\ -EN \end{bmatrix}$

f. $\text{passive} \rightarrow \begin{bmatrix} +v \\ -n \\ +aux \\ -modal \\ -have \end{bmatrix} \begin{bmatrix} +affix \\ +aspect \\ +EN \end{bmatrix}$

(16) **Transformations (unordered, optional)**

a. **Affix Hopping**

SD: $\begin{bmatrix} +v \\ -n \end{bmatrix} \begin{bmatrix} + \text{affix} \end{bmatrix}$

SC: right-adjoin 1 to 2

b. **Contraction**

SD: $\begin{bmatrix} +v \\ -n \end{bmatrix} \text{neg}$

SC: right-adjoin 2 to 1

c. **do Support**

SD: $\begin{bmatrix} +v \\ n \\ +aux \end{bmatrix}$

SC: replace 1 by *do*

d. **verb Raising**

SD: $\begin{bmatrix} +v \\ -n \\ +aux \end{bmatrix} \begin{bmatrix} +v \\ -n \\ +aux \end{bmatrix}$

SC: replace 1 by 2

e. **Subject Aux Inversion**

SD: NP Aux

SC: permute

(17) **Constraints**

a. **Elsewhere Condition:**

Rule with SD1 preempts rule with SD2 where SD1 properly includes SD2

b. **Stray Affix Filter:**

A morphologically realized affix must be a syntactic dependent at surface structure.

c. **Recoverability of deletion:**

No deletion of material with semantic content except when it...

Rightward selection of affixes by INFL, have, be:

SS: PS rules + affix hopping

L: PS rules + affix hopping

Obligatoriness of affix hopping:

SS: Affix Hopping stipulated as obligatory

L: Morphological filter requires affixes to be affixed.

Affix Hopping applies only once per affix:

SS: A hopped affix has a # to its right, so the Structural Description of Affix Hopping is met only once per affix.

L: All relevant cases yield V+affix1+affix2, ruled out by the morphology.

Placement of NEG:

SS: Transformation that looks for C+V, C+have, C+be, C+M, placing NEG between C and V, and after each of the other sequences.

L: In PS-rules, NEG follows AUX. Thus it follows modals. V-Raising to the modal slot of AUX applies to auxiliary verbs, but not to main verbs (stipulated in the V-Raising rule).

DO-support only with main verbs:

SS: Affix Hopping applies only before a verb (including modals and auxiliaries), not before NEG. The NEG-placement rule separates affix from verb only in the case of main verbs. Thus affixes will fail to hop only in the case of a main verb in a negative sentence. DO-Support follows Affix Hopping and applies (due to the #-conventions) only before unhopped affixes.

L: By Recoverability, *do*-Insertion applies only to modal slots of AUX that are not otherwise filled. The rule of V-Raising can fill the modal slot. V-Raising is preferred over *do*-Insertion because of the Elsewhere Condition: the Structural Description of *do*-Insertion is a proper subset of the Structural Description of V-Raising. V-Raising applies to all non-modals except main verbs. Hence *do*-Insertion only applies with main verbs.

DO-support only with NEG (and similar processes):

SS: DO-support ordered after Affix Hopping. Affix Hopping is obligatory, so DO-support will only apply when Affix Hopping has failed. Affix Hopping fails only when the Affix does not have a verb to its right.

L: ??

DO-support obligatory with main verbs:

SS: DO-Support is an obligatory rule.

L: Affix Hopping of INFL is obligatory because of the morphological filter. A condition on affixation is Adjacency. Thus, when AUX is followed by NEG, some verb must end up in the modal slot. When V-Raising can't do the trick, *do*-support must do the trick.

Note: V-Raising in Lasnik's system applies to *have* and *be* obligatorily only when negation (or some other factor) would otherwise prevent Affix Hopping from applying to these auxiliaries. Otherwise, Affix Hopping ("Lowering") can apply to these auxiliaries in situ, just as it applies to Main Verbs. This differs crucially from the later proposals by Emonds, Pollock and Chomsky where V-Raising actually accomplishes affixation, and is preferred over Affix Lowering, even in non-negative sentences.

7. Sag & Wasow's HPSG book (2nd edition, chapter 13)

(18) *subject-raising-verb-lx*, (*srv-lxm*), a subtype of *verb-lxm* [p. 396]

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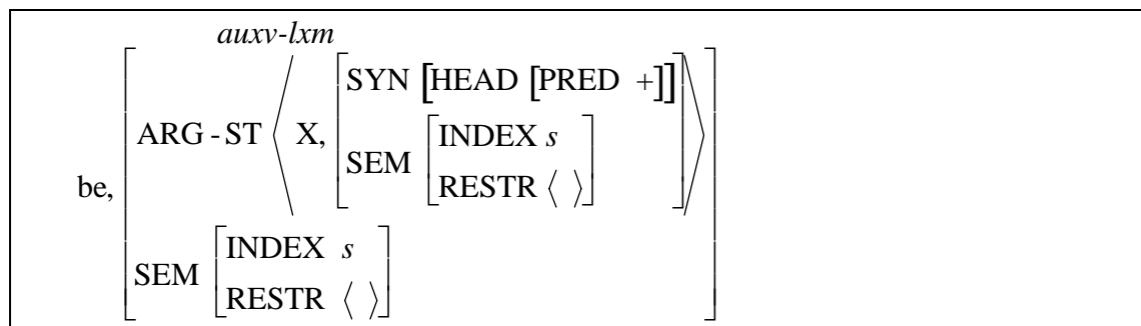
Please see:

Sag, Ivan, Thomas Wasow, and Emily Bender. *Syntactic Theory: A Formal Introduction*. 2nd ed. Stanford, CA: Center for the Study of Language and Information, 2003, p. 396. ISBN: 1575864002.

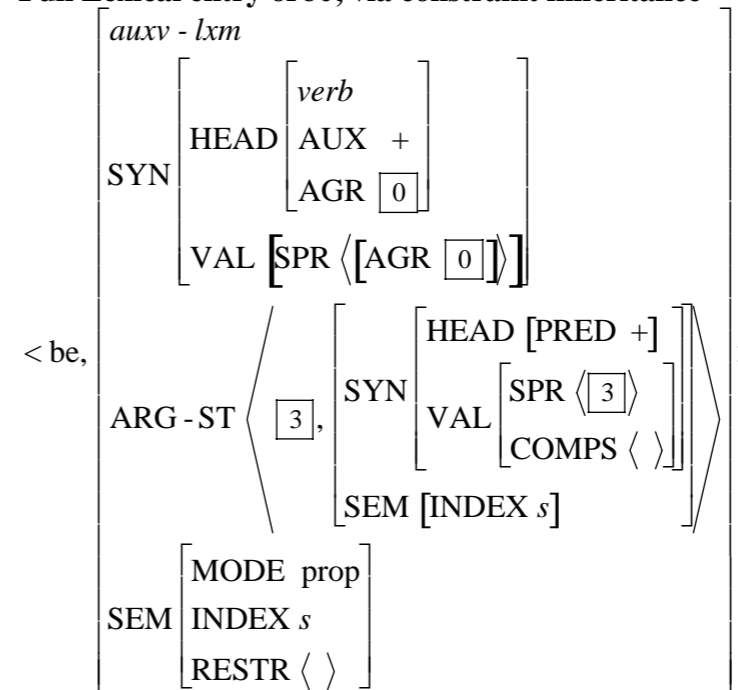
(19) *auxv-lxm*, a subtype of *srv-lxm*

auxv-lxm: [SYN [HEAD [AUX +]]]

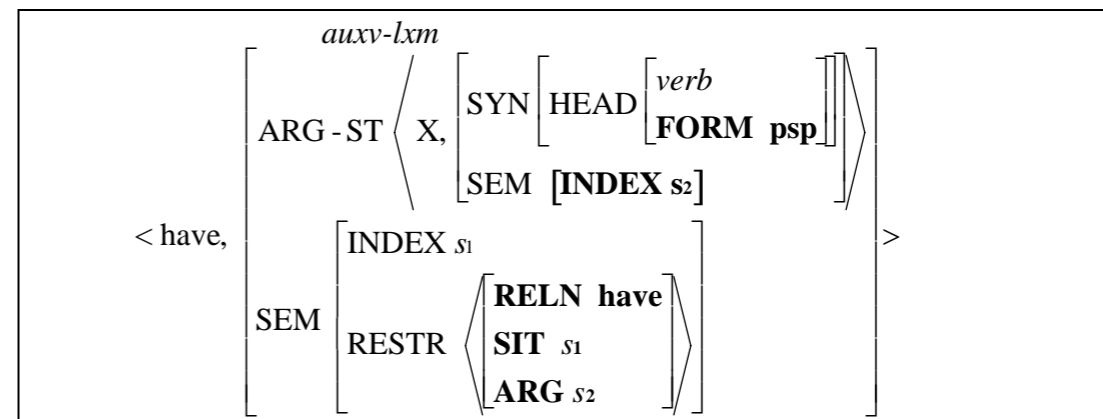
(20) Lexical entry for *be*, an instance of *auxv-lxm*



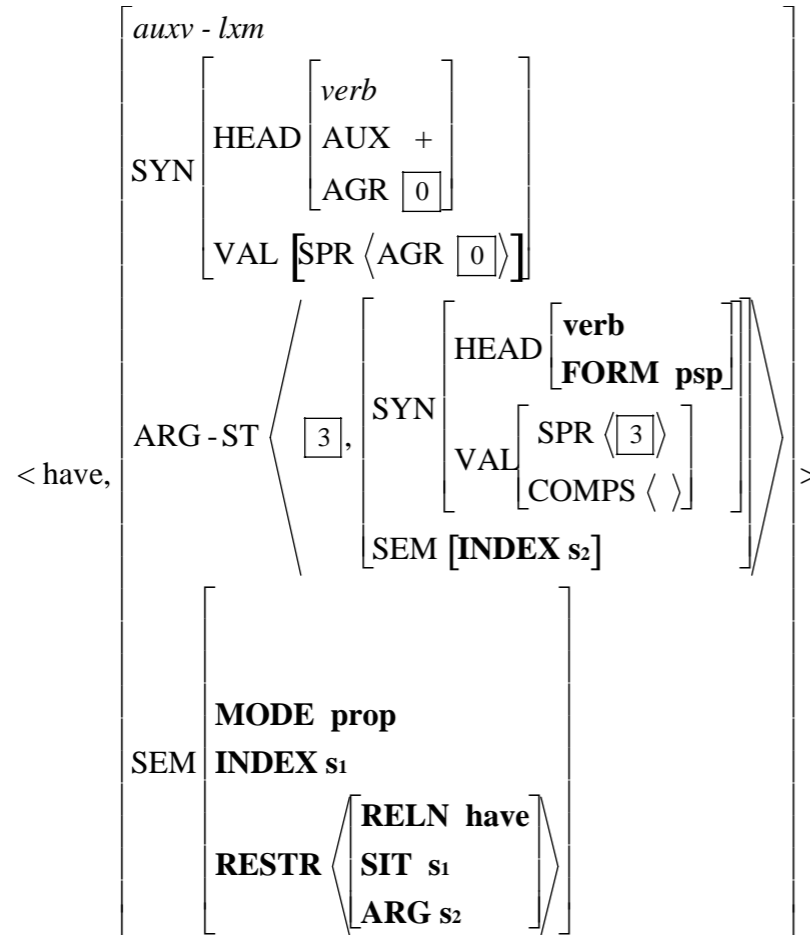
(21) Full Lexical entry of *be*, via constraint inheritance



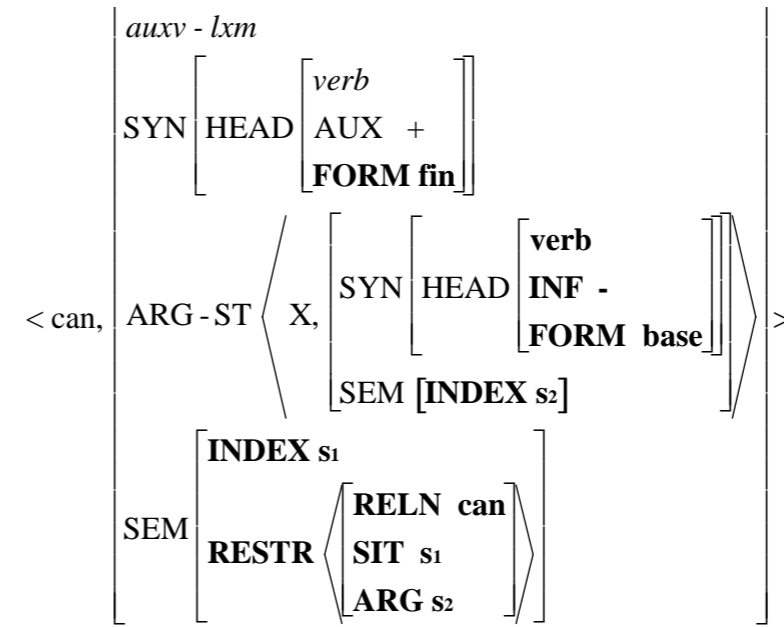
(22) Lexical entry for *be*, an instance of *auxv-lxm*



(23) Full Lexical entry of *have* [note the boldfaced info]



(24) Lexical entry for *can* [note the boldfaced information, esp. that modals are finite]



Explanation for co-occurrence constraints:

1. Modals first: they are [FORM fin].
2. Modals can't iterate: they select [FORM base].
3. **have could*: modal is [FORM fin] and *have* selects [FORM psp]
4. **be having*: semantics (*progressive of stative)
5. *have* can't iterate: hm... [p.401]

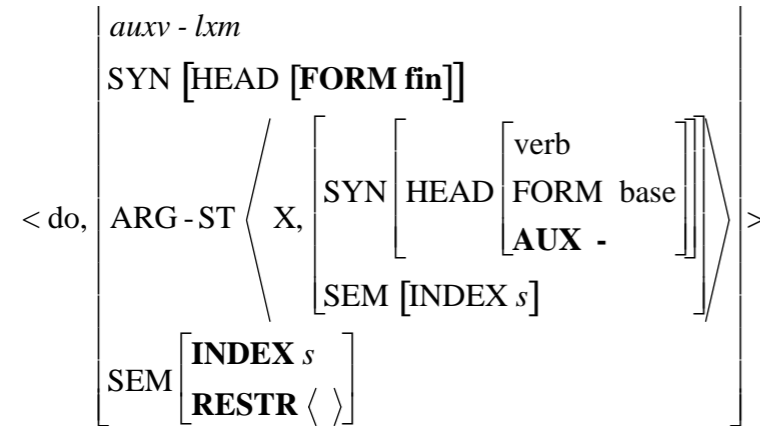
Do is just like modal *can*...

- The head of its complement is [FORM base] and [INF -]
- *Do* itself occurs only in finite form

... except that:

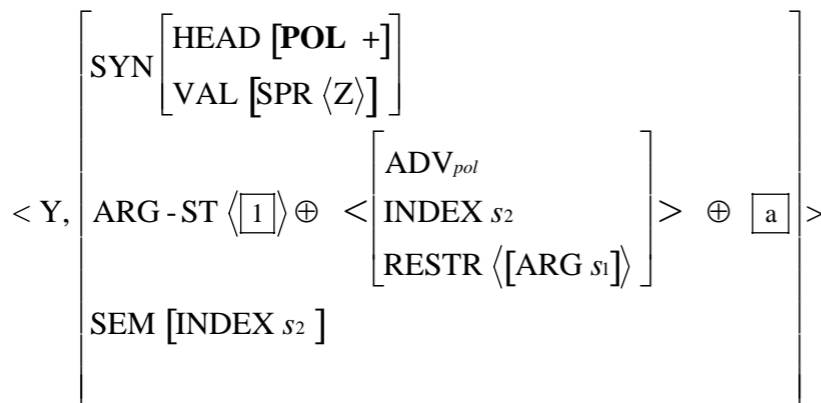
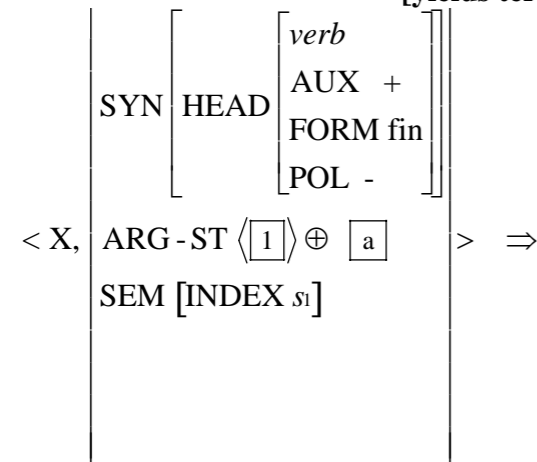
- Its complement cannot be headed by an auxiliary verb. [Compare: effect of *have/be* raising in post-SS analyses.]
- Like *be*, it makes no contribution to meaning, except to bear tense information.

(25) Lexical entry for auxiliary *do*



(26) Polarity Adverb Addition Lexical Rule!

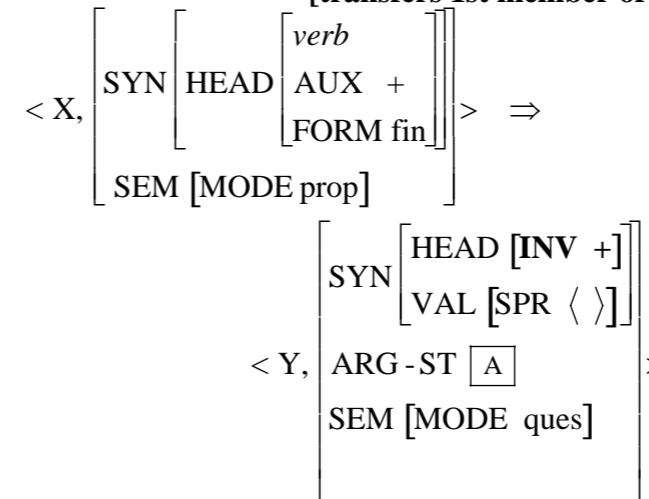
[yields ternary branching for *will not go*]



- It is a *pi-rule*, i.e. a post-inflectional lexical rule, which is subject to a defeasable constraint that maintains HEAD value and SEM.
- The switch in POL guarantees that the rule does not apply to its own output.
- The reference to [FORM fin] in the input guarantees that *not* is inserted after... well...after T+M, T+have, etc.

(27) Inversion Lexical Rule!

[transfers 1st member of ARG-ST from SPR to COMPs]



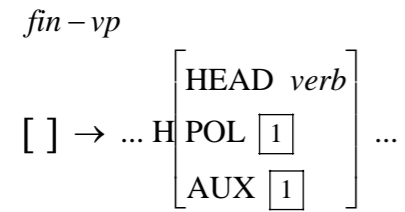
- SHAC applies to the input, guaranteeing that the output will have a verb that agrees with the subject, even if that subject is not a specifier.
-

"Last resort" property of *do*:

Account of Sag and Kim:

- "Polarized" auxiliary verbs are either negative, focused, or select a polarized adverbial. Polarization is the result of a lexical rule applying to auxiliary verbs.
- The following grammar rule guarantees that a verb specified [AUX +] must also be [POL +] and will have the complementation patterns of polarized verbs.

(28) **Finite VP construction**



- Auxiliary verbs except *do* are unspecified for AUX, so they may be used in polarized and non-polarized contexts. *Do* is specified [AUX +], and thus must be specified [POL +].
- The subject-aux inversion grammar rule imposes no polarity requirement on an auxiliary verb, therefore no requirement on *do*:

Rightward selection of affixes by INFL, have, be:

SW: Selection via the ARG-ST feature of each auxiliary verb. Stipulation that main clauses have the FORM value [finite +] for their head.

Obligatoriness of affix hopping:

SW: Selection properties are part of the constraints on PS.

Affix Hopping applies only once per affix:

SW: Feature values that would yield double-affixation are not found.

Placement of NEG:

SW: Lexical rule that adds NEG as a first object of finite auxiliary verbs only.

DO-support only with main verbs:

SW: Lexical entry for *do* requires that its (final) complement be a non-auxiliary verb.

DO-support only with NEG (and similar processes):

Sag & Kim: Complicated stuff about polarity.

DO-support obligatory with main verbs:

SW: Negation added by a lexical rule that applies to auxiliary verbs only. Subject aux inversion requires an auxiliary verb.

8. A Representational Minimalist (e.g. Brodian) Account of the English auxiliary system

[to be continued...?]