Nicholas LaCara · University of Toronto

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Architectural issues: Deep and surface structure

Overview

1 Levels of representation in GB: An overview

- Government and Binding has four levels of representation:

  1. D-Structure (DS)
  2. S-Structure (SS)
  3. Phonological form (PF)
  4. Logical form (LF)

DS and SS have their origins in earlier frameworks' Deep Structure and Surface Structure (see, *e.g.*, Chomsky 1965).

1.1 D-structure

- D-structure is most easily characterized as the starting place of a derivation.
- It is the locus of phrase-structure rules and recursivity (via $\bar{\text{X}}$-theory).

Depending when we are talking about, you may or may not have phrase structure rules (see, *e.g.*, Stowell 1981).

- The place where there is a one-to-one correspondence between grammatical function and thematic role.
  - Logical subjects are deep-structure subjects.
  - Logical objects are deep-structure objects.
  - Positions that are thematically active must be filled.

That is, positions to which θ-roles are assigned.

- Consider the following example.

(1) Sally persuaded Mary to dump Harry.

This is a case of (object-to-subject) control.

  - *Persuade* requires a 'persuader' and a 'persuadee'.
  - *Dump* requires a 'dumper' and a 'dumpee'.

- The idea above entails that each of the implied θ-roles here must be associated with an argument in the DS representation:

(2) [Sally$_{\text{presuader}}$ persuaded Mary$_{\text{persuadee}}$ [PRO$_{\text{dumper}}$ to dump Harry$_{\text{dumpee}}$]].

- This means we need some (unpronounced) filler for the person doing the dumping – a phonetically empty category called PRO.
- But compare *persuade* with a predicate like *seem*:

Seem is a raising predicate.

(3) a. Mary seems to hate Harry.
    b. It seems that Mary hates Harry.

  - *Hate* requires a 'hater' and a 'hatee'.

  - But *seem*, unlike *persuade* only appears to assign a single θ role, which goes to the propositional complement.
  - This is why the position of *Mary* alternates.

- The assumption is that the subject position of the matrix clause is empty at DS:

(4) [Δ seems [Mary to hate Harry]]

That is, there isn't even a null element here. The position is there, but nothing occupies it.

1.2 S-structure

- SS can be described as the point at which the derivation splits, sending a copy to each of LF and PF.

- A number of grammatical modules are active at SS under the GB model, including:

  - Case assignment
  - Some binding
  - Null operator stuff
  - Some ECP
  - Subjacency

We'll be talking about some of these shortly.

- SS has also been used in explanations of cross-linguistic variation.

  - It has been argued that *wh*-movement occurs before SS in languages like English but after SS in languages like Chinese.
  - Similarly, V°-to-I° movement may occur before SS in French, but after SS in English.

As we'll see in Section 2.3, it is referred to as a place before/after which various operations occur in different languages.

- GB gets a lot of use out of SS, so part of what makes Minimalism to striking are the arguments that SS does not exist.

1.3 LF & PF

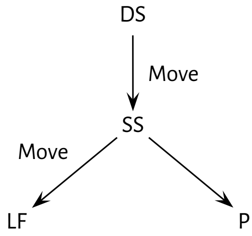
- These are the interface levels in GB.

- There are some proposals that LF is where unlicensed traces are filtered out.

- Binding and control are also thought to apply at LF under GB.

- Unlikely any syntactic conditions apply at PF, though they may apply on the mapping from SS to PF.

1.4 The Y-model



- The Y-model (or T-model as Hornstein et al. call it) shows the organization of the grammar.

- SS is the only level that directly relates all the others.

- Uniting elements throughout the course of the derivation was the Projection Principle, which required that certain information from earlier structures be preserved at later stages of the derivation (at least, DS, SS, and LF).

  - If a verb took an object at DS, it has an object at SS and LF.
  - This means, *e.g.*, that the passive does not detransitivize a verb.
  - This basically forces traces to exist.

1.5 Everything else

- There are only two transformational operations:
  - Bind freely indexes DPs.
  - Move(-α) allows anything to move anywhere, anytime.

Again, compare older generative theories where transformations could do very specific things.

- As mentioned above, there are several information-specific modules that constrain the very general transformational rules. These apply at various levels of the grammar.
  - Case theory
  - Theta theory
  - Binding theory
  - ECP
  - Subjacency
  - $\bar{\text{X}}$-theory
  - Control
- Government unites these apparently disparate components of grammar.

(5) *Government*: α governs β iff
  a. α c-commands β, and
  b. β c-commands α.

2 Rethinking S-structure

- Chomsky (1993) argues that we can actually do without S-structure.

Republished as Chapter 3 of Chomsky (1995)

- This is especially striking given the number of modules that were thought to apply at this level in GB.
- We will look at three arguments today:
  1. Case assignment
  2. Binding
  3. Variation
- These are three places where GB grammars make reference to SS.
- In each case, a slight change in assumptions makes it so that we don't have to refer to this level.
- The goal here is simply to show that we *can* avoid referring to SS.

2.1 Case assignment *vs.* checking

- In GB it was assumed that Case was assigned to NPs/DPs at SS.
- In (6), the pronoun *he* enters the derivation as a bundle of features, but this bundle lacks a case feature.
- Infl is responsible for transmitting its Case feature to the subject of a clause, and does so after subject movement has occurred.

(6) He was seen.

a. DS: $[_{\text{IP}}\ \Delta\ \text{was+Infl}_{nom}\ [_{\text{VP}}\ \text{seen} \begin{bmatrix}\text{3RD}\\ \text{SG}\\ \text{MASC}\end{bmatrix}]]$

b. SS: $[_{\text{IP}} \begin{bmatrix}\text{3RD}\\ \text{SG}\\ \text{MASC}\\ \text{NOM}\end{bmatrix}_i\ \text{was+Infl}\ [_{\text{VP}}\ \text{seen}\ t_i]]$

- The assumption is that this must happen at S-structure.
- Case cannot be assigned at DS in (6) because the pronoun is not Governed by a Case-assigner.
  - Passive verbs, it is thought, cannot assign case to their complements.
  - The pronoun can only receive Case after moving to the specifier of Infl, where it can receive Case from Infl.

It must happen after movement, when the pronoun receives a Case feature, but also satisfy other GB assumptions.

- Case assignment cannot happen at LF because it has phonological effects.
  - LF and PF are not directly linked.
  - Any Case assignment that happened at LF would not be visible at PF.
  - Different Cases have different PF forms.
  - So Case assignment cannot happen at LF.
- Finally, it cannot happen at PF. Late versions of GB relied on a notion called the *Visibility Condition*, which linked Case theory and Theta Theory:

(7) *Visibility Condition*:
A DP's θ-role is visible at LF only if it is Case-marked.

Here's a chance to do some Minimalist thinking: Is this a Bare Output Condition, or an Economy Condition? Or neither?

- This can be seen by looking at null operators:

(8) a. I met the man [Op_i that Mary believed t_i to be a genius].
b. *I met the man [Op_i that it was believed t_i to be a genius].

- Even though the null operator has no overt phonological content, it still needs to receive case in order to be interpreted correctly.
  - Passive verbs cannot assign case to their complements, and an expletive occupies SpecIP in (8b).
  - (8b) is taken to be a violation of the Theta-criterion: The subject θ-role is not visible at LF because the trace has not been Case-marked.
- Because of the Y-structure of the grammar, this means Case marking must happen before the split to LF and PF.

2.1.1 *Change one assumption: Case is checked, not assigned*

- The argument that Case must be assigned at SS collapses if we change the assumption that Case is assigned.

- In fact, if we assume that pronouns come with a Case feature and that this feature must be CHECKED against the features of other heads, we can eliminate all references to SS.

  - Movement to Infl just makes sure that the [NOM] feature on the pronoun and on Infl match.
  - The matching features can then be eliminated from the derivation.

This is important to the discussion of overt/covert movement below.

(9) He was seen.

a. DS: [$_{\text{IP}}$ Δ was+Infl$_{\text{NOM}}$ [$_{\text{VP}}$ seen he$_{\text{NOM}}$]]

b. SS: [$_{\text{IP}}$ he$_{\cancel{NOM}}$ was+Infl$_{\cancel{NOM}}$ [$_{\text{VP}}$ seen *t*]]

- If pronouns enter the derivation with a Case feature, then we don't have to worry about the mismatch between LF and PF anymore.

  - It becomes possible to check Case features at LF (the Case feature will be at PF anyway).
  - We don't need to reference SS anymore, because the Case feature is present at all stages of the derivation.

2.2 Binding and *wh*-movement

- Binding Principle C dictates that an R-expression must be free, *i.e.*, not conindexed by any c-commanding expression.

R is for 'referring'.

- Principle C does not appear to hold at DS: If it did, both (10) and (11) should be ungrammatical as they have the same DS.

There is an assumption here that these examples can be related by movement. What if they're not?

(10) a. *He$_i$ greeted Mary after John$_i$ walked in.

b. **DS/SS/LF*:
[he$_i$ [greeted Mary [after John$_i$ walked in]]]

(11) a. After John$_i$ walked in, he$_i$ greeted Mary.

b. **DS*:
[he$_i$ [greeted Mary [after John$_i$ walked in]]]

c. *SS/LF*:
[[after John$_i$ walked in]$_k$ [he$_i$ [greeted Mary t_k]]]

- There is reason to think that Principle C holds at SS. This comes from multiple *wh*-questions that give rise to so-called *pair-list* answers:

(12) a. Who ate what?

b. John ate the bagel, Mary ate a croissant, Sheila ate the kale…

- A common GB assumption is that the second *wh*-element (the one said to be *in situ*) move covertly (*i.e.*, after SS) to the CP layer.
- By so doing the two *wh*-elements form a special operator that ranges over pairs of potential answers – pairs of eaters and things eaten.

(13) a. *SS*:
[$_{\text{CP}}$ who$_i$ [$_{\text{IP}}$ t_i ate what]]

b. *LF*:
[$_{\text{CP}}$ what$_k$+who$_i$ [$_{\text{IP}}$ t_i ate t_k]]

- If we take this assumption, we see that the appropriate place to assume Principle C holds is at SS.
  - If Principle C holds at LF, we correctly predict that *he* and *Harry* can be coindexed in (14) and not in (15).

(14) a. Which picture that Harry$_i$ bought did he$_i$ like?

b. *SS/LF*:
[$_{\text{CP}}$ [which picture that Harry$_i$ bought]$_k$ did [$_{\text{IP}}$ he$_i$ like t_k]]

(15) a. *He$_i$ liked this picture that Harry$_i$ bought.

b. **SS/LF*:
[$_{\text{CP}}$ he$_i$ liked this picture that Harry$_i$ bought]

- But when we add multiple *wh*-elements, we incorrectly predict that *he* and *Harry* can be coindexed in (16), since *Harry* does not c-command *which man* at LF.

(16) a. *Which man said he$_i$ liked which picture that Harry$_i$ bought?

b. *SS*:
*[$_{\text{CP}}$ [which man]$_k$ [$_{\text{IP}}$ t_k said he$_i$ liked [which picture that Harry$_i$ bought]]]

c. *LF*:
[$_{\text{CP}}$ [which picture that Harry$_i$ bought]$_m$ + [which man]$_k$ [$_{\text{IP}}$ t_k said he$_i$ liked t_m]]

- If Principle C holds at SS, however, we get the right result.

2.2.1 *Change one assumption: Only part of the* wh-*element moves at LF*

- We know from a lot of languages, not too distantly related to English, that it is possible to move only the *wh*-word in certain complex *wh*-phrases:

(17) *French*:

a. [Combien de livres]$_i$ a-t-il consultés t_i?
how.many of book has-he consulted

b. Combien$_i$ a-t-il consultés [t_i de livres]?
how.many has-he consulted of book

(18) *German*:

a. [Was für Bücher]$_i$ hast du t_i gelesen?
what for books have you read

b. Was hast du [t_i für Bücher] gelesen?
what have you for books read

- There is no strong evidence that we are moving full *wh*-phrases at LF. Maybe we are just moving the *wh*-words.
- If this is what happens at LF in English, then notice again that the argument above changes. The LF for (16) is still malformed:

(16) c. *New LF*:
*[$_{\text{CP}}$ which$_m$ + [which man]$_k$ [$_{\text{IP}}$ t_k said he$_i$ liked [t_m picture that Harry$_i$ bought]]]

- We no longer need to refer to SS to explain why (16) is bad.

2.3 Movement and Variation

- As mentioned earlier, where English moves *wh*-words, Mandarin appears no to:

(19) What did Bill buy?

(20) Bill mai-le shenme?
Bill buy-ASP what
'What did Bill buy?'

- Similarly, French moves verbs past certain adverbs, but English does not.

(21) John often drinks wine.

(22) Jean bois souvent du vin.
Jean drinks often of wine
'Jean often drinks wine.'

- These differences were treated as cross-linguistic variation regarding when certain operations happen.
  - Mandarin still has *wh*-movement, it just occurs covertly – after SS.
  - English has V°-to-I° movement, but, again, after SS.

In fact, this is hinted at above, with the idea that English can move only *wh*-words at LF, like French and German do overtly.

- The motivation for this comes partially from the logic of the P&P framework.
  - Overt data that tells a child how to set LF parameters is sparse at best.
  - This implies that LF parameters cannot be reliably set, suggesting that LF should have little to no variation cross-linguistically.
  - Assuming this is right, we can infer that languages are identical at LF, which means differences at SS will be taken care of after SS.

You simply cannot hear LF.

- To say that some languages do certain operations before or after SS seems to make necessary reference to SS.

2.3.1 *Change one assumption: Rely on features, not timing*

- Assume that movement is driven by a need to check features.
- Now assume that derivations are lazy in some sense, and do not do things until they have to – that is, they PROCRASTINATE and put off movement until they have to do it.

This is an economy constraint.

- Now we exploit our interfaces and posit two kinds of features.
  - STRONG features are illegible at the PF interface. They must therefore trigger movement before the split to LF and PF.
  - WEAK features are illegible only at the LF interface, but legible at the PF interface. Thus they must be checked by movement before they reach LF, but need not be checked before they reach PF.

In other words, we are going to set up two different kinds of features that have different interface conditions.

- If we look back at the English–Mandarin contrast above, we can specify that C° in English has a strong [WH] feature, whereas Mandarin has a weak [WH] feature.

(23) *English*:

a. *DS*:
$[_{\text{CP}}\ \text{C}_{[wh*]}\ [_{IP} \ldots wh \ldots]]$

b. *LF/PF*:
$[_{\text{CP}}\ wh_i\ \text{C}_{\cancel{[wh*]}}\ [_{IP} \ldots t_i \ldots]]$

I've indicated a strong feature here with an asterisk.

(24) *Mandarin*:

a. *DS/PF*:
$[_{\text{CP}}\ \text{C}_{[wh]}\ [_{IP} \ldots wh \ldots]]$

b. *LF*:
$[_{\text{CP}}\ wh_i\ \text{C}_{\cancel{[wh]}}\ [_{IP} \ldots t_i \ldots]]$

- We'll worry about when and how this happens, but for now, note that we don't need to refer to SS for this.
  - Combining a new economy condition with interface constraints gets us the same effect we had before.
  - We don't need to refer to any level before or after which movements occur.
- We still need a split, since we refer to LF and PF. Does that mean we need SS?
  - A split does not entail that there is a level, though, just a place where the derivation sends some stuff to PF.
  - In fact, there might not even be one place where stuff is sent to PF – it might even happen multiple times.

We'll see the arguments for this on 7 August!

2.4 Summary

- It is possible to explain phenomena like Case assignment and binding without making reference to the level S-structure.
- We can distinguish overt and covert movement without referencing a specific level of representation.
- This suggests that we need not posit a level like S-structure. We can explain these phenomena without it.

3 Rethinking D-structure

- Now we turn to D-structure.
  - D-structure is the place where GB derivations begin.
  - Lexical properties of words are met at this level.
  - Governed by two modules: X̄-theory and Theta theory.
  - The domain of recursive structure
- Chomsky (1993) also questions the central GB assumptions about D-structure.
- As a result, have also lost D-structure in addition to S-structure.
- The big breakthrough here is the adoption of the operation Merge, which builds structure recursively.
  - With a few new assumptions, this will let us explain recursive structures and θ-role assignment as well as we did with D-structure.
- The result is a continuous syntactic derivation with no levels before Spell Out.

We'll discuss Merge in great detail on 24 July.

3.1 Recursion through Merge

- DS is supposed to be the place where recursive structure exists.
- For example, embedding a constituent of category X within another constituent of category X is possible.

(25) [$_{\text{IP}}$ John asked Mary whether [$_{\text{IP}}$ she said that [$_{\text{IP}}$ Tom left early.]]]

- Additionally, certain things like adjunction can apply repeatedly:

(26) the [$_{\text{NP}}$ big [$_{\text{NP}}$ old [$_{\text{NP}}$ blue [$_{\text{NP}}$ house]]]]

- Under the GB model, this is largely the result of recursive syntactic structure that is thought to be required at DS.
- But we can build these sorts of structures without any reference to a level like DS.

3.1.1 *Recursion through Merge*

- Rather than assume a level like DS where all of the words start and are subsequently manipulated by operations like Move, Minimalist syntax assumes these structures are built and manipulated over the course of the derivation.
- Instead of a level, we start with a set of words that we are going to use in the course of the derivation, known as a Numeration.
- For a simple transitive sentence *Mary scammed the boys*, we would begin with a numeration like this:

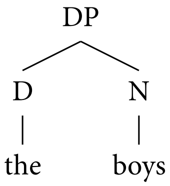
  - N_1 = {boys, the, Infl, scammed, Mary}

- The derivation proceeds by drawing individual words from the numeration and merging them with other words or syntactic elements.
  - The derivation begins with the most deeply embedded elements and works its way higher.
  - The derivation ends when the numeration has been totally depleted.

This is constrained by the Extension Condition (see below).

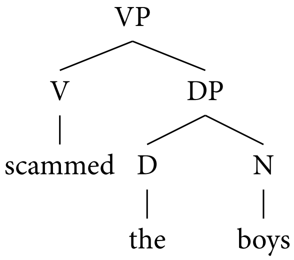
- First, the noun *boys* combines with the determiner *the* to form a DP:

(27)



- This unit then combines with scammed to form a VP:

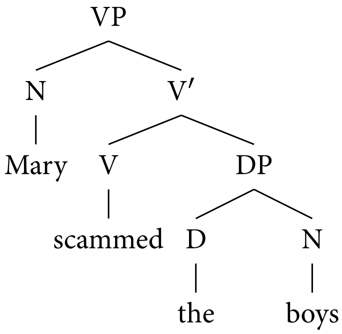
(28)



- Then *Mary* merges with the VP to allow the verb to assign its theta-role locally.

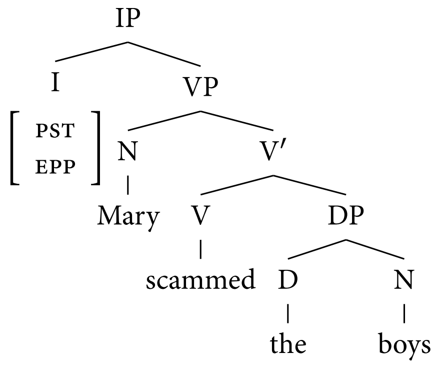
I will assume for simplicity that names are just nouns.

(29)



- After this, Infl merges:

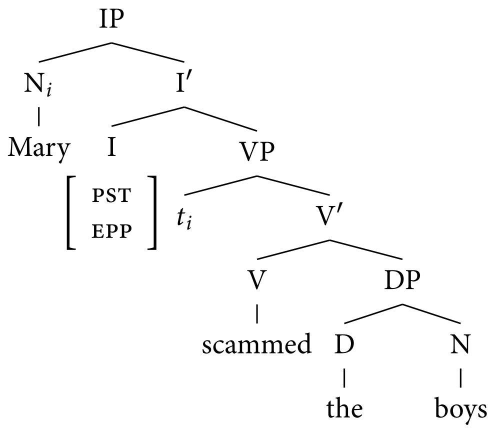
(30)



- The subject then moves from SpecVP to SpecIP to satisfy the EPP:

Notice there is never any deep structure position from which *Mary* moves. This is just the position in the tree where that word was first merged.

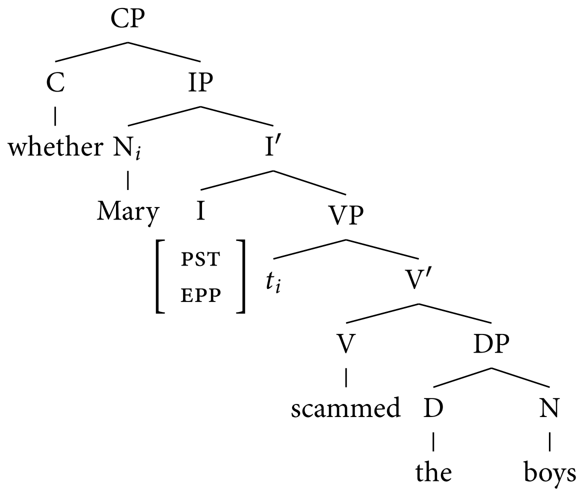
(31)



- The derivation need not stop here.
  - If we wanted to embed this sentence (as in *I wonder whether Mary scammed the boys*), we would then merge this sentence with the complementizer *whether* (presuming it is in the numeration):

The derivation would continue on after this: *wonder* would merge with the new CP, the subject would merge with the new VP, Infl would merge, and then the subject would move to SpecIP.

(32)



- The critical thing with an approach like this is that there is no DS (or SS).
  - The starting place is just the words you are going to use.
  - The operations Merge and Move are interleaved as necessary.
  - There is no level where all the words are plugged into the tree *before* movement starts.
  - The operation Merge is itself recursive: It can take its previous output as a new input, generating recursive structure automatically.
- This shows we can create derivations that need not refer to DS. Since DS is not one of the conceptually necessary levels, this should be of interest to us as Minimalists.
- This is just a starting point, though. The question is whether it is possible to do with this all the things that required DS as a level.

3.1.2 *One constraint on this: The Extension Condition*

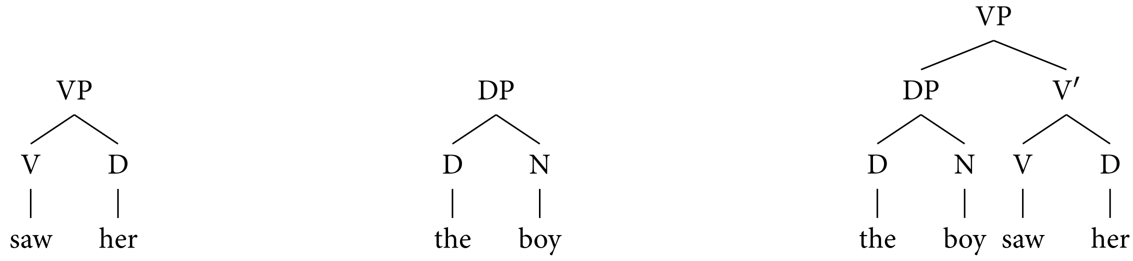
- Before moving on, it worth discussing one condition on tree building: The Extension Condition:

(33) *The Extension Condition*:
Overt applications of Merge and Move can only target root syntactic objects.

The Extension Condition is an important way of enforcing cyclicity, ensuring that the derivation proceeds upward and builds progressively larger structures.

- A *root syntactic object* is any tree that isn't dominated by another element.
- This means that when two elements are merged, they must be merged at the top of the tree.
- To give a simple case, if you wanted to form the VP [$_{\text{VP}}$ [$_{\text{DP}}$ the boy] saw her], you must merge *the* and *boy* into a DP before you merge them with *saw her*:

(34) a. Merge *saw* and *her*: b. Merge *the* and *boy*: c. Merge [$_{\text{DP}}$ *the boy*] and [$_{\text{VP}}$ *saw her*]:



- This prevents you from first merging the *the boy* with the verb to make the VP [$_{\text{VP}}$ [$_{\text{DP}}$the boy] saw] and then merging *her* directly with the verb.

3.2 Theta role assignment without DS

- Adopting Merge gives us a cyclically derived, recursive structure. But how do we account for the theta role assignment under this view?
- Here, Hornstein et al. (2005: 68) propose the following:

(35) *Theta-Role Assignment Principle* (TRAP):
θ-roles can only be assigned under a Merge operation.

- Thus, rather than saying that the Theta Criterion must be satisfied at DS, we can now say that an argument receives its θ-role as soon as it Merges with the object that assigns it its θ-role.

This is a condition on a grammatical operation.

- We can otherwise continue to use Theta theory as we did before.

3.2.1 *Control*

- Let's consider how a control sentence is derived under TRAP.

(36) Mary$_i$ intended [PRO$_i$ to scam Bill].

- In the embedded clause:
  i. When *Bill* merges with *scam*, *scam* will assign its internal θ-role to *Bill*.
  ii. Then when PRO merges with *scam*, it will receive the external θ-role.
- In the matrix clause:
  i. The embedded clause will receive its θ-role from *intended* when they merge.
  ii. When *Mary* merges with *intended*, it will receive the verb's external θ-role.
- Crucially, it is still not possible to relate these things by movement:

(37) *Mary$_i$ intended [t_i to scam Bill].

- If *Mary* first merges in the embedded clause, it will receive its θ-role from *scam*.
  - But if we specify that θ-role assignment is a property of Merge *and not Move*, then *Mary* cannot receive a θ-role from *intend* by moving to the Matrix clause.
  - Since *intended* has not discharged its external θ-role, this violates the Theta Criterion, and the derivation crashes at LF.

The assumption is that the Theta Criterion is an LF interface condition.

3.2.2 *Raising*

- Raising, on the other hand, still works in a familiar way.

(38) Mary$_i$ tended [t_i to scam Bill].

- Here, we assume that verbs like *tend* still don't assign external θ-roles.

- That means *Mary* is free to move to the subject position of the matrix clause after it receives its θ-role from *scam*.

- Just as in the GB theory, if PRO merges in the embedded clause instead, it will receive a θ-role form *scam*.

  - But then *Mary* will not receive a θ-role at all, because there will be none available when it merges.

(39) *Mary$_i$ tended [PRO$_i$ to scam Bill].

3.3 Summary

- We do not need D-structure in order to explain recursive structure in syntax. Recursive structure is built by the recursive operation Merge.

- One we adopt Merge, we don't need D-structure for θ-role assignment, either. We only have to specify that elements receive their θ-roles when they Merge with the structure.

- In the next lecture we will take a much closer look at how θ-role assignment works under minimalist assumptions, especially with regard to the Internal Subject Hypothesis, given these new assumptions about Merge.

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