Review from last time...

The structure of the grammar:  
\[ D S \leftrightarrow \text{phrase structure rules} \]

\[ \text{surface structure (abstract)} \rightarrow \text{SS} \leftrightarrow \text{movement rules} \]

\[ \text{"phonetic form"} \rightarrow \text{PF} \leftrightarrow \text{more movement rules} \]

\[ \text{"logical form" (meaning)} \]

Movement comes in four different kinds, each with its own conditions:

1. XP-movement
2. X-movement
3. Wh-movement
4. NP-movement

**XP-movement**

**X-movement**

**Wh-movement**

**NP-movement**

**Extraposition** (a rightward movement rule)

**Heavy NP shift** (a subcase of Extrapolation)

**Wh-movement**

Move wh-XP to Comp when:

(i) Comp is [+Q] if wh-word does not move further.
(ii) the wh-XP is not inside a [+Q] S′ (except the one containing the Comp).
(iii) the wh-XP is not inside a complex NP.
(iv) there is no nearer Comp.

(wh-island constraint)
(complex noun phrase condition)
(cyclicity condition, locality condition)

(3) a. Mary solved the problem.
b. The problem was solved (by Mary).

(4) a. It seems (that) Mary has solved the problem.
b. Mary seems to have solved the problem.

(5) a. [Details of a secret plan to finance the rebels] have emerged.
b. Details have emerged of a secret plan to finance the rebels.

(6) a. Mary read [NP all the books she had borrowed].
b. ? Mary returned [NP all the books she had borrowed] to the library.
c. Mary returned ti to the library [NP all the books she had borrowed].

(7) a. Mary read Aspects.
b. Mary returned Aspects to the library.
c. * Mary returned ti to the library [NP Aspects ].

Aspects not “heavy enough”

**X-bar theory**

(8) a. hit: [— NP]
b. smile: [—]
c. think: [— S′]
d. give: [— NP PP]
e. rely: [— PP]

(9) a. VP → V NP 
b. VP → V 
c. VP → V S′
d. VP → V NP PP 
e. VP → V PP

So we have: VERBS IN GENERAL CAN BE FOLLOWED BY S′

and: THE VERB think IN PARTICULAR CAN BE FOLLOWED BY S′
Heads

(10) \[ \text{XP} \rightarrow \ldots X \ldots \]

Specifiers and complements

(11) This solution to the problem

\[
\begin{array}{ccc}
\text{NP}_1 & \text{NP}_2 & \text{N} \\
\text{This} & \text{solution} & \text{to the problem}
\end{array}
\]

(12) \[ \text{a. } \text{I like [this [solution to the problem]], but not [that [one]].} \]
\[ \text{b. } \ast \text{I like [[this solution] to problem #1], but not [[one] to problem #2].} \]

(13) The big red book of poems

\[
\begin{array}{ccc}
\text{NP} & \text{SPEC} & \text{N} \\
\text{N'} & \text{Det} & \text{A} \\
\text{This} & \text{big} & \text{AP} \\
\text{solution} & \text{red} & \text{NP} \\
\text{to the problem} & \text{book} & \text{PP} \\
\text{of poems}
\end{array}
\]

(14) \[ \text{a. I bought this } [\text{big red book of poems}], \text{ not that } [\text{one}]. \]
\[ \text{b. I bought the big } [\text{red book of poems}], \text{ not the little } [\text{one}]. \]
\[ \text{c. I bought the big red } [\text{book of poems}], \text{ not the big blue } [\text{one}]. \]
\[ \text{d. } \ast \text{I bought the big red book of poems, not the little red one of cartoons.} \]

(15) \[ \text{specifier } [\text{book of poems}] \]

(16) The big red book of poems

\[
\begin{array}{ccc}
\text{NP} & \text{SPEC} & \text{N} \\
\text{N'} & \text{ Det} & \text{A} \\
\text{NP} & \text{SPEC} & \text{N} \\
\text{N'} & \text{ Det} & \text{A} \\
\text{This} & \text{big} & \text{AP} \\
\text{solution} & \text{red} & \text{NP} \\
\text{to the problem} & \text{book} & \text{PP} \\
\text{of poems}
\end{array}
\]

one-replacement

Replace N' with one.

(17) \[ \text{I saw this } [\text{book of poems on the table by the window}], \text{ not that } [\text{one}]. \]
\[ \text{I saw the } [\text{book of poems on the table}] \text{ by the window, not the } [\text{one}] \text{ by the door.} \]
\[ \text{I saw the } [\text{book of poems}] \text{ on the table by the window, not the } [\text{one}] \text{ on the floor.} \]

(18) \[ \text{The big ugly red book of poems on the table by the window in the cabin} \]

(19) \[ \text{SPECIFIER (daughter of NP and sister of N')} \]
\[ \text{COMPLEMENT (sister of N')} \]
\[ \text{ADJUNCT (sister of N')} \]

(20) \[ \text{XP } \rightarrow \text{Spec* X} \]
\[ \text{X'} \rightarrow \text{X ZP*} \]
\[ \text{X'} \rightarrow \text{YP X'} \text{ (or X' YP)} \]
(28) a. I ate lunch at Burger King.
b. I ate lunch and drank cola at Burger King.
c. I ate lunch at Burger King and Bill [did (so)] at McDonald’s.
d. I ate lunch at the Burger King on Comm. Ave. in Boston.

(29) a. [NP the suggestion [S that John should resign]] is absurd.
b. [NP the suggestion [S Opi that John made t]] is absurd.
c. [That [one]] is absurd.
d. [The [one] that Bill made] is absurd.

(30) a. NP b. NP

Det the N’

suggestion that John should resign

Det the N’

suggestion

that John made t

(31) VP

V’

PP at Burger King

V eat

NP lunch

(32) a. Mary quickly fixed the car.
b. Mary fixed the car quickly.

(33) a. VP b. VP

Adv quickly V’

V NP
t fixed the car

Adv quickly V’

V NP
t fixed the car

(34) a. I am [AP very [A tired of reruns]] but Bill is [AP less [A so]].
b. John knocked it [IP right [P off the table] and [P into the trash ] ].

S vs. IP

(35) S → NP Aux VP

Aux = INFL (for inflection. “S” is now “InflP” or “IP”, headed by the INFL node

(36) IP

Spec subject I’

tense ...

(37) a. I watch television. first person, singular (1sg)
b. You watch television. second person, singular (2sg)
c. We watch television. first person, plural (1pl)
d. You (all) watch television. second person, plural (2pl)
e. He watches television. third person, singular (3sg)
f. They watch television. third person, plural (3pl)

Agreement features often go by the name of “φ-features”.

Spec-Head Agreement

A head (X) and its specifier (SpecXP) must agree in the relevant features.

(38) IP

Spec John [3sg]

I’ VP [3sg]

[3sg]

[present]
Affix hopping.

The problem: Tense, a feature of Inf, ends up being realized together V (e.g., * solved).

Two options: Move solve to attach to Aux.
Move Tense to attach to V.

Affix Hopping
Move Inf to V provided Inf does not dominate a modal.

Do-support

(44) John did not avoid Bill.

With negation, Affix Hopping does not occur, but past tense is realized on did.
Two things we need to do:  
• Amend the Affix Hopping rule
• Generate do.

Affix Hopping (second statement)
Move Inf to V provided Inf does not dominate a Modal or have a NegP complement.

Do-support
Insert do to support stranded Tense.

(42) a. John should avoid Bill.
b. John might (cleverly) avoid Bill.
c. John could avoid Bill.
d. * John could avoided Bill.
V-raising

Auxiliary verbs *have* and *be*:

(46)  a. John is not happy.
      b. John has not visited Bill.
      c. * John did not be happy.
      d. * John did not have visited Bill.

*Have* and *be* are [+AUX], raising to Infl (instead of AH).
If Tense needs support, a [+AUX] verb will raise—but won’t if not needed.

(47)  a. John must be happy.
      b. John might have visited Bill.

V-raising

Raise V to Infl, provided:
   i) V has the feature specification [+AUX]
   ii) Infl does not dominate a modal.

Affix Hopping

Move Tense (from Infl to V), provided:
   i) V has the feature specification [–AUX]
   ii) Infl does not dominate a modal or have a NegP complement.
   iii) VP does not dominate a V with the feature specification [+AUX].

(48)  a. * Mary be worked at home.
      b. * Mary [I [Tense]] be work at home.

Goal: Support Tense.
Preferences:  Prefer V-raising to Affix Hopping
              Prefer Affix Hopping to Do-support.

   • If Tense is already supported (if there is a modal in Infl), goal is met.
   • If Tense is still unsupported and V-raising can be applied (there is a [+AUX] V),
     apply it; goal is met.
   • If Tense is still unsupported and Affix Hopping can be applied (Infl doesn’t have
     a NegP complement), apply it; goal is met.
   • If Tense is still unsupported, apply Do-support (as a “last resort”).

V-Raising

Raise V to Infl provided V has the feature specification [+AUX].

Affix Hopping

Move Infl to V, provided Infl does not have a NegP complement.

(49)  a. * John did avoid Bill.
      b. John * did avoid Bill.

S’ vs. CP

(50)  S’ → Comp IP

(51)

Only maximal projections (XPs) are found in Spec position

So *wh*-movement moves a *wh*-XP to SpecCP (where C is [+Q]).

In *wh*-questions, there are two things we have to move
   (Infl to Comp, and *wh*-XP to Comp).

I-raising (‘Aux-raising’)

(52)  a. Mary will solve the problem.
      b. Will Mary solve the problem?
a. You can drive my car.
b. Can you drive my car?

To make a question, the Infl element is moved over the subject— to C.

\[ \text{CP} \quad \text{Spec}\quad \text{C'} \]
\[ \text{Comp} \quad \text{IP} \]
\[ \text{NP} \quad \text{you} \]
\[ \text{VP} \quad \text{I} \quad \text{can} \quad \text{drive} \quad \text{my} \quad \text{car} \]

I-raising

Move Infl to C, when C has the feature specification [+Q].

(55) a. Which problem can Bill solve?
   b. DS: \[ \text{CP} \quad \text{IP} \quad \text{Bill} \quad \text{can} \quad \text{solve which problem} \]
   c. SS: \[ \text{CP} \quad \text{NP} \quad \text{which problem} \quad \text{IP} \quad \text{Bill} \quad \text{can} \quad \text{solve which problem} \]

(56) a. I wonder which problem Bill can solve.
   b. I wonder if Bill can solve this problem.

I-raising (second statement)

Move I to C, provided
   i) C has the feature specification [+Q]
   ii) C is situated in a root clause.

a. Was John at home?
   b. DS: \[ \text{CP} \quad \text{IP} \quad \text{John} \quad \text{Tense} \quad \text{be at home} \]
   c. VR: \[ \text{CP} \quad \text{IP} \quad \text{John} \quad \text{Tense} \quad \text{be at home} \]
   d. IR: \[ \text{CP} \quad \text{IP} \quad \text{John} \quad \text{Tense} \quad \text{be at home} \]

Note: Affix Hopping apparently couldn’t apply here, even though there was no Neg…

Affix Hopping

Move Infl to V provided
   i) Infl does not dominate a Modal or have a NegP complement
   ii) V has the feature specification [–AUX]
   iii) VP does not dominate a V with the feature specification [+AUX]
   iv) Infl is adjacent to VP which dominates the targeted V

or

Affix Hopping

Move Infl to V, provided
   i) Infl does not have a NegP complement.
   ii) Infl is adjacent to VP which dominates the targeted V

Notice: Affix Hopping can only apply after I-raising.
[+Q]-CP Principle
A [+Q]-CP must have a [+wh] specifier.

(60) a. I wonder who Mary saw.
   b. * I wonder Mary saw who.

(61) a. I wonder [CP whether C [IP Mary left]].
   b. I wonder [CP Op if [IP Mary left]].
   c. * I wonder [CP whether if [IP Mary left]].

Structure Preservation and types of movement

Structure-Preserving Hypothesis
Transformations are structure-preserving (the results still conform to X'-theory).

Substitution movements are movements to a position which is provided by X' structure but generated empty (specifically, specifiers).

Passives:
(62) a. [IP e [I [VP was [VP solved the problem]]]
   b. [IP the problem [I [VP was [VP solved t]]]]

Wh-questions:
(63) a. I wonder… [CP e [C [IP John bought what]]]
   b. I wonder… [CP what [C [IP John bought t]]]

Movement that attaches to a “stretched out category” like this is adjunction movement. Extraposition and Heavy NP shift are also adjunction movements, right-adjoining to VP.

Head movement
We will also consider head movement (movement of terminal categories) to be adjunction movement, where the moving head adjoins to the target head.
The Projection Principle

**Projection Principle**
Representations at each syntactic level (LF, DS, SS) are projected from the lexicon, in that they observe the subcategorization properties of lexical items.

### Small clauses

(67) a. John considers [IP [NP Bill] [i to [VP be [AP incompetent]]]].
    b. John considers Bill incompetent.

(68) Spec A'  
    NP Bill  
    a. The captain expects the drunken sailor off the ship (immediately).
    b. John made Bill read the whole book.

(69) Spec I'  
    VP V'  
    V be  
    P' PP  
    NP a unicorn  
    in the garden  
(70) Spec P'  
    NP the drunken sailors  
    off the ship  
(71) Spec V'  
    VP V  
    NP the whole book

### Nonfinite clauses and PRO

(76) a. John tried [CP [IP e to leave]].
    b. John persuaded Bill [CP [IP e to leave]].
    c. It is difficult [CP [IP e to leave]].

So:
- There must be something there (by the EPP).
- We can’t hear it.
- It can’t be a trace of movement.

→ It must be an unpronounced element (and like a pronoun).

(77) a. John tried [CP [IP PRO to leave]].
    b. John persuaded Bill [CP [IP PRO to leave]].
    c. It is difficult [CP [IP PROarb to leave]].

PRO only appears in nonfinite clauses.

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Subjects, IP, and the Extended Projection Principle

**Extended Projection Principle (EPP)**
Clauses must have a subject (that is, ‘The specifier of IP must be filled.’).

(72) a. *(It) seems that Mary has solved the problem.
    b. Mary seems t to have solved the problem.

(73) a. A unicorn is in the garden.
    b. *(There) is a unicorn in the garden.

(74) Spec I'  
    VP V'  
    V be  
    P' PP  
    NP a unicorn  
    in the garden

(75) [IP Mary, seems [IP t to have solved the problem]].

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Subject control
Object control
Arbitrary control
Nonfinite clauses lack tense and agreement features in Infl:

(78)  
  IP  
  Spec  
  \( \text{Spec} \rightarrow \text{I} \rightarrow \text{VP} \)  
  \( \text{(to)} \rightarrow \ldots \)  

Not all nonfinite clauses have \textit{to}—gerundive clauses are nonfinite but lack \textit{to}:

(79)  
  a. John dislikes \( [\text{CP} \rightarrow [\text{IP} \rightarrow \text{PRO} \rightarrow \text{eating in public}]] \).  
  b. \( [\text{CP} \rightarrow [\text{IP} \rightarrow \text{PRO} \rightarrow \text{reading detective stories}]] \) is fun.

Binary branching and the VP shell (kind of a preview)

**Binary Branching**

A node can dominate at most two branches.

(80)  
  b. John put *(the book) on the shelf.

(81)  
\( \text{put: } [- \text{ NP PP}] \)

(82)  
  \( \text{VP} \)  
  Spec  
  \( \text{VP} \rightarrow [\text{V} \rightarrow \text{NP} \rightarrow \text{PP}] \)  
  \( \text{put the book on the table} \)

(83)  
  \( \text{VP} \)  
  Spec  
  \( \text{VP} \rightarrow [\text{V} \rightarrow \text{NP} \rightarrow \text{PP}] \)  
  \( \text{PUT the book on the shelf} \)

This makes a number of claims which we aren’t in a position to confront; the object for example is not the sister of anything—it’s in SpecVP.