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Topic 1

Semantic Clues to Structure

It would be absurd to develop a general syntactic theory
without assigning an absolute crucial role to semantic con-
siderations.

Noam Chomsky¹

1. D-Structure and S-Structure

Since the very beginnings of the systematic study of language, investigations into grammar have been guided by intuitions about certain semantic properties of sentences. For example, the assumption that every sentence has a subject and a predicate derives from ancient philosophy, and was taken as a semantic fact about what is expressed by a sentence. This semantic distinction between subject and predicate was one of the first to be integrated into the systematic study of syntax, ensued by other philosophical notions like "object" and "attribute."

Another basic semantic distinction that has figured prominently in modern studies of grammar is that between truth and falsity. For example, although the following two sentences are likely to be uttered in different situations, it is clear that if one of them is true, the other cannot be false, and vice versa.

- (1) a. John admired Mary
b. Mary was admired by John

Since the basic technique for finding out something about the structure of sentences is to try to determine in which way similar sentences differ and in which ways they are alike, it is tempting to take truth in the same situations as one criterion for similarity, among others. Thus, in trying to account for the semantic equivalence of the above sentences, linguists in the fifties and sixties were led to assume that there must be a formal relation between them, namely, a formal operation called **passivization**. This operation was considered a rule of grammar which presupposes that at some appropriate level of abstraction both sentences have essentially the same underlying structure. This level of abstraction was called **D-structure**, or **deep structure**, and

¹Quoted from Harris (1993, p. 82).

the basic idea was that both sentences have the same truth conditions because they have the same D-structure.

As it happens, the structure of (1-a) is considered the more basic representation of meaning, being closer to D-structure than (1-b). Accordingly, assuming that (1-a) is in fact the D-structure of (1-b), the latter has to be derived from (1-a) by a series of elementary operations, the so-called **transformations**. For example, the verbal morphology must transform from active into passive mood (by adding the auxiliary *was*), the subject and the object change places, and finally the new object is made an indirect (“oblique”) object (by adding the preposition *by*). Any such sequence of transformations is called a **derivation**, and the single operations themselves are called elementary transformations. The result of such a derivation is called **S-structure**, or **surface structure**. If no such transformation applies to a given D-structure, D-structure and S-structure are indistinguishable and collapse into one single representation, as in the case of (1-a).

2. Pronouns and Anaphora

Above, the criterion for comparing sentences is sameness of truth conditions. Another semantic criterion is *sameness of reference*. This derives from the ability (or inability) of pronouns to corefer, i.e. to express coreference with another expression in the same sentence or text. As an example, consider the following sentences:

- (2) a. John loves his mother
b. He loves John's mother

In (2-a), the pronoun *his* can be understood as referring to the subject of the clause, i.e. to John, but it can also refer to a person different from John – one that has been made salient in previous discourse. In the latter case, the mode of reference is called **context-dependent** or **deictic**, and in the former case it is said to be **anaphoric**. In (2-b), however, no anaphoric relation can be established between *He* and *John*. These expressions are necessarily non-coreferent. Identification of the reference of *He* can only be provided by a gesture (an act of pointing), by knowledge about the utterance situation (which makes an individual particularly eligible to be referred to with *He*), or by identification via previous discourse.

As we will see, the ability of pronouns to corefer and the form of coreferential pronouns may vary, depending on various properties of the structure of sentences and of the context of utterance. Pronouns like *I*, *me*, and *my* only depend on the context of utterance, as they always refer to the speaker in a given utterance context; *you* and *your* invariably refer to the hearer in a particular situation. These expressions are called **indexical** pronouns. Third person pronouns behave differently in as far as their reference is fixed in a different way. For instance, in order to grasp the intended reference of *He* in (2-b), one needs further contextual information about the non-linguistic context in which the sentence is uttered. In contrast, the understanding of *his* as referring to *John* in (2-a) is provided by a property of the sentence alone: It does not depend on extra-sentential information, since the pronoun acquires its reference

from another expression in its own sentence.

The relation between a pronoun and a second noun (or noun phrase) whose reference is acquired by the pronoun is called **anaphora**. The study of anaphora was among the topics of research of the Stoic philosophers. The nominal that determines the reference of a pronoun is called its **antecedent**, and the coreferential use of the pronoun in a sentence is called **anaphoric**. Thus, *his* in (2-a) may or may not be used anaphorically, depending on whether or not *his* refers to John (i.e. corefers with *John*). In contrast, the pronoun *He* in (2-b) cannot be anaphoric, because it lacks an antecedent in its clause.²

3. Backwards Anaphora

The term “antecedent” derives from Latin, meaning “preceding thing or circumstance.” Taking this terminology literally one might speculate that the reason for the lack of a coreferential interpretation of (2-b) lies in the fact that *John* cannot be the antecedent of the pronoun because the pronoun does not follow the name in the linear organization of the sentence. However, despite the fact that the prefix “ante-” suggests that the antecedent of an anaphoric relation always precedes the pronoun, this is not really mandatory for an anaphoric relation to be expressible. In some contexts it seems possible to introduce discourse referents by pronouns without any previous mention of the antecedent. Thus, compare (3-a) with (3-b):

- (3) a. After *John Adams* woke up, *he* was hungry
b. After *he* woke up, *John Adams* was hungry

Both sentences convey the same meaning (in the sense of having the same truth conditions), although in (3-b) the pronoun precedes the antecedent rather than vice versa.

²At this point, the question might arise as to whether the pronoun *his* in

- (1) He loves his mother

is to be considered anaphoric or not. In one sense, it can be, because *his* may be interpreted as picking up its reference from *He*. In another sense, it might also be regarded as non-anaphoric, because it may be interpreted in the very same way as *He*, i.e. as a pronoun whose reference is determined by non-linguistic means. Apparently, these two interpretations exemplify alternative strategies for establishing the reference of a pronoun, although these different ways of fixing the reference neither entail different truth conditions, nor do they seem to relate to the structure of the sentence. It would be premature, however, to conclude that these differences are negligible or irrelevant; in fact, the different modes of fixing the reference of a pronoun do become relevant when put into a different context. Consider for example the following case of ellipsis:

- (ii) John loves his mother and Bill does too.

Understanding *his* in the anaphoric mode (i.e. as an anaphor that refers to whatever the subject refers to), the missing part in the second conjunct can be given an anaphoric interpretation, which reads as “loving the subject's mother = loving Bill's mother.” Understanding *his* in the deictic mode, i.e. as referring to a particular individual which happens to be the same as the one *John* refers to, yields a different reading, namely “loving John's mother”. Clearly, these are different readings because this time the different modes of reference yield different truth conditions. Note also that both interpretations are equally possible as far as grammar is concerned, and which one is to be considered adequate in a particular situation is a matter of pragmatics.

This is a case of **backward anaphora**. Both the backward and the forward anaphora in (3) exemplify subcases of the more general relation of **coreference**.

Backwards anaphora often does not seem as natural as forward anaphora, and in many cases it requires special contextual circumstances to be acceptable. Generally, the referent of the pronoun must already have been introduced in previous discourse, so that the reference of the pronoun can count as already established. For instance, contrastive stress on the capitalized word in (4) presupposes that the rest of the clause is old information; in particular, it is implied that the sentence does not introduce any new referents into the discourse, and this in turn facilitates backward anaphora (i.e. coreference of *His* and *John*):

- (4) His mother LOVES John

It is not clear, however, what precisely the semantic and pragmatic conditions that license backward anaphora are. The following examples, taken from Reinhart (1983) and Garden (1982), show that a new discourse referent can be introduced without giving the antecedent precedence over the anaphor:

- (5) a. Details of *her* death fill the day for family of the *latest victim* (Headline in the New York Times)
 b. ... and father Wolf taught him his business ... till every rattle in the grass ... meant just as much to him as the work of *his* office means to a *businessman* (Kipling, 'Mowgli Brothers')
 c. *She* entered the room proudly with her new hat on. A few minutes later *Rosa* collapsed.

We take these examples as evidence for the claim that backwards anaphora as such should not be blocked by a syntactic constraint. This implies that the reason for the failure of coreference in *He loves John's mother* (= (2-b)) must lie elsewhere. This will be addressed again in the next section.

4. Restrictions on Anaphora

4.1. Impossible Backward Anaphora

Whatever the exact discourse conditions for anaphora may be, the relevant point to be discussed is that in many cases backwards anaphora is indeed felt awkward, even in circumstances that would normally facilitate anaphoric relations. Thus, compare (6-a) with (6-b):

- (6) a. *John Adams* was hungry after *he* woke up
 b. **He* woke up after *John Adams* was hungry

In (6-a) coreference is likely, but in (6-b) no such interpretation is available. In the next example, coreference in (7-a) is compelled by the use of the reflexive pronoun, but is impossible in (7-b):

4. Restrictions on Anaphora

- (7) a. *John* saw *himself*
 b. **He* was seen by *John*

Since the intended meaning of (6) and (7) is the same (and could easily be captured by applying semantic rules of interpretation), it seems that there is something *syntactic* in the organization of language that prescribes the use of one form of expression while excluding the other. Above, however, we have already established that we cannot rule out the ungrammatical examples with a simple rule that excludes backwards anaphora. It will be our future task, then, to see what it is that makes anaphoric relations in certain syntactic frames inexpressible.

4.2. Impossible Quantifier Binding

Before suggesting an answer in the next chapter, let us examine yet another type of anaphoric relationship between a pronoun and its antecedent, one that differs from the above cases in as far as the antecedent of the anaphor cannot be said to be a referential expression:

- (8) a. Everyone admires his mother
 b. No one admires his mother

Neither *everyone* nor *no one* can be said to refer, but nevertheless the pronoun can enter into an anaphoric relation with these expressions. This relation can be expressed more precisely in a logical representation like the following:

- (9) a. For every *x*: *x* loves *x*'s mother
 b. For no *x*: *x* loves *x*'s mother

In cases like (8) the antecedent of the pronoun is a quantificational expression (for short: a **quantifier**). The logical relation that holds between the quantifier and the pronoun is called **binding**, and the pronoun is called a **bound variable pronoun** (abbreviated as **BVP**).

Pronouns as such are not marked as to whether they are coreferential or BVPs. Which interpretation they receive depends only on the kind of antecedent. Thus, consider (10) as an example:

- (10) *John* believes that everyone admires *his* mother



Besides having a coreferential interpretation with *his* referring to a particular person, namely to *John* as highlighted by the arrow in (11), there is also a natural way of understanding the subordinate clause as saying that every person admires his or her own mother. This reading is represented in (11):

- (11) John believes that *everyone* admires *his* mother



Thus, while the relation between the pronoun and its antecedent is coreference in (10), it is binding in (11).

A natural question that may arise at this point is whether quantifier binding and coreference are constrained in the same way, i.e. are there syntactic contexts that would allow binding but not coreference? Or is binding impossible when coreference can occur? As a clue to an answer first compare the embedded active construction with its passive counterpart in (12):

- (12) John believes that his mother was admired by everyone

When trying to understand the pronoun *his* as an anaphor, we make a significant discovery. Whereas the active sentence (10)/(11) is ambiguous in permitting the pronoun to either refer to John or to be bound by the quantifier *everyone*, no such ambiguity can be found in (12). Thus, our first finding is that there are contexts that do not permit binding.

The next step is to compare binding with the possibility of coreference in the same kind of construction. The following sentences show that although binding is impossible, coreference is still an option:

- (13) a. *John* believes that *his* mother was admired by *him*
 b. Mary believes that *his* mother was admired by *John*

Hence we must conclude that in some contexts coreference is good, but quantifier binding is unacceptable.

The next question is whether the reverse also holds. It can be verified by the reader that we do not find cases where binding is possible, but coreference would be bad. This is a significant result: Binding is in fact more narrowly constrained than coreference. Nonetheless, it will be shown below that once we fix the structural environments that permit binding, the same structural environment will rule out ungrammatical cases of coreference. For example, the structural relation between *everyone* and *his* in (14-a) permits binding, but the same relation (to be described in the next chapter) rules out coreference in (14-b):

- (14) a. Everyone admires his mother
 b. He admires John's mother

Note furthermore that there is a sharp contrast between binding in (14-a) and the impossibility of binding in (14-b):

- (15) His mother was admired by everyone

As already discussed above, no binding relation is possible. These examples shed some light on the methodological issue of how meaning and D-structure are related. We will discuss this problem in the next section. The more descriptive question of how the two restrictions, one on coreference and one on binding, are to be stated in the grammar of a language will be attacked in the next chapter.

5. D-Structure and Meaning

As a result of our above discussion of passivization we have seen that passivized sentences do not permit the same range of semantic interpretation as their active counterparts. In particular, binding was impossible in (15). From this it follows that the non-existence of certain anaphoric relations cannot be described by referring to a representation of meaning in which active and passive sentences have the same underlying structure. This observation seems particularly bothersome for a theory that relates active and passive sentences to a common source, motivated by common meanings. In fact, the above data cast doubts on the idea that passive sentences are straightforwardly derived from their active counterparts without changing their truth conditions.

However, upon closer inspection it turns out that we have not yet proven that the idea of D-structure as a representation of meaning is necessarily inconsistent. All we have established so far is that certain derivations would have to be ruled out, namely those that start off from an acceptable D-structure but yield an S-structure that cannot be understood in the same way. Given that certain anaphoric relations hold at D-structure but cannot be interpreted so at S-structure, this only means that the derivation has to be blocked in these cases.

A stronger argument against identifying D-structure with semantic interpretation seems to follow from certain anaphoric relations that hold in S-structure but never existed in the corresponding D-structure. For instance, (16) is perfectly interpretable,

- (16) *Everyone* was admired by *his* mother

binding

but its D-structural 'source' (17) is not.

- (17) *His* mother admired *everyone*

no binding

Since there are good reasons to derive passive sentences from active ones (cf. below), it seems that (16) cannot have an interpretable D-structural source. Hence we have to give up the idea that D-structure serves as the only input for semantic interpretation.

Whereas in his early writings Chomsky opposes Harris' view that transformations preserve meaning ("... not even the weakest semantic relation (factual equivalence) holds between active and passive" (Chomsky (1957b, p. 101))), he later, under the influence of Katz and Fodor, adopts the view that D-structure is a representation of meaning. Surprisingly, however, the above data pose no problem for the theory developed in his *Aspects of the Theory of Syntax* (1965). Why? The reason is simply that Chomsky drops the assumption that passive sentences are derived from active ones in the way he suggests in earlier writings. In fact, D-structures of passive and active sentences are no longer the same. Since D-structures are conceived of as abstract entities that need not display the surface structure of any actual sentence, the D-structure source of (16) is not (17) but could as well be something like (18):

(18) Δ was admired everyone by his mother

The basic idea is to first generate an empty subject position Δ that is filled during the derivation by moving the object into that position. In particular, the *by*-phrase is already generated in D-structure at a position that retains the same structural relation to *everyone* throughout the derivation. This way it becomes possible to stay consistent with the above data, because no significant change occurs during the derivation; in particular, binding options remain the same. It only remains to check that *everyone* in (18) can bind the pronoun, which can easily be established by considering similar structures like

(19) John introduced *everyone* to his mother

Here binding is no problem, hence there is no need to give up the thesis that D-structure represents meaning.

6. Paradise Lost

Nonetheless, under the influence of Jackendoff (1972) the thesis that D-structure represents meaning has lost its force. However, many arguments that have been advanced against this thesis have had the same theoretical status as the arguments cited above: They all depend on specific assumptions which have undergone substantial changes in later developments of the theory. But once we drop these specific assumptions, they no longer serve as a weapon that can be directed against the D-structure hypothesis.

One argument, however, seems largely independent of premises that have become obsolete: it concerns the representation of logical scope. The following sentence has two semantic interpretations, depending on whether or not the object is interpreted as scope dependent on the subject.

(20) Everyone on Cormorant Island speaks two languages

In the scope dependent reading there might be two different languages for each inhabitant, but in the scope independent construal, there is a fixed set of two languages such that everyone speaks both of them. On the view defended by the generative semanticists in the late sixties, this semantically ambiguous sentence would have to have two different deep structures, each of which represents one of its readings.

In the early seventies, Chomsky strongly opposed this view, although it never became particularly clear how his own theory could handle the ambiguity. In any case, sameness of truth conditions does not imply sameness of syntactic structure (as in at least some active/passive pairs). However, now the problem posed by (20) might lead one to conclude that different truth conditions do not imply different D-structures. Such a conclusion amounts to a confession that D-structure cannot handle all aspects of meaning, which is precisely the position adopted by Jackendoff, who argues that both D-structure and S-structure determine aspects of semantic interpretation.

From the present perspective, what (20) shows is that one cannot simply identify D-structure or S-structure as a representation of truth conditions. Rather, one of these

levels must be the input for still another level of representation that represents the ambiguity. It can, however, be disputed whether or not that level should be considered a syntactic level at all. Accordingly, one could remain unimpressed by (20), and simply say that the ambiguity is purely semantic and therefore outside of the realm of syntax proper. In consequence, the argument does not bear on the issue of whether D-structure or S-structure should function as input for a representation of meaning.

Another argument against this hypothesis can be raised by combining Chomsky's analysis of passives with some facts about the scope of negation. Thus compare the following two sentences:

- (21) a. Mary didn't adore only John
b. Only John wasn't adored by Mary

It is obvious that their meanings differ. (21-a) implies that Mary adored John, whereas (21-b) implies that she didn't.

The difference can readily be explained by the fact that *only John* is within the scope of negation in (21-a), while it is outside the scope of negation in (21-b). But given Chomsky's derivation of passive sentences, the D-structure of (21-b) is:

- (22) Δ wasn't adored only John by Mary

Given plausible assumptions about semantic interpretation, it follows that *only John* is again inside the scope of negation, so that (22) ~~must~~ be interpreted as:

- (23) Not only John was adored by Mary

But this is definitely not the meaning of (21-b). Hence, negation shouldn't have scope over a D-structural object that becomes a subject. But why should this be so? The only plausible answer seems to be that *only* has moved to a position outside the scope of negation. In consequence, then, we arrive at a stronger conclusion than with the Cormorant Island case: Whereas our earlier inference was that D-structure cannot correctly represent scope relations, the conclusion to be drawn from the above case is that scope seems determined by S-structure. *→ In contrast to the view to be defended...*

I consider this argument compelling, but from a purely technical point of view this result can be evaded. In order to rescue the theory, suppose that D-structure in fact does not yet represent scope, but that we need a further level of representation, called **Logical Form** and abbreviated as **LF**, that disambiguates scope relations much in the way we did in representations like (9). For the Cormorant Island sentence this means that its S- and D-structures will coincide, but there will be two different Logical Forms as shown in (24):

- (24) a. For every person *x* on Cormorant Island there is a (possibly different) set of two languages such that *x* speaks both of them
b. There is a set of two languages such that everyone on Cormorant Island speaks both of them

Now the question again becomes relevant as to whether LF should be derived from

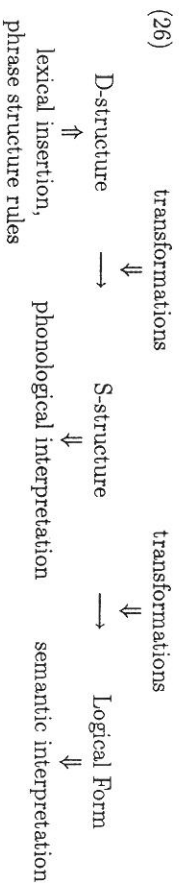
S- or from D-structure. Technically it would not be impossible to take D-structure as the input for LF. To see this, consider (22) again. Since the D-structure of passive sentences contains a dummy Δ we know that this structure must be modified by moving the object into that position (in other words, S-structure is functionally dependent on D-structure and this dependence is a deterministic one). Assume that such dummies are disallowed at the level of LF. Accordingly, the only thing one has to do in order to interpret the D-structure is to move the object into the Δ -position and then fix scope as one would expect.

Moving the object at LF is of course exactly what we do in S-structure. Thus, the only argument we have up to now is simplicity: Of course, it is undesirable to do something twice in the D-structure-as-input-to-meaning-theory, call it theory A, that would have to be done only once in the S-structure-as-input-to-meaning-theory, call it theory B. There is, however, a way to strengthen the case against theory A. The above attempt to rescue theory A crucially relies on the fact that the relation between D- and S-structure is deterministic. This, however, will not be the case if we derive both (25-a) and (25-b) from a common underlying source (25-c), as seems plausible:

- (25) a. Only John wasn't taken advantage of
 b. Advantage wasn't taken of only John
 c. Δ wasn't taken advantage of John

Thus, it would be impossible to predict from D-structure alone which of the two objects will turn into the subject at S-structure. But now observe that the meaning of the two passive versions differ: (25-a) implies that John wasn't taken advantage of, but (25-b) implies the opposite. Hence, meaning cannot be predicted from D-structure alone.

Evidence of this kind accumulated during the seventies and led to a significant change in the conception of syntax and semantics. The upshot of the discussion was that semantics became more "surfacier" than before. According to the model called "Extended Standard Theory," the overall organization of the three different levels of representation is shown in (26):



Note that all arguments against taking D-structure as the input for semantic interpretation rest on particular assumptions that are not shared by all linguists. For example, the above arguments all rest on a difference between D- and S-structure that would cease to exist if passive sentences were not derived from active sentences by moving something into the subject position. Indeed, much work has been devoted to showing that such a transformational derivation should be adopted.

If no such transformation exists, one would have to assume that passive is essentially a lexical operation, one that somehow relates two lexical entries, one with properties

inward

typical of the active verb and a second entry that describes properties of the passive verb form. An essential task of the lexicon would be to properly relate grammatical functions like subject and object, so that the semantic role of the object in active sentences is correctly associated with the semantic role of the subject position in passivized sentences.

A first argument in favor of a non-lexical treatment relies on simplicity by showing that using such a lexical device would be unduly complicated and therefore inadequate. For example, (25) shows that one would need three lexical entries rather than one in order to completely describe all the possibilities. On the other hand, if passive sentences are derived transformationally, the two passive versions would not require stating two different transformations. Both derivations can be described by a single rule: Move something appropriate into the empty slot, if possible.

Other arguments are intended to show that something can be moved there that is not lexically related to the passivized verb. Examples are given below:

- (27) a. John considers Bill intelligent
 b. Bill was considered intelligent
- (28) a. John believes there to ensue a riot
 b. There was believed to ensue a riot

Again, for reasons of simplicity it has been assumed that *Bill* and *there* do not bear any lexical relation to *consider* or *believe*; rather, they are lexically related to the embedded predicates *intelligent* and *ensue* respectively. But bearing no lexical relation to the matrix verb would preclude any reference to them in the statement of a lexical rule: hence, passive cannot be stated lexically.

Another precondition of our argument against theory A is that negation is in fact generated at D-structure at the very position that enforces movement of the object across negation. It is conceivable, however, that in a sufficiently abstract D-structure this is not the case. One would then have to reevaluate the arguments against theory A against the background of a completely different set of assumptions about structure. Indeed, many arguments against theory B gained their force more or less by historical accident, cf. Newmeyer (1980) and Harris (1993) for a survey, and a few linguists, notably McCawley (1988), have never really given up theory A. Indeed, many linguists have felt that eliminating semantics from D-structure is like expulsion from paradise. Few years later, however, a new paradise emerged: Logical Form...

Topic 2

Trees and Command

In the last chapter we argued that even though anaphora, binding, and scope are *semantic* concepts, a description of possible and impossible anaphora options must be stated in terms of syntactic relations at S-structure, so as to be able to account for the differences between pairs of active and passive sentences. In consequence, D-structure and sameness of truth conditions will play no role in what follows, but considerations of reference and S-structure, rather, will guide our search for an explanation of the observed restrictions on anaphora. It will be our task in this chapter to give a first account of why certain anaphoric relations cannot hold in certain types of constructions.

1. A First Hypothesis

An examination of the examples in (1) will confirm our hypothesis that for a pronoun to be interpretable as a bound variable we must take into account a distinctive *syntactic* relation between the pronoun and its potential antecedent:

- (1) a. *Pictures of *everyone* pleased *him*
 b. *After *everyone* woke up, *he* was hungry
 c. *With *no one* voting, *he* can't win

In terms of linear precedence, the quantifiers are close to their respective pronouns; nonetheless, they cannot bind them: Measured in terms of syntactic structure, they are still too far away, because the quantifier seems too deeply “embedded” to allow for binding. In other words, the quantifier must be structurally “high enough” – a notion to be explained further below – to act as a binder.

As we will see, this particular requirement is in no way peculiar to the pronoun-quantifier relation, but pertains to many other pronoun-antecedent relations. A particularly clear case is reflexive pronouns. Compare the following examples:

- (2) a. Pictures of *John* pleased *him*
 b. *Pictures of *John* pleased *himself*
- (3) a. *John's mother* pities *herself*
 b. **John's mother* pities *himself*

relatively

c. *John's mother pities him*

Reflexive pronouns must be used anaphorically, i.e. they need an antecedent, but as illustrated in the (b)-sentences they cannot randomly choose any referring expression in the preceding (or following) text as an antecedent. Thus, the use of such pronouns is restricted to certain syntactic contexts, and we have to describe the conditions that govern the choice of a potential antecedent, thereby explaining why *John* cannot be the antecedent of *himself* in the above example.

Comparing (3-b) with (3-a) reveals that linear order cannot play a role. Thus, the most simple mode of organizing language – its linear structure, resulting from utterances being embedded into the linear structure of time – cannot account for the difference in grammaticality we observe. Besides linear structure, however, there is hierarchical structure, resulting from sentences having parts and these parts having parts again, etc. It is this hierarchical structure that our intuition appeals to when saying that the antecedent in (3-b) is too deeply *embedded* as to serve as the antecedent of the pronoun.

In other words, the basic intuition that serves as our guide in exploring the syntactic restrictions on the choice of pronouns in the expression of anaphoric relations is grounded in hierarchical relations and should therefore be expressible in terms of a system that crucially depends on hierarchical structure. In order to make this intuition precise, we now have to develop some structural vocabulary which enables us to formulate hypotheses about the structural relation between pronouns and their antecedents.

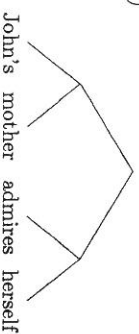
2. Trees

Let us begin with a simple example of sentence structure, e.g. with the structure of (3-a). According to standard grammar, a sentence can be split up into a subject and a predicate. This is shown in

- (4) John's mother admires herself

The same partition can be encoded into a so-called **phrase structure tree**:

(5)

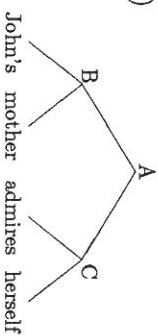


Each line in the tree is called a **branch**. The points where branches begin or end are the **nodes** of the tree. The above tree has six branches and seven nodes: one node on the top, four at the bottom, and two in between. The one on the top is called the **root**, the nodes at the bottom are called its **leaves** or **terminal nodes**. Apart from these, all nodes in this tree are branching. The topmost node **dominates** all other nodes. Every node except the root node is dominated by at least one other node; every node except the root is immediately dominated by exactly one node. The nodes that dominate a

node α are those one has to pass through when looking for the shortest way from α to the root. We will say that a node β **immediately dominates** a node α if β is the first such node one encounters on the way up to the root.

A convenient way to refer to nodes in a tree is to give them **labels**, as shown in (6):

(6)



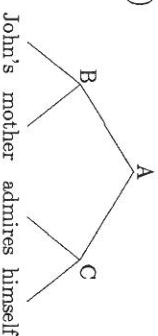
A , B , and C are labels of the branching nodes, chosen at random; the words attached to the non-branching nodes are labels of the terminal nodes. It is clear then that node A , the root, dominates all other nodes in the tree, but immediately dominates only B and C . Node B (immediately) dominates *John's* and *mother*. Node C (immediately) dominates *admire* and *herself*.

The node that immediately dominates another node is called its **mother**. If two nodes have the same mother, they are called **sisters** or **immediate constituents** of their mother. Accordingly, B and C are sisters, *John's* and *mother* are sisters, and *admires* and *herself* are sisters. However, all other pairs of nodes in (6) don't have a common mother node, so that *mother* and *admire*, for example, cannot be sisters, i.e. they are not immediate constituents of any node in the given structure.

3. Command and Reflexive Pronouns

Let us now look for the simplest structural relation that can account for the anaphora restriction between a reflexive pronoun and its antecedent. We have seen in (6) that the subject may serve as the antecedent of a reflexive, but a node contained in the subject, such as *John* in the ungrammatical construction (7),

(7)

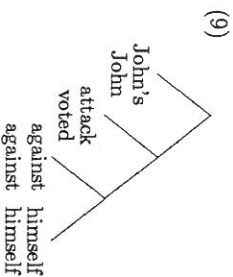


is "too deeply embedded" and therefore cannot serve as the antecedent of *himself*. This hypothesis is further confirmed by the observation that *John* can, in principle, serve as an antecedent of an anaphor, but only if the anaphor itself is contained in the subject. For example,

(8) [*John's attack against himself*] was convincing

is perfectly well-formed, since both the antecedent and the anaphor are within the subject expression, as indicated by the square brackets.

From this we conclude that the structure of the subject in (8) is basically the same as in the parallel sentential construction *John voted against himself*. Both structures are represented simultaneously in (9):



The structural relation that occurs in (9) but is missed in (7) can easily be described by using a combination of dominance and sisterhood. In order to state the required rule, we first define an auxiliary notion based on these two notions we already defined above:

(10) **Definition:**

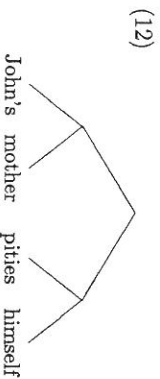
A node α **commands** a node β if and only if a sister of α dominates β .

We can now reformulate our first generalization as follows:

(11) **Condition:**

An expression α can be the antecedent of a reflexive pronoun β only if α commands β .

To see that this condition yields the correct results, consider the structure of the ungrammatical sentence (3-b) again:



Here, John cannot serve as the antecedent of *himself*, because *John's* cannot command anything in the tree; hence, it cannot command the anaphor. On the other hand, the entire subject *John's mother* does command the anaphor, so that the subject could serve as a (potential) antecedent. The anaphor *himself*, however, must agree in gender (and number) with the subject, and this agreement relation is not satisfied in the above sentence. Therefore, only (3-a) is grammatical.

As concerns (3-c), which is also grammatical, observe that the restriction formulated above does not hold for personal pronouns, but only applies to reflexive pronouns. However, if a restriction rules out a reflexive pronoun as ill-formed in a particular syntactic context, it is legitimate to conclude that in the same context a personal pronoun would be well-formed; cf. also (2), repeated as (13-a) and (13-b):

(13) a. *Pictures of John pleased himself

b. Pictures of John pleased him

c. *Compliments didn't please*

4. More Terminology

The above condition not only applies to reflexives, it also extends to another class of pronouns, namely to reciprocals. For example, consider:

(14) a. The women ignored each other

b. The women ignored each other's friends

c. *Each other's friends were ignored by the women

Here, again, *the women* in (14-c) is part of the predicate and therefore is "too far away" to have any influence on the subject.

Reflexive and reciprocal pronouns which must have an antecedent regardless of the syntactic context they are used in are called **anaphors**. Note that this is a purely technical notion, to be distinguished from our ordinary use of the term anaphoric. Although we say that a pronoun has an anaphoric relationship to its antecedent, this does not necessarily imply that the pronoun is an "anaphor." Anaphors in the technical sense of the word are only those pronouns that cannot be used independently of any antecedents. Whether or not a pronoun is an anaphor seems to be largely a matter of its morphological form. In English, the situation is rather complex, but for the time being let us assume that reflexive and reciprocal pronouns are anaphors. We can now restate Condition (11) as:

(15) An anaphor must have an antecedent that commands it.

Personal pronouns, which may or may not be used anaphorically, are called **pronominals**. As can be easily verified from the above examples, the antecedent of a pronominal, if there is one, need not command the pronominal. On the other hand, it is easy to construct examples in which the antecedent does command the pronominal:

(16) a. John saw a snake near him

b. John thought he was ill

In consequence, the syntactic restriction on anaphors does not tell us all about the difference between anaphors and pronominals. I will be more explicit about this issue in chapter 4.

5. Command and Quantifiers

Let us now turn to binding, i.e. to those cases in which the antecedent of a pronoun is a quantifier. The pronoun in these configurations is called a bound variable pronoun (BVP). Inspecting the examples that illustrate ungrammatical BVPs (namely those repeated in (18) below), the following generalization suggests itself: Both anaphors

and BVPs are referentially dependent, and both must have a commanding antecedent. Thus, we have the following condition:

- (17) A referentially dependent expression α must have an antecedent that commands α .

Let us see how this condition works for BVPs. In the following examples, repeated from above, binding is impossible:

- (18) a. **His* mother was admired by *everyone*
 b. *Pictures of *everyone* pleased *him*
 c. *After *everyone* woke up, *he* was hungry
 d. *With *no one* voting, *he* can't win

We get a straightforward explanation of their ungrammaticality by making the standard assumption that the immediate constituents of the clause are the following:

- (19) a.

<i>His</i> mother	was admired by	<i>everyone</i>
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 b.

Pictures of <i>everyone</i>	pleased	<i>him</i>
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 c.

After <i>everyone</i> woke up	<i>he</i> was hungry
-------------------------------	----------------------

 d.

With <i>no one</i> voting	<i>he</i> can't win
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In each case the quantifier must bind the pronoun, but for this to be possible the italicized quantifier cannot be properly contained in a box that does not also contain the relevant pronoun.

6. Command and R-Expressions

There are a few cases left from the previous chapter that haven't been explained yet. We have seen, for example, that the following sentences should be ruled out:

- (20) a. **He* was seen by *John*
 b. **He* woke up after *John Adams* was hungry

Recall that their ungrammaticality cannot be due to the fact that the pronoun precedes the antecedent – we attested a number of grammatical backwards anaphora sentences above. Recall also that we have already hypothesized that the same structural relation that is involved in the determinacy of anaphoric dependence might also be involved in the description of referential independence. Thus, it seems to be due to the structural relation of command that the examples in (20) are unacceptable, because a pronoun cannot command its antecedent. Given that in the above sentences the predicates are “being seen by *John*” and “waking up after *John Adams* was hungry” respectively, we observe that the predicates are the sister nodes of the subject, and since the antecedents

are properly contained within the predicate, it is easily verified that the subject commands the antecedent. Hence, it is suggestive to conclude that a pronoun may not be commanded by its antecedent.

In order to express this generalization in a technically appropriate way (which does not refer to the hitherto undefined notion of antecedenthood), nominal expressions that are not pronouns will be called **R-expressions**, where “R” simply stands for the Remainder, the Rest of the relevant expressions we have been considering – those besides reflexives, reciprocals, pronominals (and possessive pronouns – another class of pronouns we haven't talked about yet); in other words, the Referentially always independent expressions.¹ Given this bit of terminology, we can state the following generalization:

- (21) An R-expression cannot be commanded by a coreferential pronoun.

In order to see that (21) is a valid generalization, one would have to show that a) all ungrammatical examples not covered by previous conditions are ruled out by (21), and b) the grammatical examples considered so far are consistent with (21), i.e. they are not ruled out. This is left as an exercise for the reader.

7. Indices and Binding

At this point of our discussion, it will be convenient to introduce some notation and some terminology for future reference. Hitherto, we have used italics to indicate that two expressions are to be interpreted as coreferential. Likewise, we have highlighted intended binding by a quantifier by putting both the quantified expression and the pronoun in italics. We will give up that practice now, but as a substitute we will **co-index** the two expressions involved using numerical or alphabetic **indices**, 1, ..., n or i, j, k, \dots, m . Furthermore, if no referential dependence is intended, indices will differ. Since any two referring expressions will either be referentially dependent or not, any two such expressions will bear an index. Examples:

- (22) a. *Every boy_i* pities *himself_i*
 b. *John_j* believes that [*his_j* mother]_k was pitied by everyone_i
 c. **John_j* believes that [*his_j* mother]_k was pitied by *everyone_i*
 d. **He_i* pities *John_j*
 e. *He_i* pities *John_j*

As before, the grammaticality judgments indicated by * do not refer to the string of words as such but to the semantically interpreted string which is (partially) encoded by indices. In other words, the above grammaticality judgments in the context of anaphora concern grammatical or ungrammatical indexation only. Moreover, indices will help us to reformulate our previous rules in a simpler and more general way: Rather than saying that something is a potential antecedent for something else, we will now say

¹“R-expression” has been introduced as abbreviating “referential expression,” but given that quantifier expressions are not referential at all, this is actually a misnomer.

that two expressions may bear the same index. If the potential antecedent can in fact be an actual antecedent, co-indexation is grammatical. Otherwise it is not.

Before starting to use this system, we have to ensure that all relevant expressions do in fact bear indices. To guarantee an index on the relevant expressions, we first define pronouns and their potential antecedents (in particular R-expressions) as **noun phrases**, abbreviated as NPs. We then have the following convention:

(23) Every NP bears an index.

Above we hypothesized that the requirement for BVP, namely command by an antecedent, also plays a role in excluding ungrammatical coreference, where the “antecedent” is commanded by the pronoun. We are now in a position to subsume both cases under a single concept. We call this concept “syntactic binding,” which is defined in (24):

(24) **Definition:**

α syntactically binds β if and only if

- a. α and β are co-indexed and
- b. α commands β .

Observe that indices are to be interpreted semantically as binding or coreference, but at the level of S-structure they are purely syntactic objects. Accordingly, the above definition is purely syntactic; in particular, it does not mention the type of NP that is involved in the relationship of syntactic binding. There is, however, a tight relation between the syntactic notion of binding and the semantic notion of bound variables. This relation can be expressed by the following condition, which is a reformulation of (17):

(25) A pronoun is interpreted as a BVP, i.e. as (semantically) bound by some quantified NP α , if and only if it is (syntactically) bound by α .

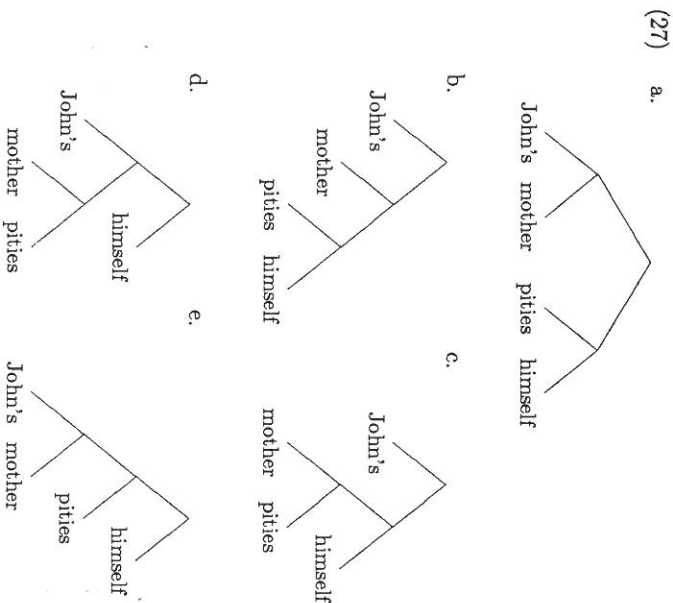
Having defined the *syntactic* notion of binding, we are now in a position to rephrase our conditions on anaphors and R-expressions in a strikingly simple way. As can easily be verified, our previous rule (15) is implied by (26-a), and condition (21) is implied by (26-b):

- (26) a. An anaphor is bound.
- b. An R-expression is free (i.e. not bound).

Summarizing so far, we have established that there is one central concept, namely command, that enters into various restrictions concerning quantification and anaphora. We will see below that command also enters into the definition of other syntactic and semantic relations.

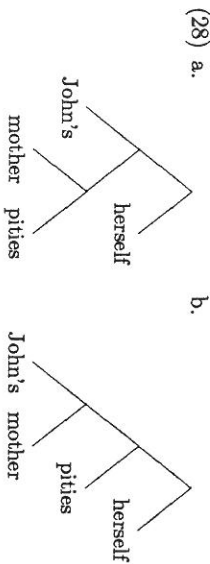
8. The Persistence of Structure

An important consequence of the above discussion of coreference options is that once we have restrictions like (25) and (26) at our disposal, we also have invaluable information about what the structure of a sentence must be. To illustrate, sentence (3-b) would, in principle, allow five different analyses, as shown below:



The structure in (27-a) is consistent with our theory, since it predicts, in accordance with principle (26-a), that the sentence is ungrammatical. A look at the rival structures (27-b) and (27-c) reveals that under these analyses the sentence should actually come out grammatical. Since *John's* in (27-b) and (27-c) commands the anaphor, John should count as a legitimate antecedent. But in fact, the sentence is ungrammatical; so these structures are indeed incompatible with our explanation.

Turning next to (27-d) and (27-e), we can detect two reasons why the sentence is ungrammatical: First, *himself* in these structures cannot have a commanding antecedent at all, hence the sentence is correctly ruled out in these structures. Secondly, *John's* is not free as would be required by (21). Thus both structures would explain the ungrammaticality of the sentence. However, we also know that these structures are incompatible with the grammaticality of *John's mother pities herself* (= (3-a)), which can be seen by inspecting the following variants of (27-d) and (27-e):



If one of the trees in (28) were in fact the structure of a subject predicate complex, we would be obliged to predict (incorrectly) that the corresponding sentence (3-a) is ungrammatical. But in fact, it is not. So, under the premise that both sentences (3-a) and (3-b) have the same structure, our rules predict that (27-a) is the one and only structure that can account for all our observations.

The above reasoning has shown that our rules for anaphoric reference completely determine the structure of a simple sentence. This conclusion, however, relies on a crucial additional premise, namely that changing only the gender of the reflexive pronoun does not entail any change in structure. With regard to the above examples this is plausible enough, but the point to be made seems more general. In order to establish structural properties, it shouldn't make much of a difference whether a certain structure contains at the same position a name or a pronoun, although there might be a great difference with respect to grammaticality. As we have seen above, however, this difference is explainable only if we assume that the change in grammaticality is not at the same time accompanied by a change in structure. However, no principle has yet been established that would guarantee just this.

Intuitively, one would not expect a difference in grammaticality when substituting an R-expression with another R-expression. To illustrate, in a sentence like *Mary pities herself* one feels entitled to substitute *John's mother* for the name *Mary*, so that the change in the tree is merely local, affecting only the relevant subpart where the substitution takes place. The expectation of sameness of grammaticality is grounded on the assumption that there cannot be any dramatic change of structure that would be caused by the exchange of R-expressions alone. This rather natural but mostly tacit methodological assumption I will call the **persistence property** of grammatical analyses.

Can we ascribe the persistence property to some pragmatic or psychological principles, or is it a genuine principle of grammar? Investigating the exact nature of the permissible substitutions, i.e. the kind of entities that may undergo substitution without a change of structure, it turns out that we have to say precisely what R-expressions are, i.e. we would have to define the class of expressions that may serve as NPs. And here it seems we are back into grammar again. The reason is that we cannot define this class of expressions on only pragmatic or psychological grounds. In the case at hand, any syntactic characterization of NPs would imply finding out the *structure* of NPs; but trying to determine structure in the same way as we did for simple sentences seems to lead into a vicious circle.

Note also that an exchange of R-expressions will not preserve grammaticality. This becomes evident by comparing the following pair of sentences, in which the bracketed

expressions are R-expressions that cannot be substituted for each other:

- (29) a. He_i loves [his_i mother]
 b. *He_i loves [John's_i father]

Nonetheless, we feel that the structures of these sentences are the same. This seems to be grounded in some basic assumptions about structure that cannot be captured by considerations of coreference.

It seems that our next task is to look for principles that establish the persistence of structure by giving operational criteria for structure and constituency. This is basically what structuralism in the first part of our century was concerned with. However, the structuralists' theories avoided any reference to semantic criteria, while the above analysis crucially relies on considerations of meaning. In what follows, I will continue to resort to semantic intuitions in another area of syntax. This intuition is concerned with the so-called argument structure of a predicate. It will be shown in the next chapter that based on such semantic intuitions about argument structure we can restrict possible syntactic configurations in a rigorous way, one that is independent of considerations of anaphora.

9. Appendix: Formal Properties of Trees

In this section we will investigate various formalizations of concepts that were introduced more or less informally in this chapter; in particular, we will more formally discuss trees. We begin by defining some mathematical properties of relations:

(30) Some formal properties of relations:

- A two place relation R is
- symmetric* if and only if (\equiv iff) xRy implies yRx ;
 - transitive* iff $(xRy$ and $yRz)$ implies xRz ;
 - reflexive* iff xRx ;
 - antisymmetric* iff $(xRy$ and $yRx)$ implies $x = y$;
 - asymmetric* iff not both xRy and yRx .

It is left to the reader to discuss which of these properties hold for dominance, immediate dominance, sisterhood, and command. It should also be easy to give an example of a relation between numbers that is antisymmetric but not asymmetric.

Let us next more closely consider immediate dominance. Some of its properties are listed in (30). Note, e.g., that immediate dominance is antisymmetric, because the implication in (30-d) is true because the antecedent can never be true: It can never be the case that x immediately dominates y and y immediately dominates x . In general, any relation that is asymmetric is also antisymmetric, but not vice versa. There may be reflexive and antisymmetric relations that are not asymmetric.

Immediate dominance is neither reflexive nor transitive. Note that in a tree, each node except the root is immediately dominated by exactly one node.

Notation: We write relations as pairs of elements such that any pair $\langle x, y \rangle$ will be an element of R iff xRy . **Immediate dominance**, abbreviated as ID , can now be characterized formally as follows:

- (31) a. If $\langle x, y \rangle \in ID$ and $\langle z, y \rangle \in ID$, then $x = z$.
 b. If $\langle x, y \rangle \in ID$, then $x \neq y$ and $\langle y, x \rangle \notin ID$.

Next we formally characterize a two place relation D , called **dominance**.

- (32) Given a relation ID , let D be the smallest set of pairs such that
 a. ID is a subset of D , and
 b. if $\langle x, y \rangle \in D$ and $\langle y, z \rangle \in D$, then $\langle x, z \rangle \in D$.

D is called the **transitive closure** of ID . $\langle x, y \rangle \in D$ means that x dominates y . We can now characterize trees as specific relations of immediate dominance.

- (33) A **tree** is a two place relation ID on a finite set τ (called nodes of the tree) such that the following condition is satisfied: There is some $x \in \tau$ (called the root of the tree) such that for all $y \in \tau$ the following holds: If $y \neq x$, then $\langle x, y \rangle \in D$, where D is the transitive closure of ID .

In other words, a tree is a set of nodes related by ID in such a way that each node, except one, is dominated by exactly one node, the **root** of the tree. The **terminal elements** of a tree are the nodes that do not dominate any other node(s).

There are many alternative ways to characterize trees. One further possibility is to use a *recursive definition* as shown in (34):

- (34) A **tree** t on a finite set τ (called nodes of the tree) is a set such that the following condition is satisfied:
 a. either $t = \emptyset$, or
 b. $t = \langle r, \{t_1, \dots, t_n\} \rangle$, where $r \in \tau$ is the root of the tree and $\{t_1, \dots, t_n\}$ is a finite set of distinct trees on τ .

Note that each t_i is an immediate subtree of w . Any tree of the form $t = \langle r, \emptyset \rangle$ is called a terminal element. An important feature of this characterization is that it does not build on the notion of immediate dominance. Given the definition of a tree as stated above it is clear that the root r of $t = \langle r, \{t_1, \dots, t_n\} \rangle$ immediately dominates any of the nodes t_i where t_i is the root of t_i . It is left to the reader to define the notions of a subtree and immediate dominance. Given immediate dominance, dominance can be defined as before.

Above we assumed that nodes of a tree are somehow pre-given formal objects. A more realistic view might be that only the terminal nodes of a tree are given, and that the non-terminal nodes are somehow built up from the terminals by operations like set formation. This idea leads to a number of further characterizations of trees. Let us first define how branching nodes can be built from terminal nodes:

- (35) A **node** k on a finite set τ (called terminal nodes of the tree) is a set such that the following condition is satisfied:
 a. either $k = \{\alpha\}$ and $\alpha \in \tau$, or
 b. $k = \{k_1, \dots, k_n\}$, where $\{k_1, \dots, k_n\}$ is a finite set of distinct nodes on τ .
- (36) A **tree** Σ over a finite set τ of terminals is a set of nodes on τ such that
 a. each terminal is an element of exactly one node in Σ ,
 b. there is exactly one node r in Σ (the root of Σ) such that r is not an element of some other node in Σ .

It is easy to figure out that α immediately dominates β if and only if $\beta \in \alpha$. Therefore, a node encodes the entire tree it dominates, so that each node consists of all information about its subtrees.

A more parsimonious characterization of nodes in a tree would result from assuming that nodes are built up from terminals but have no internal structure. This leads to the following characterization of trees:

- (37) A **node** k on a finite set τ (called terminal nodes of the tree) is a non-empty subset of τ .
- (38) A **tree** Σ over a finite set τ of terminals is a set of nodes on τ such that
 a. τ is a node in Σ ,
 b. $\alpha \subseteq \tau$ for each $\alpha \in \Sigma$, and
 c. if α and β are nodes in Σ , then either $\alpha \cap \beta = \emptyset$ or $\alpha \subseteq \beta$.

This characterization allows an easy definition of dominance: α dominates β if and only if β is a proper subset of α . Immediate dominance is defined in (39):

- (39) α immediately dominates β iff
 a. α dominates β , and
 b. there is no γ such that α dominates γ and γ dominates β .

For yet another way to characterize these notions, cf. Stechow (1993, p. 14f).

10. Bibliographic Comments

[to be written]

Topic 3

Projections and Projection Lines

1. Arguments and Thematic Roles

What is argument structure and what is an argument in the sense of argument structure theory? In mathematics, an argument is anything that may serve as the input of a function. If we think of verbs like functions, the arguments of verbs are those semantic entities that will combine with the verb to make this combination express a proposition. Translated into more traditional terminology, the term “argument” seems to be just a cover term for notions like subject, direct object, indirect object, prepositional object, and perhaps others.

Some linguistic traditions identify arguments with so-called **thematic roles** (or *θ*-roles), a cover term for semantic notions like agent, patient, goal, source, experiencer, or theme. While notions like direct or indirect object often express syntactically defined concepts, notions like agent or experiencer are apparently entirely semantic. Thus, the arguments in a clause like

- (1) John put the car into the garage

can receive a dual classification: *John* is the subject and the agent, *the car* figures as the direct object and the theme (or patient), and *into the garage* is a prepositional object and a goal. The semantic notions correlate with the syntactic ones, but this correlation is not always straightforward.

I will refrain from defining the relation between grammatical and semantic terms here, since the following observation can be made without knowing the precise nature of their interrelation: Whenever there is a verb like *put*, which requires a subject, a direct object, and an indirect object (or equivalently an agent, a theme, and a goal), a syntactic structure that does not “realize” these obligatory arguments of the verb is defective.

- (2) a. *John put the car
 b. *John put into the garage
 c. *John put
 d. *put the car

- e. *put into the garage
f. *put

Although this is fairly obvious, it is not altogether clear whether these strings of words should be considered ungrammatical on *syntactic* or on *semantic* grounds. For instance, shall we say that (2-a) is out because the indirect object is missing, or because the goal is missing? It is at his point that syntax and semantics touch most closely. At least, we do have clear intuitions about the fact that the above strings of words cannot be sentences and about the (or one) reason for their deviance: There is at least one argument missing.

Turning the tables now, one might exploit these intuitions about what is wrong with the above strings of words and try to (partially) *define* what an argument is: You can't drop one without causing ungrammaticality. Or so it seems on a first attempt to explain argumenthood. But what about the following pair of sentences:

- (3) a. Liza married a millionaire
b. Liza married

Both sentences are complete. This state of affairs is in conflict with the above criterion: Since the object can be dropped, a *millionaire* would not count as an argument, which – from a semantic point of view – it surely is. What (3-b) shows, then, is that there are certain verbs whose arguments need not be expressed, although they are necessarily present in semantics. It is at this point that syntax and semantics begin to diverge. Within syntax we will say that the argument is *optional*, but within semantics the argument, being implicitly understood, is still there. It might even be the case that verbs have semantic arguments that can never be expressed as syntactic arguments. This is illustrated in (4) from German:

- (4) a. Er hat angeordnet, die Tür zu schließen
He has ordered the door to close
b. *Er hat mir/mich angeordnet, die Tür zu schließen
He has me ordered the door to close

Although *anordnen* semantically has an addressee (the one who closes the door), it is impossible in German to express this semantic argument as a direct or indirect object. Accordingly, we cannot define the semantic notion by using a syntactic criterion. Rather, the notion of argumenthood is a basic and primitive one in our theory.

Other examples that illustrate the notion of argumenthood are the following pairs of sentences:

- (5) a. John slept in the garage
b. John slept
(6) a. John locked it in the garage
b. John locked it

in the garage is not an argument of *slept*, since the place of sleeping is not necessarily

involved in the concept of sleeping. By the same criterion we can try to compare (6-b) with (6-a). But here we detect a problem: Due to a slight change of meaning, the relation between these sentences is not the same as that in (5). If one locks a door, the concept of place does not really play a role in any description of the action. On the other hand, there is a closely related concept, also expressed by the same word *lock* in English (but by a different word in German: cf. *einschließen* vs. *verschließen*), whose prepositional object specifies a container which things are locked into. Thus, if it refers to a car in (6-a), it is not the car that is locked (in the first sense of the word), but the garage. Only in this use of the word is the prepositional phrase an argument of the verb. Alternatively, the sentence as such may also be understood in a more far-fetched way, meaning that the locking of the car took place in the garage. In this case, the prepositional phrase has the same function as in (5). We must conclude, then, that there is a semantic ambiguity involved in (6-a), resulting from whether or not *in the garage* is an argument of the verb.

Besides verbs, there are also adjectives, nouns, and prepositions that have arguments. For instance, in

- (7) Kepler's proof that the earth is round
the noun *proof* can have the same arguments as the verb *prove*, i.e. a subject (*Kepler*) and a clausal object (*that the earth is round*). However, all arguments of nouns are optional, in contrast to arguments of verbs; here we never find that *all* arguments are optional. Thus, compare
- (8) a. *Kepler proves (missing object)
b. *proves that the earth is round (missing subject)
(9) a. the proof was convincing (no argument)
b. Kepler's proof was convincing (one argument)
c. the proof that the earth is round was convincing (one argument)
d. Kepler's proof that the earth is round was convincing (two arguments)

In each example in (9) the noun *proof* is called the **head** of the entire NP. We may then say that arguments of a nominal head are always optional. Arguments of a verbal head may or may not be optional, depending on lexical properties of the verb in question.

2. The Theta-Criterion

We are now in a position to spell out the link between syntax and semantics in more explicit terms by stating a correspondence between semantic arguments and syntactic positions. We use Σ as a variable for tree structures. The following two principles state that a well formed tree structure contains neither too many nor too few arguments:

- (10) a. If a head takes n obligatory semantic arguments (i.e. a head assigns n θ -roles), there must be n positions in Σ where these arguments can be syntactically realized.

- b. If a referential expression α in Σ cannot be interpreted as an adverb, there must be a head β in Σ , such that α is one of β 's arguments (i.e. is assigned a θ -role by β).

The effect of (10-a) is to exclude all the examples in (2). The intention of (10-b) is in a sense the opposite: Not only do too few arguments spoil the soup, but too many arguments will have the same effect. This is illustrated in

- (11) a. *John put the car his mother into the garage
 b. *John slept his mother *the chair dog*
 c. *John talks his mother to Bill

In (11-b) and (11-c), *his mother* cannot receive a meaningful interpretation because the expression cannot be linked to a function: There is no appropriate head in these constructions such that *his mother* could be an argument of that head. In (11-a) we arrive at the same conclusion with respect to either *his mother* or *his car*. (Although putting his mother into the garage might seem quite unusual, this does not affect the validity of the argument.)

Variants of (10-a) have become known under the label **projection principle**. The idea is that a lexical item has at its disposal n thematic roles which must **project** on n syntactic positions. The case of more than n arguments in a structure but only n theta roles to be projected is ruled out by (10-b). Both principles taken together are often referred to as the **theta criterion**, or **θ -criterion**.

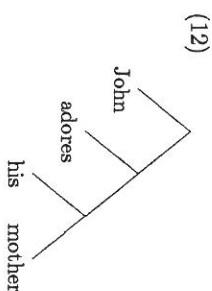
To summarize, the basic idea behind the theta criterion is that every referring expression must receive some sort of interpretation in the sentence, and bearing an "argument of" relation to some verb is one way to achieve interpretability (cf. Williams (1994, p. 28ff. for further discussion).

Before closing this section, it should be noted that the principle as stated above cannot be considered a genuine syntactic principle: Structures that do not conform to the theta criterion simply cannot be interpreted by the semantic component of the grammar. In any case, the principle was invoked here only for the purpose of clarifying the notion of an argument, which will play a genuine syntactic role in the next section.

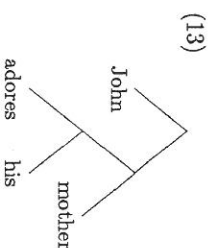
3. Argumenthood and Projection Lines

Having discussed the notion of argumenthood, we now turn to a more syntactic issue. The question to be pursued in the following sections is: At which places in a structure can arguments of heads appear? Is there any structural relation to be satisfied between arguments and their heads?

The basic intuition to be discussed is that arguments cannot appear "too far away" from their respective predicates, i.e. the predicates of which they are arguments. Being too far away can imply several things. For example, an argument should not be too deeply embedded with respect to its predicate, much in the same sense that a quantifier cannot be too deeply embedded with respect to a BVP. For example, in a structure like (12),



his cannot qualify as an argument of the verb, since it is too deeply embedded. In fact, *his* is a part of the real argument *his mother*. Accordingly, a structure like (13)



can be excluded by a number of similar considerations. Intuitively, *his* is the object of the relational noun *mother*, but in (13) it seems that this argument is structurally too deeply embedded to function as an argument of *mother*. Furthermore, it seems reasonable to require that arguments are constituents, and since *his mother* is intuitively an argument of *adores* it follows that (13) cannot be a well-formed structure. Moreover, being too far away can also imply that an argument cannot be separated from its head by another argument that is not an argument of the same head. Nor can it be separated from its head by another head. For example, (13) can be ruled out as ill-formed by arguing as follows: Although *John* is semantically an argument of *adores*, the structure displayed in (13) would formally block this semantic link to *adores* because there is another predicate, namely *mother*, that is structurally "closer" to *John* than *adores*. Accordingly, predicates and their arguments must form a closely connected structure. It will be shown in the remainder of this section how to make this intuition precise.

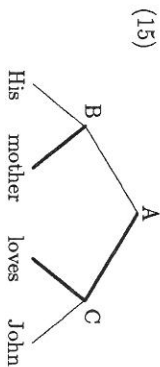
The restriction informally formulated above can be captured by a general constraint on the locality of the argument-predicate relation. In order to formulate this restriction precisely, we must develop some additional syntactic machinery. The main concept involved is the **projection** of a head. Intuitively, a projection of a category α is a "path" through the tree, i.e. a connected set of nodes such that each of these nodes dominates α . Thus, we can describe a projection by drawing a line in the tree which starts off with a terminal node α and eventually reaches a node β that dominates α . All nodes touched by this line, including α and β are elements of a (potential) projection line of α .

This characterization of projection lines does not tell us how far the projection of some lexical element may extend on its way to the root. Now, for a set of nodes to be an actual projection line of α , several additional constraints must be met. In order to be in a position to say something about which sets are projections in a given concrete tree, we must impose further restrictions on projections. In conjunction with the following

generalizations, it will be possible to further restrict projections, which in turn will lead to further restrictions on possible syntactic analyses. The first one of these additional restrictions places every node in a projection line, and the second restriction locates the position of arguments with respect to their heads:

- (14) a. Every node in a tree is an element of exactly one projection line.
 b. If β is an argument of α , β is immediately dominated by an element of α 's projection line.

These two conditions will turn out to be very restrictive. In effect, (14) will cut down the number of permissible structures to only a very few, as we will demonstrate immediately. Let us first discuss



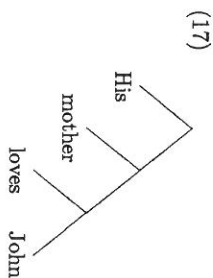
As indicated by the thick lines, we assume that the tree contains the following projections:

- (16) {loves, C, A}
 {mother, B}
 {his}

Note that we allow for projections that contain only a single element, namely the head itself. Although these heads do not really project, it makes sense to say that they form their own projection. This convention allows us to state generalization (14-a), which requires each node in a tree to be an element of a projection set. On the other hand, it is essential to note that there is no thick line from B to A. Otherwise, A would be an element of two projection lines, which is precluded by condition (14-a). By inspecting (15) and (16) it will also become clear that each node is an element of exactly one such set. Thus, (14-a) is satisfied.

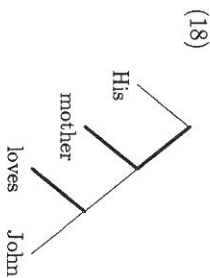
In order to see that (14-b) is fulfilled, we have to match arguments with their respective heads. Intuitively, *love* is a two place relation with *John* as its object and *His mother* as its subject. These two arguments are immediately dominated by elements of the projection line of *love*. Furthermore, *His* is an argument of *mother*, so that B, which immediately dominates *His*, must be a projection of *mother*. As indicated by the thick line, this is the case. Hence, the above tree is well-formed, i.e. is in accordance with our rules.

Let us now consider:



One way to rule out (17) is by considerations of anaphora. If we were to chose a coreferential interpretation for *His* and *John*, our anaphora rules would predict that no such construal would be grammatical in this structure. Clearly, this outcome is contrary to fact, so the above structure must be ill-formed. But assume now that no coreference is intended. From the principle of persistence we would expect that the structure is still bad. According to our present line of investigation, however, we do not simply want to presuppose persistence; what we want now is to establish *independent* reasons for the unacceptability of certain structures.

In the present context we then have to ask: What are the possible projection lines this (ill-formed) tree would permit? Since *John* is an argument of *loves*, and since *His* is an argument of *mother*, (14-a) and (14-b) force us to construct the following projection lines:



Having done justice to the intuition that *John* and *His* are arguments of their respective heads, we still have to account for the fact that *love* not only must have an object, it must also have a subject argument. This intuition, however, would require an extension of the projection line of *love*, in fact one that is incompatible with the uniqueness requirement (14-a) in the above structure. We thus can infer that the above structure must be ill-formed, since it contradicts the Theta-Criterion.

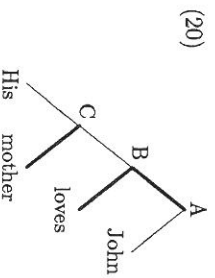
Let us finally return to the intuition that arguments cannot be too far away from their heads. Suppose now that α is an argument of some verb V, and β is an argument of some noun N. Consider the following possibilities:

- (19) a. ... α ... β ... V ... N ...
 b. ... α ... β ... N ... V ...
 c. ... N ... α ... β ... V ...
 d. ... V ... α ... β ... N ...
 e. ... α ... N ... β ... V ...
 f. ... α ... V ... β ... N ...

Which of these orders of constituents in the abstract representations in (20) are consistent with our our principles? For example, it is easy to verify that (19-c) cannot be generated: Since V must project to reach α , this projection line would necessarily have to dominate β , hence β cannot be connected with N. Accordingly, an argument of another head cannot intervene between a head and its own argument. Thus, the system also yields predictions about possible word orders. I will leave it to the reader to figure out which word orders in (19) are excluded, and how the system accounts for this intervention constraint.

4. Subjects, Hierarchies, and Word Order

At this point, the question arises as to whether or not the restriction stated so far may reduce the number of possible structures to a minimum, i.e. to exactly the structures one would predict from our considerations of binding. Unfortunately, the reader may verify that this is not yet the case. There is at least one alternative structure compatible with our principles of projection, namely (20):



This tree is sort of a counterpart to (15), in the sense that in (15) we group together the verb and its object, and in (20) the subject goes together with the verb to form a constituent. We have already seen above that such a structure is incompatible with the requirements of binding: In a structure like (20) a sentence like *John's mother likes him* would be ungrammatical, contrary to fact. Recall, however, that at present we are concerned with establishing additional principles that are independent of binding and which corroborate our earlier results. Accordingly, since (20) cannot be ruled out by principles of projection, we need some additional principle that rules it out.

Thinking about the problem, the question arises as to how one can be sure that the first theta argument of *love* corresponds to the subject rather than the object: The description of (20) above simply presupposes that it is the subject that forms the constituent C together with the verb, rather than the object. If things were the other way around, we would stay in accord with binding theory, but still the structure would have to be ruled out. Thus, the problem is: Why is it that we automatically associate certain positions in a tree with certain thematic roles? It appears that this is an elementary question of word order that must be answered in any syntactic description of any language. It will therefore be our next task to establish a link between syntactic functions and semantic roles.

The general problem of word order is one of the central (and difficult) issues in syntactic theories, but a quick solution to the present problem would be to simply

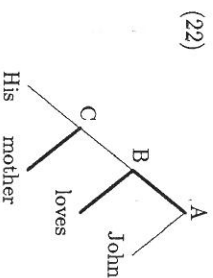
stipulate that subjects must always come first. Intuitively, the subject is the "highest" position *within the projection line of a verb*; it is the position that commands all other argument positions within that projection. Let us take this as a preliminary definition of subjects. Note that something like this has already been established as a result of considerations in binding theory: We never find a language in which subject anaphors can be bound by objects within the same clause; hence, subjects always command objects.

Above we characterized subjects in terms of a specified position in a tree. What remains to be done is to say something about the link between thematic roles and syntactic positions. For example, a verb like *hit* has an agent and a patient, and the link between thematic roles and syntactic positions is readily described: The agent must be the argument in the subject position, and the patient must occupy the object position (i.e. must be realized as a sister of the verb).

Let us call the relevant ensemble of thematic roles – some of them obligatory, some of them optional – the **theta grid** of a verb (or noun, or adjective). The more general problem to be attacked now is: How is the theta grid mapped onto syntactic positions? Assume that the theta grid involves an ordering of thematic roles, such that the agent is ordered before the theme.¹ The regularity we have sought to express can now be formulated as follows:

- (21) The higher ranked thematic role of a theta grid must correspond to a position in the tree that commands the position of a lower ranked one.

Let us return now to the structure discussed above and repeated as (22):



It can now be seen that the condition (21) imposes a particular interpretation on (22): From the requirement that the thematically higher theta argument command the lower one, we infer that *John* must be associated with the agent role of *love*. Now, in order to exclude (22) we only have to add that the higher ranked argument not only commands, but also precedes the lower argument. It is clear, then, that in (22) this further requirement is violated.

The principle that higher ordered theta roles come first in linear order not only restricts the possible structures for a given string of words, it also determines word order by fixing the position of arguments with respect to each other. Thus, it should be easy to verify that besides the order "subject precedes verb precedes object," as in

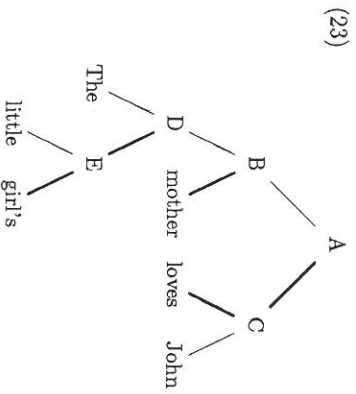
¹ I assume that such an ordering is universal. I do not, at this point, presuppose that the ordering between objects must be total or complete. An ordering " $x < y$ " is incomplete if for some x, y , it does not specify whether $x < y$ or $y < x$.

English (a so-called **SVO-language**), only “subject precedes object precedes verb,” as in German (a so-called **SOV-language**), is permitted, and any other word order (OVS, OSV, VSO, VOS) is ruled out.²

Note, however, that the above principles only cover the relation between arguments of predicates, and do not fix the position of the verb with respect to its arguments. Thus, although SOV and SVO are the only word orders permitted by the precede and command restriction, they would not rule out the order verb before subject in intransitive constructions. It seems, then, that adding a linearity requirement to (21) is spurious.

The solution I would like to suggest is couched in terms of a syntactic notion that will become relevant in many other contexts. The basic idea is that there is a phrase structural concept that describes a configurational relation between a head and the highest position that can be dominated by a projection ~~head~~ of that head. This highest position is called the specifier of the head. We will then say that the specifier position is bound to appear only to the left of its head. This position will then serve as the target of theta assignment for the subject theta role.

By way of illustration, consider the following structure in (23):



Beginning with the projection of *loves*, the end of its projection line is A. This is the maximal projection of *love*. Immediately dominated by A is the specifier of *love*, namely B (= *The little girl's mother*). This in turn is the maximal projection of *mother*. The highest node dominated by the projection of *mother* is D, the specifier of *mother*. Finally, the maximal projection of *girl's* is E, and its specifier is *The*.

We will say that a node α that is not dominated by a node that belongs to α 's projection line is a maximal projection. Accordingly, A, B, and D are maximal projections. In addition, *The*, *little*, and *John* are also maximal projections, since they do not project and therefore are automatically dominated by alien projection lines. Given the notion of a maximal projection, we can now characterize the notion of a specifier ~~as follows~~.

²The above generalization (21) concerns typical, so-called “underlying” word order, i.e. it is not intended to capture certain variations of word order, which can be observed in almost any of the world's languages. Some variations, including sentences in the passive mood, will be described in later chapters.

- (24) If α is the specifier of β , then *Maximal projection*
 a. α is immediately dominated by the maximal projection of β , and
 b. α precedes β .

The role of specifiers in the present context is obvious: We want to characterize subjects syntactically by adopting a principle to the effect that the subject theta role is always assigned to the specifier of a verb:

- (25) The subject theta role of a head α must be assigned to the specifier position of α .³

This leaves us with the question of whether an object is generated to the right or to the left of the verb, the former option yielding a language like English, the latter a language like German or Japanese. I will return to the issue shortly.

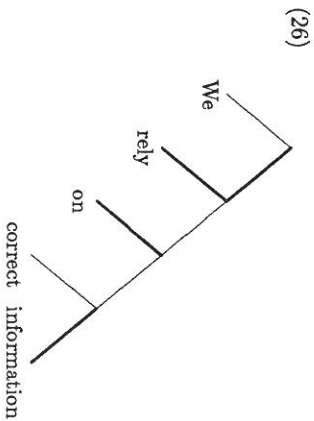
5. Projections and Categories

In the preceding sections we have established that the structure of a sentence like *His mother loves John* is completely determined by a very small number of principles of grammar (basically only (14) and (25)) that have been postulated independently of the principles of binding. These principles crucially depend on the notion of projection lines. In this section, we will discuss the concept in more detail, investigating what they are “projections” of.

The basic idea is that some property of the head is “inherited” by all nodes along the projection line. The relevant property is drawn from the lexical representation of the head; it is some *inherent* property of the word. Lexical entries consist of relevant morpho-syntactic and phonological information that is needed to characterize the item in question—the most general information being a specification of its syntactic category (noun, adjective, preposition, verb, and perhaps others), and the most specific being a representation of its meaning and its phonological shape. Depending on the item in question, lexical representations will in addition contain theta grids, inflectional features (e.g. for person, number, and gender of nouns), features that differentiate between anaphors and pronouns, etc.

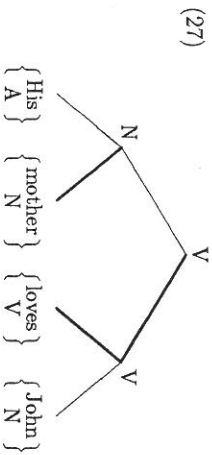
A verb like *rely*, for example, will contain a theta grid with two theta roles, one for the subject and one for its object position. For our present purpose, there is no need to specify exactly what these theta roles are; it suffices to note that the most relevant syntactic information that characterizes *rely* seems to be that its semantic object must be introduced with the preposition *on*. To be concrete, let us consider a sentence like *We rely on correct information* and a structure as in (26):

³Note that this condition obviates (21) as far as subject theta roles are concerned. The empirical impact of the principle only concerns the relation between objects. It predicts that either the direct or the indirect object must command the other, and which one is to be the commanding one should be defined by the hierarchy embodied in the theta grid. I will return to double object constructions in a later chapter.

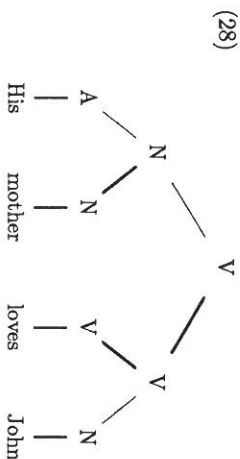


The syntactic information located in the verb concerns, among other things, information about the theta roles of its arguments, and it may concern their syntactic category, but in any case it will include a specification of its own syntactic category. As a consequence of (14-b), the argument of the verb must occur as a daughter of the verb's projection line; thus, it makes sense to say that the information about what arguments are required can percolate up the tree on the projection line. Moreover, since the category of a lexical item is in any case one of its most important lexical features, it is this property that is most likely to be inherited, along with other properties that may encode relevant information about the head.

One way to graphically represent the projection of head properties via projection lines is the following. For simplicity, we assume that the only relevant property is categorial status. We consider the terminal elements of a tree as consisting of a set of features, inter alia its categorial features and a phonological specification (which, for technical reasons, will not be transcribed into a phonological alphabet). Now, in order to formally represent the projection of the category feature, we attach the category of a head to all nodes of the respective projection line. This is shown in (27):

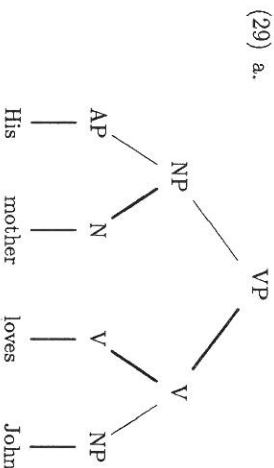


Another way to represent the same information as in (27) is shown in (28):

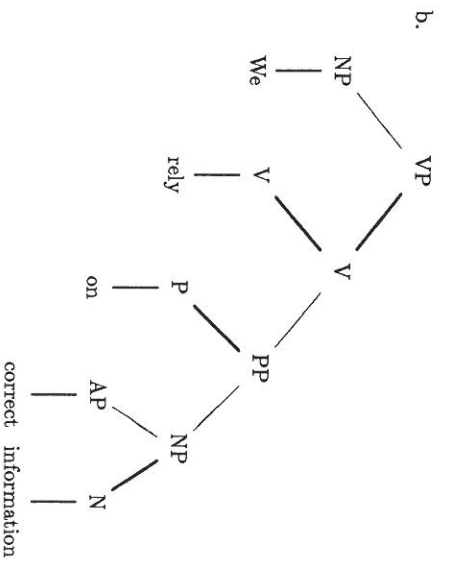


Here we have detached the category symbol from the lexical entry and represented it as a node label. One must, however, bear in mind that the lines between the words and their lexical categories do not connect *nodes* in the tree. They rather belong to a single node, so that the non-branching line merely separates features to be projected from those that do not project.

Thus far, the category labels of a node only give us information about the head it is projected from; it will turn out to be useful, however, to add to these labels some information about the syntactic context of their occurrence. Suppose we add as a category label the information of being the topmost node of a projection line. In other words, we somehow encode into the node label the information of being a **maximal projection** or a **phrase**. The most widely used notation is to attach the letter P (for “phrase”) to the category symbol. This convention yields trees like the following:⁴

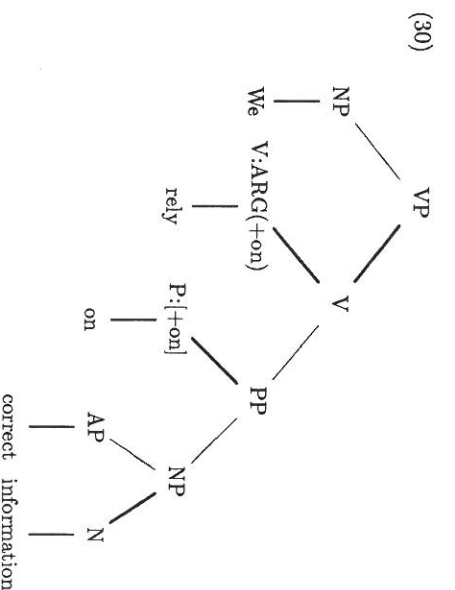


⁴Students familiar with phrase structure grammar might feel obliged to use S or IP instead of VP. I will discuss this issue in the next chapter.

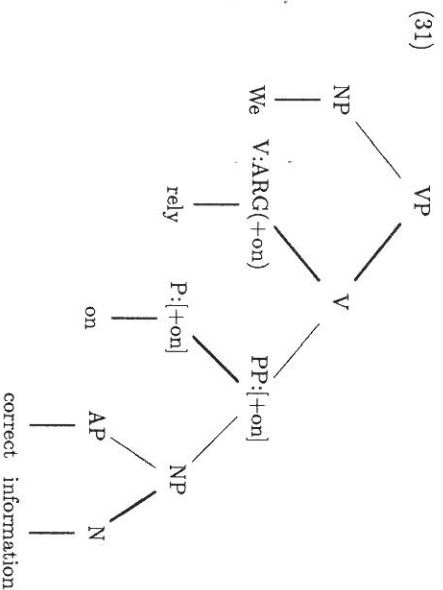


The next point to observe is that the verb *rely* selects a particular PP as an object, namely one that is headed by *on*. According to what we have said above, ~~the projection line of the verb cannot directly select a preposition~~; rather, it selects a particular PP. That this PP has a particular head is in turn information that is conveyed by the projection line of the preposition. Thus, the function of the projection line of *on* is to pave the way for a flow of morpho-syntactic information, so that the verb can look into the PP via its projection line.

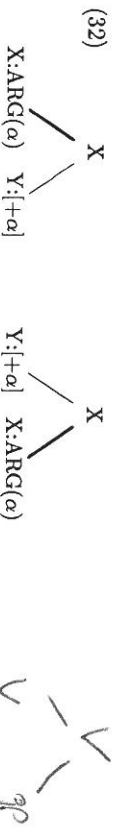
In order to fully understand the idea of projection, let us see how it can be implemented in a technical way. Assume that the verb *rely* has a lexical feature that says that it needs an argument of the required sort, i.e. one with the preposition *on*. We will encode this as a feature ARG(+on). Let us further assume that the preposition *on* can project its phonological features. This is encoded as a feature [+on]. The fact that these two sorts of information project into syntactic representations is expressed by putting them into the tree as shown in (30):



We now need two further principles that tell us how these features function in a tree. The first is that these features can project along the projection line. The principle is applied to [+on] as follows:



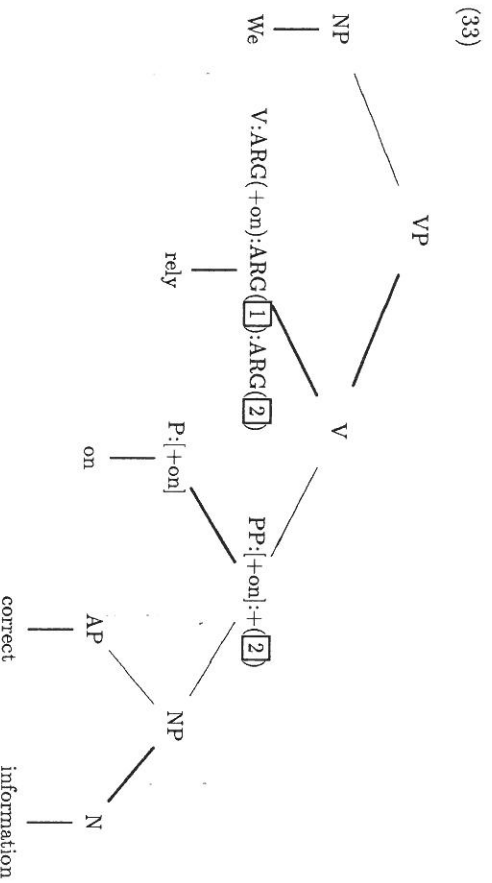
The next principle governs the behavior of ARG(+on). Any feature ARG(α) must be interpreted as requiring an argument of type α . In general, this feature can project along the projection line, but it may not appear at the end of the projection. The feature may be absorbed, i.e. it cannot project any further, in the following contexts:



It can be seen, then, that tree (31) conforms to our principles.

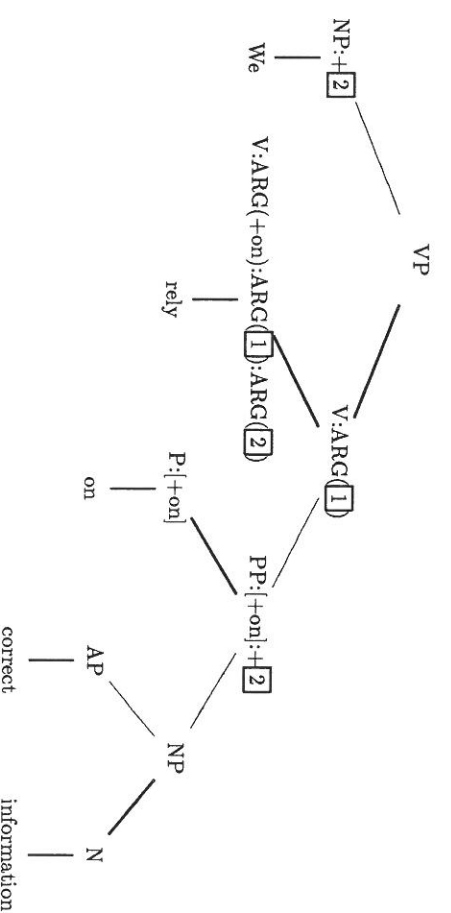
As another illustration, consider the lexical information encoded in the theta grid of *rely*. All we need to say at this point is that *rely* takes two arguments, a subject and an object theta role. We will encode these as numbers. Accordingly, the lexical entry of *rely* will contain the features ARG(1) and ARG(2), where increasing numbers indicate lower positions in the theta grid and in syntactic structure.

As with ARG(+on) there is no need to further project the feature ARG(2), since the object is a sister of the terminal node. In order to prevent the feature from projecting, it must appear on the PP, as shown in (33):



The next step is to project ARG(1). This feature must project in order to reach the specifier position, where it is absorbed by the subject:

(34)



These examples should make it clear that the role of projection lines is twofold: First, they tell us where to look for arguments (which must be daughters of projection lines), and second they tell us where to look for more information about a particular argument (namely, at the head of the projection line of the argument). Thus, the function of projection lines is to convey relevant information about their heads, making it locally accessible at higher positions in the tree, while at the same time blocking any access to syntactic information about nodes that would come from different, unconnected, e.g. more deeply embedded, projection lines.

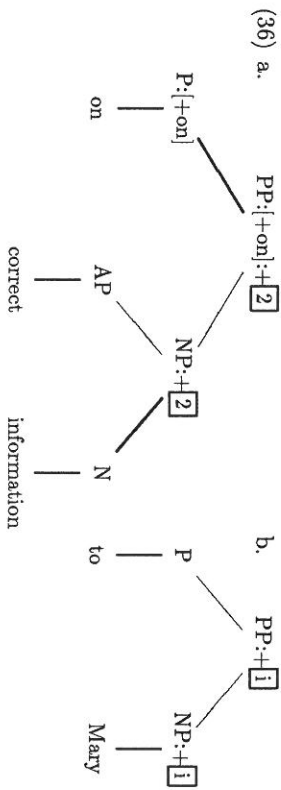
Upon closer inspection, however, one might encounter a problem. Semantically, verbs like *rely* are two-place relations like ordinary predicates, what makes them special is that they require a preposition without semantic content. In a sense, then, we may assume that the theta role assigned to the PP is in fact realized by the NP, because the preposition is semantically vacuous. This is a problem for the percolation mechanism encoded in the theory of projections: If percolation is restricted in the way predicted by the theory, the thematic role assigned by the verb can neither be assigned directly to the NP, nor can it percolate from NP to PP, because there is no projection line that would license percolation.

If projection lines restrict all types of features, there is no simple way to avoid a contradiction, except by stipulation. There is reason to believe, however, that the indices given to argument positions behave slightly differently than one would expect. For instance, many prepositional phrases when selected by a verb may behave in a surprising fashion, as if they were transparent for grammatical processes. One problem, for example, is binding out of PP, as illustrated in (35):

- (35) a. John talked [pp to Mary_i] [pp about herself_i]
 b. Bill spoke [pp with Mary_i] [pp about herself_i]

Here we feel forced to conclude that the first PP is in fact invisible for command exercised by the NP Mary_i; otherwise, binding would be impossible. Thus, if the PP is a syntactic argument of the verb, but the head of the PP has no semantic function

independently of the verb, the NP becomes an argument of the verb, rather than of the preposition. What we have to assume, then, is (36):

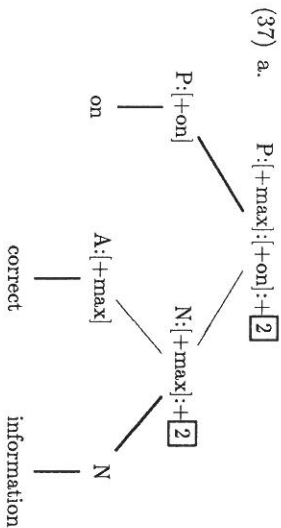


In fact, as concerns syntactic selection, *on* and *to* are the heads of the PPs. But in semantic respects, the PP seems to be an improper projection of the NP, as if the preposition qualifies only as a Case marker on the NP. Observe that if the index of the NP can percolate onto the PP, binding of the reflexive pronoun is no problem any more. This suggests that the role of indices in semantic selection and in binding can be unified. We will refrain from doing so here, since this is essentially a matter of the semantic interpretation of indices.

6. Lexical and Contextual Features

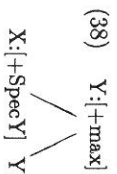
In the last section we introduced lexical features. In this section we will discuss contextual features, i.e. features that may appear only at certain positions defined by their syntactic context. We will discuss two examples: the feature $[+max]$ and the feature $[+SpecX]$.

The first feature is contextually defined in the way we defined maximal projections: It has exactly the function we attributed to the letter P in previous syntactic representations. Thus, we may rewrite the tree in (36-a) as:

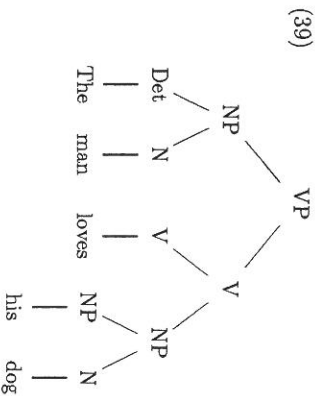


The syntactic behavior of this feature can be described simply by assuming that it blocks any further projection.

The feature $[+SpecX]$, which is attached to the specifier position, can be inserted in the following context:



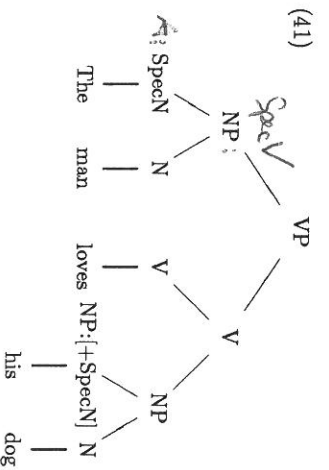
We write $[+SpecY]$ for the specifier of V and $[+SpecN]$ for the specifier of N. The usefulness of contextual features will become apparent if this contextual information is made part of a lexical entry. Consider for example



So-called determiners (definite and indefinite articles), quantifiers (every, some, many, etc.), and possessive pronouns consistently appear at the left edge of an NP. In particular, adjectives may not precede a determiner:

- (40) a. The big man chopped down the tree
 b. *Big the man chopped down the tree
 c. The man loves his old dog
 d. *The man loves old his dog

Now, if these lexical items have the lexical entry $[+SpecN]$, their syntactic behavior is automatically accounted for.



In German, adjectives show different inflections, depending on their Case and their position within an NP. As can be seen from the following paradigm, an adjective has a so-called strong inflection (-em) if and only if it is the first adjective of the (dative) NP:

- (42) a. dem guten alten Wein
the good old wine
b. *dem gutem alten Wein
c. *dem guten alten Wein
d. *dem gutem alten Wein
e. gutem alten Wein
f. *guten alten Wein
g. *gutem alten Wein
h. *guten alten Wein

In English, the role of determiners can also be taken over by genitive NPs. Thus we have

- (43) a. Wittgenstein's blue book
b. *Blue Wittgenstein's book
c. *The Wittgenstein's book
d. *Wittgenstein's the book

These regularities can easily be described by making strong inflection and genitive Case dependent on the feature [+SpecN]. Thus, lexical and morphological features that encode contextual information provide us with unexpected additional descriptive power: Once we can specify whether a word or phrase has certain features, we can automatically account for its distribution.

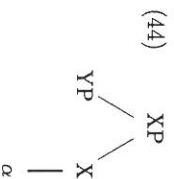
Let us try to extend the idea to the feature [+max]. Proper names in English can be defined as NPs rather than Ns. This implies that they cannot take a specifier. Conversely, if proper names were [-max] they would need some kind of completion. Since they cannot have arguments, a natural place to look for such syntactic completions would be the SpecN position. This is exactly the place where we can find specifiers for proper names in other languages. In Swiss German, for example, proper names must

be preceded by definite articles (cf. *Der Hans kommt* vs. **Hans kommt*). Similarly, many Austronesian languages have an obligatory person marker that precedes proper names only (e.g. *si* in Toba Batak).

Adopting the view that lexical entries can (but not necessarily must) contain information about their syntactic environment, a great number of further questions arise. What is the nature of this kind of information? Can lexical entries for verbs have the feature [+max]? Why is it that apparently all adjectives can be [+max]? Are there verbs that select Ps rather than PPs? We cannot answer all these questions, nor do we intend to go any further into the direction of a feature driven syntactic theory. Rather, we will turn to a somewhat different problem that underlies our conception of trees.

7. Specifiers and Command

From many current theories of phrase structure it follows that specifiers should command their heads; they cannot be sisters of their head. Thus, contrary to what we said above, YP in (44) cannot be the specifier of α , where α is the lexical head of the projection:



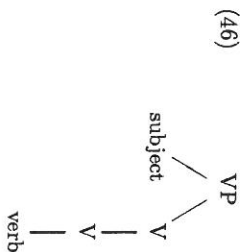
In our theory, this configuration is ambiguous as to whether or not YP is a specifier: If principles of grammar require a specifier, YP is a specifier, but if they don't, YP may be considered not to be a specifier. Current theories of grammar avoid this ambiguity; in these theories, specifiers are defined as follows:

- (45) YP is the specifier of α if and only if
- YP precedes α ,
 - YP is immediately dominated by the maximal projection of α , and
 - YP commands α .

The difference is that we don't require command. For intransitive verbs, a structure consistent with (45-c) would be (46):

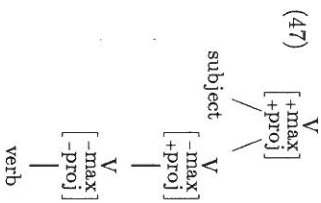


we can say sufficient



The question then arises as to how these theories can make sense out of this configuration, in which one and the same symbol V dominates only V , and both symbols seem to convey exactly the same information.

Well, there is a way to differentiate between these symbols by employing a contextual feature system that encodes two sorts of information: Whether a node is a projection or not (if it is not, it is a head) and whether a node is a maximal projection or not. In our former notation, the second kind of information was encoded by the feature $[+max]$. The first kind of information requires a new feature $[\pm\text{proj}(\text{action})]$. The above tree then translates into the following notation:



Formally, the two non-branching nodes are distinct now, since one node is “lexical” (i.e. $[-\text{proj}]$), whereas the other figures as a projection.

Although in a technical sense there is nothing wrong with assuming a feature $[+\text{proj}]$, there remains something artificial with non-branching nodes. The difference between two non-branching nodes is a purely terminological stipulation, i.e. it is described in terms of one node being a “projection” of the other, but over and above that description there is nothing inherent to the node descriptions that can justify why this should be so. In fact, the feature $[\pm\text{proj}(\text{action})]$ is largely redundant, since it merely tells us whether something is a head or not, i.e. it is positively specified for all non-heads, and negatively for all heads. Interpreted in this way, the positive specification in $V[+\text{proj}, -\text{max}]$ would say that what is dominated by $V[+\text{proj}, -\text{max}]$ is not a head; however, what in fact is dominated in (47) is nothing else than a head.

Suppose we dismiss a feature system of this kind. The question of whether or not there can be non-branching nodes can then be answered by investigating the formal

nature of nodes in a tree. To grasp this we first have to differentiate between nodes and node labels. Above we were only discussing node labels. In the appendix to the last chapter we gave several definitions of nodes. One of them was in terms of the sets of terminal nodes that are dominated by a node. If we adopt such a characterization, it immediately follows that the two V s in (46) cannot be different nodes, since they dominate the same terminals. In such a definition, non-branching nodes are excluded. [Hier: Exkurs zur X-bar Theorie]

8. C-Command and M-Command

[to be written] Data from Hungarian: Speas (1990, p. 189)

- (48) a. *János; anyja szereti őt;
John's mother loves him
b. *Ő; szereti János; anyját
He loves John's mother

Similar data in Woolford (1991).

9. Appendix: Formal Properties of Trees II

9.1. Defining Projection Lines

There are numerous ways to define projection lines more formally, three of which are offered below:

- (49) A set P_α can qualify as a **projection set** of α if it satisfies at least the following conditions:

- α is an element of P_α ,
- if β is an element of P_α , then β dominates α , and
- if γ (immediately) dominates an element of P_α , but γ is not itself an element of P_α , then no node that dominates β is an element of P_α .

- (50) A set P_α is a **projection** of α only if the following holds: Assume β to be an element in P_α that immediately dominates γ . Then γ is an element of P_α if and only if either $\gamma = \alpha$ or γ dominates α .

- (51) Let α be a terminal element of a tree τ and let D_α be defined as the set containing α and all nodes in τ that dominate α . Let S_β be the set of nodes dominated by some β . A (non-empty) set P_α is a **projection** of α only if either
- $P_\alpha = D_\alpha$, or
 - there is some β such that $P_\alpha = S_\beta \cap D_\alpha$.

Show that these definitions are equivalent. The reader should also verify that the following is true:

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(52) If α and β are elements of a projection π , α dominates γ , and γ dominates β , then γ is in π .

Another way to characterize projections is this:

(53) A set P_α is a projection of α in a tree τ if P_α contains only α and the nodes in a subtree τ' of τ that dominate α .

This definition presupposes the notion of a subtree that has not yet been defined formally. This task is also left to the reader.

Once we have defined projection lines we can make them part of the definition of nodes in a tree. Suppose that in a binary tree we attach to each node γ an ordered pair (α, β) as a label, such that α is the terminal node that heads the projection of γ , and β is the head of the node that immediately dominates γ but does not belong to its projection line. Suppose next that all nodes that are pre-given are the terminals. Show that the above defined "labels" contain enough information to qualify as a definition of the branching nodes in a tree.

9.2. Defining Linear Order in Trees

Trees as defined in the appendix of the last chapter describe a (partial) hierarchical ordering of nodes; none of the definitions given there fixes a linear order of the terminal elements. This is to say that if two nodes are sisters in a tree, we cannot say which one of them precedes the other. In our exposition above we have simply presupposed that trees do have some linear order, but this is not yet guaranteed by our formal definitions.

There are again numerous ways to define linear order in a tree. The most simplest one is to make sisterhood (which is implicit in all definitions given in the last chapter) a linearly ordered relation. This is illustrated in (54):

- (54) An ordered tree t on a finite set τ (called nodes of the tree) is a set such that the following condition is satisfied:
- either $t = \emptyset$, or
 - $t = \langle r, \langle t_1, \dots, t_n \rangle \rangle$, where $r \in \tau$ is the root of the tree and $\langle t_1, \dots, t_n \rangle$ is a sequence of distinct trees on τ .

The only difference to definition (34) in the previous chapter is that we substituted the sequence $\langle t_1, \dots, t_n \rangle$ for the set $\{t_1, \dots, t_n\}$.

There are also more indirect ways to define a linear order on a tree. Suppose a tree structure is already given in terms of an immediate dominance relation that satisfies the condition of being a tree. An example is (55):

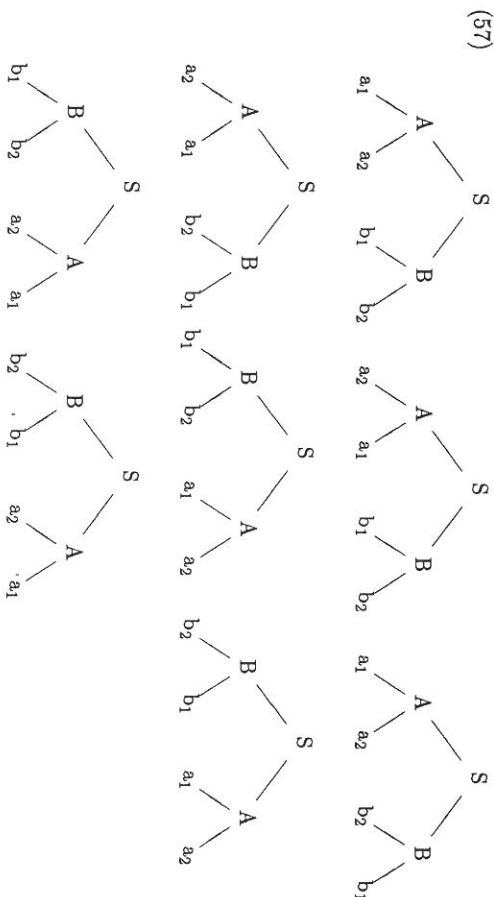
$$(55) \quad \{ \langle S, A \rangle, \langle S, B \rangle, \langle A, a_1 \rangle, \langle A, a_2 \rangle, \langle B, b_1 \rangle, \langle B, b_2 \rangle \}$$

We can arrange the terminal elements in any of the following linear orders:

$$(56) \quad \begin{aligned} a_1 &< a_2 < b_1 < b_2 \\ a_2 &< a_1 < b_1 < b_2 \end{aligned}$$

$$\begin{aligned} a_1 &< a_2 < b_2 < b_1 \\ a_2 &< a_1 < b_2 < b_1 \\ b_1 &< b_2 < a_1 < a_2 \\ b_2 &< b_1 < a_1 < a_2 \\ b_1 &< b_2 < a_2 < a_1 \\ b_2 &< b_1 < a_2 < a_1 \end{aligned}$$

These orderings correspond to the following trees:



The linear orders we do not get are the ones that would force branches in a tree to cross. This would be the case with the following arrangement of terminals:

$$(58) \quad \begin{aligned} a_1 &< b_1 < a_2 < b_2 \\ a_2 &< b_1 < a_1 < b_2 \\ a_1 &< b_2 < a_2 < b_1 \\ a_2 &< b_2 < a_1 < b_1 \\ b_1 &< a_1 < a_2 < b_2 \\ b_2 &< a_1 < a_2 < b_1 \\ b_1 &< a_2 < a_1 < b_2 \\ b_2 &< a_2 < a_1 < b_1 \end{aligned}$$

Whereas in a well-formed linear order all nodes dominated by some A must either precede or follow all nodes dominated by some B, this condition cannot be satisfied in the second set of ordering possibilities.

In order to write down this restriction in a formal way, let us define \mathcal{F}_x as the set of terminal nodes dominated by x . We may then define:

$$(59) \quad \langle \tau, \langle \rangle \rangle \text{ is an ordered tree iff } < \text{ is a linear order of the terminal elements of } \tau \text{ that satisfies the following condition: Given two arbitrary nodes } x \text{ and } y \text{ in } \tau$$

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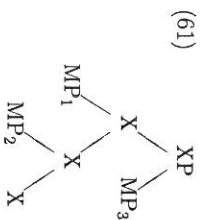
such that $T_x \cap T_y = \emptyset$ and for some $a \in T_x$ and some $b \in T_y$ it holds that $a < b$.
Then for any $\alpha \in T_x$ and any $\beta \in T_y$ it holds that $\alpha < \beta$.

Note that an ordering a/b can be interpreted either as a precedes b , or as b precedes a , if only the interpretation once chosen remains fixed. We can now define the notion of precedence in a tree for non-terminal elements:

- (60) A non-terminal x precedes y in an ordered tree $\langle \tau, < \rangle$ iff all elements of T_x precede those of T_y in the order relation $<$.

9.3. Linear and Hierarchical Order in Asymmetric Trees

Given an unordered tree and the notion of a linear ordering we may investigate the relation between the linear order and the hierarchical order. For instance, if one maximal projection MP_1 commands another maximal projection MP_2 , then it is automatically the case that either $MP_1 < MP_2$ or $MP_2 < MP_1$. But now suppose that command must be mapped into linear structure in such a way that there is only one option, so that for all MP_i and MP_j , if MP_i commands MP_j a tree can be well formed only if $MP_i < MP_j$. As soon as there are more than three maximal projections in a tree, this condition is not automatically satisfied, as can be seen from the following example:



It is clear that MP_1 commands MP_2 , which in the above tree is mapped into precedence. But then it should also be the case that MP_3 which commands both MP_1 and MP_2 should precede them. Thus the above tree cannot satisfy the mapping requirement.

An even stronger mapping requirement would be that all command relations between trees are mapped into a linear order as indicated above. To be precise, one could formulate a well-formedness condition on trees that restricts a possible linear order of its terminal elements as follows. First we state that all terminal elements are ordered, next we say the particular ordering chosen must also be reflected by the command relations in the tree. Such a tree will be called antisymmetric.

- (62) a. If n_i and n_j are terminal elements of a tree, then either n_i precedes n_j , or n_j precedes n_i (but not both).
b. In an asymmetric tree, a terminal node n_i precedes a terminal node n_j iff there are α and β such that α dominates n_i , β dominates n_j , and α commands β .

(62) is a reformulation of Kayne's condition on trees, cf. Kayne (1993). In order to see the impact of (62), consider the

10. Bibliographic Comments

[to be written] Subject Internal VP: Fukui and Speas (1986) Sportiche (1988) Dasgupta (1985)

$\alpha < \beta$
 $\beta < \alpha$

Topic 4

The Locality of Binding

1. Basic Facts

This chapter takes up the discussion of anaphoric pronouns. The basic facts to be explained here are the rules for the distribution of pronominals and anaphors in the next three sets of examples:

- (1) a. *Max_i criticizes him_i;
 b. *Max_i speaks with him_i;
 c. *Lucie_i's jokes about her_i upset him
 d. *Max_i relies on him_i

In the above examples, a reflexive pronoun is mandatory.

- (2) a. Max_i saw a gun near him_i(self)_i;
 b. Lucie_i counted five tourists in the room apart from her_i(self)_i;
 c. Lucy_i saw a picture of her_i(self)_i;
 d. Max_i likes jokes about *him_i(self)_i;
 e. Max_i put the gun near/under/on him_i(self)_i.

In these examples, both a pronominal and an anaphor are possible. In such contexts, the choice between the right kind of pronoun may depend on various semantic and pragmatic circumstances, among them sentence perspective and empathy. These conditions have been discussed exhaustively in Cantrall (1974), Kuno (1987), and Sells (1987). In what follows I will not try to explain what may influence the choice, remarking only that the use of the reflexive pronoun in these contexts is called **logophoric**.

The next examples illustrate contexts that preclude the anaphors:

- (3) a. *It angered him_i that she tried to attack himself.
 b. *Max_i boasted that the queen invited himself, for a drink

In these examples, a pronominal is mandatory.

Reflecting on the problem posed by these three types of examples will reveal that we have to state two conditions on grammaticality, one that blocks ungrammatical reflexive

pronouns, and one that blocks ungrammatical pronominals. If neither condition can apply, both pronominals and logophoric anaphors should be possible.

2. Basic Ideas

In what follows I will review the theory of Reinhart and Reuland (1993). The basic intuitions are the following. In (3) the intended antecedents are “too far away” from the anaphors. Being too far away means that the antecedents are arguments of the wrong predicates (*anger*, *boast*) because the subject of a closer predicate (*try* or *attack*, *invite*) could serve as the antecedent of the anaphor, as in the following grammatical (albeit hardly plausible) sentences:

- (4) a. It angered him_i that she_j tried to attack herself_i;
 b. Max_i boasted that the queen_j invited herself_i for a drink

In fact, the anaphors in (3), although bound by a subject, are not bound by the subject of their nearest predicate, which is exactly what rules out the long-distance anaphora in this example. Thus, the basic tenet is that an anaphoric argument of a verb must be bound to a coargument of that verb.

The second principle concerns (1). Here, two arguments of the same predicate are semantically coindexed, without there being a reflexive pronoun at all. The required condition will simply say that in such a situation, i.e. coindexation of coarguments, at least one of the arguments must be an anaphor.

Turning finally to the cases in (2), the theory has nothing to say about these examples, because the antecedent and the anaphoric pronoun are not co-arguments, i.e. they have not received their theta role from the same predicate. Accordingly, both an anaphor and a pronominal are possible.

In order to make these ideas precise, we have to define a number of auxiliary notions that determine

- a. the local domain of a predicate that defines co-argumenthood,
- b. the semantic reflexivity of a predicate (expressed by coindexation between its arguments), and
- c. the syntactic reflexivity of a predicate (expressed by the use of an anaphor).

3. A Constraint on Anaphors

We will begin by formulating a constraint that rules out long distance anaphors as in (3). The following definitions are taken directly from Reinhart and Reuland (1993):

(5) **Definitions:**

- a. The *syntactic arguments* of a predicate P are the projections assigned a θ -role or Case by P.
- b. The *syntactic predicate* formed of (a head) P is P, all its syntactic arguments, and an external argument of P (subject).

- c. A syntactic predicate P is reflexive-marked if and only if one of its arguments is a SELF anaphor.
- d. A predicate is reflexive iff two of its arguments are coindexed.

(6) **Condition A:**

A reflexive-marked syntactic predicate is reflexive.

In other words, if a predicate has a subject and if one of its arguments is an anaphor, this anaphor must be coindexed with another argument of that predicate. In order to apply (6) it is crucial to first find out whether or not a predicate is syntactic (i.e. has a subject) and when it is reflexive-marked. Let us begin with the simple cases:

- (7) a. *John_i admires himself_i;
 b. *Bill_i believes that John_j admires himself_i;

Clearly, *admire* forms a syntactic predicate, because it has a subject. The syntactic arguments are *John* and *himself*. By virtue of having *himself* as its argument, the predicate is reflexive marked. Hence it must be reflexive, i.e. we need coindexation with one of its arguments. This, however, is not the case in (7); hence, the indices are ruled out.

Similarly, Condition A rules out the examples in (3). The condition cannot apply to (1) because the predicates are not reflexive-marked. These examples will be ruled out by the second condition, to be discussed later. Now for the reflexive variants of (2):

- (8) a. Max_i saw a gun near himself_i;
 b. Lucie_i counted five tourists in the room apart from herself_i;
 c. Max_i put the gun near/under/on himself_i;
 d. Lucy_i saw a picture of herself_i;
 e. Max_i likes jokes about himself_i;

These examples are judged grammatical, although they might presuppose certain pragmatic conditions in order to be acceptable. Here, the verbs are not reflexive-marked, because the anaphors are not syntactic arguments of the respective verbs. Rather, they form a syntactic argument of the nouns *picture* and *joke* in (8-d) and (8-e), respectively, and of the prepositions in the remaining cases. These nouns and prepositions, however, do not have a syntactic subject, and hence do not form a syntactic predicate. As a consequence, the theory cannot apply to these cases.

Note that the examples in (8) should be contrasted with those in (9), which contain the same predicates as (1):

- (9) a. *John_i thinks Max_j speaks with himself_i;
 b. *Mary_i thinks Lucie_j's jokes about herself_i upset him_i;
 c. *John_i thinks Max_j relies on himself_i;

The reason for ungrammaticality here is that the anaphor is a co-argument of the subject. As argued in chapter 2, the prepositions are semantically empty, i.e. they do

not assign their own theta role to their syntactic arguments. Hence, *speaks-with*, *jokes-about*, and *rely-on* form reflexive-marked predicates. In particular, we consider *Lucie's* as the subject of *jokes*, hence the noun will form a syntactic predicate. We thus need a co-argument of the noun as antecedent of *herself*. Compare the situation with

- (10) *Mary_j thinks jokes about herself_j are unpleasant*

Here *jokes* has no subject, hence the theory does not rule out coindexation with the matrix subject.

Let us now turn to some more problematic cases. The first problem is derived subjects. What does the theory predict for (11)?

- (11) a. *Lucie_i seems to herself_i [*t_i* to be beyond suspicion]*
 b. *Max_i strikes himself_i [*t_i* as clever]*

The first question is whether or not *seem* forms a syntactic predicate. According to the above definition, the question is reduced to whether or not the derived subject should count as an external argument of *seem*. Suppose it does; then, two arguments of *seem* should corefer. But now it seems that this condition cannot be met, because the syntactic arguments of *seem* are defined by theta- or Case assignment. The antecedence, however, is neither Case marked by the predicate, nor is it a semantic argument. Reinhart and Reuland claim that "... given our definition, the external subject (*Lucie*, *Max*) and the anaphor (as a θ -argument) are co-arguments of the syntactic predicate, nevertheless, and the Condition A is met."

However, no explicit definition of co-argument or argument has been given; we therefore must reinterpret the notion argument as different from the notion "syntactic argument" as defined in (5-a). Let us say that "argument" means syntactic argument plus closest subject position, if there is one. Given this revision, it now follows that the anaphor to be bound can be bound to an argument in the revised sense of the term.¹

The next problem is concerned with so-called exceptional Case marking constructions, as illustrated in (12-b):

- (12) a. **John believes [CP that himself loves Mary]*
 b. *John believes [IP himself to love Mary]*

It is not clear, however, whether this should be the proper way to deal with these cases. For instance, the theory is unable to account for Baker et al. (1989)'s judgement of (i):

- (i) *They_i seem to each other/*themselves_i [*t_i* to like John]*

Now can it capture the markedness of an analogous construction in German:

- (ii) a. *Fritz schien uns glücklich zu sein*
 Fritz seemed to-us happy to be
 b. *??Fritz_i schien sich_i/him_i glücklich zu sein*
 Fritz seemed to-himself/to-him happy to be

Perhaps the proper conclusion should be that the object of *to* in English and the dative phrase in German should not be considered a semantic argument of *seem/scheinen*. If this is correct the theory would not make any predictions as concerns the grammaticality of these examples.

The construction is exceptional in as far as it is assumed that *believe* in (12-b) assigns accusative Case to the anaphor *himself*, although *himself* is not theta marked by *believes* (12-a) is correctly ruled out by Condition A, but (12-b) might be a problem. The syntactic predicate *believes* is reflexive-marked here, because *himself* gets Case from the matrix predicate. Hence, according to Condition A it must be reflexive. This in turn is the case if two arguments (i.e. two syntactic arguments) of *believe* are coindexed. Since this holds for *believe*, so far so good. The real problem, however, comes in with the predicate *love* in (12-b). The predicate is reflexive-marked, by virtue of having a subject and a reflexive pronoun as a thematic argument. But it is obviously not reflexive.

The solution proposed by Reinhart and Reuland is complicated and highly problematic for reasons that cannot be discussed here. It seems to me that the simplest way to deal with the problem is to modify the definition of reflexive-marking, repeated as (13):

- (13) A syntactic predicate P is reflexive-marked if and only if one of its arguments is a SELF anaphor.

We do not want *love* to be reflexive-marked in the infinitive construction (12-b), but in order to block (12-a) the subject must still cause reflexive-marking on the embedded predicate of the finite clause. This suggests that we have to say something like the following:

- (14) **Definition:**

- a. A syntactic predicate P is reflexive-marked if and only if one of its minimally accessible arguments is a SELF anaphor.
 b. An argument α is minimally accessible to P if and only if
 (i) α is an argument of P, and
 (ii) α is not a syntactic argument of some higher P'.

Since *himself* is Case marked by a higher predicate P' – *believe* in (12-b) – it is not minimally accessible to *love*; hence, *love* is not reflexive-marked. But since this makes the lower predicate exempt from Condition A, the problem has disappeared.

4. A Constraint on Pronominals

Recall that we also have to rule out the pronouns in (1), repeated as (15):

- (15) a. **Max_i criticizes him_i*
 b. **Max_i speaks with him_i*
 c. **Lucie's_i jokes about her_i; upset him*
 d. **Max_i relies on him_i*

In order to deal with cases like these and others, we need one auxiliary notion and one constraint:

new auxiliary

(16) **Definition:**

The *semantic predicate* formed of P is P and all its arguments at the relevant semantic level.

(17) **Condition B:**

A reflexive semantic predicate is reflexive-marked.

Above we have already argued that *rely-on*, etc. form predicates that take the syntactic complement of the preposition as their semantic argument. Hence, the predicate *rely* is reflexive, without being reflexive-marked in (15-d). This clearly violates Condition B; similar considerations apply to the remaining sentences in (15).

The reason for invoking semantic rather than syntactic predicates in (17) is illustrated in the following examples:

- (18) a. The queen_i invited both Max and herself_i to our party.
 b. *The queen_i invited both Max and her_i to our party.

In (18-a) *herself* is not a syntactic argument of *invite*, the syntactic argument being *Max and herself*. From this it follows that the reflexive pronoun is permitted as an emphatic anaphor. In (18-b), however, the pronoun must be ruled out. This cannot be done by referring to the syntactic predicate. Rather, we have to refer to the semantic representation. Here, the predicate *invite* forces a distributive reading that can be paraphrased as:

- (19) The queen invited Max and the queen_i invited *her_i to our party.

On this level, the predicate *invite* is reflexive (in its second conjunct). Hence, according to Condition B it should be reflexive-marked. This rules out the pronominal.

This kind of reasoning is also intended to capture the ungrammaticality of the following examples:

- (20) a. *We_i voted for me_i
 b. *_i[Felix and Lucie]_i praised her_i.
 c. *Felix but not Lucie_i praised her_i.

In contrast, the following examples can only have a non-distributive, collective reading:

- (21) a. We_i elected me_i
 b. Felix and Lucie_i authorized her_i to be their representative.

Basically, then, Condition B aims at relating semantic interpretation with syntactic representation. At present, however, it is unclear how this could be achieved in a technically precise way.²

²The problem is that the distributivity of a predicate is an entirely semantic affair that cannot structurally be represented at the level at which coindexation is usually checked. Another problem is that the authors claim to explain a purported difference between (i-a) and (i-b) by saying that *both* forces the distributive reading:

- (i) a. Max_i and Lucie talked about him_i.

5. Dutch

Dutch has two kinds of anaphors: *zich* and *zichzelf*. The latter is called a SELF anaphor, the former is called a SE anaphor. It is argued that SE anaphors do not have a reflexivizing function:

(22)		SELF	SE	Pronoun
	Reflexivizing function	+	-	-
	Referential independence	-	-	+

This means that in Dutch, *zich* is referentially dependent, but it cannot reflexivize a predicate. This is shown in (23-a) and (23-b). In other words, although *zich* is referentially deficient (=R), SE-pronominal anaphors do not reflexivize.

- (23) a. *Max haat zich.
 Max hates SE
 b. *Max praat met zich.
 Max speaks with SE
 c. Max legt het boek achter zich.
 Max puts the book behind SE

As shown in (23-c), the function of *zich* is only logophoric. On the other hand, we find grammatical constructions like (24):

- (24) a. Max wast zich.
 Max washes SE
 b. Max schaamt zich.
 Max shames SE
 'Max is ashamed.'

Verbs in (24) are intrinsically reflexive, which according to Reinhart and Reuland means that they necessarily form a reflexive semantic predicate. According to Condition B, these predicates should be reflexive-marked. However, true reflexive-markers in these contexts are ungrammatical:

- (25) a. *Max wast zichzelf.
 Max washes SELF
 b. *Max schaamt zichzelf.
 Max shames SELF
 'Max is ashamed.'

This calls for a slight revision of reflexive marking:

- b. *Both Max_i and Lucie talked about him_i.

I must admit to having difficulties imagining a non-distributive reading for *talk*: According to my intuition, (i-b) is logically implied by (i-a) because for me *talk about* has only a distributive reading.

- (26) A predicate (formed of P) is **reflexive-marked** iff either P is lexically reflexive or one of P's (minimally accessible) arguments is a SELF anaphor.

Now, according to (26) it follows that the examples in (24) are permitted by the theory. It does not yet follow in a purely formal and mechanical way that the examples in (25) are ungrammatical. It seems that in their theory it must be stipulated as a lexical property of lexically reflexive predicates that they take *zich* as a complement, rather than *zichzelf*. But if this has to be stipulated anyway, one might as well stipulate that these predicates are semantically one place predicates, as seems plausible for most obligatory reflexive predicates, at least in German. Given this, the predicates would not count as reflexive. This has two advantages. First, the modification in (26) turns out to be superfluous. Since the predicate is not reflexive, it does not require reflexive-marking. Second, if we had reflexive-marking as in (25), we should have a reflexive predicate. Thus, the ungrammaticality can be explained precisely because the predicates are not reflexive.

6. Logophoricity in English

Zich in Dutch serves as a so-called logophoric pronoun. It is one of the virtues of Reinhart and Reuland's theory that it does not enforce any syntactic restriction on the occurrence of these pronouns. In English, there is no morphological difference between SELF- and SE-pronouns. Thus, we find SELF-anaphors in various contexts that would also permit pronominals. This has already been illustrated in (2), repeated as (27):

- (27) a. Max_i saw a gun near him_i/himself_i
 b. Lucie_j counted five tourists in the room apart from her_j/herself_j
 c. Lucy_i saw a picture of her_i/herself_i
 d. Max_i likes jokes about him_i/himself_i
 e. Max_i put the gun near/under/on him_i/himself_i

Further examples are provided by so-called picture noun contexts, already exemplified in (27-c):

- (28) a. A picture of myself would be nice on that wall.
 b. Lucie thought that a picture of herself would be nice on that wall.

As a diagnostic property of logophoric pronouns Reinhart and Reuland postulate that the logophoric anaphor does not need a commanding antecedent; cf. (28-b) and (29):

- (29) a. The picture of himself that John saw in the post office was ugly.
 b. Her pleasant smile gives most pictures of herself an air of confidence.

According to the above definitions, a SELF anaphor can be logophoric only if it does not reflexive-mark its syntactic predicate. As can be seen quite easily, this is not the case in (29): Nouns do not necessarily form a syntactic predicate, since they may lack an external argument, i.e. a subject, as is the case in (29). If, however, a noun should

happen to have an NP-specifier, this specifier is considered a subject of the noun. Hence, in cases like (30-a) the noun does qualify as a syntactic predicate. Therefore the anaphor can be bound only within that predicate, as shown in (30-c):

- (30) a. Lucie_j liked [a picture of herself_j]
 b.*/?Lucie_j liked [your picture of herself_j]
 c. Lucie_j liked [your_i picture of yourself_j]
 d. *Lucie_j liked [your_i picture of you_i]
 (31) a.*/?Your picture of myself would be nice on that wall.
 b.*/?Your picture of himself that John saw in the post office was ugly.

7. Open Problems

Another instance of logophoricity is focussed anaphors, as illustrated in (32):

- (32) a. This letter was addressed only to myself.
 b. Bismarck's impulsiveness has, as so often, rebounded against himself.

It seems that these require special treatment when occurring in argument position. They are exceptions to the rule that a SELF anaphor can be logophoric only if it does not reflexive-mark its syntactic predicate. Reinhart and Reuland's attempt to capture their behavior relies on the assumption that focussed anaphoric expressions may escape from the binding conditions because they can be moved in LF. This line of reasoning is not convincing, however, because movement as such cannot turn a SELF anaphor into a SE anaphor; otherwise, we would expect (33-b) and its analogue in Dutch to be grammatical:

- (33) a. Himself_i John_j cannot stand t_i
 b. *Him_i John_j cannot stand t_i
 c. *Zich_i haat Jan niet t_i
 d. Zichzelf_i haat Jan niet t_i

It seems, then, that focussing anaphors cannot be subsumed under the general theory of logophoric pronouns, as they require special treatment when occurring in argument position.

Let us again take up the problem of exceptional Case marking (ECM) constructions: ECM subjects are defined as syntactic arguments of the matrix verb, since it is the matrix verb that assigns accusative Case to the embedded subject; cf. the discussion of (12-b). However, with respect to the semantic predicate of the matrix clause, it is the entire embedded IP, rather than the subject, that figures as the argument of the matrix verb. But now consider:

- (34) *Lucie_j expects [her_i to entertain Max]

Unfortunately, Condition B cannot rule out the pronoun in (34): Although *her* is a syntactic argument of the matrix predicate *expect*, it is not its semantic argument, hence Condition B cannot apply to *her* with respect to the matrix predicate.

One might try to account for these data by modifying the notion of argumenthood. But unfortunately this seems to preclude an explanation of an interesting fact of Dutch. Compare the following data:

(35) a. *Henk_i hoorde hem_i.

b. *Henk_i hoorde zich_i.

c. Henk_i hoorde zichzelf_i.

(36) a. *Henk_i hoorde [hem_i, zingen].

b. Henk_i hoorde [zich_i, zingen].

c. Henk_i hoorde [zichzelf_i, zingen].

The problem comes up with the grammaticality of (36-b). If we assume that (36-a) is ruled out by a modification of Condition B, we would have to say that the matrix predicate is reflexive-marked. This would at the same time force *zichzelf* into the position of *hem*, and hence would not allow *zich* in that position, contrary to fact. Since the solution offered by Reinhart and Reuland is complicated and far from being satisfactory, I must leave this as an open problem.

Another problem is that they implicitly seem to presuppose that there shouldn't be any syntactic constraints on logophoric pronouns. As illustrated above, a SELF-anaphor may occur even without a syntactic antecedent. We concede that this might be true for English, but it certainly does not hold for other languages whose anaphors work pretty much like *zich* and *zichzelf*. What is even worse, there seem to be clear locality constraints on logophoric pronouns in German and even in Dutch, where we can distinguish SELF from SE anaphors. Consider the contrast between English in (37-a) and Dutch/German in (37-b):

(37) a. John_i doesn't know which pictures of himself_i Mary has bought

- b. John_i weet niet welke fotos van hem_i/*zich_i/*zichzelf_i Mary
 John weiß nicht welche Fotos von ihm_i/*sich_i/*sich selbst_i Maria
 John knows not which pictures of pronoun Mary
 gekocht heeft
 gekauft hat
 bought has (= (37-a))

Note that German *selbst* functions only as an emphatic particle, much in the same way as *himself* does in the following example from English:

(38) No one has himself ever been arrested by a sheriff.³

This leaves only *sich* as a candidate for a SE-anaphor in German, and there clearly is a use of *sich* as a logophoric pronoun in the sense of Reinhart and Reuland; cf:

³For a first attempt at capturing the rather complicated constraints on the syntactic distribution of such pronouns, cf. Edmondson and Plank (1978).

(39) Johann sah eine Schlange neben sich/*ihm
 John saw a snake near himself/him

Quite surprisingly, the use of the pronominal in (39) is excluded by a vast majority of native speakers. In consequence, a further difficulty is to explain the ungrammaticality of *ihm* in this context. Moreover, (37-b) shows that German poses the same problem as Dutch: How can we explain the difference between English on the one hand, and German/Dutch on the other? No answer is offered in Reinhart and Reuland (1993), but it seems that the theory has to be supplemented by another syntactic component that is able to describe syntactic restrictions on the behavior of what the authors call logophoric pronouns.

8. Bibliographic Comments

[to be written] Theory: Chomsky (1981), Yang (1983), Chomsky (1986)
 Learning: Solan (1983)
 Learnability: Manzini and Wexler (1987),

Topic 5

Projection(s) and Inflection(s)

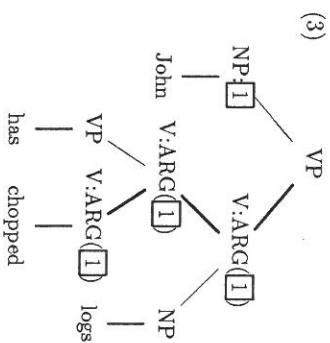
1. Subject Verb Agreement: The Problem

Consider the following sentences:

- (1) a. John has chopped logs
 b. I/We have chopped logs
 c. *I/We has chopped logs
 d. *John have chopped logs

- (2) a. John will chop logs
 b. *John will chopped logs

(1) shows that the subject “agrees” in person and number with the auxiliary verb and (2) shows that the auxiliary determines the morphological form of the main verb (infinitive vs. participle). Let us try now to draw projection lines in accordance with our principles of projection. From the fact that the subject is an argument of the main verb, we would expect something like the following:



However, if we think of projection lines as conveying *locally relevant* information, we cannot express subject verb agreement as being mediated by projection lines. In order to describe agreement as information that percolates from the sister node of *John* (or

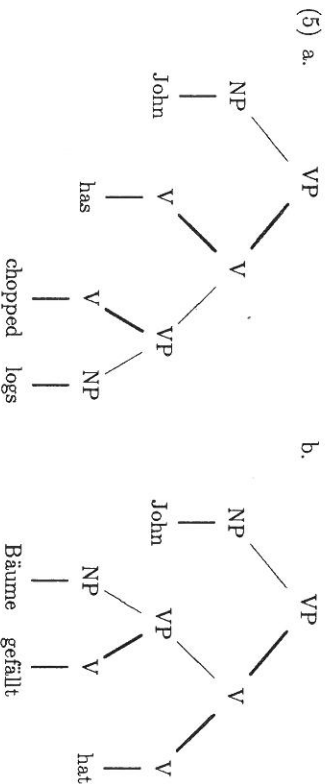
the node that immediately dominates *John*) to the head of the projection, we would expect agreement to be expressed in *chopped*, contrary to fact. One might decide, then, that agreement is a matter of **adjacent** terminal nodes, so that the subject agrees with whatever verb comes next in the linear order. This expectation is defied by agreement in German; here, the subject is neither adjacent to the verb, nor do we find that the closest verb agrees with the subject:

- (4) a. daß **John** Bäume gefällt **hat**
 that John logs chopped has
 b. daß **ich** Bäume gefällt **habe**
 that I logs chopped have

This observation strongly suggests that agreement must be described in structural terms and cannot be a matter of linear order.

The next observation concerns the contrast between the participle and infinitive forms of the main verb. Given that the auxiliary verb *have* selects a participle whereas *will* selects an infinitive, we would expect that the selected items are dominated by the projection line of the auxiliary, as in the case of argument selection exercised by main verbs. But this expectation is frustrated in a structure like (3), because the auxiliary has no projection line.

We can satisfy both the agreement requirement and the selection requirement of the auxiliary in structures like these:



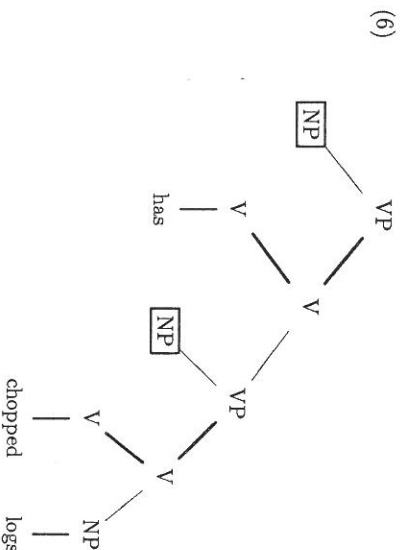
The agreement phenomenon can now be described as congruity between a specifier and its head. The selection requirement exercised by the auxiliary – in the sense that selection determines the morphological form of the embedded verb (infinitive or participle) – can also be satisfied, since there is a VP that is attached to the projection line of the auxiliary, being I-related to the auxiliary. However, we have lost any structural relation between the subject argument of the main verb and its projection line.

If we want to stick to our earlier assumptions, we find ourselves in a predicament, and it seems that one of our hypotheses has to be revised. An obvious revision would be to allow projection lines to “merge” so that the subject could be reached by the projection of both the main verb and the auxiliary. Such a solution would, however, create new problems. Whereas in the above representation it is structurally clear where

agreement features go (and that it is the auxiliary that controls the morphology of the head of the VP, i.e. the main verb, rather than vice versa), branching projection lines would again obscure the asymmetry between main verb and auxiliary. In other words, if both projection lines could reach the subject, it would again be unclear where to look for agreement features.

2. A Solution: Movement

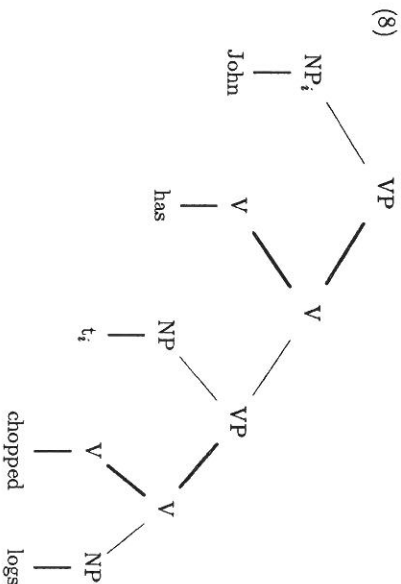
Let us now try to find a way out of our dilemma, one that introduces a new concept but does not force us to give up any earlier assumptions. The current problem seems to be that the subject should at the same time be the specifier of the auxiliary (to trigger verb agreement) and the specifier of the predicate (to receive a theta role from the predicate). In a sense, then, the present situation would require two projections to share the same specifier, i.e. the specifier would have to be dominated by two nodes instead of only one. However, this contradicts our definition of a (two dimensional) tree. Thus, the closest we can come in two dimensional space is splitting up the subject into two positions share a certain amount of information. This information sharing is indicated by the boxes in (6):



In a sense, then, the NP *John* must be at two places at the same time. It has to be in the lower specifier position in order to qualify as an argument of the main verb, and it has to be in the upper position so as to agree with the auxiliary. “Physically” it is of course impossible to occupy two places simultaneously; we thus conceive of “being at two places” only in the sense of one constituent being a sort of a copy of the other, not a complete copy, but a copy of selected relevant properties, some of which are “present” in both nodes, and some of which are represented only once. For instance, it is obvious that the phonological information of the NP cannot be realized at both places, otherwise we would get:

- (7) *John has John chopped logs

Thus, the phonological information drawn from the lexicon must be copied into the higher NP-position, but deleted in the lower position. Our formal representation of this is given in (8):



The t_i is called a **trace** of $John_i$; it indicates that in this position phonological material has been deleted. The representation also makes it clear that the minimal information that must be shared by both positions is categorial information, i.e. the property of being an N and of being maximal.

Movement of the subject has been forced by the assumption that there is in fact a subject position generated within the VP. This assumption in turn follows from our decision to generate all arguments within one projection. Although the idea seems intuitively appealing, it does not have any a priori or conceptual necessity; indeed it has often been proposed that the subject should be made exempt from the rule and should be generated outside VP. In the following subsections, I will briefly indicate that an additional subject position *within* VP may be advantageous.

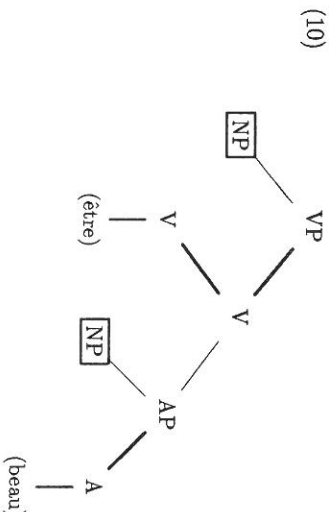
2.1. Adjectival and Participle Agreement

Above, information about person and number is irrelevant in the lower NP-position; with respect to the lower NP, it suffices to locate there only the assignment of the subject theta role. In other languages, however, person, number, and even gender may very well be relevant on the lower node. Thus, adjectival predicate constructions in French show agreement on both the verb *être* and the predicative adjective, as shown in (9):

- (9) a. Il est beau
 he is handsome
 b. Elle est belle
 she is beautiful
 c. Ils sont beaux
 They_{Masc.} are handsome

- d. Elles sont belles
 They_{Fem.} are beautiful

We therefore must conclude that the structure of these sentences is (10):

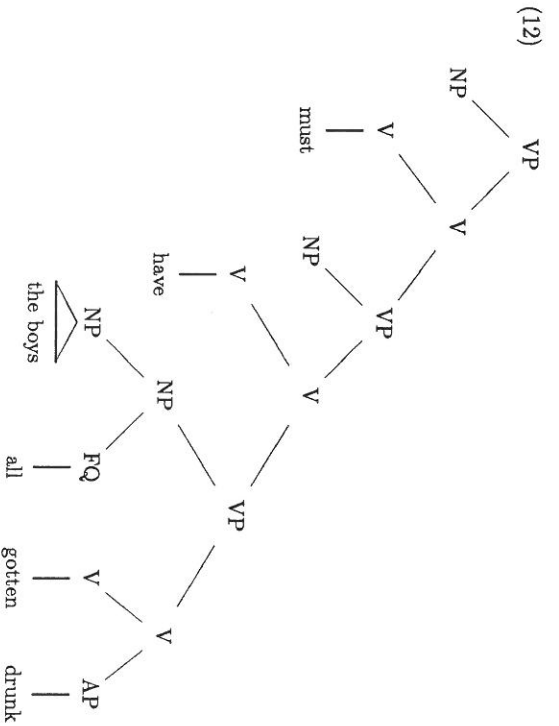


The point here is that agreement features must be present in both the SpecA and SpecV positions, so that both heads can enter into a specifier head agreement relation.

2.2. Quantifier Floating

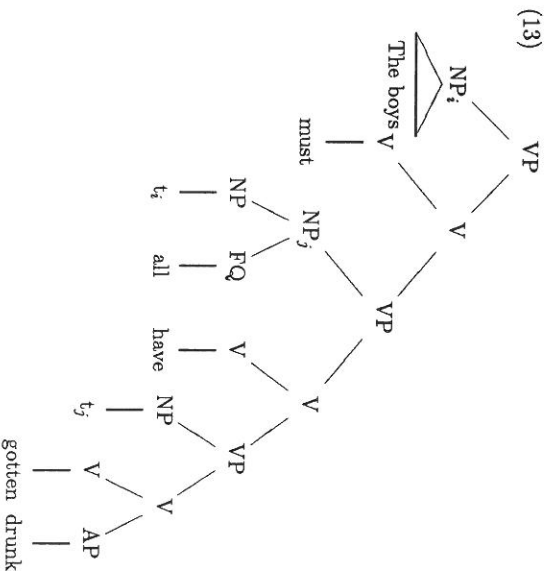
Sportiche (1988) argues that the data in (11) can be elegantly described by assuming that the derivational source of all these examples is (12):

- (11) a. The boys all must have gotten drunk
 b. The boys must all have gotten drunk
 c. The boys must have all gotten drunk



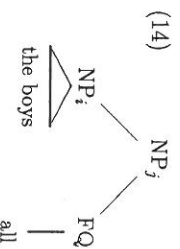
McCawley (1988, p. 595) argues that each of the sentences has a different semantic interpretation. We take this as evidence that semantic interpretation has to be derived from the surface representations rather than from D-structure. But how can we arrive at the surface? The subject must ultimately go into the highest specifier position. But the floating quantifier (FQ) is not forced to move along with *the boys*. If it does, we get (11-a). If it stays in situ, we get (11-c). And there is even a third derivation shown in (13):

Abelian \rightarrow str. \rightarrow S-S-Konstruktion in NP_j
 determinativisch



Here we first move the entire subject NP_j into the specifier position of *have*. In this position the floating quantifier has been stranded, i.e. we only moved the lower part of the NP, namely NP_i , into the subject position. This accounts for all the possible positions of the floated quantifier.

This explanation relies on a peculiarity of the above structure, namely that the floating quantifier is attached to an NP in such a way that both NP_i and NP_j are maximal projections:



Strictly speaking, this would contradict our principle that phrases cannot be expanded. However, we will see that many elegant descriptions of data like the one presented above simply force us to acknowledge the projection of the feature [+max]. In such cases we will say that the node that is both dominated by and sister of the maximal projection is an **adjunct**. Accordingly, the floating quantifier is adjoined to the NP.

We will come across a number of further cases of adjunction later. In each case, the adjoined element cannot be an argument of the head; rather, adjoined elements somehow modify the node they are adjoined to. We give further examples in the next section.

2.3. Scope

In what follows I will resort to German about which my intuitions are most clear. Consider:

- (15) Einbrecher könnten das getan haben
burglars could this done have

Here the modal is used as an evidential mood marker, giving rise to the semantic interpretation paraphrased in (16):

- (16) It could have been true that there were burglars who did it.

It does not follow that there are particular burglars who could have done it. As shown in the paraphrase the modal has wide scope over the subject although in S-structure the subject commands the verb. From what we have learned about scope and command it should be the other way around. But given that the subject has indeed originated from a lower position within the command of the verb, it seems natural to assume that this position also determines the semantic interpretation. A way to capture this idea is to conceive of movement as we have done above, namely as copying of some but not necessarily all lexical information. In the present case it is morpho-syntactic and phonological information that is copied into the agreement position of the auxiliary, but in order to be interpreted as within the semantic scope of the modal the semantic information conveyed by the NP rests in place. In fact, we will see below that such a situation is not unusual; it will arise with movement in various other contexts.

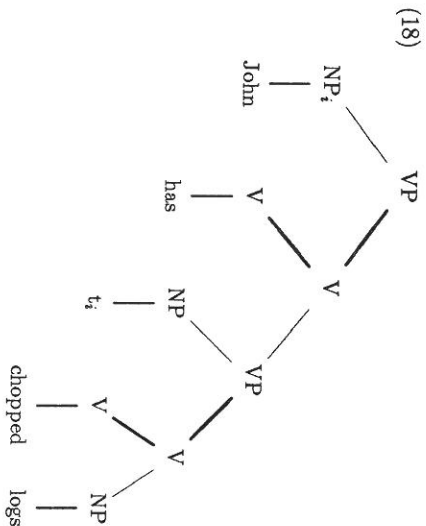
2.4. Chains

Let us call two or more positions that are linked by sharing information in the sense illustrated above a **Chain**. Chain formation can be thought of as being basically a process of copying and deleting information. This mechanism is governed by a number of essential restrictions, the most basic of which are the following:

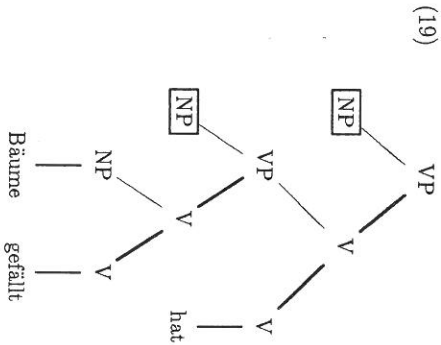
- (17) a. The information that triggers the phonological spell-out can appear only at one node of the Chain (i.e. it must be deleted at other nodes).
b. The information that is used for semantic interpretation can appear only at one node of the Chain (i.e. it must be deleted at other nodes).
c. Chain formation is permissible only if the nodes of a Chain can be ordered by command, so that the first element of a Chain commands the second, the second commands a third, if there is one, etc.).

(17-a) has been illustrated in (7), and (17-b) is equally self-evident, but (17-c) needs more empirical justification. Let us adopt these restrictions here, without further discussion. We call the first element of the Chain the **head of the Chain** and the last element is called its **basis**. Most Chains look like this: Only the head is phonetically visible, while all other elements are phonetically invisible. These invisible elements are called **traces**. If we represent traces by *t* and phonetically visible material as before,

we can use coindexation as a means to signal Chain formation:



Although it seems reasonable to require that all Chains be headed by phonologically visible material, it is conceivable that such a condition might not be universally true. Consider for example the parallel situation in German:



It is impossible to tell from the surface order of (19) alone which element of the Chain will serve to phonologically realize the subject; one could just as well claim that the first NP contains only the relevant morphological information. Although such a hypothesis may in fact yield interesting consequences, we will, unless noted otherwise, tacitly assume that Chains headed by NPs are always headed by “overt phonology.”

2.5. Afterthoughts on VP-External Subjects

Traditional generative syntax excludes the subject from an otherwise valid generalization, namely that arguments should be dominated by the projection of the predicate. Instead, these theories assume that the subject theta role is assigned by the VP (by so-called "compositional theta marking"), rather than by the verb. Accordingly, the subject position cannot be generated within the VP, and if so there is no need to assume movement of the subject. Above we have seen that it may be advantageous to depart from this standard practice, and a number of other features of our analysis will presuppose that the subject is generated VP-internally. In this section, I will briefly discuss and dismiss with the former motivation for not having the subject within VP.

Assume, then, that the VP does not contain a subject position. As an argument in favor of such a view, linguists have pointed out that the theta role assigned to the subject of the following examples depends on the VP (cf. Chomsky (1981, pp. 47-51)):

- (20) a. John [VP broke the window]
 b. John [VP broke his arm]

In the first example, *John* is an agent, and in the second, *John* may be a theme. This has been taken as evidence that only object theta roles are generated directly by the verb, i.e. within the projection of V. The subject is theta marked only by the entire VP.

Although it may be true that the subjects in (20) have different thematic roles, compositional theta marking is hard to understand from a conceptual point of view. If such theta assignment is determined by VP, it must somehow be post-lexically. Presumably, this would violate the projection principle which requires that argument structure is projected from a lexical entry. In what follows, therefore, I will stick to the assumption that all theta roles, if any, are projected from the verb alone, forcing us to adopt the view that verbs like *break* are associated with two different theta grids.

Apart from being problematic for methodological reasons, the kind of empirical motivation given in support of theta marking by VP does not hold universally. As regards English, Marantz (1981, pp. 47-51) claims that with transitive verbs in an SVO configuration only VO may form an idiomatic expression, and SV never does. From this he derives that the theta role of the subject is determined "compositionally" by the verb and its object (i.e. the VP in that theory), so that it is never the case that the subject expression could be idiomatic without there being an idiomatic reading on the object as well.

Unfortunately, however, this generalization is refuted by a number of idioms in German; cf. the following examples from Reis (1982):

- (21) a. x reitet der Teufel
 b. x reißt der Gedulstfaden
 c. x sticht der Hafer
 d. x schwimmen alle Felle davon

Does this imply that in these cases there is compositional theta marking of the object?

The proper conclusion seems to be that the idiomatic predicate has an idiomatic theta grid, apart from the regular one. Hence we resort again to lexical properties of the head.

But even if the generalization concerning non-idiomatic objects holds for English – leading one to maintain the idea of "compositional theta marking" – it still would not follow that the subject must be generated outside VP. In any case it would be possible to already theta mark the subject *within* the most deeply embedded VP, so that the subject would always be theta marked by its sister node.

3. Tense and INFL

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In this section we investigate some of the properties that can be observed in the syntactic behavior of tensed auxiliaries. We first observe that agreement marking on verbs in English always occurs at the topmost verbal projection:

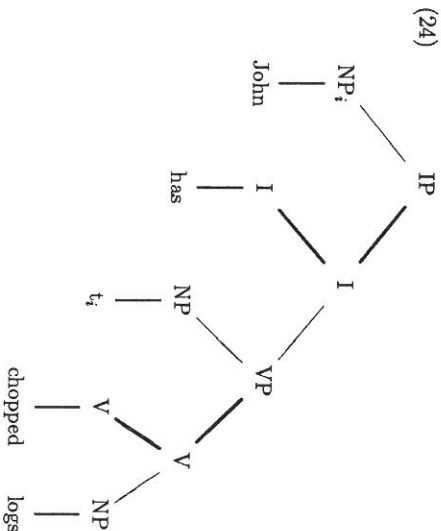
- (22) a. John sing[s]
 b. John [has] been singing
 c. John [sang]

- (23) a. daß ich singe
 that I sing
 b. daß ich gesungen haben werde
 that I sung have shall
 c. daß ich [sang]
 that I sang

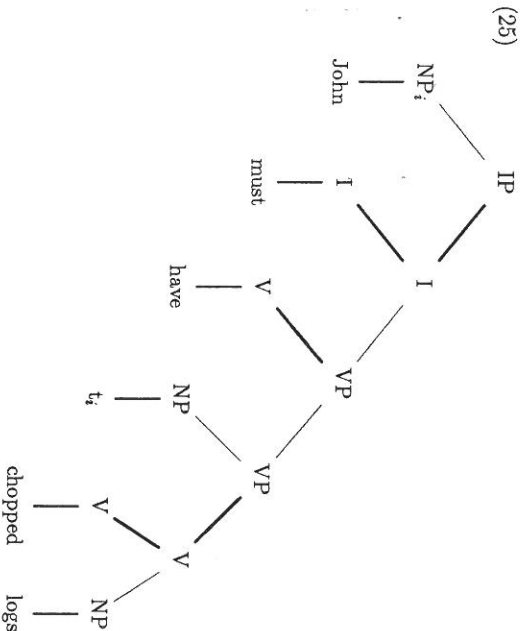
Agreement morphology contains both information about the subject and about tense. We will abstract away now from the concrete morphological shape this information takes, and represent it by abstract features [+agr] and [+tense].

The fact that these features occur only in the topmost verbal projection show that they characterize the **structurally highest projection of a clause**. In other words, it is characteristic of clauses that they are projections of a head with agreement features in it, so that clauses can be *defined* as projections of agreement features.

We will discuss in this section how this idea can be made precise and what consequences it will have. Let us first abbreviate the combination V[+tense] as INFL, or I for simplicity. The notation for our tree structure now turns into (24):



According to our conventions, the tense feature is projected up to IP as usual. We also locate agreement features in I, but it is not implied by our notation that these features must percolate up to IP. On the other hand, if the verb does not have these inflection features, it will project again as V; cf. *have* in (25):



Note that modal auxiliaries like *must* in (25) do not have overt inflection in English; nonetheless, it is reasonable to assume that these are Is. If modals are I-elements and if IP is by definition the highest projection of a clause it then follows that modals cannot be embedded under other auxiliaries. This is exactly what we observe for a language like English. Hence, including this kind of contextual information – namely, being an I-element – into the lexical entry of modals automatically accounts for their

distribution.

In some contexts, however, even modals cannot occur as the highest projection. For tensed clauses of this type it is characteristic *not* to have overt tense or agreement, although in other respects they exhibit all the properties of tensed sentences. This applies for English conjunctive clauses:

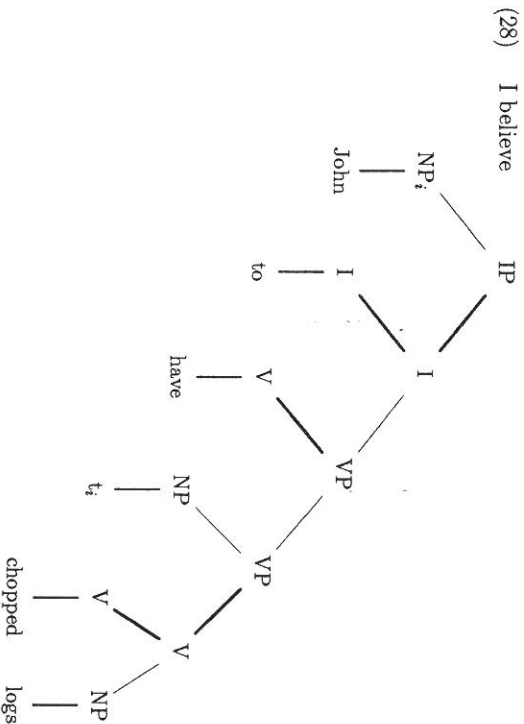
- (26) a. They may insist that he resign
 b. They may insist that he be fired

It will be argued below that a proper account of this construction has to assume an empty head I that “vacuously” realizes the abstract tense feature.

There is also another context where modals cannot appear in English. Thus, consider

- (27) a. I believe John to have chopped logs
 b. *I believe John to must chop logs

Since it is precisely the position of *must* in (25) that seems to be occupied by *to* in (27-a), and since *to* and *must* cannot co-occur, linguists have concluded that these elements in fact occupy the same position in the tree. In consequence then, *to*, like *must*, is in I-element:



But of course this IP is not tensed, so it must have the feature [-tense]. And it is presumably not a V but a P. Abstracting away from these differences we may simply define INFL as the highest clausal projection that bears the features [+tense] or [-tense].

Thus, we have postulated a rather abstract entity, a projection whose categorial status is not defined, and whose function can only be explained by demonstrating

which elements can go into that position, i.e. into the position just characterized as the highest projection of a clause. Hence the question arises, Why do we have to postulate such a projection? It should be noted that there is no genuine morphological evidence for the need of such a position. In fact, that modals are I-elements might be attributed to an idiosyncrasy of English to be stated in the lexicon, namely that they cannot form participles or infinitives. In German, they can; hence they also occur in embedded positions.

Furthermore, there is no need to stipulate that [±tense] occurs in the highest position. Since no verb that selects a VP selects a finite verb (but rather participles and infinitives), the only place for finite morphology is at the highest non embedded position called INFL. Hence INFL seems just a name for that position. In fact, it is not even particularly clear how "highest" should be defined. Consider (29):

(29) John seems to chop logs

If we maintain that *to* heads an IP, there are two IPs here, one that is headed by the agreement on *seem* and one headed by *to*:

(30) [IP John_i seems [IP to [VP t_i chop logs]]

Thus, the question arises whether there are genuine syntactic arguments that motivate a particular role of the INFL-projection, beyond mere terminology. It seems to me that the only kind of argument that could be given is to show that INFL enters into syntactic regularities that cannot be described simply and elegantly when referring to morphology alone. It is precisely this kind of argument that I will present in the following sections.

Somewhat ironically, however, the justification of an abstract INFL-projection relies, and – as we have argued – must rely on a certain mismatch between syntactic behavior and morphological marking, otherwise reference to morphology would do. This mismatch will arise if it can be shown that in certain cases the morphologically inflected tensed verb form does not occupy the INFL-position at S-structure. I will now present some pieces of evidence that have been ventured in support of this thesis. In each case the evidence rests on the assumption that main verbs cannot move into the I position.

3.1. Negation

Consider the following sentences:

- (31) a. John can not leave the city
 b. John has not left the city
 c. John has not been arrested
 d. John did not leave the city
 e. *John leave not the city
 f. *John has been not arrested
 g. I suggested that Janet not be asked to pay the fine

h. *I suggested that Janet be not asked to pay the fine

In all grammatical sentences, negation immediately follows the tensed inflected auxiliary. As (31-e) shows, negation cannot follow an inflected main verb. Moreover, as demonstrated by (31-g) and (31-h), it would not be correct to say that negation follows the first auxiliary. We have assumed in the last section there is in fact an empty inflected INFL-projection. Hence, the generalization emerges that negation follows the INFL-projection. In order to rule out (31-e), however, it is crucial to require that the main verb cannot be generated in INFL.

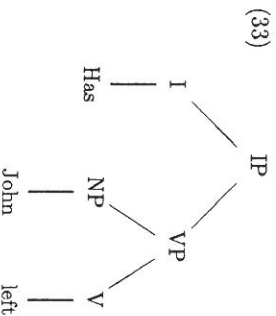
Up to now, the observed regularity involves tensed auxiliaries. We could describe the regularity in terms of this notion, but observe that the tense on auxiliaries, in particular on modals, is an abstract category not reflected by overt morphological properties. In order to justify INFL which happens to be the position of tensed auxiliaries it is necessary to find another regularity that happens to apply to the same class of items.

3.2. Yes-No Questions

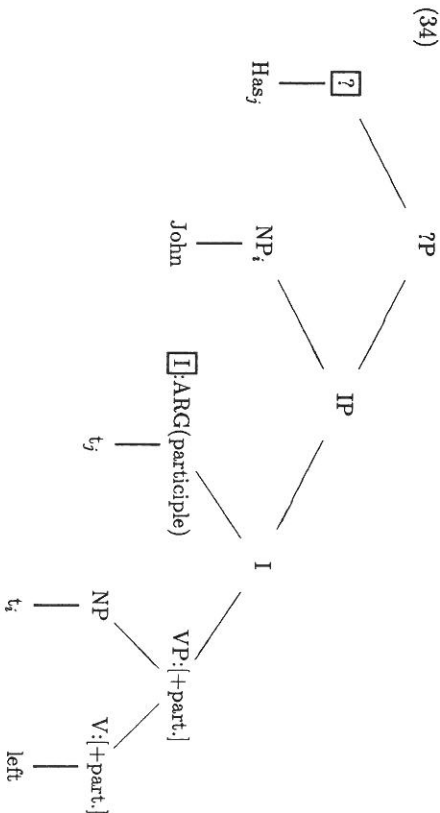
Consider the following paradigm:

- (32) a. Has John left?
 b. *Has John leave?
 c. Will John leave?
 d. *Will John left?
 e. Did John leave?
 f. *Leaves John?

Examples (a) through (d) demonstrate again that the morphology of the main verb is selected by the auxiliary, (f) shows that a main verb cannot precede the subject; instead, we have to use an auxiliary as shown in (e). The fact that the auxiliary is not adjacent to the main verb implies that the above sentences cannot be base generated in accordance with our projection principles. This may easily be checked as follows: The verb *has* as a head cannot at the same time be a maximal projection; if it were, it would not project and hence could not select anything. In particular, it could not determine the morphology of the main embedded verb; hence, it must project. But if it projects all we can get is something like:



But now it is impossible to express subject verb agreement as a local relation (i.e. as specifier head agreement). We thus have to conclude that the structure must be this:



In other words, we have to move the auxiliary to a position “?”, whose nature will be discussed further below. Let us call [?] “position C,” for reasons to be discussed later. Now, if main verbs were in I before we move I into C, we would expect that main verbs would be able to move there too, exactly as auxiliaries do. But in fact we have seen that such sentences are ungrammatical. Assume therefore, as we already have in the last subsection, that the main verb is not in I. Then the generalization that I-elements move to C to form a question is the same as to say that tensed auxiliaries move to C. But now consider a language like German. In German there is no distinction between auxiliaries and main verbs, hence there is no reason to assume that main verbs do not move to I. But now observe that formation of Yes-No-question is in principle the same as in English, namely movement of I to C:

- (35) a. Ist, Fritz nachhause gegangen t_i
 Is Fritz home gone
 b. Ging, Fritz nachhause t_i
 Went John home

It follows that question formation should not be described as saying that only tensed auxiliaries move. In fact, the facts from English directly follow by assuming that main verbs cannot move into I. This shows that even in English the rule of question formation should not refer to a morphologically defined class of items: the more general rule is that C must be filled. All the observed differences now follow from a particular assumption about the I-position in English.

3.3. VP-Ellipsis

Compare the following sets of sentences:

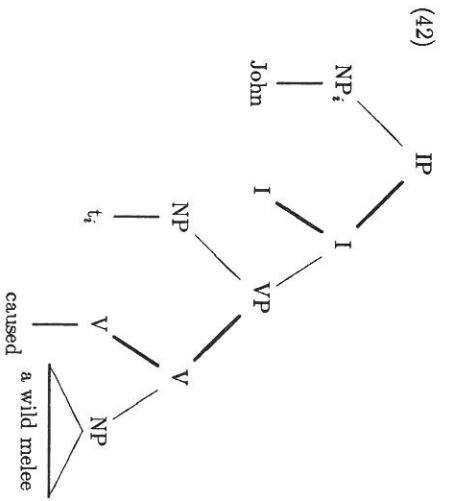
- (36) a. Karen has exceeded the speed limit, and Bill has ___ too
 b. Nora won't remember the password, and George won't ___ either
 c. David knows how much money was taken, and Bill does ___ too
- (37) a. Gary should have been sleeping, and Mary should have been, too
 b. ?Gary should have been sleeping, and Mary should have, too
 c. ?Gary should have been sleeping, and Mary should, too
- (38) a. Gary should have been paid better, and Mary should have been, too
 b. Gary should have been paid better, and Mary should have, too
 c. ?Gary should have been paid better, and Mary should, too
- (39) a. Fred must have been singing songs, and Nancy must have been too
 b. Fred must have been singing songs, and Nancy must have too
 c. Fred must have been singing songs, and Nancy must too

Descriptively, the regularity we discover in the above examples is called VP ellipsis. In the second conjunct of coordinated clauses any VP can be omitted. The semantic content of the missing VP is identical to that of a VP in the first conjunct.

We also find ellipsis in contexts other than coordination; cf.:

- (40) That Fred was singing songs suggests that George was ___ too
- In these contexts it becomes particularly clear that we can neither omit too much nor too little:
- (41) a. *That Fred was singing songs suggests that George ___ too
 b. *That John caused a wild melee suggests that George caused ___ too
 c. *Karen exceeded the speed limit, and Bill exceeded ___ too

In order to explain these facts, let us assume that the structure of the first conjunct in (41-b) is the following:



In accordance with our earlier assumptions, the main verb does not move to I. The rule of VP deletion therefore straightforwardly accounts for (41-c) and (41-b): VP deletion necessarily deletes the main verb because the main verb cannot move out of its VP. Likewise, there is a straightforward explanation for the contrast in (43):

- (43) a. I'm not positive that John knows the answer, but Sam seems to ____.
 b. *I'm not positive that John knows the answer, but Sam seems ____.

If *to* is in I as we postulated above, VP deletion cannot delete *to*, hence (43-b) cannot be derived.

In order to explain (41-a) we need a further assumption. Suppose that the tense marking of a finite clause must remain "visible" after VP deletion. Clearly, if a modal or auxiliary is in INFL, this condition is met, and it can also be met if tense is realized morphologically on the main verb. In consequence, VP-deletion cannot apply to a tensed main verb, because it thereby would make the tense marking of the clause "invisible."

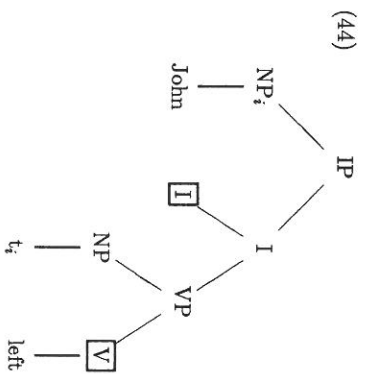
3.4. Negation and the Head Movement Constraint

3.4.1. The Head Movement Constraint

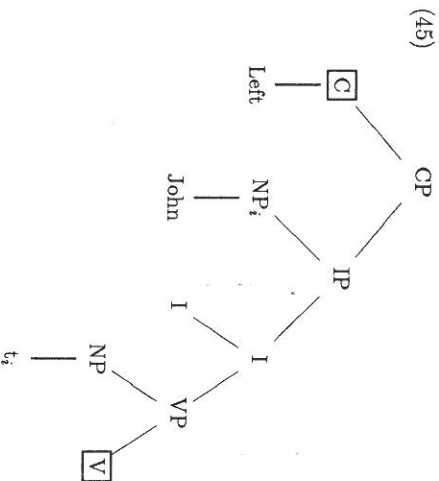
Recall that one of our motivations to not move a main verb into I derives from the fact that we don't find a main verb in C. From what we have said above, it is clear that before question formation we start off with a structure like the one shown in (44):

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Morphological inflection is directly realized on the verb, rather than in I. We will return to the question of how V and I are related later and focus now on question formation again. Above we said that only some visible element in C makes a Yes-No question, hence in order to become visible, *do* is inserted into I and then moves into C. But what about moving V directly into C? This last step would yield exactly the sentence we wanted to block:



In order to exclude this kind of derivation, a general kind of constraint has been proposed, the so-called **head movement constraint** (=HMC), which implies that the semantic relation of heads with respect to each other is already fixed at D-structure and cannot be changed on the way to S-structure. This does not mean that it would be impossible to move heads; rather, the constraint says that it is impossible to move a head α "across" another head β , so that the new position of α would command β . We formulate this constraint by invoking the notion **minimal command** as given in (46):

- (46) A head α minimally commands another head β iff there is no head γ such that α commands γ and γ commands β .

If α minimally commands another head β there cannot be any other head between these nodes that commands β but would be closer to β than α . Accordingly, in the above examples C minimally commands I, and I minimally commands V, but C does not minimally command V. We can now formulate the constraint as follows:

- (47) **HMC:** A head α can move to a position β only if β minimally commands α .

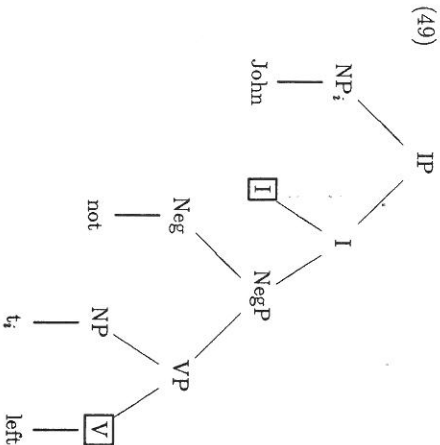
Put differently, a head cannot move to another head position if movement would have to skip a structurally closer head. It is obvious that the HMC blocks the above derivation.

3.4.2. Negation: Specifier, Head, or Adjunct?

Let us now return to the description of negative sentences. Here a number of issues have been left open; in particular, it is not clear why (48-a) is ungrammatical:

- (48) a. *John not left the city
b. John did not leave the city

The question here is, Why we need so-called *do*-support, i.e. why must INFL be morphologically realized in place, as in (48-b)? An explanation has been sought in assuming that negation is a head that projects its own Negation-Phrase:



In order to understand why such a structure is blocked the relation between I and the tense on the main verb cannot be accidental; in fact it is reasonable to assume that this relation must be spelled out as a covert (partial) movement process. Accordingly, the morphological features of V have to be copied into I where they are checked against the abstract agreement/tense features. But now, when inspecting (49), it turns out that negation and the head movement constraint would block such a process, since Neg is

an intervening head. Hence, we must insert a semantically empty auxiliary, namely *do*, which spells out the tense in situ and thereby the eliminates any need for establishing a relation between I and the main verb.

Unfortunately, this solution raises a number of problems. First, observe that an intermediate projection between IP and VP would also disturb the selection relation illustrated in (31-a) and (31-b): *can* calls for an infinitive, and *have* takes a participle. However, for an auxiliary in I to be able to select the head of a VP, no projection can intervene, hence (49) is precluded.

Moreover, one might put forth semantic reasons in favor of the assumption that auxiliaries and modals are base generated in a lower VP and then move across negation. If a structure like (49) could also be the underlying structure of (50),

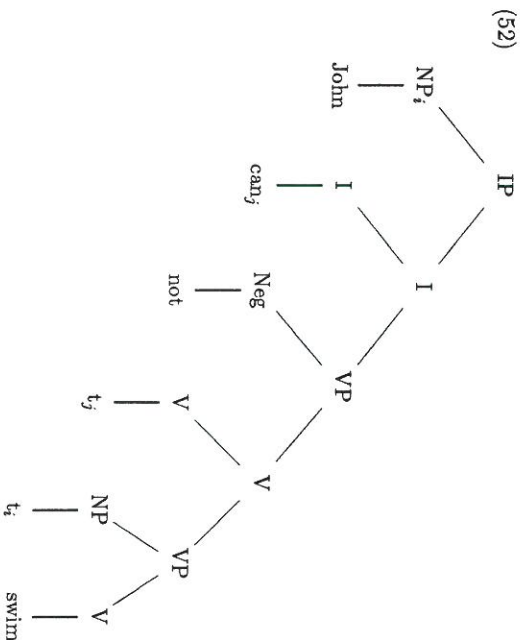
- (50) John can not swim

then the head *can* would command the head *not*. Since command relations of heads encode semantic scope relations, we would predict that the modal has wider scope than negation. But usually the opposite is true. Negation has wider scope than the modal. An obvious solution would be generate *can* as the head of its own VP below negation. At S-structure, then, the head of VP has to move into I for syntactic reasons:

- (51) John can_i [not [VP t_i [VP swim]]]

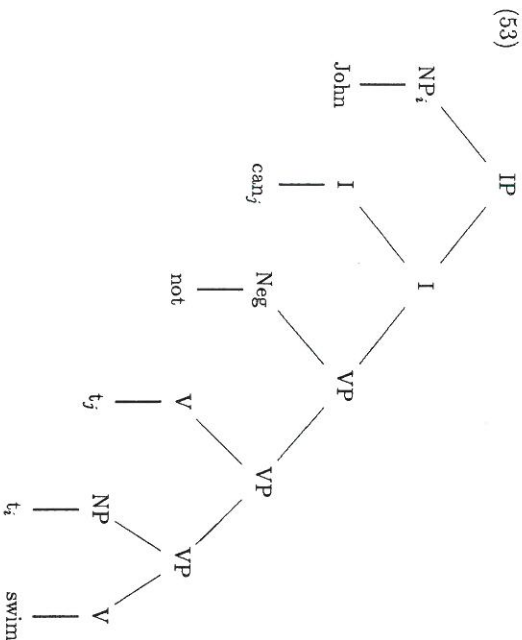
Narrow scope interpretation for *can* would now follow on the assumption that movement of the modal only involves copying of morpho-phonological material, leaving the relevant semantic information in place. Unfortunately, however, this solution would again require movement across a head which is precluded by the HMC.

One possibility would be to somehow weaken the HMC constraint, as has been done e.g. in citeChomsky:92 or Baker and Hale (1990). Another possibility might be that negation is not in fact a head but a specifier. It could be the specifier of a verbal projections, since in many languages negation is not expressed by a particle but also by a negative verb, for instance in Chinese and in Turkish. What blocks the relation between the main verb and INFL would then be an abstract verbal projection. On the other hand it seems possible that modals can be generated in this position, and in fact we do find morphemes that express negative modality, e.g. in Turkish (cf. Keenan (1985)). Hence it might be reasonable to say that negation is in Spec V. The structure of (51) would be something like this:



The fact that we cannot have negation without an auxiliary would now be explained: Main verbs have a subject in their specifier position, hence they cannot also have negation in that position.

The traditional proposal, however, is **adjunction**, which means that the negation is attached to the top of VP without becoming SpecV, leaving the status of its specifier as the highest node of the V-projection unaffected:



Again, negation does not project and hence, cannot disturb selection. On the other hand, however, the status of Neg deserves some clarification since both as an adjunct in (53), and as a specifier in (52), Neg cannot be a head, otherwise movement would again be blocked by the HMC. We may for the purpose of the discussion define a head in the sense of the HMC as something that can project, at least in principle. Since we know from principles of phrase structure that specifiers and adjuncts cannot project, they cannot be heads in the required sense.¹

The evidence that negation is adjoined is drawn from its distributional properties, observing that negation shares negation shares many of the adjunction sites of adverbs, except for the one constraint that if there is a finite auxiliary it must be moved across negation, as shown in nextB:

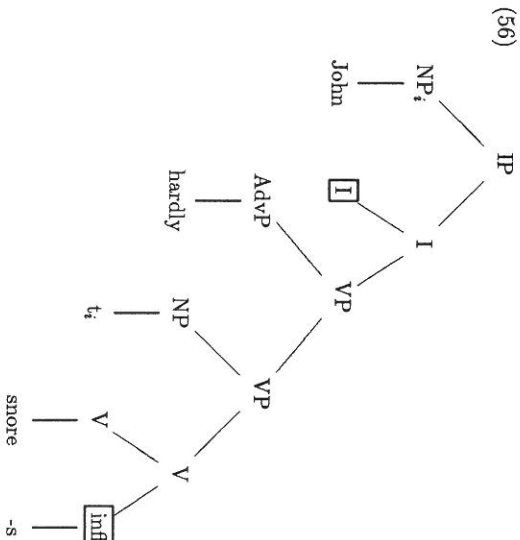
- (54) a. Well, I never did hear anything like that before
 b. You never can get anything to eat in that restaurant
 c. Horace does not often believe the New York Times
 d. Horace does often not believe the New York Times
 e. The students will probably not always be told what the answer is

Significantly, negative adverbs may even precede the finite verb (which perhaps did not raise to I in these cases), but *not* in modern English may never precede the finite auxiliary. Accordingly, other types of adjuncts may appear at the position of negation but these do not require *do*-support:

- (55) a. John ___ hardly snores
 b. John ___ hardly left
 c. John could hardly leave
 d. *John left hardly

Of course, (55-d) and (55-c) are predicted on the assumption that the main verb does not move to I. But given that the structure of adverbial modification is the same as that with negation, namely,

¹For evidence that specifiers like determiners cannot be heads in the sense of the HMC we only have to look for cases where nouns can move across a determiner. Such cases may not be easy to find but nonetheless seem to exist; see examples in Baker and Hale (1990) for noun incorporation that strands a specifier.



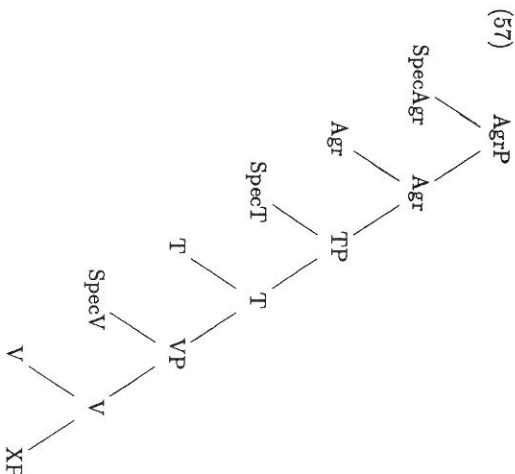
there is no way to explain the difference of grammaticality on structural grounds alone. In fact, it has been argued that any existing attempts to derive the interaction between negation from theoretical principles has failed, although deceptively the behaviour can easily be described (cf. Baker (1991)).

I am not convinced that this should be the last word on the issue, but let us summarize the discussion so far. The conclusion we have drawn above is that in English there must be a rule to the effect that an auxiliary moves (across negation) into some higher position (INFL) that cannot be filled by the main verb in English. Three things remained unexplained: Why is it obligatory to move tensed auxiliaries there? Why is it impossible to move the main verb? What is the relation between INFL and the main verb?

In search for an answer a number of principles have been proposed, all of which assume that the abstract I-projection is connected with the tense morphology of the verb. Recall, however, what we did so far is locate abstract features in that position, but we still did not establish a necessary connection between these features and the verbal morphology. All we established so far is that for purely syntactic reasons it is required that such a position be available. Only at one place did we try to syntactically motivate that the abstract tense feature should be related to the verb in a more than arbitrary way. This was where we assumed that negation is a head that somehow disturbs the relation between these nodes. On the other hand, we also motivated INFL by agreement features, although agreement was not the defining characteristics of INFL. But if subject verb agreement features are in INFL such a direct morpho-syntactic relation would be justified.

In fact, however, it is presently assumed that agreement features are located still in another head whose existence is not sufficiently argued for. We thus distinguish between an Agreement Phrase and a Tense Phrase. Accordingly, two possibilities arise.

The first is that the agreement phrase is embedded into the tense phrase. This would in no way affect the above reasoning, the above arguments in favor of I are independent of the existence of such a projection. The second is that the Tense Phrase is embedded into the agreement Phrase, as shown in (57):



In that case things are quite different. Regardless of whether the arguments we advanced above apply to AgrP or to TP, in both cases we need a morpho-syntactic relation, namely specifier head agreement in the highest projection, i.e. in a position that is not filled by the verb that bears agreement. Hence, in both cases the relation between tense and the verb seems not arbitrary, because due to the HMC the information in the agreement position must go to the main verb and therefore must pass through tense.

[to be continued]

4. The Mirror Principle

[to be written]

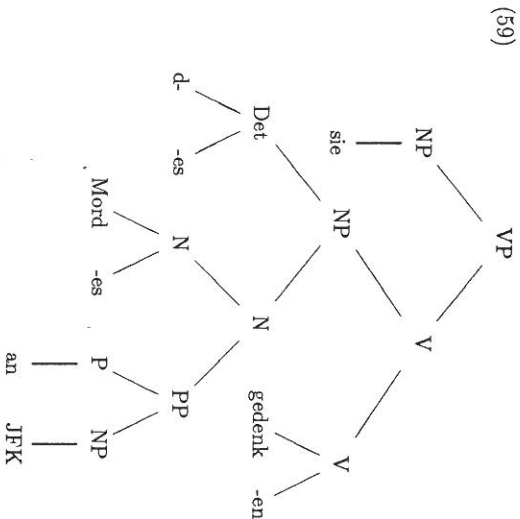
5. Inflection on Nouns

Investigating a language with a bit more overt inflection than English might be instructive at this point. Note that in a Case inflecting language like German, arguments of verbs may be in accusative, dative, and genitive Case (with equational verbs like *be* and *become* the semantic predicate is an NP in nominative Case). Accusative Case

is typical for direct objects, and dative Case accompanies indirect objects. Genitive Case on arguments of verbs is highly idiosyncratic, being selected only by a relatively small class of verbs. Given that genitive inflection on a noun must be checked by an appropriate verb, consider the following example:

- (58) daß sie des Mordes an JFK gedenken
that they Det_{GEN} murder_{GEN} of JFK remember

Let us ask now for the structure of the VP, putting aside questions of agreement for a while. This might be something like:



Here the verb *gedenken* assigns genitive Case to the NP *des Mordes an JFK*. Within that NP the determiner *des* agrees with the noun *Mordes* in Case, number, and gender – arguably another case of spec-head-agreement.

Let us ask now for the internal structure of the noun. Is it plausible that – by analogy to verbal inflection – nominal inflection is a *head* with its own projection line? Since we are now investigating projections within a word, this seems largely a matter of morphology. Although inside complex words the head of a word normally is the rightmost constituent, at least when considering compounds and derivational morphology, this generalization becomes questionable when applied to inflection: Here it has often been observed that most criteria for headedness no longer hold. First of all observe that the noun stem *Mord* must project its syntactic (and semantic) properties into the structure, this being so because it selects the preposition *an* – a process that cannot be blocked by any projection line of inflection. Furthermore, inflection never changes the category of a stem. In general, these characteristics – being categorially void and transparent for subcategorization features – is taken as (part of) a *definition* of inflection; hence, inflection as such does not support the view that heads inside words are always on a right branch.

Another fact to be noted is that the morphological realization of Case depends on a number of lexical and syntactic factors. Traditional grammar distinguishes up to over thirty different Case paradigms, a few of them being shown in (60) below:

(60)

	P ₁	P ₂	P ₃	P ₄	P ₅
Nominative	die Frucht	der Funke	das Herz	der Planet	Frankreich
Genitive	der Frucht	des Funkes	des Herzens	der Planeten	Frankreichs
Dative	der Frucht	dem Funken	dem Herzen	dem Planeten	Frankreich
Accusative	die Frucht	den Funken	das Herz	den Planeten	Frankreich

As can be seen from these examples, nouns must be classified into different classes (the most relevant criterion here being gender), depending on which paradigm they take as inflection. According to the traditional view it is the noun that determines the type of inflection rather than the other way around.² Interpreting this determination as assignment of a morphological feature, this means that we have to assume the following structure:

²There are a number of complicating factors. For instance, nouns that are phrases tend to be Caseless, i.e. they lack overt morphological marking; cf. the following examples (partly adopted from Gallman (1994)):

- (i) a. Lebewesen mit nur einem Herzen
living-being with only one heart
b. *Lebewesen mit (nur) Herzen
c. Lebewesen mit Herz
- (ii) a. aus tropischem Holze
made-from tropical wood
b. *aus Holze
c. aus Holz
- (iii) a. ein Orchester ohne eigenen Dirigenten
an orchestra without own conductor
b. *ein Orchester ohne Dirigenten
c. ein Orchester ohne Dirigent

Lebewesen mit Herzen is grammatical if *-en* on *Herz* is interpreted as plural morphology. This is not the intended reading of the example. The examples show that overt morphological marking seems to be a consequence of there being an inflected specifier. It is not correct, however, to conclude that nominal morphology in German is a subclass of specifier head agreement, and that for this reason the inflection must serve as a head. There are at least three reasons that count against such a proposal. 1. The paradigms of determiners and nouns may differ; 2. To trigger inflection on the noun in the other paradigms it suffices that there is one adjective with inflection, which need not be the specifier; 3. The genitive of P₃ is overt only if there is *no* specifier; 4. There are a number of additional factors that determine Case realization; cf. Gallman (1994).

6.1. 'Visibility' of Suppressed Theta Roles

6.1.1. Control

As observed by Manzini (1983), passivized subjects can still serve as controllers of purpose clauses:

- (65) a. They decreased the price [PRO to help the poor]
 b. The price was decreased [PRO to help the poor]
 c. *The price decreased [PRO to help the poor]

This kind of control can be made explicit by assuming a small pro-subject in the specifier position of V:

- (66) a. They_i decreased the price [PRO_i to help the poor]
 b. The price pro_i was decreased [PRO_i to help the poor]
 c. *The price decreased [PRO_i to help the poor]

The ungrammaticality of (66-c) can now be explained by the lack of an appropriate controller.

The same point is made by Baker et al. (1989), using the following examples:

- (67) a. This bureaucrat was bribed [PRO to avoid the draft]
 b. *This bureaucrat bribes easily [PRO to avoid the draft]

In German, it is possible to passivize verbs that do not assign accusative Case. This also holds for control verbs:

- (68) a. Sie_i versuchten [PRO_i zu tanzen]
 They tried to dance
 b. Es wurde versucht [PRO zu tanzen]
 It was tried to dance

Evidently the suppressed subject still must be able to control the embedded PRO, as shown in (69):

- (69) daß pro_i [PRO_i zu tanzen] versucht wurde
 that to dance tried was

immer dann

6.1.2. Subject-Oriented Modifiers

Similarly, suppressed subjects can still serve as the subjects of predicates that Jackendoff (1972) calls 'subject oriented modifiers':

- (70) a. Die Mädchen haben die Cocktails nackt serviert

The girls have the cocktails nude served

- b. Die Cocktails sind pro nackt serviert worden

The cocktails have nude served been

This contrasts with so-called lexical passives, also called *Zustandspassiv*:

- (71) a. Die Cocktails sind serviert
 The cocktails are served

- b. *Die Cocktails sind nackt serviert
 The cocktails are nude served

Compare also Baker et al.'s examples:

- (72) a. This bureaucrat was bribed deliberately

- b. *This bureaucrat bribes deliberately

- (73) a. They decreased the price willingly

- b. The price was decreased willingly

- c. *The price decreased willingly

6.1.3. Binding to Invisible Subjects

Empty PRO-subjects when interpreted as arbitrary in reference can serve as the antecedent of impersonal anaphors:

- (74) a. [PRO_i to shave oneself_i] is fun

- b. ?*[PRO_i to shave themselves_i] is fun

This behavior is paralleled by the suppressed external subject in passive constructions; cf.:

- (75) a. Such privileges should be pro_i kept to oneself_i

- b. ?*This privilege was pro_i kept to themselves_i

There is one difference, however, between PRO and pro. Whereas arbitrary PRO can be 1st person plural, the invisible passivized argument must be 3rd person singular, at least in English:

- (76) a. [PRO to shave ourselves] is fun

- b. *Love letters were written to ourselves

In German, impersonal constructions are compatible with reflexivization or reciprocalization of an object:

- (77) a. Sie_i ermordeten einander_i;
 They killed each-other

- b. Hier wurde pro_i einander_i ermordet
 Here was each-other murdered

Again this shows that the subject must still serve as the antecedent of the anaphor. For that reason, it seems implausible that the anaphor becomes a derived subject. This raises the question of Case absorption, to which I turn in the next section.

6.2. Case Absorption

In the standard theory, the fact that the object moves to the subject position has been explained by the assumption that in this position the object cannot receive structural accusative Case. Here again the question of how passive morphology can have such an effect has not been answered satisfactorily, even in a theory without subjects in VP. The problem here is parallel to the above problem in as far as the property in question, namely Case absorption on the object, must be entirely VP-internal, regardless of whether the subject is generated inside or outside of VP. But how can the passivizer have such an effect on the verb?

The solution envisaged in Chomsky (1981) is to say that the participles in question are "passive participles" which are assumed to be defective in their ability to check Case. This is assumed to be a lexical property of these participles.

However, as shown in (78), there are two different passive constructions in German. Depending on the passivizing verbs (*werden* in (78-b) and *bekommen* or *kriegen* in (78-c)), one absorbs the accusative, and one absorbs the dative:

- (78) a. Ich schenke dem Fritz einen Cognac
 I give ART_{dat} Fritz ART_{acc} cognac
- b. Ein Cognac wurde dem Fritz (von mir) geschenkt
 ART_{nom} cognac was/gets ART_{dat} Fritz by me given
- c. Der Fritz bekommt den Cognac (von mir) geschenkt
 ART_{nom} Fritz gets/was ART_{acc} cognac by me given

But observe that there is only one type of participle involved. According to Chomsky's theory, this would force us to introduce two morphologically indistinguishable "passive participles," one that cannot check accusative, and one that cannot check dative.

The situation becomes even worse when looking at other passive constructions in German. The point is that these do not involve participles, but rather infinitives. One example is the following:

- (79) Das Buch ist (von allen) zu lesen
 The book is by everyone to read
 'the book is to be read by everyone'

Here again we find "Case absorption"; hence, one would be led to assume that there is a *zu*-infinitive that can check accusative and one that cannot. But this proliferation of lexical ambiguities that do not have any morphological reflex seems entirely misguided; in fact, the very idea that there are particular passive participles that are to be distinguished from ordinary ones seems misleading: I know of no language that has a "passive participle" that is morphologically distinct from a past participle, hence the duplication of participles in the lexicon is unmotivated.

Given that there is only one infinitive and one participle, the present difficulty is exactly parallel to the one we observed in the last section: once we select an item from the lexicon, we cannot modify its (Case checking) properties. Given the structure in (64), the auxiliary of the periphrastic construction is outside the projection of the main verb, hence it cannot exercise any influence on internal properties of the embedded projection.

It is natural to ask, then, whether Case absorption is a necessary property of passive constructions. And indeed it is not. Sobin (1985) shows that in Ukrainian, the thematic object of a passive sentence can appear in either a nominative Case form or in an accusative Case form, in more or less free variation.

- (80) a. Cerkv-u bul-o zbudova-n-o v 1640 ro'i
 church-acc/fem was-imp built-imp in 1640
 'The church was built in 1640'
- b. Cerkv-a bul-a zbudova-n-a v 1640 ro'i
 church-nom/fem was-fem built-fem in 1640
 'The church was built in 1640'

Timberlake (1976) makes the same point for North Russian dialects, Stechow and Sternfeld (1988) for Semitic languages, and Baker et al. (1989) for Welsh and Polish. An interesting survey is provided by Goodall (1993). Case absorption is obligatory in English, optional in Ukrainian, and prohibited in Kannada. Furthermore, Goodall brings in a further parameter, namely whether or not passivization can apply to intransitives:

(81)	Case absorption	Transitive Only	Transitive or Intransitive
	Obligatory	English	German
	Prohibited	Kannada	Finnish
	Optional	Ukrainian	Nepali, Norwegian

Another variant of passive-like constructions without Case absorption is impersonal transitives. Keenan (1985) and Dubinsky and Nzwanga (1994) give the following examples of impersonal constructions with 3rd person plural agreement marking on the verb:

- (82) Nzua a-mu-mono kwa meme
 John they-him-saw by me
 'John was-seen by me'
 (from Kimbundu, =(23b) in Keenan 1985)

- (83) Ba-beng-i Francine na mama
 AgrS-call-Trns Fr. by mom
 'Francine has been called by mom'
 lit.: They (impersonal) have called Francine by mom
 (from Lingala, =(5) in Dubinsky/Nzwanga 1994)

These constructions exhibit the properties listed in (84):

its Case checked. Assume that it does. What about the subject theta role in such a situation? Let us assume that the subject theta role is associated with accusative Case. Again, this combination cannot be licensed *in situ*, hence the subject has to move. But where can this combination be licensed? The answer is given in (92):

- (92) *werden_P* and *sein_Z* license accusative Case marking on the subject theta role.

The Index P on *werden* encodes that among the different functions the auxiliary may have we only consider the variant that takes a participle; Z means that *sein* in its function as a passive morpheme selects a *zu*-infinitive. The above principle in effect forces movement of a subject theta role with accusative Case into a position where this Linking can be checked. For instance, we may consider:

- (93) Der Motor_{nom,i} wurde pro_{acc,j} [t_j t_i repariert]
the engine was repaired

Now that the arguments of the verb have moved into positions where the particular combination of theta role and Case is licensed, the derivation is successful.

Principle (93) cannot be evaluated in isolation. In fact, its impact will become more clear in combination with (94):

- (94) *kriegen_P* and *bekommen_P* license dative Case marking on the subject theta role.

The effect of these principles is exactly what has previously been called “Case absorption,” although, as with theta role absorption, no real absorption ever takes place. This is illustrated again in (95):

- (95) a. Ich_{nom} schenke dem Fritz_{dat} einen Cognac_{acc}
I give ART_{dat} Fritz ART_{acc} Cognac
b. Ein Cognac_{nom} wurde pro_{acc} dem Fritz_{dat} (von mir) geschenkt
ART_{nom} Cognac was ART_{dat} Fritz by me given
c. Der Fritz_{nom} bekommt pro_{dat} den Cognac_{acc} (von mir) geschenkt
ART_{nom} Fritz gets ART_{acc} Cognac by me given

The grammatical derivation of (95-c), for example, starts with three argument positions:

- (96) a. The indirect object theta role is nominative. This Case Linking is licensed by INFL.
b. The direct object is marked as accusative. This Case Linking is licensed by (90).
c. The subject is marked as dative. This Case Linking is licensed by *bekommen*.

However, in order to make the theory work, we have to add a further assumption concerning Case assignment. This will become evident from inspecting the ungrammatical sentences in (97):

- (97) a. *Ein Cognac bekommt dem Fritz (von mir) geschenkt
ART_{nom} cognac gets ART_{dat} Fritz by me given
b. *Der Fritz wurde den Cognac (von mir) geschenkt
ART_{nom} Fritz was ART_{acc} cognac by me given

As for the well-formed example (95-c) above, let us list the properties that a grammatical derivation of (97-a) would require:

- (98) a. The direct object theta role is nominative. This Case Linking is licensed by INFL.
b. The indirect object is marked as dative. This Case Linking is licensed by (90).
c. If the subject is marked as accusative, the Case Linking cannot be licensed by *bekommen*. If the subject is marked as dative, the Case Linking is licensed by *bekommen*.

From (98-c) it follows that Case absorption can work properly only if it can be guaranteed that dative Case is not assigned both to the subject and the indirect object. We thus have to split up Case checking into two components. The first component is the Case Linking part as formulated in (90), (92), (94), and (91). The second component is Case Checking or Case assignment, which is independent of Linking. We assume that tensed INFL assigns nominative to its specifier position, and that the verb assigns structural accusative and structural dative in such a way that in a language like German, two structural Cases cannot be identical. A very strong condition that captures this requirement is formulated in (99):

- (99) **Structural Case Checking:**
a. Structural dative Case is assigned (or checked) by ditransitive verbs.
b. Structural accusative is assigned by transitive verbs.
c. Structural nominative is assigned by INFL.
d. If two Cases in the domain of a verb are the same, one must be either a lexical Case or an agreement Case.

We may consider variations on these conditions, depending, for example, on the question of whether or not non-transitive verbs may have a passive *bekommen*:

- (100) a. Wir helfen ihm_{dat}
We help him
b. *%Er bekommt geholfen
He gets helped
c. *Er wird geholfen
He is helped

If (100-b) is considered grammatical, structural dative cannot be limited to only ditransitive verbs.

- (84) a. Third person plural subject agreement is obligatory,
 b. an overt third person plural pronoun would be ungrammatical,
 c. there is an optional *by*-phrase as in ordinary passives,
 d. there is no Case absorption,
 e. there is no passive morphology.

Occasionally, it seems possible to combine passive and the impersonal constructions, cf.:

- (85) Copulatur dexteras
 Unified-pass-3pl right-acc
 (Latin, cited in Stechow and Sternefeld (1988, p. 162))

Here we find both passive morphology and impersonal third person plural morphology on the verb, but lack of Case absorption. It will be our task to find an answer to the problem of Case absorption, one that can also account for the language particular differences we have observed above.

6.3. Sketch of a Theory

6.3.1. 'Visibility'

In order to capture the behavior of suppressed but active arguments in passive clauses, I will assume, following Jaeggli (1986) and Baker et al. (1989), that the subject theta role in passive constructions, although being somehow "absorbed," is still present in syntactic structure. Unlike the above authors, however, I do not assume that the theta role goes to the participle morphology. Rather, I assume a passive projection, headed by *be* in English and by *werden* and other verbs in German, such that the theta role goes to the specifier of that projection. Adopting terminology from Kratzer (1993), this projection will also be called a **voice phrase**, abbreviated as VP. The head of the voice phrase is the passivizing verb. Given a D-structure as shown in (86),

- (86) [P e I [VP e was [VP pro killed John]]]

was is the head of the voice phrase. To derive an S-structure, we first move the *pro* subject into the specifier of the voice phrase. Next, we move *John* into SpecI:

- (87) [P John_i I [VP pro_j was [t_j killed t_i]]]

Only in this configuration can the requirements of the head of the passive voice phrase be met:

- (88) The head of a passive voice phrase must license (via spec-head agreement) a *pro* that bears an external theta role.

Finally, it is necessary to move the passive verb into INFL, where it can agree with *John*:

- (89) [P John_i was_k [VP pro_j t_k [t_j killed t_i]]]

I take (88) as a universal property of passive constructions. Thus, if a language has a passive that exhibits the properties we have discussed above, it must have a passive projection that requires and licenses a 3rd person *pro*.

Given that there is an empty NP in S-structure, the facts that call for a syntactically 'visible' but absorbed subject now follow straightforwardly from there being an empty NP that satisfies the role of reference point for the various processes we have observed above.

Similarly, we can account for two aspects of the impersonal constructions: Since there is mostly no overt passive morphology in these constructions, we simply assume an empty voice phrase, i.e. one with an empty head but with the licensing properties of passivizing overt heads. Thus we can immediately account for the theta role absorption property of impersonal transitives. One difference from ordinary passives can also be captured by a special licensing requirement: This concerns *pro*'s property of being 3pl, rather than singular as in ordinary passive constructions. Being 3pl must be built directly into the licensing property of the empty voice phrase. Another property concerns the transitivity of the construction. This is obviously a matter of Case absorption, to which we turn in the next section.

6.3.2. Case Theory

Let us now turn to Case assignment in these constructions. In what follows, I will focus on the richer Case system we find in German. I assume that the nominative, accusative, and dative Cases of bitransitive verbs are structural Cases. This means that they need not be attached directly to thematic roles drawn from the lexicon, but can be freely assigned to or checked on any thematic roles, given appropriate contextual circumstances to be discussed.

I assume the following structural Case Linking rule that checks the association of a structural Case with the required theta roles, as one would expect in the unmarked case:

- (90) **Structural Case Linking:**

Within the projection of a main verb, accusative Case is licensed on the direct object theta role, and dative Case on the indirect object theta role.

By direct object theta role I mean the theta role that is assigned to the direct object position, and analogously for indirect object theta role. Since association of theta roles with Case is free, at least in principle, this means that the direct object does not necessarily bear accusative Case. Assume, for example, that the direct object has nominative Case. Now since the link between nominative and the direct object position cannot be sanctioned in situ, nominative on a direct object theta role must be checked elsewhere. Nominative can be checked by INFL on any theta role:

- (91) Tensed INFL licenses nominative Case Linking on every theta role.

Hence, an object with nominative Case would have to move to INFL in order to get

6.3.3. Transitive Passives

We have seen above that in some languages Case absorption is optional or even forbidden. Taking the latter possibility as a point of departure, let us assume that pro needs Case, and that in such languages the voice phrase licenses a 3rd-sg-pro without Case. In order to get Case, then, pro has to move into the INFL projection. Hence it is impossible for other phrases to move there. Accordingly, it follows from the theory developed above that such a language can be characterized by (101):

- (101) A language has transitive passives if and only if the head of its passive voice phrase licenses pro_{-Case} .

This straightforwardly accounts for the lack of Case absorption: There is no Case to be absorbed. In a language with only optional absorption, the optional Case to be absorbed is accusative; hence, the passive head licenses either pro_{-Case} or pro_{acc} .

6.3.4. Impersonal Passives

German exhibits impersonal passives, i.e. passive constructions with intransitive verbs that describe an action:

- (102) *weil getanzt wurde*
because danced was
'because there was dancing'

Given that the passivized verb is intransitive, the question arises as to whether the theta role to be absorbed can be accusative, as would be required by (92). However, accusative is not the Case one would expect to be licensed with intransitive verbs, and in fact (99) has been formulated in a restrictive way so that only transitive verbs assign an accusative within their syntactic domain. For intransitive passives to be possible, two conditions must be met: First, pro must somehow receive Case. Second, the combination of Case and theta role must be licensed. Since we do not want to confuse impersonal passives with transitive ones, the mechanism that allows one must be kept distinct from the mechanism that allows the other. We therefore assume that in impersonal passives the specifier of INFL is an expletive pro, rather than a passive pro. This implies that a passive pro cannot move into that position but must receive Case elsewhere. This additional Case assignment will be performed by the passive morpheme. We thus have:

- (103) A language has intransitive passives if and only if
- the head of its passive projection assigns nominative,
 - the head of its passive projection licenses a nominative pro on certain (mostly external³) theta roles, and
 - INFL licenses an expletive pro.

³ A remarkable exception to this qualification is languages that allow impersonal passives of ergative verbs; cf. Keenan (1985).

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sample language

This yields the following combinations (cf. (81)):

type of licensed pro	predicted type of language	sample language
pro_{acc}	oblig. abs., no imp. no abs., no imp.	English Kannada
$pro_{no\ Case}$	opt. abs., no imp.	Ukrainian
pro_{acc} and $pro_{no\ Case}$	obl. abs., imp.	German
$pro_{no\ Case}$ and pro_{nom}	no abs., imp.	Finnish
pro_{acc} , $pro_{no\ Case}$ and pro_{nom}	opt. abs., imp.	Norwegian, Nepali

For the last two language types this means that nominative assignment by the passive morpheme is optional.

7. Appendix: Formal Properties of Adjunction

8. Bibliographical Comments

[to be written] HMC: Travis (1984), Do-support, economy Chomsky (1992), optimality theory Grimshaw (1993) Passive: Combines ideas from Fukui and Speas (1986), Fabb (1984), Baker (1985) and Baker et al. (1989). NegPhrase: Pollock (1989), more general: Polarity Phrase cf. Laka (1997), Culicover (1997).

Topic 6

Wh-Movement

1. Direct Wh-Questions

In the last section we postulated that in Yes-No-questions the finite verb moves to a sentence initial position we have called C. In this chapter we will discuss the nature of this position by going into the syntax of direct and indirect questions.

The formation of direct questions can be described as a process of moving a *wh*-phrase into the position immediately before the C-position. We take this position to be the specifier position of C:

- (1) a. What did John do ___
 b. Where has John gone ___
 c. What did you put ___ in the sink
 d. Who do you believe ___ came to the party
 e. Why do you believe John didn't come to the party ___
 f. What did Susan tell you that Roger had ordered me to put ___ in the vase
 g. What is it likely that Tom will try to persuade Edith to name the baby ___

These examples show that the extraction site marked by ___ can be arbitrary far away from the landing site. The next examples show that the *wh*-word that is extracted from the IP can be part of a complex construction, indicated by cornered brackets:

- (2) a. [Which pictures of John] did you see ___
 b. [Which vase] did you put the flowers in ___
 c. [Which] vase [did you think I put the flowers in ___]
 d. [How old] are you ___
 e. [Whose mother] did you say [died]
 f. [Which men] did you promise ___ to support them
 g. [For what reason] did he do it ___
 h. [In which room] did he live ___

The phenomenon that more than only the *wh*-word is fronted is called **pied piping** . In

many cases the reason for pied piping is that without it the construction would become ungrammatical:

- (3) a. *Which did you see ___ pictures of John
 b. *Which did you put the flowers in ___ vase
 c. *Which did you think I put the flowers in ___ vase
 d. *How are you ___ old
 e. *Whose did you say ___ mother died
 f. *Which did you do it for ___ reason
 g. *Which did he live in ___ room

Phrases like that in (2) which do not permit the extractions shown in (3) are called **islands** for the respective *wh*-terms they contain. Which phrases are islands for *wh*-movement? The following examples show that NPs and APs are not islands in an absolute sense:

- (4) a. Who is John [AP proud of ___]
 b. Who did John see [pictures of ___]

Hence it is an intriguing question how islandhood should be determined in a general way. If we were to say that *how* is specifier of the adjective *old*, and if similarly *whose*, *which*, and *what* are specifiers of the repetitive nouns in (3), then the ungrammaticality of the examples in (4) would follow from a condition that says that NPs and APs are islands only with respect to their specifiers. Alternatively, one might say that NPs and APs are islands for everything that is at the left of their heads. I will not try to decide the question, nor do I intend to answer the question in general. In what follows I will not assume that *how* e.g. is a specifier, and I will not discuss the issue in general, although I will crucially refer to the islandhood of some particular phrases, without making an effort to characterize islandhood in a general theory about these matters.

We have seen above that because of the phenomenon of pied piping what is fronted is not necessarily a *wh*-pronoun alone, although current terminology would describe this process as involving the fronting of a "*wh*-phrase." Unfortunately this terminology is not particularly suited within the context of a theory of projections: When speaking of noun phrases and verb phrases we imply that the head of the phrase is a noun or a verb. But in examples like (2) the phrases that are fronted are not headed by a *wh*-term. Nevertheless they are called *wh*-phrases. Ignoring this terminological sloppiness as is done in the standard literature still should not deliberate one from giving a additional characterization of what is meant by *wh*-phrase.

The above examples suggest that what qualifies as a *wh*-phrase is precisely the minimal phrase that contains a *wh*-word that could not be extracted without violating any constraints. For example, in

- (5) [See what] did John ___

the constituent *see what* cannot qualify as a *wh*-phrase because *what* alone could easily be extracted, yielding *What did John see*. However, such a characterization is both too

wide and too narrow. First, there are cases of *optional* pied piping, which imply that it is wrong to say that the PP in (6-a) can be pied piped because it would be an island:

- (6) a. With whom did you share a room ___
 b. Whom did you share a room with ___

Second, there are *wh*-islands that cannot serve as *wh*-phrases in this sense, i.e., they cannot pied pipe. For instance, *wh*-complements of verbs are islands for *wh*-movement. This can be seen by comparing the derivations in (7). (7-a) shows that the verb *know* may take an indirect question as a complement. Of course, *know* can also take a *that*-clause as a complement and (7-b) shows this clause is not an island for movement. Furthermore, the ungrammaticality of (7-c) demonstrates that we cannot extract from the embedded indirect question, hence indirect questions are islands for *wh*-movement.

- (7) a. I don't know what John bought for Mary
 b. Who don't you know that John bought a present for
 c. *Who don't you know what John bought for

But although the complement of *know* can be fronted as in (8-a) this fronting cannot be re-interpreted as pied piping of a *wh*-word inside the island; thus it is impossible to interpret (8-a) as a direct question with the same intended meaning as (7-):

- (8) a. What John bought for Mary I don't know
 b. What John bought for whom I don't know

The only interpretation (8-b) may get is

- (9) I don't know what John bought for whom

This is unexpected under the hypothesis that it is precisely all islands that can be pied piped: Although the *wh*-phrase *what(m)* is inside an island and although the island can be moved there is no way to pied pipe the island.

Because I lack precise intuitions of what are direct questions in English (as opposed to echo questions) I must leave it open how to characterize exactly the conditions on pied piping, but I will briefly take up the issue in the next section.

Another topic that will not be discussed here is that in English there must be an auxiliary in C except when a matrix subject is questioned:

- (10) a. Whose mother died
 b. *Whose mother did die

Thus it seems that C must remain empty in this case. But why? Concerning direct questions in general the first task would be to explain why C must be filled in regular constituent questions. I have seen no really satisfactory explanation that would go much beyond a mere stipulation, but a natural idea might be that movement of the verb to C is somehow triggered by movement of the *wh*-phrase to SpecC. Accordingly, one would have to stipulate that once SpecC is filled with a *wh*-phrase, C must be made visible, and since C is empty in matrix questions this can only be achieved by head

movement. But if, for some reason or other, a *wh*-subject must not move in S-structure (perhaps because subject movement would be string vacuous), there is no trigger for verb movement. Hence C can remain empty, because SpecC is – at least at S-structure.

2. Indirect Questions

Let us next discuss indirect questions. Everything we said about long distance movement and pied piping also applies to indirect questions. For instance, a good way to test whether VPs or CPs can undergo pied piping is to try to embed the construction and ask whether it can be understood as indirect questions. Thus compare (11-a), which represents a successful case of PP-pied piping, with the ungrammatical version of VP-pied piping in (11-b) and the attempted but equally unsuccessful case of CP-pied piping in : (12-b)

- (11) a. John knows [*whose* mother] Bill has visited
 b. *John knows [visited *whose* mother] Bill has
- (12) a. Bill knows *who* John believes that Mary has visited ___
 b. *Bill knows [_{CP} that Mary has visited *who*] John believes

A relevant difference to direct questions certainly is that in English there is no movement to C in English. Again this is far from being really explained; it seems just a fact of English that no movement is possible. A natural idea might be that indirect questions are selected by the matrix verb, so that the CP phrase has a property we may call +Q. Thus, compare (13-a) with (13-b); in the latter one would assume that the embedded clause has the property –Q:

- (13) a. John inquired/wondered whether the Yankees had won
 b. *John demanded/requested whether the Yankees had won

Given the mechanism of percolation along the projection line of CP it follows that +Q is also a property of C. Now recall that in matrix questions movement of the *wh*-phrase into the SpecC seems to have an effect on C, namely that it must be filled. The opposite seems to be the case in indirect questions. Here it is the fact that the head C has the Q-property that triggers movement of a *wh*-phrase into SpecC.

One might then go on to speculate that head movement is ruled out here because the C position of embedded clauses cannot serve as a landing site for a verb because this position is in fact nominal in nature (at least for languages like English). This hypothesis is somewhat confirmed by the same construction in German. Here we also have verb movement to C in direct questions but no movement in indirect ones. However, what we do find in German is that in many southern dialects we optionally have a declarative complementizer in what we have analyzed as the C position:

- (14) a. Ich erzählte [_{CP} *wen* (daß) [_{IP} wir gesehen haben ___]]
 I told who that we seen haben have

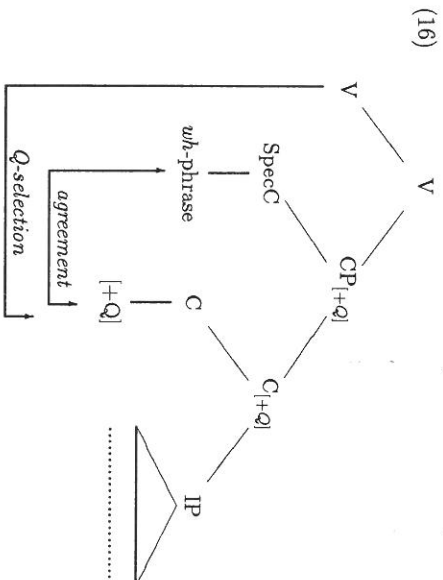
The explanation would be based on the assumption that the complementizers *that* and *daß* are nominal elements, as seems plausible for etymological reasons. Hence, in the Germanic languages under discussion the C position is nominal in embedded contexts, but is verbal in matrix contexts. Implied by this diversification is of course the assumption that neither can there be a verb in a nominal C nor can there be a complementizer in a verbal C.¹

Another widespread assumption is that *whether* in English and *ob* in German are in C. It is not really clear, however, how this fits with the observation that in some Swiss dialects *ob* and *daß* can cooccur (cf. Stechow 1993, p. 26):

- (15) Er hätt mich gfröögət ob das sii chunt
 He has me asked whether that she comes

If one sticks to the wide spread assumption that *whether* is a complementizer then either there must be more C-projections, at least in Zürich-German, or *ob* is on a par with all other *wh*-phrases, being in SpecC. If so, the only difference is that *whether* is base generated, whereas all other *wh*-phrases have to move into this position.

Let us finally return to the question of how the distribution of indirect questions can be described. In fact this is a non-trivial matter, but most (simplifying) descriptions suggest that all that has to be done is to put some relevant information into the lexical specification of the matrix verb. This means that it would be an entirely lexical matter whether or not a declarative clause or an indirect question or both can be the complement of a verb, cf. ?? above. Given that these complements are CPs, this means that we only have to specify whether or not complements bear the feature [\pm Q] that percolates to the head of CP where it has to agree with *wh*-phrases in its specifier.



Sometimes, however, things are not as simple as that. Compare

¹ All this seems to hold only for Germanic languages. In Romance the situation is different: For instance, we find V-to-C movement in Spanish indirect questions (cf. Torrego 1984), and Quebec French seems to exhibit the complementizer *que* (=that) in the matrix C position, i.e. the position we classified as verbal in Germanic (cf. Noonan (1989) and Rizzi and Roberts (1990)).

- (17) a. *Du wirst glauben, wie wenig das gekostet hat
 You will believe how less this cost has
 'You will believe how ...'
 b. Du wirst nicht glauben, wie wenig das gekostet hat
 You will not believe how less this cost has
 'You won't believe how ...'
- (18) a. ??Ich vermute, wie sich das abgespielt hat
 I conjecture how REFL this happened has
 b. Ich kann nur vermuten, wie sich das abgespielt hat
 I can only conjecture how REFL this happened has
- (19) s. Stechow and Sternefeld (1988)

Something similar can be found with the selection of infinitives:

3. Cyclic Movement

In the last two sections we were concerned with *wh*-movement and its effects on ultimate landing site of movement, in terms of a feature specification [$\pm Q$]. In this section we will focus on the description of the movement process as such. The most simplest description of the rule that is involved is the following:

- (20) Move a *wh*-phrase to SpecC.

The rule mentions both the item to be moved and the landing site of movement. Of course it would be natural to reduce the rule to an instance of move- α . In any case, one would have to specify somehow which specifier positions are appropriate for *wh*-phrases; above we have seen that the *wh*-phrase only ends up in a [$+\bar{Q}$] position in embedded clauses or in SpecC of a verbal C in matrix clauses. We may state this as an output condition on movement, which is what has become known as the *wh*-criterion.

Note that the criterion states some kind of agreement condition between C and SpecC but it is left open at which level of syntactic representation the criterion has to be satisfied. Below I will offer much empirical evidence to the effect that the criterion can hold at LF only. This brings in further complications, alongside with the associated question of which *wh*-phrases have to move and which stay in situ. For languages like German or English only one *wh*-phrase visibly moves. Thus we have (21-a) but not (21-b):

- (21) a. Who saw what
 b. *Who what saw

In many Slavic languages, however, all *wh*-phrases must be fronted, so that the analogue of (21-b) becomes grammatical. In contrast, many Eastasian languages exhibit no *wh*-movement in S-structure; however, there some overt morphological $+\bar{Q}$ -marking in C

(which in head final languages ultimately gets attached onto the verb).² These are parametric differences that have to be accounted for in one way or another; for some first steps in that direction, cf. Stechow and Sternefeld (1988). But if SpecC is empty in these languages, we must conclude that the *wh*-criterion can hold at LF only, if it is universally valid at all.

In contrast to these descriptive problems there is also a more theoretical issue that might strike one as seemingly artificial or far-fetched. The problem arises with the fact that the above descriptions of *wh*-movement are inexplicit as concerns the question of how certain long distance movements as repeated in (22) can be derived:

- (22) s.o.

We will see immediately that the following is a real and important issue: If the instruction is to move *wh*-phrases to SpecC one might ask whether or not the following derivation should be legitimate: Taking ... as an example

we in fact apply *wh*-movement twice by first moving the *wh*-term into the embedded SpecC position and subsequently move it to its ultimate landing site in the matrix clause. The effect of this splitting up of one long movement into two shorter ones would be that we might get into a position to formulate island conditions on *wh*-movement by stipulating that it is essentially local, being subject to various locality constraints to be discussed later. In effect, then, each single step of apparent long movement would satisfy the envisaged locality constraint, but the one-step-movement would not.

Let us call a rule that may apply to its own output *cyclic*. The question then is whether *wh*-movement proceeds in one step or whether it must apply in a cyclic fashion. To be cyclic means that we reach the ultimate landing site of a *wh*-phrase only by iterated application of the rule. One would be forced so only if a direct one step derivation would be ruled out by a locality restriction on rule application. If such a locality restriction exists, its most direct and general formulation is the following:

- (23) α cannot cross a CP β unless $\alpha = \text{SpecC}$ and C is the head of β .

According to (23), *wh*-movement that leaves a CP must be cyclic. This follows although we do not directly see that cyclicity is involved in the long movement constructions of English. There are however many languages that directly exhibit cyclicity. To these we turn in the following subsections.

3.1. Ancash Quechua

Ancash *wh*-movement provides direct evidence for successive cyclicity. The following data are taken from Cole (1982). Consider first the formation of *wh*-questions from simple sentences like (24):

- (24) María José-wan parlan
 María José-with speaks
 'María speaks with José.'

²Many of these languages even do not have *wh*-pronouns; ...

It is possible to leave *wh*-phrases in situ:

- (25) María pi-wan-taq parlan
 María who-with-INTERR. speaks
 'Who is María speaking with?'

And it is equally possible to move the *wh*-phrases to SpecC:

- (26) Pi-wan-taq María parlan
 Who-with-INTERR. María speaks
 'Who is María speaking with?'

In biclausal structures, we find the following patterns:

- (27) a. *Wh*-phrase *in situ*:
 [[José munan [[María may-man aywa-na-n-ta]]]]
 José wants María where-to go-nominalizer-3-accusative
 Where does José want María to go?
 b. *Wh*-phrase moved to SpecC of matrix clause:
 [may-man-taq [José munan [[María aywa-na-n-ta]]]]
 where-to José wants María go-nominalizer-3-accusative
 Where does José want María to go?

The relevant point here is that in addition we also find the following pattern:

- (28) a. Partial *wh*-movement:
 [[José munan [may-man [María aywa-na-n-ta]]]]
 José wants where-to María go-nominalizer-3-accusative
 Where does José want María to go?

Here the *wh*-element has the same logical scope as in the previous examples, hence the meaning of all examples are the same. Nonetheless (28) shows that overt *wh*-movement can stop in an embedded [-*wh*] SpecC position, leaving the ultimate landing site in the matrix clause empty. This possibility of so-called **partial movement** clearly supports the view that *wh*-movement is cyclic. See also a more complex example:

- (29) a. *Wh*-phrase *in situ*:
 [[(gam) kreinki [[María muna-nga-n-ta [José ima-ta ranti-na-n-ta]]]]]]
 you believe María want-nom-3-acc José what-acc buy-nom-3-acc
 What do you believe María wants José to buy?
 b. *Wh*-phrase moved to SpecC of matrix clause:
 [ima-ta-taq [(gam) kreinki [[María muna-nga-n-ta [José t
 what-acc you believe María want-nom-3-acc José
 ranti-na-n-ta]]]]]]
 buy-nom-3-acc
 What do you believe María wants José to buy?
 c. Partial *wh*-movement:

- [[(gam) kreinki [[María muna-nga-n-ta [ima-ta [José t
 you believe María want-nom-3-acc what-acc José
 ranti-na-n-ta]]]]]]
 buy-nom-3-acc
 What do you believe María wants José to buy?

- d. Partial *wh*-movement:
 [[(gam) kreinki [ima-ta [María muna-nga-n-ta [José t
 you believe what-acc María want-nom-3-acc José
 ranti-na-n-ta]]]]]]
 buy-nom-3-acc
 What do you believe María wants José to buy?

3.2. German

3.3. Africans

Africans has basically the same word order properties as Dutch and German. In particular, we have embedded verb second sentences and cyclic movement through the embedded SpecC position, as in analogous cases in German:

- (30) [cp Wöfir_i glaubst_j [p du t_j [cp t_i arbeiten_k [p wir t_i t_k]]]]
 wherefore believe you work we
 'For what do you think do we work?'

In Africans as in German and Dutch some *wh*-words form complex PPs together with a postposition. Movement of such a *wh*-PP will automatically pied pipe the preposition. As shown in (31-b), however, this kind of pied piping is only optional (data from Plessis (1977)):

- (31) a. *Waarvoor* werk ons nou eintlik
 wherefore work we now actually
 For what do we actually work?
 b. *Waar* werk ons nou eintlik *voor*
 For what do we actually work?

In biclausal structures, the relevant pattern is this:

- (32) a. *julle dink ons werk *waarvoor*
 you think we work what-for
 b. *waarvoor*_i dink julle t_i werk ons t_i
 c. *waar*_i dink julle t_i werk ons [t_i *voor*]

A difference to German and Dutch emerges with (33):

- (33) *waar*_i dink julle [cp [t_i *voor*]_j werk [p ons t_j]

Here the postposition has been stranded at an intermediate position on the way to the matrix COMP. Furthermore, the possibility exists that *wh*-words are doubled all the way along the cycle:

- (34) a. *Waarvoor* dink julle *waarvoor* werk ons
 wherefore think you wherefore work we
 b. *Waarvoor* dink julle *waarvoor* dink die bure *waarvoor*
 whereabouts think you whereabouts think the neighbors whereabouts
 stry ons die meeste
 argue we the most
 What do you think the neighbors think we are arguing about the most?
 (35) *Met wie* het jy nou weer *gesé met wie* het Sarie gedog *met wie* gaan
 with who did you now again said with who did Sarie thought with who go
 Jan trou
 Jan marry
 Whom did you say (again) did Sarie think Jan is going to marry?

These data again reconfirm the cyclicity of *wh*-movement. They moreover show that one of our earlier generalizations was premature: Above (cf. ??) we assumed that the process of copying is universally constrained by the all too natural restriction that the phonological material to be copied must *move*, i.e., it has to be deleted after having been copied. The examples displayed above illustrate exceptions to this rule.

Another remarkable consequence concerns an alternative analysis of examples like (30). It has been claimed that there is really no cyclic movement involved here; rather, the construction emerges from modifying a simple clause *Wofür arbeiten wir?* by stuffing in *glaukst du* as a *parenthesis*. The examples from Africans clearly show that such a treatment does not work, at least for this language. If the construction were parenthetical there would be no explanation for the reduplication of *wh*-phrases.

3.4. Iraqi Arabic

As discussed by Wahba (1992) *wh*-movement in Iraqi Arabic is optional. We may either front a *wh*-phrase, as shown in (36-a), or we can leave it in situ, as in (36-b):

- (36) a. [CP *meno*_i *Mona raadat* [CP *t*'_i *tjibir* *Su'ad* [CP *t*'_i *tisa'ad* *t*_i]]] ?
 whom_{dat} *Mona wanted* to force *Su'ad* to help
 b. [CP – *Mona raadat* [CP – *tjibir* *Su'ad* [CP – *tisa'ad* *meno*_i]]] ?
Mona wanted to force *Su'ad* to help whom_{dat}

In (36-a), *wh*-movement of *meno* ('whom') has applied in successive-cyclic fashion via two embedded [–wh] SpecC positions of infinitival clauses to the matrix [+wh] SpecC position. In (36-b), overt *wh*-movement does not take place at all. But now consider (37):

- (37) a. [CP – *Mona raadat* [CP *meno*_i *tjibir* *Su'ad* [CP *t*'_i *tisa'ad* *t*_i]]] ?
Mona wanted whom_{dat} to force *Su'ad* to help

- b. [CP – *Mona raadat* [CP – *tjibir* *Su'ad* [CP *meno*_i *tisa'ad* *t*_i]]] ?
Mona wanted to force *Su'ad* whom_{dat} to help
- In (37-a) and in (37-b), overt *wh*-movement stops in an embedded [–wh] SpecC position, and the ultimate landing site in the matrix clause remains empty. These possibilities clearly show that *wh*-movement is cyclic. From (37) we also gain evidence that infinitives have full-fledged clausal structures with their own CP.

3.5. Irish/Celtic/Welsh

Irish is a so called head initial language, i.e. in normal declarative clauses the verb precedes the subject. We may describe this pattern by assuming that the verb raises to I but the subject still remains within its VP:

- (38) [IP *bpostfaidh*_i [VP *Sile* *t*_i *é*]
 will-marry *Sheila* *him*
 'Sheila will marry him'

Irish has (at least) two types of complementizers, one for subordinated clauses ('*go*') as exemplified in (39-a), and one for relative clauses ('*aL'*') as in (39-b):

- (39) a. *deir siad* [*go* [*sileann* an t-athair [*go* [*bpostfaidh* *Sile* *é*]]]
 say they COMP thinks the father COMP will-marry *Sheila* *him*
 They say that the father thinks that *Sheila* will marry *him*
 b. an *bád* [*al* [*dhíol* an fear]]
 the boat COMP sold the man
 the boat that the man sold

We assume that (39-b) is generated by moving an empty relative pronoun (an empty operator 'Op') into SpecC. Thus, the structure of (39) is this:

- (40) an *bád* [CP *Op*_i *al* [IP *dhíol* an fear *t*_i]]
 the boat SpecC C sold the man
 the boat that the man sold

Relativization like other types of *wh*-movement is cyclic. We thus expect to get long extractions as shown in (41):

- (41) an fear [CP *Op*_i *al* [IP *deir siad* [CP *go* [IP *sileann* an t-athair [CP *go* [IP
 the man say they thinks the father
bpostfaidh *Sile* *t*_i]]]]]]
 will-marry *Sheila*
 the man that they say that the father thinks that *Sheila* will marry

According to subjacency we also would expect traces at the position of the *go*-complementizer. The interesting thing to be noted is that this expectation is corroborated

by a switch from *go* to *aL* which can be observed only if at some stage of the derivation the complementizer is adjacent to (the trace of) the relativizing operator:

- (42) an fear [CP Op; aL [IP deir siad [CP t_i aL [IP síleann an t-athair
the man say they thinks the father
[CP t_i aL [IP bposfaidh Síle t_i]]]]]
will-marry Sheila
the man that they say that the father thinks that Sheila will marry

The data are taken from McCloskey (1979). For more discussion of similar phenomena in Celtic and Welsh, cf. Harlow (1981).

3.6. Chamorro and Other Languages

[to be written] (Data from Chung (1982)) and recent LI])

3.7. Subjacency

[to be written]

There is evidence that the Subjacency condition as stated in the text (=Freidin (1993)) is more problematic than the text would like to make one believe. First, Russian allows constructions like

- (43) Whose_i did you read [t_i comments]?

Second, constructions like (46-b) in the book (=Freidin (1993)) are perfectly grammatical in German.

Third, as noted on p. 103f, constructions like (44) are grammatical even in English:

- (44) Who did you see [pictures of t_i]?

It is questionable, then, whether the condition in its present form is really universal, at least it is in need of substantial qualification.

For the remainder of this section we will dismiss with extraction from NP, concentrating on extraction from CP only. Under this premise we may reformulate subjacency in a number of different ways: By analogy to the Head Movement Constraint, we may say that *wh*-movement may not skip another *wh*-phrase, where the structural relation involved in skipping can again be spelled out by minimal command: A *wh*-phrase α minimally commands its trace β if and only if there is no other *wh*-phrase γ that commands β and is commanded by α . One possible constraint then is this

- (45) A *wh*-phrase minimally commands its trace.

Other possibilities are the following:

- (46) Chain formation may not cross a specifier of CP.

The two conditions differ in their empirical consequences; as shown in (47):

- (47) a. *What_t did who see t_i?
b. *Why_i did who come t_i?
c. Who saw what?
d. Who came why?

The ungrammaticality of these examples is explained by (45), but not by (46). This is so because only the former implies that movement of a *wh*-phrase can only effect the structurally highest *wh*-phrase, but cannot apply in

- (48) SpecC ... [*wh*-phrase ... [*wh*-phrase ...]]

← do movement

Since the *wh*-phrase that can be moved is always structurally superior to those that cannot, the phenomenon has been called **Superiority Effect**.

Fortunately there are languages like German that do not exhibit these effects; i.e. under appropriate conditions, the following is perfectly grammatical:

- (49) a. Warum ist wer gekommen ?
Why is who come
b. Was hat wer gekauft ?
What has who bought

That (45) might be too strong is also suggested by so called Connectedness Effects:

- (50) Why did who by what?

(50) should be compared with ...

It seems then, that it is more safe to assume the weaker condition (46), leaving the explanation of superiority effects to a later discussion.

The text leaves it open whether or not each CP has automatically a (possible empty) specifier position.

...

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