The English Auxiliary System

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Linguistics 226
Construction Grammar
Chomsky’s (1955/1957) Analysis of EAS
The Problem of English Auxiliaries

- Auxiliaries are optional: They (will) know the answers.
- Auxiliaries precede any main verbs: They must have read the book.
- Strict ordering of auxiliary elements: *They are having/musting read the book.
- Discontinuous Dependencies:
  Kim has eaten/*eat/*eating lunch.
  Has Kim eaten/*eat/*eating lunch?
- Mysterious appearance of auxiliary *do*:
  ‘Necessary whenever it’s possible.’
The NICE(R) Properties
(Huddleston 1976, Quirk et al. 1985; Warner 1993)

**Negation:** Lee will not eat apples./*Kim eats not apples.

**Inversion:** Has Lee eaten apples?/*Eats Lee apples?

**Contraction:** can’t, shouldn’t/*eatn’t,...

**Ellipsis:** Kim will prove a theorem, and Lee will __ , too./
*Kim proves theorems, and Lee proves __ , too.

**Rebuttal:** Kim will so/too see it./*Kim sees so/too it.

Whenever there is no auxiliary verb, auxiliary *do* must appear:
Kim does not eat apples.
Does Lee eat apples?
Kim didn’t eat apples.
Kim does __ , too.
Summary of SS Analysis of EAS

- Auxiliaries are optional: Optionality in PS Rules.
- Auxiliaries precede any main verbs: Order Fixed by PS Rules.
- Strict ordering of auxiliary elements: Order Fixed by PS Rules.
- Discontinuous Dependencies:
  Auxiliaries determine form of following verb: morphemes introduced with AUX element by PS Rules; moved by Affix-Hopping transformation.
  Auxiliary can be moved subsequently by transformation (Subject-Aux Inversion).
- Mysterious appearance of auxiliary *do*: Obligatory Do-Support transformation applies whenever a tense morpheme is ‘stranded’.
In the late 1970s, new kinds of generative grammar began to emerge that eliminated transformations. These approaches came to be known as **Constraint-Based Grammar**.

- Generalised Phrase Structure Grammar (GPSCG)
- Lexical Functional Grammar (LFG)
- Head-Driven Phrase Structure Grammar (HPSG)
- Categorial Grammar (especially Combinatory CG (CCG))
- Berkeley Construction Grammar (BCG)
- Simpler Syntax
As early as the mid 1960s, Chomsky suggested replacing familiar syntactic categories with feature ‘bundles’, e.g.

\[
\begin{bmatrix}
V & + \\
N & - \\
\text{BAR} & 2
\end{bmatrix} \quad (= S), \quad \begin{bmatrix}
N & + \\
V & - \\
\text{BAR} & 2
\end{bmatrix} \quad (= \text{NP}), \\
\begin{bmatrix}
V & + \\
N & - \\
\text{BAR} & 1
\end{bmatrix} \quad (= \text{VP}), \quad \begin{bmatrix}
N & - \\
V & - \\
\text{BAR} & 0
\end{bmatrix} \quad (= \text{P})
\]

X-Bar Theory, widely adopted within TG and elsewhere
A fundamental claim of GPSG (Gazdar 1981, 1982): the theories of schematization already in use in Generative Grammar can provide perspicuous analysis of many phenomena previously thought to motivate transformations.

E.g. Featural analysis of categories, $\bar{X}$ theory (including Head Feature Principle)

Minor changes to the theory of CFG can do the rest of the work, allowing transformational operations to be eliminated from the theory of grammar.

E.g. Metarules (inductive definition of the grammar).
two guys walked into the room

\[
\begin{bmatrix}
V + \\
N - \\
\text{BAR 2}
\end{bmatrix}
\]

\[
\begin{bmatrix}
V + \\
N - \\
\text{BAR 1}
\end{bmatrix}
\]

\[
\begin{bmatrix}
V - \\
N - \\
\text{BAR 0}
\end{bmatrix}
\]

\[
\begin{bmatrix}
V - \\
N - \\
\text{BAR 1}
\end{bmatrix}
\]

\[
\begin{bmatrix}
V - \\
N + \\
\text{BAR 2}
\end{bmatrix}
\]
**Gazdar, Pullum & Sag (1982) on Auxiliaries\(^1\)**

\[
\begin{align*}
V^1 \\
\left[ \begin{array}{c}
\text{AUX} + \\
\alpha
\end{array} \right] \rightarrow V[n] \quad [\beta]^1, \text{ where}
\end{align*}
\]

<table>
<thead>
<tr>
<th>n</th>
<th>(\alpha)</th>
<th>(\beta)</th>
<th>MEMBERSHIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>FIN+</td>
<td>BSE+</td>
<td>can, may, must, will etc.</td>
</tr>
<tr>
<td>6</td>
<td>FIN+</td>
<td>BSE+, AUX−</td>
<td>do</td>
</tr>
<tr>
<td>7</td>
<td>ASP+</td>
<td>PSP+</td>
<td>have</td>
</tr>
<tr>
<td>8</td>
<td>ASP+, COP+</td>
<td>PRP+</td>
<td>be</td>
</tr>
<tr>
<td>9</td>
<td>COP+</td>
<td>PAS+</td>
<td>be</td>
</tr>
<tr>
<td>10</td>
<td>INF+</td>
<td>BSE+</td>
<td>to</td>
</tr>
<tr>
<td>11</td>
<td>COP+</td>
<td>PRED+</td>
<td>be</td>
</tr>
</tbody>
</table>

\(\ldots\) \(\ldots\) \(\ldots\) \(\ldots\)

---

Subject-Auxiliary ‘Inversion’ Metarule:

\[
\begin{align*}
V^1 & \quad \begin{bmatrix} \text{AUX} & + \end{bmatrix} \rightarrow V[n] \ [\beta]^1 \\
\downarrow & \\
V^2 & \quad \begin{bmatrix} \text{INV} & + \end{bmatrix} \rightarrow V[n] \ [\beta]^2
\end{align*}
\]
\[
\begin{bmatrix}
V^2 \\
\text{AUX} + \\
\text{INV} + \\
\alpha
\end{bmatrix} \rightarrow V[n] \ [\beta]^2, \text{ where}
\]

<table>
<thead>
<tr>
<th>n</th>
<th>$\alpha$</th>
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<td>11</td>
<td>COP+</td>
<td>PRED+</td>
<td>be</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
PROG(talk)(Kim)  QUES(PROG(talk)(Kim)(Lee))
The GPS Context-Free Grammar of Auxiliaries

- Provides a superior account of negation.
- Expresses the relevant generalizations about the NICE(R) properties,
- Deals with exceptions which seem hard to reconcile with the SS grammar (e.g. exceptions to SAI),
- Avoids the redundancies of the SS grammar:

1. \[
\text{NP} \rightarrow \begin{cases} 
C - V \\
C + M - \\
C + \text{have} - \\
C + \text{be} - 
\end{cases} \times 1 - 2 - 3 \Rightarrow ... \\
\]

is redundantly stipulated in at least 6 transformations

2. GPS grammar avoids the rule proliferation masked by the theoretically illegitimate abbreviations \textbf{Af} and \textbf{v} required for the affix ‘hopping’ analysis to work.
Blocking *Kim dǐd leave.

- The one possible defect of the GPS analysis of the EAS: *Kim dǐd leave.

- Blocking by Maxim of Quantity/Manner (Kim 2000; Newmeyer 2006)
  Kim left.

- Falk 1984 (Bresnan’s ‘Economy of Expression’ Principle)
- OT account (Grimshaw 1997, Vikner 1999, Bresnan 2000)

- Morphology competes with (and systematically blocks) syntax.
These Analyses ‘Explain’ Too Much

- Dialects where **Kim did leave** and **Kim left** both exist and are equivalent. (Palmer 1968, Klemola 1998, Schütze 2004)
- We thought they would (cf. they’d) accept our offer.
- I will not (cf. won’t) put up with this.
- I know (that) she’s right.
- Pat prefers (for) them to go first.
- The Red Cross helped them (to) get back on their feet.
- Kim went to the store before Sandy went to the store (cf. ...before Sandy (did).)
- They’re more likely to go to Paris than they are to go to Rome. (cf. They’re more likely to go to Paris than (to) Rome).
- ...
Sign-Based Construction Grammar
(Boas and Sag in press)

- Synthesis of **Berkeley Construction Grammar**
  (Fillmore, Kay and O’Connor 88, Kay and Fillmore 99, ...)
  and

  **Head-Driven Phrase Structure Grammar**
  (Pollard and Sag 1994, Ginzburg and Sag 2000, ...)

- **Constraint-Based**
- **Declarative**
- **Monotonic**
- **Lexicalist**
- Based on notion of **Sign**
Psycholinguistically Plausible


- **SBCG** Grammars fit naturally in a processing regime where partial meanings are constructed incrementally. [Tanenhaus et al. in *Science*, 1995; Sag and Wasow, 2011]

- Makes sense of Fodor, Bever, and Garrett’s (1974:276) conclusions that linguistic representations are experimentally confirmed, but not the transformational processes that were supposed to relate them.

- **Stochastic SBCG**: The constraints can be associated with weights and integrated into a psycholinguistic model where the effects of frequency, priming, and inhibition can be taken into account.
Sign-Based Construction Grammar

A Grammar is a Recursive System of Constructions (Constraints that license signs):

- $sign_0 \rightarrow sign_1 \ldots sign_n$

- $\begin{bmatrix}
PHON & [...] \\
SYN  & [...] \\
SEM  & [...] \\
\end{bmatrix} \rightarrow \begin{bmatrix}
PHON & [...] \\
SYN  & [...] \\
SEM  & [...] \\
\end{bmatrix} \ldots \begin{bmatrix}
PHON & [...] \\
SYN  & [...] \\
SEM  & [...] \\
\end{bmatrix}$
Signs Look Like This:

<table>
<thead>
<tr>
<th>word/phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHON</td>
</tr>
<tr>
<td>FORM</td>
</tr>
<tr>
<td>ARG-ST</td>
</tr>
</tbody>
</table>

```
word|phrase
PHON | phon-obj |
FORM | morph-obj |
ARG-ST | list(sign) [only for lexical signs]

SYN

<table>
<thead>
<tr>
<th>CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>noun</td>
</tr>
<tr>
<td>VFORM</td>
</tr>
<tr>
<td>AUX</td>
</tr>
<tr>
<td>INV</td>
</tr>
<tr>
<td>CASE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VALENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>list(sign)</td>
</tr>
</tbody>
</table>

SEM | sem-object |
CNTXT | context-obj |
Sign-Based Construction Grammar

- Every feature structure is assigned a type.
- Feature structures, including signs and constructs, are cross-classified via a type hierarchy.
- A grammar is a set of constraints defining the properties of these FSs in terms of the type hierarchy.
- Allows general constraints, idiosyncrasies, and intermediate-level constraints to be stated.
- Well-formedness involves simultaneous satisfaction of all relevant constraints.
- Sign well-formedness is defined with respect to a set of listemes and a set of constructions.
An **sbcg Grammar**

- A set of listemes (sign descriptions)
- A set of constructions of the form:

\[ \tau \Rightarrow D \quad (\text{Every FS of type } \tau \text{ must satisfy } D), \]

where either:

a. \( \tau \) is a subtype of *lexical-sign*  
   *(Lexical Class Construction)*, or  

b. \( \tau \) is a subtype of *construct*  
   *(Combinatory Construction)*
Also in the mid-1960s, Chomsky suggested providing words with features specifying their combinatoric potential.

(Cf. Ajdukiewicz 1935)

<table>
<thead>
<tr>
<th>LEXEME</th>
<th>VALENCE List</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAUGH</td>
<td>⟨ NP ⟩</td>
<td><em>Kim laughs</em></td>
</tr>
<tr>
<td>WALK</td>
<td>⟨ NP (, PP) ⟩</td>
<td><em>Kim walked (into a bar)</em></td>
</tr>
<tr>
<td>LOVE</td>
<td>⟨ NP, NP ⟩</td>
<td><em>Kim loved Lee</em></td>
</tr>
<tr>
<td>GIVE</td>
<td>⟨ NP, NP, NP ⟩</td>
<td><em>They gave Pat a watch</em></td>
</tr>
<tr>
<td>GIVE</td>
<td>⟨ NP, NP, PP[to] ⟩</td>
<td><em>They gave a watch to Pat</em></td>
</tr>
<tr>
<td>KEEP</td>
<td>⟨ NP, VP[prp] ⟩</td>
<td><em>They kept coming</em></td>
</tr>
<tr>
<td>CONTINUE</td>
<td>⟨ NP, VP[inf] ⟩</td>
<td><em>I continue to doubt</em></td>
</tr>
</tbody>
</table>
Two Combinatoric Constructions

**Subject-Predicate Construction:**

\[
[S\ Y\ N \ [V\ A\ L \ \langle \ \rangle]] \rightarrow X \ H:\ \begin{bmatrix}
    \text{SYN} \\
    \text{CAT} \\
    \text{VAL}
\end{bmatrix}
\begin{bmatrix}
    \text{VF} & \text{fin} \\
    \text{AUX} & - \\
    \text{INV} & -
\end{bmatrix}
\text{\langle} \ X \ \rangle
\]

(A valence-saturated phrase may consist of an expression followed by its head, where the latter is a finite, \text{AUX} –, and \text{INV} – expression selecting the former as its only valent.)

**Head-Complement Construction:**

\[
[S\ Y\ N \ [V\ A\ L \ \langle X \rangle]] \rightarrow H:\ \begin{bmatrix}
    \text{word} \\
    \text{SYN} \ [V\ A\ L \ \langle X \rangle \oplus L]
\end{bmatrix}
\]

(L)

(A phrase selecting a single valent may consist of a lexical head whose \text{VALENCE list} consists of that valent followed by its sister signs.)
An Analysis Tree

```
phrase
FORM⟨ Obama, loved, them ⟩
SYN
CAT [2]
VAL ⟨ ⟩
SEM ... (subj-pred-cxt)
```

```
word
FORM⟨ Obama ⟩
SYN NP
SEM ... [1]
```

```
phrase
FORM⟨ loved, them ⟩
SYN
CAT [2]
VAL ⟨ [1] ⟩
SEM ... (hd-compl-cxt)
```

```
word
FORM⟨ loved ⟩
SYN
CAT [2]
VAL ⟨ [1], [2] ⟩
SEM ... [1]
```

```
word
FORM⟨ them ⟩
SYN NP
SEM ... [2]
```

```
word
FORM⟨ loved ⟩
SYN
CAT [2]
VAL ⟨ [1], [2] ⟩
SEM ... [1]
```

```
word
FORM⟨ them ⟩
SYN NP
SEM ... [2]
```
Three Principles of SBCG

- **Lexical Encoding:**
  Words encode category and valence information.

- **Head Feature Principle:**
  CATEGORY information projects upward from the head.

- **Valence Principle:**
  Phrasal structure obeys a regime of VALENCE ‘cancellation’.
### Auxiliary Verb Forms (Palmer 1968: 19)

<table>
<thead>
<tr>
<th>LEXEME</th>
<th>finite</th>
<th>non-finite</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE</td>
<td><em>is, are, am, was, were</em></td>
<td><em>be, being, been</em></td>
</tr>
<tr>
<td>HAVE</td>
<td><em>has, have, had</em></td>
<td><em>have, having</em></td>
</tr>
<tr>
<td>DO</td>
<td><em>do, does, did</em></td>
<td></td>
</tr>
<tr>
<td>WILL</td>
<td><em>will, would</em></td>
<td></td>
</tr>
<tr>
<td>SHALL</td>
<td><em>shall, should</em></td>
<td></td>
</tr>
<tr>
<td>CAN</td>
<td><em>can, could</em></td>
<td></td>
</tr>
<tr>
<td>MAY</td>
<td><em>may, might</em></td>
<td></td>
</tr>
<tr>
<td>MUST</td>
<td><em>must</em></td>
<td></td>
</tr>
<tr>
<td>OUGHT</td>
<td><em>ought</em></td>
<td></td>
</tr>
<tr>
<td>DARE</td>
<td><em>dare</em></td>
<td></td>
</tr>
<tr>
<td>NEED</td>
<td><em>need</em></td>
<td></td>
</tr>
<tr>
<td>USED</td>
<td><em>used</em></td>
<td></td>
</tr>
</tbody>
</table>
The Valence of Auxiliary Verbs

<table>
<thead>
<tr>
<th>LEXEME</th>
<th>Value of VALENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE</td>
<td>⟨NP, XP⟩</td>
</tr>
<tr>
<td>HAVE</td>
<td>⟨NP, VP[psp]⟩</td>
</tr>
<tr>
<td>all modals</td>
<td>⟨NP, VP[bse]⟩</td>
</tr>
<tr>
<td>OUGHT and ‘modal’ IS</td>
<td>⟨NP, VP[inf]⟩</td>
</tr>
</tbody>
</table>
My Theory of the EAS

- Auxiliary verbs project structure just like other verbs (cf. Ross 1969, GPS 1982, and others)

- **Subject-Predicate Construction** and **Head-Complement Construction**
FORM 〈two, guys, will, greet, you〉

SYN
CAT
VAL 〈⟩

FORM 〈two, guys〉

SYN  NP

FORM 〈will, greet, you〉

SYN
CAT
VAL 〈NP〉

FORM 〈will〉

SYN
CAT
VAL 〈NP, VP[bse]〉

FORM 〈greet, you〉

SYN
CAT
VAL 〈NP〉

FORM 〈greet〉

SYN
CAT
VAL 〈NP, NP〉

FORM 〈you〉

SYN
NP
Featural Analysis of Auxiliaries

- The feature $\text{AUX}$ is not used to distinguish auxiliary verbs from main verbs.
- Rather, $\text{AUX}$ distinguishes the auxiliary-restricted environments (e.g. the NICE constructions) from unrestricted environments.
- A syntactic environment restricted to auxiliary verbs is specified as $[\text{AUX} +]$.
- $\text{INV}$: A clause that is verb-initial is specified as $[\text{INV} +]$ (in English, only auxiliary verbs can be $[\text{INV} +]$).
- Auxiliary verbs are lexically unspecified for $\text{AUX}$ and $\text{INV}$.
- Hence they are compatible with the following combinations:

\[
\begin{align*}
\text{AUX} & \quad + & \text{AUX} & \quad + & \text{AUX} & \quad - & \text{AUX} & \quad - \\
\text{INV} & \quad - & \text{INV} & \quad + & \text{INV} & \quad - & \text{INV} & \quad +
\end{align*}
\]

- Main (nonauxiliary) verbs are lexically specified as $[\text{AUX} -]$.
Two Kinds of Negation in English (Klima, 1964)

Constituent Negation:

\[
\text{Adv} \quad \text{VP} \quad [\text{nonfin}]
\]

Finite Negation:

\[
\text{VP} \quad [\text{fin}]
\]

\[
\text{V} \quad \text{Adv} \quad \text{Complements} \quad \text{not}
\]

&Kim can not do that.

Kim cannot [not take advantage of that offer].
The Variable Scope of Modals and Negation

- &Sandy must accept nothing.
- &Sandy will accept nothing.

- &Nobody must visit Pat.
- &Nobody in the room will visit Pat.
The Fixed Scope of Modals and Not

Zwicky and Pullum (1983):

- My parents can't accept that. \[ \neg M \]
- Chris won't do that, will she? \[ \neg M \]
- Hilary mustn't accept the offer. \[ M \neg \]
- They shouldn't have been drinking. \[ M \neg \]

- My parents cannot accept that. \[ \neg M \]
- Chris will not do that, will she? \[ \neg M \]
- Hilary must not accept the offer. \[ M \neg \]
- They should not have been drinking. \[ M \neg \]
Some modals must outscope \textbf{not}; others must be outscoped by \textbf{not} (unless \textbf{not} functions as constituent negation).

These facts can only be partly predicted on semantic grounds (Warner 2000):

- \textit{can, could, need, dare, will, would} [Epistemic: $\neg M$]
- \textit{must, shall, ought, should} [Deontic: $M \neg$]

But \textit{may} (epistemic), \textit{might} (epistemic) [$M \neg$]

and \textit{may} (deontic) [$\neg M$]

Finite $[\text{AUX+}]$-compatible verbs may select \textbf{not} as a complement.
A Lexical Analysis of Finite Not

\[
\text{FORM } \langle \text{will, not, go} \rangle \\
\text{SYN} \\
\text{CAT} \\
\text{INV} \\
\text{VF} \\
\text{fin} \\
\text{VAL } \langle \text{NP} \rangle \\
\text{SEM} \\
= \text{not(will)(go)} \\
\text{(hd-compl-cxt)}
\]

\[
\text{FORM } \langle \text{will} \rangle \\
\text{SYN} \\
\text{CAT} \\
\text{AUX} \\
\text{INV} \\
\text{VF} \\
\text{fin} \\
\text{VAL } \langle \text{NP,Adv[not],VP[bse]} \rangle \\
\text{SEM} \\
\text{C}_{\text{not}}(\text{will})
\]

\[
\text{FORM } \langle \text{not} \rangle \\
\text{SYN} \\
\text{ADV[not]} \\
\text{SEM } \text{not}
\]

\[
\text{FORM } \langle \text{go} \rangle \\
\text{SYN} \\
\text{VP[bse]} \\
\text{SEM } \text{go}
\]


A Lexical Analysis of Finite Not

\[
\begin{align*}
\text{FORM} & \langle \text{must, not, go} \rangle \\
\text{SYN} & \left[ \begin{array}{c}
\text{CAT} \\
\text{VAL} \\
\text{SEM}
\end{array} \right] \\
\text{SEM} & = \text{must}(\text{not(go)})
\end{align*}
\]

\[
\begin{align*}
\text{FORM} & \langle \text{must} \rangle \\
\text{SYN} & \left[ \begin{array}{c}
\text{CAT} \\
\text{VAL} \\
\text{SEM}
\end{array} \right] \\
\text{SEM} & = \text{must}
\end{align*}
\]

\[
\begin{align*}
\text{FORM} & \langle \text{not} \rangle \\
\text{SYN} & \left[ \begin{array}{c}
\text{ADV}[\text{not}] \\
\text{SEM}
\end{array} \right] \\
\text{SEM} & = \text{not}
\end{align*}
\]

\[
\begin{align*}
\text{FORM} & \langle \text{go} \rangle \\
\text{SYN} & \left[ \begin{array}{c}
\text{VP}[\text{bse}] \\
\text{SEM}
\end{array} \right] \\
\text{SEM} & = \text{go}
\end{align*}
\]
Contraction (Lexical)

Contraction Construction:

\[
\begin{align*}
\text{FORM} & \quad \langle F_{\text{Contr}}(Y) \rangle \\
\text{SYN} & \quad \begin{bmatrix}
\text{CAT} & X \ ! [\text{AUX} \ bool] \\
\text{VAL} & \langle \text{NP}, \ldots \rangle
\end{bmatrix} \\
\text{SEM} & \quad Z
\end{align*}
\rightarrow
\begin{align*}
\text{FORM} & \quad \langle Y \rangle \\
\text{SYN} & \quad \begin{bmatrix}
\text{CAT} & X \\
\text{VAL} & \langle \text{NP}, \text{ADV}[\text{not}], \ldots \rangle
\end{bmatrix} \\
\text{SEM} & \quad Z
\end{align*}
\]
Consequences

- **Not** is a complement of the finite auxiliary verb.
- Therefore, **not** is ordered after the finite verb.
- In finite negation, **not** does not form a constituent with the following VP (and hence never fronts with the following material).
- **Not** participates in lexical idiosyncrasy (scope variation) only with finite auxiliaries.
- No iteration of complement **not**.
- The interaction of **not** in VPE is properly accounted for (VPE is ellipsis of the complement of an auxiliary verb).
- This formulation blocks *Will not he laugh?*, but allows Won’t he laugh?.
- **Will he not laugh?** is allowed only as constituent negation.
Expanded Grammar

Subject-Predicate Construction:

\[[\text{SYN} [\text{VAL} \langle \rangle]] \rightarrow X \quad \text{H:} \begin{bmatrix} \text{SYN} \\ \text{CAT} \\ \text{AUX} \\ \text{INV} \\ \langle X \rangle \end{bmatrix} \]

Head-Complement Construction:

\[[\text{SYN} [\text{VAL} \langle X \rangle]] \rightarrow \text{H:} \begin{bmatrix} \text{word} \\ \text{SYN} \\ \text{VAL} \\ \langle X \rangle \oplus L \end{bmatrix} \]

Aux-Initial Construction:

\[[\text{SYN} [\text{VAL} \langle \rangle]] \rightarrow \text{H:} \begin{bmatrix} \text{word} \\ \text{SYN} \\ \text{CAT} \\ \text{AUX} \\ \text{INV} \\ \langle L \rangle \end{bmatrix} \]

(A valence-saturated clause may consist of a lexical head specified as \text{AUX} + and \text{INV} + followed by all its valents.)
The Family of Aux-Initial Constructions:  
(Fillmore 1999; Ginzburg & Sag 2000)

<table>
<thead>
<tr>
<th>Exclamatives:</th>
<th>Boy, [was I stupid]!</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wow, [can she sing]!</td>
</tr>
</tbody>
</table>

**Conditionals:**

<table>
<thead>
<tr>
<th>Were they here now], we’d...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Should there be a storm], we’d...</td>
</tr>
</tbody>
</table>

**‘Magic’:**

<table>
<thead>
<tr>
<th>May they live forever!</th>
</tr>
</thead>
<tbody>
<tr>
<td>May all your teeth fall out!</td>
</tr>
</tbody>
</table>

**Interrogatives:**

<table>
<thead>
<tr>
<th>Were they involved?</th>
</tr>
</thead>
<tbody>
<tr>
<td>We won’t go, [will we]?</td>
</tr>
</tbody>
</table>

**Declaratives:**

<table>
<thead>
<tr>
<th>So [can I]!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never [would I do such a thing].</td>
</tr>
</tbody>
</table>
A Polar Interrogative Construct

\[
\begin{array}{c}
\text{FORM} \langle \text{am, I, invited} \rangle \\
\text{SYN} \\
\text{CAT} \\
\text{VAL} \langle \rangle \\
\end{array}
\]

\[
\begin{array}{c}
\text{word} \\
\text{FORM} \langle \text{am} \rangle \\
\text{SYN} \\
\text{CAT} \\
\text{VAL} \langle 1, 2 \rangle \\
\end{array}
\]

\[
\begin{array}{c}
\text{FORM} \langle \text{I} \rangle \\
\text{SYN} \\
\text{NP} \\
\end{array}
\]

\[
\begin{array}{c}
\text{FORM} \langle \text{invited} \rangle \\
\text{SYN} \\
\text{VP[bse]} \\
\end{array}
\]
Motivating \textbf{INV}: Some Irregularities of SAI

\begin{itemize}
  \item Some auxiliary verbs, e.g. first person \textit{aren’t}, only appear in inverted environments (Langendoen 1970):
    \begin{itemize}
      \item *I aren’t invited to the party.
      \item Aren’t I invited to the party?
      \item These are lexically specified as [\textbf{INV} +].
    \end{itemize}

  \item Some auxiliary verbs, e.g. \textit{better}, only appear in noninverted environments (GPS 1982):
    \begin{itemize}
      \item *Better you not cry?
      \item You better not cry.
      \item These are lexically specified as [\textbf{INV} −].
    \end{itemize}

  \item Cf. also \textit{I shall go downtown} vs. \textit{Shall I go downtown}? (due to Emonds, as cited by Chomsky (1981: 209))
  \item These remain unaccounted for in transformational analyses.
\end{itemize}
Kim hasn’t read that, but I have __ .

Are they talking to the dean? - They must be __ .

Lee left before Sandy did __ .

**VP-Ellipsis Construction:**

\[
\begin{align*}
\text{SYN} & \begin{bmatrix}
\text{CAT} & X ! \text{ [AUX } \text{ bool}]
\end{bmatrix} \quad \rightarrow \quad \begin{bmatrix}
\text{CAT} & X : \text{ [AUX } +] \\
\text{VAL} & \langle \text{NP} \rangle \\
\text{SEM} & V' \text{(Variable)}
\end{bmatrix} \\
\text{SYN} & \begin{bmatrix}
\text{CAT} & X : \text{ [AUX } +] \\
\text{VAL} & \langle \text{NP}, \text{ XP} \rangle \\
\text{SEM} & V'
\end{bmatrix}
\end{align*}
\]
VP-Ellipsis
Interactions of VP-Ellipsis

- **VP-Ellipsis** feeds **Negation** and **Contraction**:
  Sandy will not __ .
  Sandy won’t __ .

- **VP-Ellipsis** feeds **The Aux-Initial Construction**:
  Has Lee __ ?

- **VP-Ellipsis** feeds **Negation**, **Contraction**, and **The Aux-Initial Construction**:
  Hasn’t Lee __ ?

- Lexical scope restrictions are preserved in **VP-Ellipsis**:
  Pat will not __ . vs. Pat must not __ .
  Pat won’t __ . vs. Pat mustn’t __ .
We will so/too attend. We will attend. We won’t attend.

**Rebuttal Construction:**

\[
\begin{align*}
\text{FORM} & \quad \langle F_{\text{Rebut}}(Y) \rangle \\
\text{SYN} & \quad X \! [\text{AUX } -] \\
\text{SEM} & \quad Z \bullet \text{Rebut}(\text{Spkr}_u, \text{Addr}_u, u)
\end{align*}
\]

\[
\begin{align*}
\text{FORM} & \quad \langle Y \rangle \\
\text{SYN} & \quad X: [\text{AUX } +] \\
\text{SEM} & \quad Z \! [\text{VF } \text{fin}]
\end{align*}
\]

where
1. If \( Y = F_{\text{contr}}(X) \), then \( F_{\text{Rebut}}(Y) = \dot{Y} \), and
2. Otherwise, \( F_{\text{Rebut}}(Y) = \dot{Y}, Y + \text{too}, \) or \( Y + \text{so}. \)

\(^2\)‘\( \bullet \)' is a Pottsian composition operator functioning as ‘expressive glue’.
\[
\begin{align*}
\text{FORM} & \langle \text{will+so} \rangle \\
\text{SYN} & \begin{cases}
\text{CAT} [\text{VF } fin] \\
\text{AUX } - \\
\text{VAL} \langle \text{NP, VP}[bse] \rangle 
\end{cases} \\
\text{SEM} & \text{will } \bullet \text{Rebut}(\text{Spkr}_u,\text{Addr}_u,u)
\end{align*}
\]

\[
\begin{align*}
\text{FORM} & \langle \text{will} \rangle \\
\text{SYN} & \begin{cases}
\text{CAT} [\text{VF } fin] \\
\text{AUX } + \\
\text{VAL} \langle \text{NP, VP}[bse] \rangle 
\end{cases} \\
\text{SEM} & \text{will}
\end{align*}
\]
Summary of Analysis of EAS

- Auxiliaries are optional: A clause is headed by a finite verb, which may be an auxiliary verb or a nonauxiliary verb.
- Auxiliaries precede any main verbs: Some auxiliaries have only finite lexical forms and hence must precede all other verbs because they head a finite clause.
- Strict ordering of auxiliary elements: Order Fixed by semantic constraints and/or feature incompatibilities.
- Discontinuous Dependencies:
  Auxiliaries determine form of following verb: Work is done by lexical selection and the Head Feature Principle.
  (This derives the effects of the Head Movement Constraint without head movement!)
Auxiliary Do

- Generalization: *Do* appears only in $[^{\text{AUX} +}]$ environments.
- Analysis: *Do* is lexically specified as $[^{\text{AUX} +}]$.

- Hence,
  
  *Kim dŏes walk into a bar*, but
  
  *Kim does not walk into a bar*,
  
  *Kim does so walk into a bar*,
  
  *Kim DOES walk into a bar*,
  
  *Did Kim walk into a bar?*,
  
  *Kim did ___*, etc.
Lasnik (2000: 119) on Syntactic Structures

... it appears that any theory with the following features fails to attain explanatory adequacy:

- Optional vs. obligatory rules
- Extrinsic ordering in rules
- Complicated structural analyses (…)
- Complicated structural changes (…)
In other words, the rules [of SS - IAS] describe, but don’t capture the following overwhelming generalization:

(169) A stranded affix is no good.

My analysis derives this generalization directly from the strong form of lexicalism it embraces: Inflectional affixes cannot be autonomous syntactic entities.
Human Biology: Ts as Structure-Sensitive Operations?

- Chomsky 1968 (Language and Mind), 1971 (Problems of Knowledge and Freedom), Crain & Nakayama 1987, ...

- [[The man] who is speaking] is their friend.
- Is the man who is speaking ___ their friend?
- *Is the man who ___ speaking is their friend?

- Can eagles that fly eat?
- ‘Constrained Ambiguity’
... adding such rules [e.g. metarules -IAS] threatens to enrich the role of [innate, language-specific factors - IAS]. Moreover, adding meta-rules threatens massive over-generation, as outlined in e.g., Uszkoreit and Peters (1987) or Ristad (1986). For us, the issue is whether PTR’s model of such acquisition makes it plausible that a similar model - with similar stress on general learning as opposed to domain-specific constraints - can capture the constrained ambiguity facts.
BPYC’s concern about meta-rules has no relevance for evaluating the GPSG proposals discussed earlier: GPSG grammars involve finite closure under metarules; The Uszkoreit/Peters results all turn on metagrammars that allow infinite grammars.

The analysis of the EAS I have presented here uses no ‘meta-rules’. Aux-initial structures are directly generated from the lexical specifications of auxiliary verbs.

As noted by Clark and Lappin (2010: Ch. 2), a grammar that directly generates aux-initial structures answers BC’s objections to learnability results for nontransformational grammars. See their discussion for an optimistic assessment of learnability for grammars like SBCG.
Another Advantage

Embick and Noyer (2001) discuss a situation of putative ineffability created by constituent negation which suffices to block affix lowering, but is not enough to trigger do-support:

▶ *You always not do that.
    cf. You can always not do that.
▶ *You do always not do that.
▶ You **DO** always not do that.

---

³Embick, David. Noyer, Rolf, Movement Operations after Syntax, Linguistic Inquiry 32.4, Fall 2001
One might object that Lasnik’s analysis does as well and is independently motivated by Warner’s (1986) observation:

- John left and Mary will leave, too.
- *John was here and Mary will be here, too.
But

- Modal/negation scope variation is not analyzed.
- No treatment of inversion idiosyncrasies.
- More stipulative (e.g. Stranded Affix Filter).
- No account of Embick/Noyer contrasts.
Lasnik’s account of Warner’s observation incorrectly rules out:

Ms Sanford, whose husband had cheated on her, has said that even if he had asked her to be there, she would not have been there. [NYTimes, Political Memo, June 19, 2011]

I don’t deny that he can be a little quirky... He always has been a little quirky. [The Sopranos. Season 3]

He hasn’t been known for his back-hand serve in the past, but he will be known for his back-hand serve, once he’s taken Mike’s advanced class. [constructed]

[I’m] pretty good at being invisible when I need to be invisible. [CSI:NY 3.11.11]

That guy’s in more trouble than he has a right to be in much trouble. [Movie, Aug 6, 2003]