Lecture 15 **Wh-movement, take one** Nov. 7, 2002

(The general family is known as A-bar Movement,
and Operator Movement)

Where we are:

→ you've seen Head Movement, seen how it can't 'skip' intermediate heads
(the Head Movement Constraint)
*Been John had *t* drinking?
*Went you not *t* to the store?

→ you've seen A-movement (also called NP-movement or DP-movement)
- a DP moves to check its Case features, when it can't check them where it is
- V and finite T can check abstract Case (nom & acc respectively)
- non-finite T and passive or unaccusative V cannot check abstract Case; anything looking to check Case will have to go elsewhere
- A-movement can't 'skip' intermediate abstract Case positions, either:

a. *John seemed that it was likely *t* to go
Cf: b. It seemed that John was likely *t* to go.
c. John seemed to be likely *t* to go.

- in (c), does John stop off in the Spec-TP of *to be likely*? we have no evidence one way or another. If infinitive Spec-TP has an EPP feature, then definitely yes.

→ Both head-movement and A-movement are subject to the Structure Preservation Constraint (this is also sometimes called *Chain Uniformity*). That is, you can't put a phrase into a head-position, nor can you put a head into a phrase position.

Finally, you've also seen that meaning interacts with syntactic structure: there seems to be something fundamentally different about arguments that are projected in Spec-VP and arguments that are projected in complement-to-V position.

→ Even intransitive verbs can differ in whether or not their single argument is "external" or not; for *unergative* intransitive verbs, the single argument is external, and for *unaccusative* intransitive verbs[1], the single argument is internal. Unaccusatives in general seem to have a change-of-state ("Accomplishment") meaning; Unergatives in general seem to have an Activity meaning.

→ now: on to the biggest, baddest movement operation of them all: A-bar movement; also called *wh*-movement, or Operator movement. (If you're a psycholinguist, you'll also hear wh-movement called *filler-gap dependencies*)

[1] Brace yourselves for more terminological insanity: some people call unaccusative verbs *ergative* verbs, because they think of them as the opposite of *un*ergative verbs.

1. Preliminaries.

1. a. Who does Bill love?
   b. What languages can you speak?
   c. Which road should we take?
   d. Where were you going?
   e. Who have they arrested?

These simple matrix questions in English involve a constituent appearing where no constituent would appear in a neutral declarative clause: the *wh*-phrase, although thematically interpreted as the complement of the verb in all the above sentences, appears sentence-initially.

Movement gives us a good account of why it's interpreted as it is: if these wh-phrases are base-generated in a position that satisfies the verb's theta-assignment and case-marking requirements, and subsequently moved away, we can understand why the wh-phrase obeys the selectional requirements of the verb:

2. a. #Who can you speak?
   b. #Which road have they arrested?
   c. #What languages were you going?

etc.

and we can understand why wh-pronouns used to have different case forms:

3. a. Whom did John say Priscilla saw *t* ?
   b. Who did John say *t* saw Bill?

and why wh-pronouns cannot be extracted from non-case-marked positions:

4. a. Who did you ask *t* to depart?
   a'. I asked John to depart.
   b. *Who were you anxious to depart?
   b'. *I was anxious John to depart.

2 Why trace? Why "Operator"

5. Here we can ask why we need the trace at all: essentially, it's the same reason as we need a trace for A-movement (DP-movement). The interpretive requirements of the verb need the trace to be satisfied.

It used to be a real question why the trace existed, because there was a level of D-structure, which served an interpretive purpose; you might think it was possible to satisfy the necessary constraints on the verb at D-structure, then move the wh-phrase away *without* leaving a trace. It seemed like that didn't happen, though, because for binding purposes, etc., it still appears as if the wh-phrase has a presence in the lower phrase:

   a. Who did Bill think *t* liked himself?
   b. Who did John believe *t* was likely *t* to talk about himself?

So for these sentences (and others), it was necessary to invent a principle of the grammar: the Projection Principle, which simply said that lexical information (like theta-roles) is syntactically represented at all levels — this entailed the necessity of traces. In fact, in Minimalism, no such extra principle is required, as all interpretation is at LF — no D-structure — so if there's no trace, the verb's interpretive requirements cannot be met.

6. Why "Operator"?

A roughly model-theoretic semantic way of thinking about the meaning of a wh-question like *Which books did Bill read?* is something like, "Of the set of things which are books, Bill read some of the members of that set. Tell me which ones." This is similar to the model-theoretic interpretation of "Bill read every book", which is "Of the set of things which are books, Bill read every member of that set". Similarly for the existential quantifier "some", "Bill read some books" has the interpretation "Of the set of things which are books, Bill read some of the members of that set."

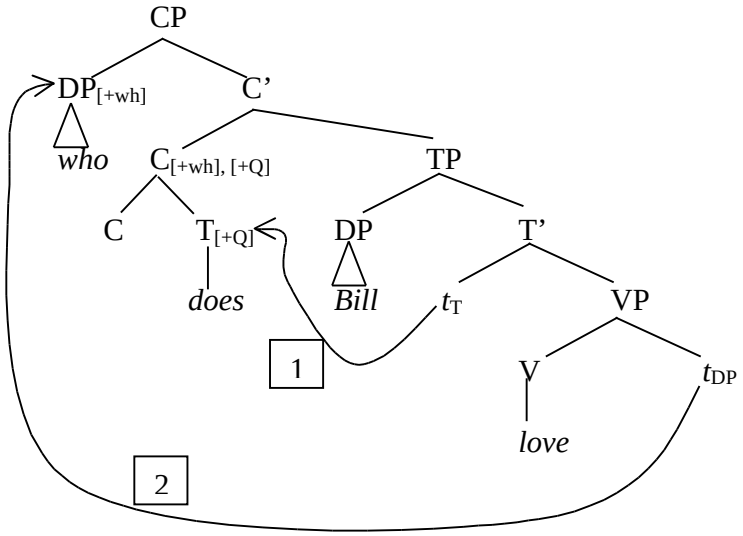
x:book(x), read(B, x) (read the ":" as "such that")
x:book(x), read(B, x)
Whx:book(x), read (B, x)

Wh-pronouns like "what", "who" work the same way, except that instead of the restrictor being "book", it'll be "person" or "thing" (for some x such that x is a person, Bill likes X; tell me which ones).

Since logicians term the universal and existential quantifiers "operators", which are said to *bind* the variable (in this case x) over which they quantify — i.e. determine its reference— , the *wh*-word is also termed an operator. In fact, a popular semantic treatment of wh-words is to treat them as a combination of the existential quantifier and an imperative: "Bill read some books, tell me the names of those books = Which books did Bill read?" (This is an interesting treatment, since in many languages, *wh*-words are homophonous with existentials like *someone, something, sometime*.)

So, given the movement analysis, what's going on in a sentence like 1a?

7.



3. Pied-piping and Chain Uniformity/Structure Preservation

8. Notice: we've seen head-movement from a head position to a head position, and phrase-movement (the DP *who*) from a phrase-position to a phrase-position. In fact, it seems likely that movement from a head-position to a phrase-position and vice versa is impossible in English, consider the attempts below:

a. *Was John said that who/someone *t* happy?
b. *John who'd *t* said was happy?
c. *Which did Bill read books?

There are few cases where it looks like phrase-to-head movement is desirable cross-linguistically, which Bare Phrase Structure can account for; see Carnie 1995). But in general, we want to rule out free head-to-phrase and phrase-to-head movement: we can ensure this with the Structure Preservation Condition, a.k.a. the *chain uniformity principle*: A chain must be uniform with regard to phrase structure status.

This explains why the whole DP must move in sentences like d, and e below. In (d), if the wh-element is the head D, the chain-uniformity principle will forbid it from moving by itself. In (e), the possessive D head *'s* has cliticized to the pronoun *who*. *Who* can't go by itself, because *'s* would have nothing to support it, so the whole DP must go:

d. Which book of mine did you read *t* ?
d'. *Which did you read *t* book of mine?
e. Whose car did you borrow *t* ?
e' *Whose did you borrow *t* car?

Note: in some languages you can do e'! But (I think) in most of those languages you can independently scramble possessors away from their constituents; it's not a property unique to wh-movement. That is, I think in such languages you can say:

g. *John's* yesterday you borrowed *t* car.

9. The carried-along material — the non *wh*-part of the DP — is said to be *pied-piped.* Other examples of pied piping:

a. Who did you speak to *t* ? (no pied-piping)
b. To whom did you speak *t* ? (pied-piping of *to*)
c. *To who did you speak *t*? (Because of case?)
d. How many minutes did it take you to bake the cake?
(It took me *two* minutes to bake the cake)
e. How many books did you read?
(I read *three* books) (cf. Kayne's talk)
f. *Combien as-tu lu* t *de livres*?
How-many have-you read *t* of books?
g. *How many did you read *t* books?

4 A Beastiary of Wh-Islands

→ Wh-movement doesn't just target objects, of course! You can ask a wh-question about a subject:

10. a. Who do you think *t* likes me?
    b. Who likes me?

Or about any adjunct:

11. a. I like you because you're fun to be with.
    b. Why do you like me?

12. a. I fixed it with a wrench.
    b. How did you fix it?

13. a. I saw him in the garden.
    b. Where did you see him?

So, thought some clever generative grammarians in the 1960s (notably Haj Ross), let's look at some objects, subjects, and adjuncts that occur in various types of sentences, and see what happens if we try to ask questions about them by wh-movement!

3.1 Let's try extracting objects from various spots first:

Extracting an object out of an embedded declarative clause

(This is fine -- it's also called an *unbounded dependency*. We've seen unbounded dependencies with DP movement too: *John was certain to seem to appear* t *to be grateful*)

14. a. I said [$_{CP}$ that John wanted [$_{TP}$ Mary to ask Bill [$_{TP}$ to bake a cake.]]]
    b. What did you say that John wanted Mary to ask Bill to bake *t* ?

Extracting an object out of a clause embedded in a DP

(This is called the **Complex NP constraint** (CNPC).)

15. *Clause = Complement to a noun like* 'claim' *or* 'fact'
    a. I concealed [$_{DP}$ the fact [$_{CP}$ that John baked a cake].
    b. ??What did you conceal the fact that John baked *t* ?
    c. I believed the claim that John baked that cake.
    d. ?? Which cake did you believe the claim that John baked *t* ?

16. *Clause = Relative clause*
    a. I saw [$_{DP}$ the man [$_{CP}$ who baked that cake]]
    b. ??Which cake did you see the man who baked *t* ?

Extracting an object out of a phrase in subject position

(This is called the **Subject Condition**)

17. *Phrase = Clause*
    a. [$_{CP}$ That the police would arrest several rioters] was a certainty.
    b. *What was that the police would arrest *t* a certainty?
    c. [$_{IP}$To read *Great Expectations* in peace] was all he wanted.
    d. *What was to read *t* in peace all he wanted?

18. *Phrase = DP*
    a. [$_{DP}$ Admirers of classical music] had come to the concert.
    b. * What had [admirers of *t*] come to the concert?
    c. [Mom's efforts to bake a cake for my birthday] ended up failing.
    d. * What did [your mom's efforts to bake *t* for your birthday] end up failing?

Extracting an object out of an embedded wh-clause

The **Wh-island Constraint**, or just a **Wh-island**

19. a. I wondered how John had baked that cake.
    b. ?? Which cake did you wonder how John had baked *t* ?
    c. I wondered how to cook that recipe.
    d. ? Which recipe did you wonder how to cook *t* ?

Extracting a DP out of a "left branch"

The **Left Branch Condition**

(We saw this above. Also notice that this is like extracting out of a subject)

20. a. I liked [$_{DP}$ [$_{DP2}$ John] 's friend].
    b. *Whose did you like *t* friend?
    c. I appreciated Mary's mother's efforts to make me feel at home
    d. *Whose did you appreciate *t* mother's efforts to make me feel at home?

Extracting a single DP out of a coordinate clause:

(the **Coordinate Structure Constraint**)

(We've seen this before):

21. a. I liked Mary and John.
    b. *Who did you like Mary and *t*?
    c. *Who did you like *t* and John?

3.2 Extracting *adjuncts* from most of these same places

22. *Embedded declarative clauses*:
    a. John said that Bill told Mary he baked a cake in two minutes.
    b. How fast did John say that Bill told Mary he baked a cake?

23. *Complex NPs*
    a. John denied the fact that Bill baked a cake in two minutes.
    b. *How fast did John deny the fact that Bill baked a cake *t* ?
    (c. John denied the fact that Bill baked a cake how fast?)
    d. Mary liked the cake that Bill baked in two minutes.
    e. *How fast did Mary like the cake that Bill baked *t* ?
    (f. Mary liked the cake that Bill baked how fast?)

24. *Subject condition*
    a. That Bill baked his cake in two minutes was undeniable.
    b. *How fast was [that Bill baked a cake *t*] undeniable?

25. *Wh-island*

(first, for comparison, from an embedded declarative clause)
    a. John told me to do the problems using my calculator.
    b. How did John tell you to do the problems *t* ?

(and now from an embedded question:)
    a. I was wondering which problem to do with my calculator.
    b. *How were you wondering which problem to do *t* ?

Ouch! all of these (except possibly the subject condition ones) are way worse with adjuncts than with arguments. Notably worse, really uninterpretable. We've got an *argument/adjunct asymmetry*.

→ Next: old-style and new-style accounts of these facts
→ Even in old-style accounts, no one really had a good story about the CSC
→ In the new-style accounts, things get worse: certain kinds of CNPC violations aren't explained, nor are left-branch or subject island violations explained.
→ In new-style accounts, the argument/adjunct asymmetry has a different provenance than in old-style accounts

4 Old-style: Subjacency and the ECP

(These were "principles" of Principles & Parameters theory)

First thing to recognize: in wh-movement, at least, we have evidence that it doesn't all happen in one fell swoop. That is, the wh-word has to stop off at possible landing sites on the way, even if it's not the place it's ultimately heading to check its features:

Complementizer agreement in Irish (McCloskey 1979) – NOTE doctored data.

go^N/gur^L	The form you get if there is no wh-movement
a^L/ar^L	The form you get if there is cyclic wh-movement and NO resumptive pronoun
a^N/a^N	The form you get with a resumptive pronoun

a) Cheap Seán gur^{L} phóg sé Liam
Thought John that kissed he in Liam
"John thinks that he kissed Liam"

b) Cé a^{L} cheap Seán a^{L} phóg sé?
who C thought Sean C kissed he
"Who did Sean think that he kissed?"

c) Cé a^{N} gceap Seán a^{N} bpóg sé é
who C thought John C kissed he him
"Who$_i$ did Sean think that he kissed him$_i$"

In (b) and (c) we have clear evidence of cyclicity, since the FORM of the C is determined by what kind of wh element appears in it.
you get a^{L} if the wh-element has left a trace
you get a^{N} if the wh-element has left a resumptive pronoun.

This is true in the INTERMEDIATE specifiers.

The a^{N}/resumptive pattern is required when you'd otherwise have a violation of one of the principles above. The resumptive pattern thus seems to be a phenomenon of ***last resort***. (that is, a way of saving the derivation).

d) Cé$_1$ a^{N} n-iarr Seán cád$_2$ a^{L} phóg sé$_1$ t$_2$
who C ask John what C kissed he
Who$_i$ did John ask what (he$_i$) kissed (notice that this is totally grammatical in Irish!)

e) ?Cé a^{N} gceap Seán gur phóg sé é
who C think John that kiss him it
"Who$_i$ did Sean think that he kissed him$_i$"

f) *Cé a^{L} gceap Seán gur phóg sé
who C think John that kiss him
"Who$_i$ did Sean think that he kissed?"

So, we get 'stopping off', on the way up. How is this going to help us?

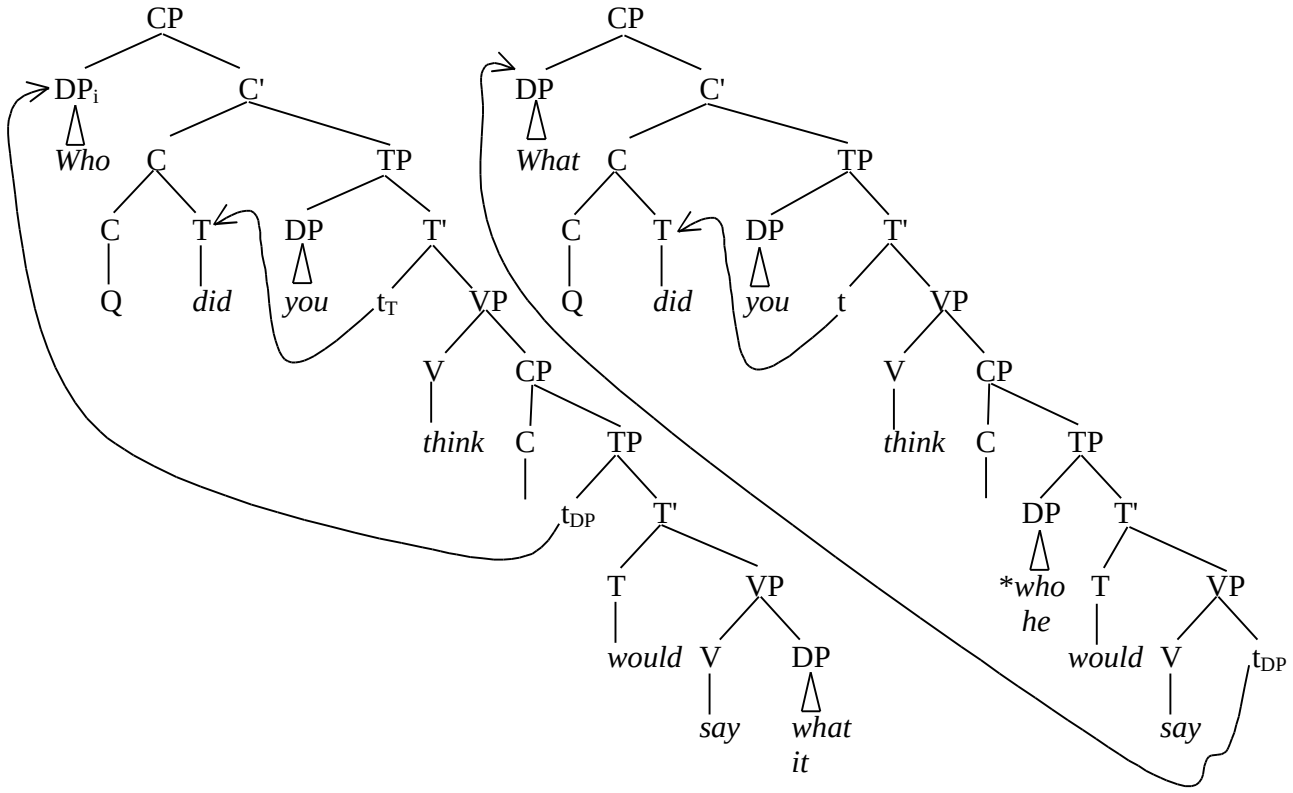
… *to be continued.*

4. Shortest Move

10. Recall that in all our instances of head-movement, it looked like the *closest* appropriate head had to move to the attracting head; we called this the "Head Movement Constraint", and used it to account for **John walked not*. It also predicts that something like **Been John has* t *walking*? or **Was John had* t *walking?* is ungrammatical (similarly for head movement in German and French). Interestingly, we can see that there seems to be a similar constraint on wh-movement:

a. Who_i did you think t_i would say it?
b. What_i did you think John would say t_i?
c. Who_i did you think t_i would say what?
d. *What_i did you think who would say t_i?
e. *Who_i what_j did you think t_i would say t_j
f. *What_i who_j did you think would t_j say t_i?

Notice especially the contrast between (c) and (d), illustrated below:


CP
DP$_i$
C'
Who
C
TP
C
T
DP
T'
Q
did
you
t$_T$
VP
V
CP
think
C
TP
t$_{DP}$
T'
T
VP
would
V
DP
say
what
it
CP
DP
C'
What
C
TP
C
T
DP
T'
Q
did
you
t
VP
V
CP
think
C
TP
DP
T'
*who
he
T
VP
would
V
t$_{DP}$
say

They are essentially the same except that instead of moving the highest *wh*-phrase, as in (c), in the ungrammatical (d), we've tried to move the lower *wh*-phrase. Notice, of course, that (d) is grammatical when the subject is not a *wh*-pronoun but a regular pronoun. (In neither order can we move both: (e) and (f).) Seems like we can say that movement is constrained in the same way in both head-movement and wh-cases: the "Shortest Movement Principle" says that if there are two movement possibilities to check a feature, the shortest one is the only one that works: shorter movements are more economical. (This is also called the "Minimal Link Condition" (MLC), or the "minimality condition", after the original version, discovered by Rizzi, "Relativized Minimality". (Originally, this type of movement-blocking effect was called an *island*, by Ross; we'll see other island effects and try to use the MLC to account for it).

5. Condition on Extraction Domains

11. Pied-piping + island:

a. [Whose mother]$_i$ did he take [$_{DP}$ pictures of t_i]?
b. *[Whose mother]$_i$ did you think [pictures of t_i] were on the mantel?
c. *[Whose]$_i$ did you think [pictures of *t* mother] were on the mantel?
d. *[Of whose mother]$_i$ did you think pictures were on the mantel?
e. [Pictures of whose mother]$_i$ did you think t_i were on the mantel?

Here, although extraction from an object DP is ok (11a), extraction from the same DP in subject position is very bad. This is a "subject island"; sadly, there's no obvious way to reduce this to the MLC (although people try; possible paper topic!). In subject position, the only way to ask who the picture is of is to move the whole subject DP, as in (11e).

(Note: extraction from adjunct DPs is also bad:

f. *Who did John hit Mary with pictures of t?
g. *Pictures of who did John hit Mary with t?
h. With pictures of who did John hit Mary?

Basically, if you're going to extract out of a DP, it better be the complement of a V; adjuncts and subjects don't let you do it. Huang called this the *Condition on Extraction Domains*.)

6 Embedded questions

12. Belfast English: exactly what you would expect:

a. She asked who had I seen.
b. They wondered what had John done.
c. They couldn't understand how had she time to get her hair done.
d. He didn't say why had they come.

Also, satisfying needs of C through merge of *that*:

13. a. I wonder which dish that they tested?
    b. They didn't know which model that we had discussed?

What about these: are they grammatical, I wonder?

14. a. I wonder which dish did they test?
    b. They didn't know which model did they discuss?
    c. Which dish that they tested?
    d. Which model that we had discussed?

(I'd bet a and b are good; c and d are not, prob. having only the relative-clause analysis they have in American English).

15. Embedded questions in standard English: no auxiliary movement, no *that*

    a. *I wondered who had Bill seen?
    b. I wondered who Bill had seen?
    c. * I wonder which dish that they tested?
    d. I wonder which dish they tested?

Note that if the auxiliary movement in standard English is connected to the imperative portion of the question, the lack of aux movement in embedded questions makes sense; there's no imperative force in embedded questions. Then there's a question about the Belfast variety. However, there's a suggestion that the inversion in the embedded clauses in Belfast English isn't connected to the question-ness of the embedded clause, but simply to the fact that a wh-phrase has moved through its specifier:

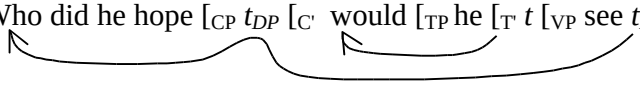
16. Belfast English:
    a. Who did he hope would he see?
    Standard English:
    b. Who did he hope he would see?
    c. He hoped he would see Joan.

Hope doesn't take an embedded question complement, rather, it just takes a finite CP complement, just like *think* or similar verbs. With movement out of the embedded clause, however, we see inversion in Belfast English. If the wh-phrase stops off in Spec-CP on the way, perhaps that triggers auxiliary inversion. Wh-movement is unbounded, crossing arbitrarily many CPs. If the clue from Belfast English is right, the wh-element stops cyclically at each SpecCP on the way.

17. Who did John think t that Bill hoped t that Mary believed t that Jim had seen t ?

Belfast English auxiliary inversion, then, is perhaps triggered by having a wh-phrase in the specifier of a CP:

18. Who did he hope [$_{CP}$ t_{DP} [$_{C'}$ would [$_{TP}$ he [$_{T'}$ *t* [$_{VP}$ see t_{DP}]]]]]



In embedded clauses in American English, however, it seems as if C can't be full: no auxiliary movement, no *that*. How can we tell if there's successive-cyclic movement?

19. *Whether* blocks wh-movement (although not from object position):

a. Who did you think saw John?
b. *Who did you wonder whether t saw John?
c. Who did you wonder whether John saw t?

Note that *whether*is not a possible wh-checker; it cannot move in matrix clauses:

d. Whether did John go?

Hence we cannot appeal to Shortest Move to block 19b. If *whether* is in SpecCP, and *wh*-movement is cyclic, it will block movement of the subject through spec-CP in 19b. (The object Wh-phrase can apparently move without stopping in specCP, related to Huang's CED facts metioned above…).

It is plausible that *whether* is a wh-phrase in SpecCP, btw, because it did used to move in EME:

f. Whether had you rather lead mine eyes or eye your master's heels?
g. Whether dost thou profess thyself a knave or a fool?

20. Also have to ensure that *if* blocks wh-movement of the same type:
a. *Who did you wonder if t saw John ?
b. Who did you wonder if John saw t?

7 Wh-movement to subject position in English?

21. Wh-movement from subject position?

Hard to tell because with ordinary auxiliaries there would be no difference in the surface order.

a. [$_{CP}$ Who [$_{C'}$ is [$_{TP}$ t_{wh} [$_{T'}$ t_{is} [$_{VP}$ dancing]]]] movement
b [$_{CP}$ [$_{C'}$ [$_{TP}$ Who [$_{T'}$ is [$_{VP}$ dancing]]]] no movement

22. FOR wh-movement from subject positions:
allows us to unify wh-features, the same feature is associated with wh-words in subject position as with object position.
In many languages there IS wh-movement of subject.

a. Cé a bhfaca é Irish
who wh-comp saw him
"Who saw him"

(cf. Chonaic sé é
saw him it
"He saw it"(don't worry about the suppletive form of the verb)

We also get wh-movement out of subjects of embedded clauses in English:

b. Who did Roger say [t_{wh} loved Bill?]

AGAINST wh-movement from subject position:
no do-support in subject forms:

c. *Who does dance? (non-emphatic meaning)

(Although note: movement of the subject to specCP removes the phonological barrier between V and C: perhaps that's why do-support is unnecessary.)

8. That-trace effect

23. First, a stipulative constraint.

Who did Roger say that Bill loved t_{wh}
Who did Roger say Bill loved t_{wh}
Who did Roger say t_{wh} loved Sue
*Who did Roger say that t_{wh} loved Sue
*that t_{wh}

notice not a constraint in many other languages (Spanish, French etc)

9. Back to cyclicity: Evidence from modern Irish

Homework #7 Operator movement
Due: November 6

1. Radford, Exercise VII, page 311

addendum: if relative clauses are derived by invisible operator movement (see discussion before exercise IV, page 305), what is surprising about the following?

I saw the man that John sent *any/some flowers to.

2. Radford exercise VIII, p. 312