

Government and Binding Theory.

Notes by Rick Grush, based on GB course taught using Haegeman, Liliane (1994)
Introduction to Government and Binding Theory. Blackwell.

A. Basic Syntax.

Sentences - are the primary items that GB will be concerned with.

(1a) I like eggs.

(1b) He said that I should take logic, but I think I'll do French Literature.

(1c) Did Mike eat his brain?

Clauses - to a first approximation, a constituent which contains a verbal element and all its arguments. Many sentences are clauses.

(2a) I like eggs.

(2b) John thinks *that I like eggs*. [A higher or 'matrix' clause, AND a lower, or subordinate finite clause]

(2c) I would like *for Mary to give me some money*. [lower clause is non-finite]

Phrases - a constituent which includes a head (e.g. V, N, A, P) and all its associated complements, adjuncts, and determiners.

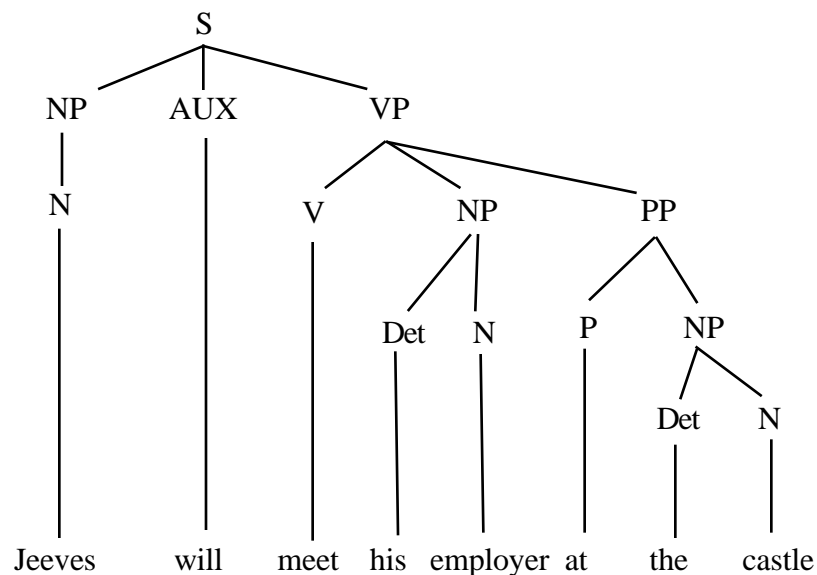
(3a) the man in the box

(3b) all gave a book to Mary

(3c) just above the table

(3d) entirely covered with Cheez-Whiz

Heads - lexical items (at least for now) which 'head' a phrase and establish its category.



B. Lexicon.

The lexicon is the mental dictionary. Every word has an 'entry' which includes all the information which is syntactically and grammatically relevant for that word. There is no clear agreement within the tradition on exactly what information is in the lexicon, but minimally it includes the word's syntactic category (noun, verb, etc.), required complements, theta grid (see later), and other features as well. Most of the information is assumed to be represented in the form of a choice of a small number (usually binary) options or features. E.g +/- male, +/- animate.

C. Argument Structure.

Many lexical items have requirements concerning other constituents -- this is the item's *argument structure*. It may require certain constituents to be present, and may optionally allow others. These details will be part of the item's lexical entry.

1. Verbs.

The verb's argument structure is (allegedly) determined by the semantics of the verb, and is projected into the initial (pre-movement) syntactic representations. The terms 'argument structure', 'subcategorization frame', and 'theta grid' at least as far as verbs go, all refer to aspects of the verb's argument structure.

Subcategorization. One way to express different verbal argument structures is to place them in different subcategories, such as intransitive, transitive, ditransitive, and the like (e.g. double object vs. dative).

Argument structure. A way of representing the semantically required constituents (of verb as well as other categories).

Theta grids. A semantically richer (though still quite thin) way to specify required constituents is with a *theta grid*. This grid lists the theta roles associated with the lexical items and requirements on their realization (such as whether or not a theta role may be left unexpressed, and if it can only be expressed by certain categories).

give: verb

<u>agent/source</u>	theme/mover	recipient/beneficiary
NP	NP	NP

2. Sentential Arguments.

Many verbs (and other lexical items: John's belief *that he is a martian* is unreasonable) can take clausal arguments. They can be small clauses (verbless clauses), or finite (complementized or not), or non-finite (complementized or not).

(4a) I consider *her a genius*.

(4b) Did you know *that John will eat a wombat?*

(4c) I don't believe *John ate that wombat*.

(4d) *For John to eat a wombat* would be interesting.

(4e) I'd like *us to eat wombats*.

D. Grammatical Constraints.

Theta Criterion:

Each argument is assigned exactly one theta-role, and
Each theta-role is assigned to exactly one argument.

Projection Principle:

Lexical information is syntactically represented.

Among other things, this means that information in the lexical item's lexical entry shows up in, and plays a role in, syntactic structure, most centrally by requiring and/or licensing other constituents.

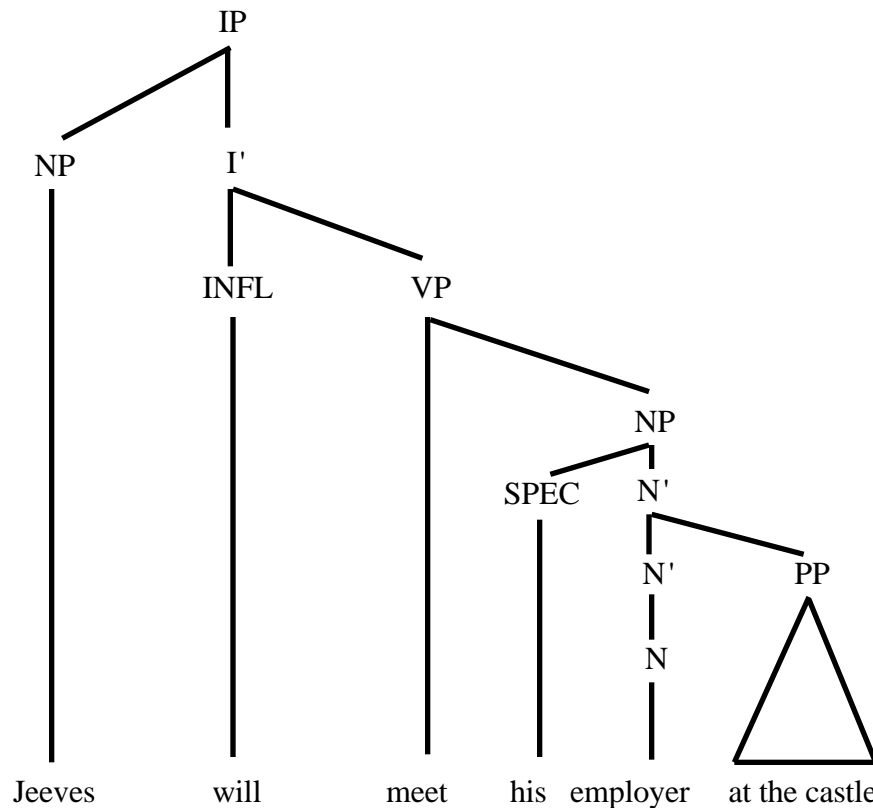
E. Phrase Structure.

1. Structural relations.

(Immediate) Dominance

(Immediate) Precedence

Mothers, daughters and sisters.



2. X' Theory. (X-bar).

Head - The item which heads the phrase and establishes its category.

Complement - Constituent required within the phrase by the head's argument structure.

Adjunct - Constituent optionally allowed within the phrase by the head.

Specifier - Serves to specify, determine, or ground the head.

Phrase (Maximal Projection) - The complete, filled-out constituent.

Basically, X' phrase structure is pretty simple:

i) Heads are a 'zero level' node: X^0

ii) Complements combine with an X^0 to form an X^1 node.

iii) Adjuncts combine with an X^1 node to form another X^1 node.

iv) The specifier combines with the highest X^1 node to form the phrase (aka X^2 or maximal projection).

Order of the constituents is not determined by UG, but the nesting is.

3. Sentences as IP.

Clause structure is also subsumed under the X' format originally designed for phrases. The idea is that clauses have as their 'head' the 'functional head' INFL (pronounced 'Inf'), INFL's complement is VP, and its specifier is NP. So, sentences are headed by I (a zero level category). I combines with VP to form I', and I' combines with NP to form IP. Just like other phrases.

4. CPs and movement.

We even go beyond the clause to complementized clauses, CP. The complementizer *C* is the head, it takes IP as a complement. There is no real specifier for CPs, but by assimilating them to X' format, the assumption is that the specifier position is there anyway, even if not filled by real [Spec, CP] material. In effect, [Spec, CP] turns out to be a position mainly concerned with movement, as the *C* and [Spec, CP] positions provide 'landing sites' for moving material.

5. Small clauses.

Normal clauses have a verbal element which has tense and agreement features. These may be realized on the verb, on an auxiliary, or not at all (non-finite clauses). Small clauses (I consider *her a genius*.) have no verb, and no tense, but do have agreement of a sort (the NP agrees with the attributed phrase (adjectival or NP)). It is thus treated like a clause, with AGR as its head, the attributed constituent as the complement, and the subject NP as the specifier [Spec, AGRP].

F. c-command, m-command, and government.

c-command: A structural relation between constituents.

A c-commands B iff

A does not dominate B, and B does not dominate A, and
the first branching node dominating A also dominates B.

m-command: Also a structural relation.

A m-commands B iff

A does not dominate B and B does not dominate A, and
The first maximal projection dominating A also dominates B.

government: Another structural relation, but this time the governing constituent must be a head.

A governs B iff

A is a governor (head, at least for now), and
A m-commands B, and
no barrier (maximal projection, for now) intervenes between A and B.

theta-government:

A theta governs B iff

A governs B, and
A assigns B a theta-role.

G. Case

1. Abstract vs. overt (morphologically/phonologically realized) case.

Just like with agreement on verbs, we assume that case, such as dative, genitive, accusative, nominative, etc., is a property of NPs even if it has no overt manifestation.

2. Structural case

We will be concerned with two flavors of structural case, nominative and accusative. Structural case is assigned by verbal elements and prepositions to NPs which they govern.

a. Finite INFL assigns nominative case to NPs it governs. INFL can only govern the subject NP, i.e. [Spec, IP], because the VP which is the complement of INFL blocks INFL's government of any NPs which might be in VP.

1) He wants to buy a ham sandwich.

b. Transitive verbs assign accusative case to NPs they govern.

2a) I don't like *them*.

2b) I understand *him* to be a completely confusing speaker.

c. Prepositions assign accusative case to NPs they govern. This includes certain prepositional complementizers (e.g. *for*).

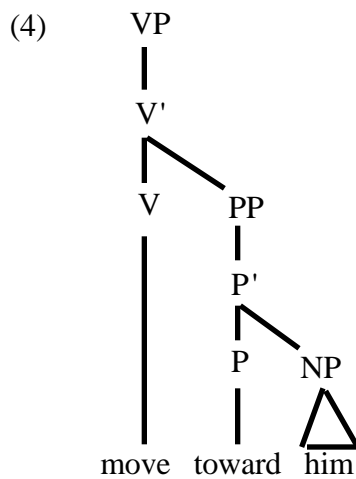
3a) The big bird above *him* just ate.

3b) That primate under *me* looks like a good target.

3c) For *him* to eat a wombat would be a change of pace.

d. Subjects of infinitival clauses need case too, but the non-finite INFL cannot assign them case. That's why some other mechanism, like complementizing the clause with *for*, or ECM (both of which assign the subject NP accusative case) is needed.

e. Barriers.



Case is assigned under government, so we can see that the preposition 'towards', and not the verb 'move', assigns accusative case to 'him', since the maximal projection PP is a barrier to government of the NP by V. Thus P, and not V, is NP's governor, and assigns it accusative case.

Similarly, note that INFL will always govern [Spec, IP], and thus be able to assign it case (if it is finite).

f. ECM and prepositional complementizers.

Look again at (2b), repeated here as (5):

5) I understand *him* to be a completely confusing speaker.

Here, *him* is the subject of the infinitival subordinate clause '*him* to be a completely confusing speaker'. This clause is an IP which is the complement of the verb 'understand' in the matrix clause. If all maximal projections are barriers to government, then IP should block the ability of 'understand' to govern 'him'. Because of examples like this, it is proposed that non-finite IP is NOT a barrier to government (somehow, being negatively specified for TNS and AGR makes such IPs too 'weak' to be barriers for outside government).

This phenomenon, where a matrix verb case marks the subject NP of a complement infinitival clause is called exceptional case marking (ECM).

Notice that similar reasoning is behind (3c) aka (6):

6) For *him* to eat a wombat would be a change of pace.

Here, the non-finite subordinate clause '*him* to eat a wombat', the IP is not a barrier to outside government, allowing COMP ('for') to govern 'him' and assign it accusative case.

3. Inherent case.

All of the preceding discussion concerned **structural** case. Case was assigned by certain elements (heads) to NPs which they governed, and since government is a purely structural relation, this is called structural case. N.B.. ECM, where the matrix verb case marks the subject NP, even though *t* doesn't assign it a theta role, and even though it is not an argument of the verb.

By contrast, **inherent** case is assigned by certain elements (we discuss nouns only) to NPs which they both govern and assign a theta-role to.

- 7a) Rick envies the Lotto winner.
- 7b) *Rick is envious the Lotto winner.
- 7c) Rick is envious of the Lotto winner.
- 7d) *Rick's envy the Lotto winner
- 7e) Rick's envy of the Lotto winner

Here we have an example of *of-insertion*. One way to explain what is going on is to say that nouns, such as *envy*, and adjectives, such as *envious*, cannot assign case, though their associated verbs (*envies*) can assign structural case.

We could say that (7b) and (7d) are ungrammatical because the complement NP doesn't have abstract case. By inserting the preposition 'of' before the NP, however, we allow the NP to be assigned accusative case by the preposition.

But consider (8):

- 8a) Rick believes that the Lotto winner is lucky.
- 8b) Rick's belief that the Lotto winner is lucky
- 8c) I believe the Lotto winner to be lucky.
- 8d) *Rick's belief the Lotto winner to be lucky.
- 8e) *Rick's belief of the Lotto winner to be lucky.

Notice that *of-insertion* does not work for (8e). The difference between (7e) and (8e) is that 'envy' assigns a theta-role to the NP 'the Lotto winner', where 'belief' does not. 'Belief' assigns a theta-role to the entire subordinate clause.

So now the story is that the original analysis of *of-insertion* was not correct. Nouns and adjectives **do** assign case to NPs they theta-govern (but only inherent case, not structural case), and this case assignment includes the insertion of the syntactic dummy element 'of' before the case marked NP. This is an example of **inherent** case marking.

4. Recap.

- All NPs must receive abstract case.
- Finite INFL case marks [Spec, IP] nominative.
- Transitive verbs and prepositions case mark governed NPs accusative.
- Because non-finite IP is not a barrier for government, subject NPs of non-finite subordinate clauses can be case marked by adjacent transitive verbs (ECM) and complementizing prepositions (e.g. 'for') adjacent to them.
- Nouns and adjectives assign inherent genitive case in English to NPs they *theta*-govern, and this is realized morphologically by insertion of 'of', and accusative case marking.

H. Passivization

1. The passive construction.

- (9a) Pittsburgh beat Detroit.
 (9b) Detroit was beaten by Pittsburgh.

Here we have a typical passivization. The object of the active sentence becomes the subject, the subject of the active pedant, if expressed, shows up in an oblique 'by' phrase, and the verb undergoes participial morphology (V-en) and is preceded by an inflected form of 'be'.

2. External theta-role assignment.

- (10a) *Beat Detroit.
 (10b) Detroit was beaten.

As (10a) shows, the external theta role of agent is not optional. However, when the passive morphology is used, the external theta role is not assigned by the verb. If the agent is present, its theta role is assigned by the preposition 'by'. So we assume that the passive morphology on the verb absorbs the verb's external theta role.

3. Case absorption.

- (11a) Pittsburgh beat Detroit.
 (11b) *There was beaten Detroit.
 (11c) Everyone believes that Pittsburgh beat Detroit.
 (11d) It was believed that Pittsburgh beat Detroit.

It is also assumed that the passive morphology makes the verb unable to assign structural accusative case. Thus in (11b) 'Detroit' is unable to receive case, and thus fails the case filter. The structurally similar (11d) is acceptable because the object of 'believes' is a clause, and is not subject to the case filter.

I. The case filter, visibility, movement, and the theta-criterion.

- (12a) was beaten Detroit.
 (12b) Detroit_i was beaten t_i.

(12a) represents the d-structure of the passive sentence, and (12b) the s-structure. In (12b) the subject NP 'Detroit' leaves a trace in its original post-verbal position. We say that the two form a chain, represented $\langle \text{Detroit}_i, t_i \rangle$. Given this construct, we can reformulate the case filter and the theta criterion.

Theta criterion:

Each argument A appears in a chain containing a unique visible theta position P, and each theta position P is visible in a chain containing a unique argument A.
 A theta position P is visible if it is in a chain containing a case marked position.

J. Reflexives, Pronouns and R-Expressions

1. Reflexives (and reciprocals) are anaphoric elements which are coreferential with an element which is overtly expressed within a certain syntactically limited domain. E.g. *himself, herself, each other, themselves*.
2. Pronouns may or may not be coreferential with some other NP in the sentence. If there is coreference, there will be syntactic constraints on the relative position of the pronoun and its antecedent. E.g. *he, her, it, them*.
3. R-expressions are full NPs (perhaps lexical) which pick out a referent in a basically context independent way. E.g. *Tad, Professor Quine, the Vice President of the United States, the most violent criminal in Nevada*.

K. Constraints on reflexive distribution.

Reflexives cannot just show up anywhere, and the constraints on where they can occur are non-obvious. The basic aim now is to define a certain syntactic domain, a governing category (GC), and then define the distribution of NPs (reflexives, reciprocals, pronouns and R-expressions) in terms of their GC.

1. Reflexives must be bound by an antecedent.

All this means is that the reflexive is only licensed if there is a coreferential NP in the sentence (and the binder must c-command the reflexive). Coreference will be marked by co-indexing, and different reference will be marked by different indices.

- 1a) Noam_i really likes himself_i.
- 1b) *Noam_i really likes himself_k.

2. The relative location of the reflexive and the antecedent is constrained.

- 2a) *Himself_i likes Noam_i.
- 2b) *Noam_i thinks that himself_i is really smart.
- 2c) Noam_i thinks that the picture of himself_i is quite nice.
- 2d) After hurting himself_i, Noam_i called for a medic.

On the basis of (2a) one might think that the reflexive must occur after the antecedent, but (2d) shows that this isn't correct. On the basis of (2b) one might conclude that the reflexive must be in the same clause as the antecedent, but this can't be right either, as (2c) shows. So we'll start formulating and refining hypotheses:

- 3) A reflexive must be bound within its clause.
- 4) A binds B iff
 - i) A c-commands B, and
 - ii) A and B are co-indexed.

The idea will be to show that (3) is basically right, except that the clause will not turn out to be a good local domain (as (2c) shows), and we'll need to substitute some more complex construction for 'clause' in (3).

3. *The reflexive's governor must be within the local binding domain.*

5) Jerry_i believes himself_i to be the smartest.

Here is an example in which the reflexive is bound from outside its clause. We see that the reflexive is governed, and case marked (ECM) by the matrix verb 'believes'. If we revise the definition (3) as (6), then (5) is accounted for:

6) A reflexive must be bound within the smallest (lowest) clause containing it and its governor.

In (5), the lowest clause containing both the reflexive AND its governor is the matrix clause, and the reflexive is bound within this clause. But notice that this still rules out the grammatical (2c), repeated here as (7):

7) Naom_i thinks that the picture of himself_i is quite nice.

In (7), the lower clause contains the reflexive and its governor (the preposition 'of'), it is not bound in this clause, and yet is grammatical.

4. *An accessible subject/SUBJECT must be within the local binding domain.*

As (7) shows, expanding the local binding domain to include the reflexive's governor is not always enough, it must sometimes be even larger. The final piece of the puzzle will be that the local binding domain must contain 'an accessible subject/SUBJECT'. Once this phrase is unpacked, the binding domain will be defined as the minimal domain containing the reflexive, its governor, and an accessible SUBJECT/subject. (We will be able to drop reference to clauses altogether).

subject: This is just an NP in a [Spec, XP] position. This includes clausal subjects (NPs in [Spec, IP]), as well as others (the NP *Lincoln* in 'Lincoln's assassination').

SUBJECT: "Big subject" is the feature [+AGR], which for our purposes is equivalent to finite INFL. Crucially, the AGR feature of small clauses does not count as a SUBJECT.

Accessibility: A subject/SUBJECT is accessible to B iff the co-indexation of A and B does not violate any grammatical principles.

The i-within-i filter:

*[A_i...B_i...]

(The coindexation of a phrase and one of that phrase's proper constituents is ungrammatical.)

5. Principle A. (One of three Binding Theory principles, the one which concerns reflexives)

A reflexive X must be bound in its Governing Category (GC).

X is bound iff X is c-commanded by a co-indexed antecedent (in an A-position).

The GC for X is the minimal domain containing X, X's governors, and a subject/SUBJECT accessible to X.

The minimal domains for our purposes will be NPs or IPs.

subject is NP in [Spec, XP]

SUBJECT is feature [+AGR] in finite INFL

A is accessible to X iff the coindexation of A and X does not violate any grammatical principles.

The i-within-i filter:

*[_{Ai}...B_i...]

(The coindexation of a phrase and one of that phrase's proper constituents is ungrammatical.)

L. The Binding Theory:

Principle A: A reflexive must be bound in its GC.

Principle B: A pronoun must be free (not bound) in its GC.

Principle C: An R-expression must be free (everywhere).

M. Examples

8a) Clinton_i likes him_{*i/k}.

8b) Clinton_i likes himself_{i/*k}.

8c) He_{*i/k} likes Clinton_i.

In the (8) examples, the GC is the entire clause. In (8a) the pronoun must be free within the clause, hence co-indexation is ungrammatical. In (8b) only co-indexation is grammatical, since the reflexive must be bound. In (8c) co-indexation would bind the R-expression, and thus would render the sentence ungrammatical.

9) Tad_i thinks that Kate_k injured *himself_i/herself_k.

In (9) the GC is the lower clause, and so the reflexive must be bound within it.

10) *I expect himself_i to hurt Jason_i.

In (10), notice that the c-command condition on binding in effect fixes the order of reflexive and antecedent. Since the reflexive c-commands the co-indexed R-expression, but not vice versa, this sentence violates both Principle A as well as Principle C.

11) *Poirot believes Miss Marple's description of himself.

Here the GC is the object NP. It contains the reflexive, its governor ('of'), and an accessible subject ('Miss Marple', in [Spec, NP]). It should thus be bound in this domain, but it ain't.

12) *Poirot_i's sister invited himself_i.

The problem here is that there is no accessible subject/SUBJECT. The reason is that the subject 'Poirot's sister' in [Spec, IP] has 'Poirot' as a constituent. Co-indexing 'himself' with 'Poirot's sister' would leave 'Poirot' co-indexed with 'Poirot's sister' as well.

13a) *Poirot believes that himself is the best detective.

13b) Poirot believes himself to be the best detective.

In (13a) the GC is the lower clause. It contains the reflexive, its governor (the finite INFL), and an accessible SUBJECT, the AGR on the finite INFL. But the reflexive is not bound within this domain. In (13b) the GC is the matrix clause, because the matrix verb governs the reflexive.

14) Miss Marple believes Poirot_i's description of him_{*i/k}/himself_{i/*k}.

The object NP is the GC, hence the judgments shown.

N. NP feature specifications

If we assume two binary feature types, [+/-Anaphor] and [+/-Pronoun] as primitive NP features, there are four possible combinations:

[+Anaphor], [-Pronoun]: These will be reflexives and reciprocals.

[-Anaphor], [+Pronoun]: These will be pronouns.

[-Anaphor], [-Pronoun]: These will be R-expressions.

[+Anaphor], [+Pronoun]: Not encountered yet, discussion below.

We can recast the Binding theory in terms of features:

Principle A: A [+Anaphor] NP must be bound within its GC.

Principle B: A [+Pronoun] NP must be free within its GC.

We don't need to worry about why Principle C can't be derived from these. Not a problem for us.

What about a [+Anaphor], [+Pronoun] NP? It would have to be free AND bound in its GC. Clearly this will only be possible for NPs which lack a GC.

These NPs will be in ungoverned positions, hence there will be no domain containing the NP's governor. Notice that since case is assigned under government, such NPs won't be able to get case, and hence would violate the case filter *if they were overt*. Thus all such NPs will be non-overt, i.e. phonetically null. PRO by name. They're the next topic.

O. PRO

1. What's a PRO? And why?

Non-finite subordinate clauses (as well as some other constructions) can, if the conditions are right, have non-overt NP subjects. These non-overt NPs will be called PRO ('big PRO').

- 1a) Patricia wants Paul to invite some people over for dinner.
- 1b) Patricia wants him to invite some people over for dinner.
- 1c) Patricia wants to invite people over for dinner.
- 1d) Patricia_i wants PRO_i to invite some people over for dinner.

In (1a) we have an unproblematic sentence, a matrix clause and a subordinate non-finite clause. As (1b) shows, ECM allows the matrix verb to case mark the subject NP of the non-finite clause.

In (1c) the subject of the subordinate clause is missing, at least it is non-overt. We will assume that the real representation is as in (1d), with a non-overt NP PRO co-indexed with the subject of the matrix clause.

[Historical note: Sentences such as (1c) were, in earlier versions of generative grammar, derived from deep-structures with a rule called Equi-NP deletion (or 'Equi' for short), which allowed the subject of a non-finite subordinate clause to be deleted if it was the same as the subject of the matrix clause.]

- 2a) To leave together would be stupid.
- 2b) To hit oneself in the head is not advisable.

Sentences such as those in (2) are meant to convince us that PRO is syntactically represented. There is some ('independently motivated') reason for thinking that 'together' in the sense of (2a) requires some sort of plural antecedent. And on the basis of the binding theory, we must assume that the reflexive 'oneself' is bound within the lower clause.

2. The syntax of PRO

PRO is subject to both Principle A and Principle B (since it is [+Anaphor], [+Pronoun]), and thus, as we discussed last time, must be ungoverned. But a quick look at (1b) and (1d) (repeated here as (3a) and (3b)) should make us scratch our collective head:

- 3a) Patricia wants him to invite some people over for dinner.
- 3b) Patricia_i wants PRO_i to invite some people over for dinner.

It looks like in (3a) 'want' governs in to the [Spec, IP] position of the subordinate clause and case marks it accusative. Straight-forward ECM. But if this is so, then shouldn't PRO be governed in (3b) by 'want' in exactly the same way? Well, for those of you who were waiting to see GB's powers to completely insulate itself from any empirical disconfirmation, dig:

Normally, as in (3a) we assume that the non-finite IP is a complement of the matrix verb. But in cases like (3b) the complement now becomes a CP, with no [Spec, CP], no head, and the IP as it's complement. This has the effect of creating an additional CP node above the IP which blocks the matrix verb's capacity to govern into [Spec, IP] and govern PRO.

P. Control

Control refers to the referential relationship between PRO and other NPs (overt, explicit or otherwise) in the sentence. PRO may be controlled by another element, in which case its reference depends on that element, or PRO may be arbitrary. PRO cannot be controlled by expletives.

1. Obligatory vs. Optional control

Optional control is when PRO can either be controlled by a sentential argument, or be arbitrary, as in (4):

- 4a) Rick thought it was important to do the homework problems.
 4b) Rick wonders how to behave oneself/himself in public.

It is typically required that with obligatory control, the controller must c-command PRO. Furthermore, PRO is obligatorily controlled in declarative complement clauses and adjunct clauses, though this is not a requirement in subject clauses.

- 5a) Smith_i is eager PRO_{i/*ARB} to go.
 5b) Mike_i bought the Lotto ticket PRO_i to win himself/*oneself a lot of money.
 5c) PRO_{i/ARB} to behave in public would help the police_i.

2. Subject and Object control

Some (matrix) verbs select for either subject or object control. A subject control verb requires that its subject control PRO of the subordinate clause, while object control verbs require that the verb's object control PRO.

- 6a) Andy_i promised the publisher_k PRO_{i/*k} to finish the book by December.
 6b) Andy_i told the publisher_k PRO_{*i/k} to print the book by March.

Q. NP-Movement.

It is now time to look at the movement of NPs to A-positions. In brief, this is when an NP constituent is moved to an argument position. Later on, we will get to movement to A'-positions, movement of an NP to a position which is not an argument position. We will be led to posit two levels of syntactic representation, *d-structure* and *s-structure*. D-structure is the underlying level of syntactic representation (it is analogous to the 'deep structure' of transformational grammars). S-structure (analogous to 'surface structure') is the final post-movement level of syntactic representation. Movements will be analyzed as the movement of a constituent from a position it has at d-structure to a new position at s-structure.

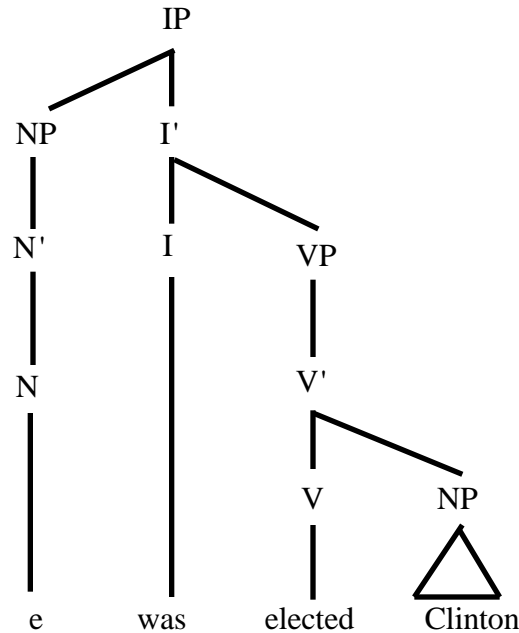
1. Passives.

- 7a) Clinton was elected.
 7b) Clinton was believed to have been elected.

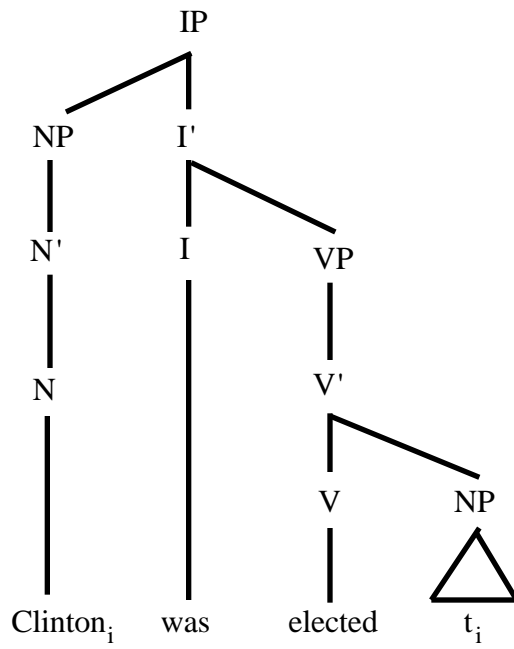
On the face of it, passive sentences, such as (7a) violate several rules of the grammar so far. The theta-criterion maintains that each of a verb's theta-roles must be assigned to an argument in the sentence. The verb *elect* has a theta-grid which calls for two arguments, filling the roles of agent and theme. But (7a) has only one argument, and

nothing in the sentences takes on the role of agent. Furthermore, as the theta-role of theme is the internal theta-role, it must be assigned under government by the verb, but clearly 'elected' does not govern 'Clinton' (the verb doesn't even m-command 'Clinton').

Thus it is proposed that there is a level of syntactic representation at which the NP 'Clinton' is governed by the verb. This structure, d-structure, is shown in (8):



In (8), the [Spec, IP] position is unfilled (it is generated because of the extended projection principle, which holds that all sentences must have a subject). But, the verb is able to assign its internal theta-role to Clinton. The movement of 'Clinton' gives us an s-structure as in (9):



In (9) we have the s-structure of (7). The NP 'Clinton' has been moved from its d-structure VP-internal position to [Spec, IP]. It leaves behind a non-overt trace, with which it is coindexed. In effect, the GB explanation of passivization is:

- i) The passive verbal morphology (consisting of a 'be' and a participial morpheme), has two effects on the verb, it makes the verb unable to assign structural case, and absorbs the verb's external theta-role.
- ii) Because the verb has no external theta-role, there will be no base-generated subject (in accordance with the theta criterion), although the [Spec, IP] *position* is generated in accordance with the extended projection principle.
- iii) Movement of the NP from the d-structure position to the subject position in s-structure solves both these problems. The NP gets its theta-role from the VP-internal position, and it gets case-marked in the [Spec, IP] position by INFL.
- iv) We thus formulate the theta-criterion as:
Each argument A appears in a chain containing a unique visible theta position P, and each theta position P is visible in a chain containing a unique argument A.
A theta position P is visible if it is in a chain containing a case marked position.

Consider (10):

10) Detroit was believed to have been beaten.

The d-structure and s-structure of of 10 is roughly (11a, b):

- 11a) [[e] [was [[believed] [e [to [[have been beaten] Detroit]]]]]]
- 11b) [[**Detroit**] [was [[believed] [**t'** [to [[have been beaten] **t**]]]]]]

Here we have a matrix clause (matrix verb: believe), and a subordinate clause (main verb: beat), each of which has been passivized. Thus in (11a) both [Spec, IP] positions are base-generated but empty. Because of the passive morphologies, the only case-marked position is the [Spec, IP] of the matrix clause (non-finite INFL does not assign nominative case). Also, both external theta-roles have been absorbed (the agent believer, and the agent beater). The theme (internal) theta-role of 'believe' is assigned to the subordinate clause, and the patient theta-role of 'beat' is assigned to 'Detroit'. But 'Detroit' is not assigned structural case by 'beat', and hence must move to a case-marked position. Movement to the subordinate [Spec, IP] won't do the trick, because that position is not case marked. It thus moves to the matrix [Spec, IP]. where it receives nominative case from the finite INFL.

This analysis not only explains why the movement is obligatory, but also explains (13c):

- 12a) Pittsburgh beat Detroit.
- 12b) Detroit was beaten.
- 12c) *It/*There was beaten Detroit.

- 13a) The students believed that the instructor was looney.
- 13b) The instructor was believed to be looney.

13c) It was believed that the instructor was looney.

The difference between (12c) and (13c) is explained by the fact that NP movement is case driven. In (12c), movement is obligatory, because otherwise the NP 'Detroit' would not be assigned case. It must therefore form an A-chain which receives both a theta-role and case. In (13c), the complement of the matrix verb is a clause, and clauses are not subject to the case filter. The clause is therefore not obligated to move -- it gets a theta-role, and needs no case. The matrix [Spec, IP] can therefore be filled by the expletive 'it'.

2. Raising.

Raising is another type of NP movement, where an NP, which is unable to receive case in its d-structure position moves to a case-marked position in order to receive case.

Examples:

14a) It is likely that John will leave.

14b) John is likely to leave.

15a) It seems that Prince has changed his name.

15b) Prince seems to have changed his name.

'Likely' and 'seems' are verbs which assign only an internal theta-role, and that to a clause. They assign no external theta-role, and do not case mark their arguments (they are like passivized verbs). In the (b) sentences, the subordinate clause is non-finite, and thus unable to assign nominative case. The subjects thus must move, to [Spec, IP] of the matrix clause, in order to receive nominative case. Again, they form an A-chain, the foot of which receives the theta-role.

Finally, in all cases, elements in A-chains must c-command all lower elements in the chain. Indeed, NP traces have the same feature decomposition as anaphors, and thus must be bound in their GC

3. S-structure, d-structure, and grammatical constraints.

This is a brief summary.

i) The theta-criterion must hold at both d-structure and s-structure. In order for it to hold at s-structure, it must be formulated in terms of chains.

ii) The extended projection principle (EPP), which holds that sentences must have subjects, holds at both d- and s-structure. Of course, these positions need not be filled by overt elements, but the positions must be generated

iii) The case filter applies only at s-structure.

iv) The received view is that principles B and C of the binding theory must be filled at s-structure. Principle A is more controversial.

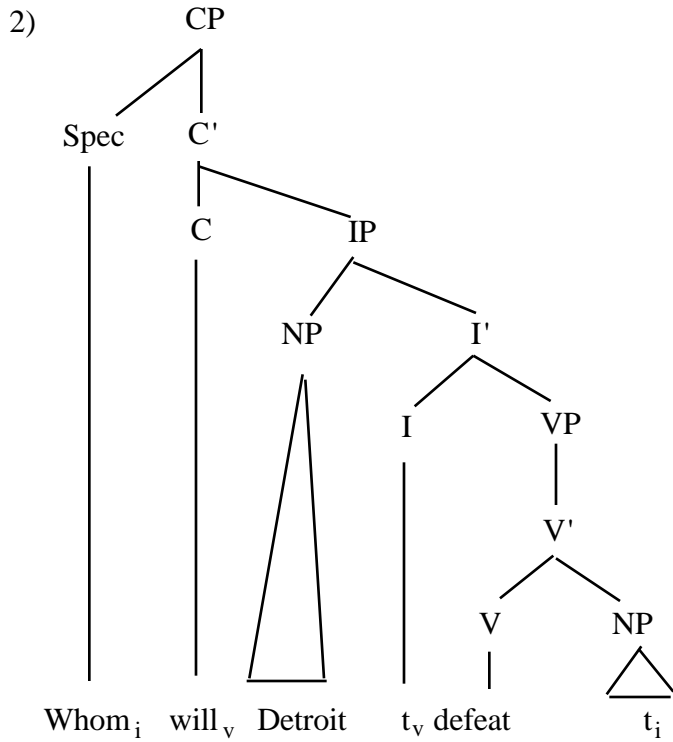
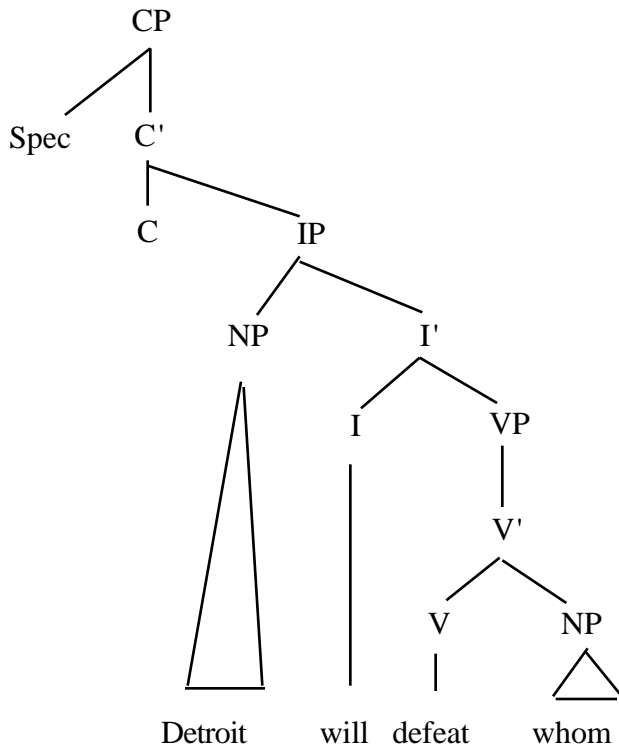
P. Wh-movement.

We looked at NP movement last time, where an NP, because it is unable to be case marked, moves to a location where it can receive case. Movement is thus obligatory.

Wh-movement contrasts in several ways. The moved constituent is in a case-markable position at d-structure, and moves to a location which is NOT case marked (typically, but not always, a [Spec, CP] position).

As can be seen in (1) below (which represents the d-structure of 'Whom will Detroit defeat?'), the moved wh-constituent receives case from 'defeat', which governs and case marks it.

In (2), the s-structure, two things have happened. The auxiliary 'will' moves from the head of IP to the head of CP (head-to-head movement). Furthermore, the wh-constituent moves from the VP internal complement spot to [Spec, CP].



Both (1) and (2) are examples of 'short movement', where the wh-constituent ends up in the specifier slot of the CP which has as its complement the IP from which the moved phrase originates. Long movement results when a wh-constituent it moved from a subordinate clause to the [Spec, CP] of a higher clause, as in (3):

3) Whom_i do you think that Detroit will beat t_i?

Like NP movement, however, the antecedent (the moved constituent) c-commands the trace.

R. wh-traces

There are reasons why traces are posited. Like NP movement, since theta roles are assigned under government, and the extraction site is the site which is theta-governed, we must assume that a co-indexed trace is left at the site, and forms a chain with the antecedent.

Examples like (4a) and (4b) are meant to show that some local process is satisfied, and so there must be something non-overt within the local domain which allows the process to occur.

4a) Which teams_i does Rick think t_i have soft defenses?

4b) Which governor_i did Jason think t_i cut himself with a knife last night?

S. Constraints

1. *that-trace filter*

The sequence of an overt complementizer followed by a trace is ungrammatical.

This explains the acceptability of sentences such as (5).

5a) *Who_i do you think that t_i will catch the first pass?

5b) Who_i do you think t_i will catch the first pass?

2. *Doubly filled COMP*

When an overt wh-phrase occupies [Spec, CP], then the head of that CP must not dominate an overt complementizer.

3. *Subjacency*

There are constraints on movement of wh-constituents. Two sorts of constraints are seen in the data, complex-NP islands and wh-islands. Complex NPs are NPs which take sentential complements, such as (6):

6a) John's conviction that he just ran over a cat

6b) the claim that John just ran over a cat

Wh-extraction from complex NPs is not allowed, as (7) shows:

7a) I don't understand John's conviction that he just ran over a cat.

7b) *What_i don't you understand John's conviction that he just ran over t_i?

7c) What_i did you claim that John ran over t_i?

7c) *What_i did you make the claim that John ran over t_i?

Wh-islands are embedded CPs introduced by wh-constituents, such as (8), and are islands for wh-extraction, as in (9):

8a) I don't know which cat_i John ran over t_i.

8b) You saw who_i Mary went to the prom with t_i.

9a) *Who_k do you think which cat_i t_k ran over t_i.

9b) *Who_k did you see who_i t_k went to the prom with t_i?

Both of these constraints can be subsumed under the subjacency condition:

10) Movement cannot cross more than one bounding node. Bounding nodes are IP and NP in English.

As can be seen, NPs with a sentential complement will have an NP and IP nodes which elements would have to cross. They can do this by leaving a trace at the intervening [Spec, CP] spot. The problem is that these complex NPs are typically arguments of verbs, and it is the second movement cycle, from the [Spec, CP] of the NP's sentential complement to the [Spec, CP] of the matrix clause, which will be ruled out, as it would have to cross the NP boundary of the complex NP, as well as the IP of the matrix clause.

11) *What_t did [_{IP} you make [_{NP} the claim [_{CP} t_i that [_{IP} John ran over t_i]]]]?

The situation with wh-islands is comparable. Recall that wh-islands are CPs introduced by wh-constituents. These constituents will be occupying the [Spec, CP] position, thus any movement out of the CP will not be able to leave any intermediate traces there. Since these embedded CPs will again be complements of the matrix verb, movement out of them must pass through the IP of the subordinate clause as well as the IP of the matrix clause, as in (12):

12) *Who_k did [_{IP} you see [_{CP} who_i [_{IP} t_k went to the prom with t_i]]]]?

D. Feature decomposition and comparison with NP movement

NP movement takes a constituent which is in a position which cannot receive case, but does receive a theta role, and moves it to an argument (A) position where it can receive case. The resultant chain thus passes the case filter and theta criterion. Since the antecedent is in an A-position, it A-binds the next lower member of the chain, and is thus eligible to fill Principle A of the binding theory (which deals only with A-binding, not A'-binding).

Wh-movement moves a constituent in a position where it gets both case AND a theta role, and moves it to a position (an A'-position) which gets neither case nor a theta role. Again, the resultant chain passes the theta criterion and the case filter. Since wh-constituents do not A-bind their traces, these traces can be [-Pronominal] [-Anaphor], like R-expressions, since they will not be A-bound at all (they thus conform to Principle C of the binding theory).

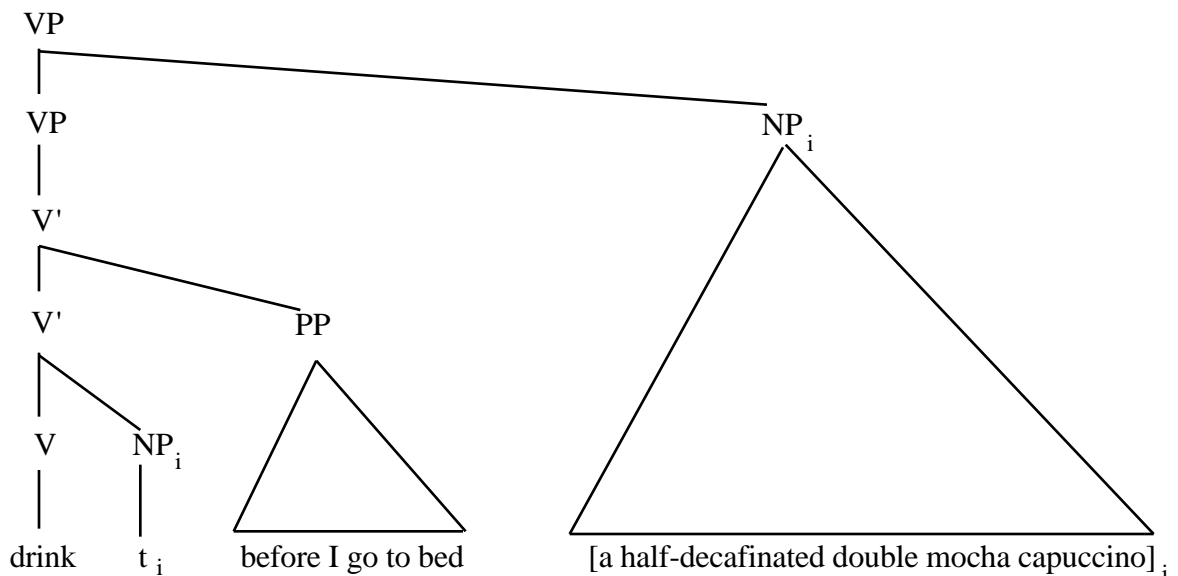
In both cases, movement is subject to subjacency, i.e. there can be no more than one bounding node (NP or IP in English) between any two consecutive elements in the chain. Also in both cases, each element in the chain c-commands the next lowest element in the chain.

E. Heavy NP-shift, and extraposition from NP

- 13a) I like to drink coffee before I go to bed.
 13b) *I like to drink before I go to bed coffee.
 13c) I like to drink a half-decaffeinated double mocha cappuccino before I go to bed.
 13d) I like to drink before I go to bed a half-decaffeinated double mocha cappuccino.

- 14a) I saw a picture of Joel last night.
 14b) ?I saw a picture last night of Joel.
 14c) ?I saw a picture of the third quarter touchdown pass to Moore last night.
 14d) I saw a picture last night of the third quarter touchdown pass to Moore.

In (13d) we have a putative violation of X' phrase structure, since an adjunct comes between a head and its complement. The situation in (14d) is even worse, because the complement PP is moved outside the NP altogether, and adjoined to the embedding VP. Here's the s-structure of the relevant part of (13d):



I leave you to ponder the implications of this with respect to the capacity of GB to account for anything in an ad hoc manner, by simply adding more structure, landing sites, and traces as needed to 'explain' syntactic configurations. (I.e., you're not supposed to ask why (13b) is unacceptable if the sort of structure above is OK.)