

So far we have examined the anaphora options of definite NPs only, and ignored in the examples cases with indefinite or quantified antecedents. This was necessary since while the latter observe the anaphora conditions we examined ((17) and (40) of Chapter 2) these conditions are not sufficient to handle all anaphora facts of quantified NPs, which seem to require a special, stronger condition. We have also considered in the previous discussion only anaphora involving non-R(reflexive or reciprocal) pronouns, since the latter, too, while observing the general anaphora conditions require a specific, stronger restriction.

(1) \**He* exploits the secretary that works for *Felix*.  
(2) \**He* exploits the secretary that works for *each of the managers*.  
The point is, however, that when we consider quantified antecedents, there are many cases where the general anaphora condition allows, inappropriately, anaphora interpretation. Compare, for example, the sentences in (3) with those in (4).

The general anaphora condition we discussed ((17) of Chapter 2) blocks coreference between any given NP and any non-pronouns in its domain, e.g. it blocks anaphora interpretation in both (1) and (2).

### 5.1.1 The problem

#### 5.1 Quantified Antecedents

- (3a) The secretary who works for *him* despises *Stiegfried*.  
(b) The fact that *she* has already climbed this mountain before encouraged *Rosa* to try again.  
(c) In *his* flat, I saw *Bill* washing the dishes.  
(4a) \*The secretary who worked for *him* despised each of the managers.  
(b) \*The fact that *he* has already climbed this mountain before encouraged *someone* to try again.  
(c) \*In *his* apartment, I saw *nobody* washing the dishes.

In all these sentences the pronoun is not contra-indexed or marked as non-coreferential with the potential antecedent by the general anaphora condition. Nevertheless, while free coreference is possible in (3) the pronoun cannot be interpreted as bound by the operator corresponding to the italicised NPs in (4). The puzzling problem about these facts, known as the 'weak crossover' cases (Wasow, 1972) is that they do not follow from semantic considerations: we can see this if we compare (4a) and (5).

- (5) The secretary who worked for *each of the managers* despises *him*.  
(6a) (Each *x*: *x* a manager) (the secretary who works for *him* despises *x*).  
(b) (Each *x*: *x* a manager) (the secretary who works for *x* despises *x*).

The unavailability of anaphora interpretation in (5) is easily explained on semantic grounds: since in the semantic interpretation of the sentence the pronoun is not in the scope of the operator corresponding to *each manager*, it obviously cannot be interpreted as a variable bound by this operator. This, however, is not the case with (4a). A rough logical formula which can reasonably correspond to this sentence is the one given in (6a), in which the pronoun is in the scope of the operator and its translation as a bound variable which would yield the formula in (6b) should be perfectly acceptable. For some reason, however, the logical formula (6b) is not expressible in English by means of sentences like (4a), which cannot be so interpreted. It is also not the case that quantified NPs cannot bind pronouns at all in natural language — they obviously can, e.g. in (7).

- (7) Each of the managers exploits the secretary who works for him.

So the unavailability of the anaphora (bound-variable) interpretation in the sentences of (4), or the difference between (4a) and (7), must be attributed to structural properties of their surface structure which the anaphora or coindexing conditions should then specify.<sup>1</sup> Postal (1970, 1971), who was the first to discuss such cases in detail, suggested that indefinite NPs obey a special restriction blocking any kind of backward generalisation. Though I shall soon argue that this is not the correct generalisation, some syntactic account is needed.

A similar famous problem arises in sentences to which *wh*-movement has applied, as we see if we compare (3) and (8).

(8a) \**Who* does the secretary who works for *him* despise *t*?

(b) \*The guy *who* those who have met *him* say *t* was dangerous was arrested.

(c) \**Who* did the fact that *he* had climbed this mountain before en-courage *t* to try again?

(9a) \**Who* did *he* say *t* was brave?

(b) \*The guy *who* I told *him* that I like *t* was offended.

(10a) *Who t* insisted that those who like *him* are crazy?

(b) *Who* did you accuse *t* of killing *his* mother?

These cases have received several analyses that will be mentioned below. Within trace theory (as e.g. in Wasow, 1972, and Chomsky, 1975), which I will assume here, the problem presented by (8) concerns anaphora (rather than the *wh*-word itself) is anaphorically related to the pronoun to its right. Within this framework, the general coreference restriction we have examined is sufficient to block the sentences in (9): the trace is not defined as a pronoun, hence in the sentences in (9), we find a non-pronoun (t) in the domain of a pronoun, which violates the requirements for anaphora. These sentences are, then, blocked in the same way as sentences like \**He said that Bill was brave* and \**I told him that I like Bill*. This same coreference restriction, however, is not sufficient to block the sentences in (8): the traces in (8) are not in the domain of the pronouns (the pronouns do not c-command the traces). Hence, the coreference restriction as stated so far permits anaphora in these cases. As with quantified NPs, it is not the case that traces can never have anaphoric relations with pronouns. In (10), where the trace happens to precede the pronoun, anaphora is permitted, while in (8), where the pronoun precedes the trace, anaphora is blocked. It is clear, therefore, that a

special restriction is needed to determine the conditions for anaphora of traces.

As observed in Chomsky (1976), what quantified NP anaphora and *wh*-trace anaphora have in common, is that in both cases an anaphoric pronoun is interpreted as a bound variable. Within Chomsky's framework the (a)-sentences below will be assigned roughly the informal logical formulae in (b).

(11a) Someone kissed Rosa.

(b) There is a person *x* such that [*x* kissed Rosa].

(12a) *Who t* kissed Rosa.

(b) For which person *x*, [*x* kissed Rosa].

(13a) The man who *t* kissed Rosa is my friend.

(b) The man *x* such that [*x* kissed Rosa] is my friend.

When such sentences contain a pronoun anaphoric to the relevant NP, this pronoun is translated, then, as the same variable that corresponds to the original position of the NP in surface structure. In the case of *wh*-trace, this is so because the antecedent itself (the trace) is interpreted as a bound variable). I will use here the term *bound anaphora* for all and only the cases where the pronoun is interpreted as a bound variable. This should not be confused with the way this term is used in much of the current EST literature, where it is a syntactic notion which does not necessarily have a unique semantic interpretation.<sup>2</sup>

The problem we face is that within this framework pronouns in all other cases are not interpreted as bound variables. Therefore, whether the pronoun is interpreted as a bound variable depends upon the antecedent it is anaphorically linked to, i.e. on whether this antecedent is interpreted either as a variable binding operator, or as a bound variable itself (as with *wh*-traces). So it turns out that a semantically determined class of NPs (the antecedents in this case) obeys a syntactic restriction which does not follow independently from their semantic properties. In Reinhart (1976), I attempted to avoid this problem by defining this set syntactically, and I will mention other attempts along such lines in Chapter 7. There is very little hope for such attempts, since it is not true that all syntactically quantified or indefinite NPs obey the special bound-anaphora condition.<sup>3</sup>

As is well known (e.g. Postal, 1971; Wasow, 1972; and Hawkins, 1978) generic and specific indefinite NPs are not subject to the bound anaphora restriction (although they are commonly believed to correspond

to variable binding operators as well). Consider the following sentences from Wasow (1972, p. 53) (the first two are quoted from Postal):

- (14a) If he has a boring wife, a man should find a mistress.  
 (b) The fact that he is being sued should worry any businessman.  
 (c) That he was not elected upset a certain leading candidate.  
 (d) The woman he loved betrayed a man I knew.

In all these cases the antecedent is an indefinite NP, but 'backward anaphora' is possible. Attempting to define the class of NPs which obey the stricter restriction on anaphora, Wasow (ibid.) has distinguished between two classes of NPs: determinate NPs include definite NPs, generic indefinites as in (14a, b), and specific indefinites, as in (14c, d). Indeterminate NPs are nonspecific, nongeneric indefinite NPs. It is only the last class of NPs that requires a stricter anaphora restriction, or, in our terms, that obeys the bound anaphora restriction.

Wasow offers several convincing examples showing similarities between the types of NPs included in the determinate NP class. However, the precise logical analysis of determinate NPs, which distinguishes them from indeterminate NPs, is still an open question. In any case, even if this distinction can be made explicit, it remains a semantic distinction and we are left where we started. Furthermore, there are many other types of counterexamples to any possible bound anaphora restriction on quantified NPs. The most famous cases are the so called 'donkey sentences' and pronouns of laziness, e.g.

- (15a) Every man who owns a donkey beats it. (Geach, 1962)  
 (b) The man who gives his paycheck to his wife is wiser than the man who gives it to his mistress. (Karttunen, 1969)  
 (c) John wants to catch a fish and Bill wants to eat it. (Partee, 1978)

In all these cases the pronoun is both outside the scope of the quantified antecedent, and does not meet the syntactic conditions allowing bound anaphora which we will examine directly. Nevertheless it can be anaphorically linked to the antecedent. Another type of problem is that there is always a difference between cases where the pronoun is singular or plural: universally quantified NPs can often control the reference of plural pronouns when they fail to bind a singular pronoun, as in (17b), and plural quantified NPs can always do so, as, e.g. in (16).

- (16a) The secretary who works for them despises all the managers.

- (b) Everybody who has any experience with them is convinced that some politicians are corrupt.  
 (17a) \*The guy who read every book in the library says that it is absolutely boring.  
 (b) The guy who read every book in the library says that they are absolutely boring.

Obviously, such counterexamples to the potential bound anaphora condition cannot be handled syntactically to begin with, since in these cases the quantified NP can control coreference also outside the sentence. For example: every boy failed the exam. Should we give them another chance? What these cases seem to have in common is that in the interpretation of the sentence, some pragmatic reference is established for the quantified NP in the discourse. So these are not cases of bound anaphora, but of coreference, where the pronoun is not interpreted as a bound variable, which is also clear from the fact that in many of the problematic cases the pronoun cannot be in the scope of the quantifier under any semantic analysis (for some discussion of this extensively studied problem see Kasher and Gabbai, 1976; Partee, 1978; and Kamp, 1980). So once an analysis of the pragmatic interpretation of such quantified NPs is found, they are not, in and of themselves, counterexamples to the structural condition I will propose here. However, they clearly indicate that there is no hope of defining the set of NPs that obey this condition syntactically.

I will postpone the conclusions to be drawn from this problem until Chapter 7, and here we will concentrate only on the question under what structural conditions a pronoun can be interpreted as a bound variable (assuming that the semantic conditions can be handled separately). For the time being, I will continue to refer to the class of relevant antecedents as 'quantified' NPs, which will include here *wh*-traces. However, in evaluating the judgements in the following sections it would be crucial that the only interpretation considered for the sentences should be the bound-variable interpretation for the pronoun, and all potentially relevant interpretations (which result, for example, from interpreting the antecedent as generic or specific) should be avoided.

### 5.1.2 The non-relevance of 'Precede'

The most common treatments of the bound anaphora condition are in terms of linear order. The condition (18) which had first been proposed (with a different formulation) by Postal (1970, 1971) is still assumed, e.g. in Chomsky (1976) and Higginbotham (1980b).

- (18) Quantified NPs and *wh*-traces can have anaphoric relations (or can be coindexed) only with pronouns to their right.

That this restriction is incorrect can be shown in two ways. First, there are many cases of impossible anaphoric relations not blocked by these restrictions; secondly, there are a few cases where the restriction incorrectly blocks possible anaphoric relations. Let us see this first in the case of quantified NPs.

We have seen already some cases where forward-anaphora of quantified NPs is impossible, e.g. (17a) or (5), repeated in (19a) and the same is true for (19b, c).

- (19a) \*The secretary who worked with *each of the managers* despises *him*.  
 (b) \*The fact that the nurse expected *one more patient* to get undressed embarrassed *him*.  
 (c) \*Since the nurse expected *one more patient* to get undressed, she shouted at *him*.

However, in these cases the unavailability of anaphora can be attributed to independent scope considerations: in standard analyses the pronoun is not in the scope of the operator corresponding to the antecedent. So, we should look at cases where no independent semantic account is possible, such as (20)–(23). (I am using the *each* of quantifiers in most of the examples since it seems to be harder to be interpreted referentially.)

- (20a) \*People from *each of the small western cities* hate it.  
 (b) \*Gossip about *every businessman* harmed *his* career.  
 (c) \*The neighbours of *each of the pianists* hate *him*.  
 (21a) \*We changed the carpets in *each of the flats* to make it look more cheerful.  
 (b) \*I placed the scores in front of *each of the pianists* before *his* performance.  
 (22a) \*So many patients called a *psychiatrist* that *he* couldn't handle them all.  
 (b) \*We fired *each of the workers* since *he* was corrupt.  
 (23a) In *Felix's* office, *he* is an absolute dictator.  
 (b) \*In *everyone's* office, *he* is an absolute dictator.  
 (24a) According to *Felix*, *he* is a real democrat.  
 (b) \*According to *every candidate*, *he* is a real democrat.

In all these examples standard logical analyses may include the pronoun in the scope of the quantified NPs. Still, despite the fact that the antecedent precedes the pronoun, the pronoun cannot be understood as bound by the operator corresponding to it. None of these cases is blocked also by the general anaphora conditions, since the pronoun does not c-command the antecedent. As we saw in Section 3.2 of Chapter 3, the sentences in (23) and (24) are examples for preposed sentential PPs, which are attached to a node higher than S, and, as illustrated by the (a)-sentences, definite NP coreference is possible in such cases, though the bound anaphora in the (b)-sentences is impossible. What all these cases have in common is that the antecedent does not c-command the pronoun, and we shall see more examples of the failure of the linear restriction when we examine the alternative c-command restriction.

An alternative formulation of the restriction on anaphoric relations or indefinite NPs was suggested by Ross (1972 b). This restriction states that the antecedent must both precede and have primacy over the pronoun, which amounts to saying that the antecedent must both precede and command the pronoun. (A similar restriction in terms of precedence-and-command was suggested briefly in Lasnik, 1976.) The problems for a restriction couched in terms of 'precede-and-command', rather than 'precede' alone, arise in environments similar to those which provide counterexamples to the 'precede-and-command' restriction on the co-reference of definite NPs. While the modified definition of command I mentioned in Chapter 1, which defines any cyclic node as relevant for the relation, can handle the sentences in (20), in all the other examples we considered in (21)–(24), the preceding antecedent commands the pronoun, so this stricter restriction fails as well. Furthermore, this restriction will fail just like (18) because the other type of counter-evidence for any linearly based account for bound anaphora holds here as well: backward-bound anaphora is possible.

- (25a) In *his* own way, however, *each man* is petitioning for the same kind of administration. (NYT, 21 Jan. 1977, quoted in Carden, 1978)  
 (b) As its major source of income, *each club* collects a playing fee from the players every half hour. (SOCIAL PROBLEMS 28, 557, 77, quoted in, Carden, 1978)  
 (26a) Near *his* child's crib *nobody* would keep matches.  
 (b) \*Near *his* child's crib you should give *nobody* matches.  
 (c) You should give *nobody* matches near *his* child's crib.  
 (27a) Thinking about *his* problems, *everyone* got depressed.

quantified NPs. Possibly this is so because they can be more easily interpreted with a referential interpretation to the *wh*-antecedent. In any case, in judging such examples their 'echo' question interpretation should be carefully avoided, since echo questions are known to violate all sentence-level restrictions.

Examples of appropriate 'backward pronominalisation' with traces are even harder to find. The examples in the case of quantified NPs (in (26) and (27) above) were of sentences with preposed PPs. *Wh*-movement is usually impossible in such cases (e.g. \**Who, in the box, put the book?*), so they cannot be used as counterexamples. However, we may look at the following cases cited by Wasow (1972), in which the pronoun does precede the trace.

- (31a) On December 23rd, the postman brought a large envelope which, when I opened it at breakfast, *t* shed a lot of silvery tinsel into my plate. [from Graham Greene]
- (b) He was the kind of man who, when *he* loses *his* collar stud, *t* bellows the house down. [from Agatha Christie]

Two alternative solutions have been proposed for the problem of anaphora in sentences to which *wh*-movement has applied. Postal (1971, 1972) has faced the problem with a derivational constraint. His constraint, summarised roughly, blocks sentences in which a *wh*-word has been fronted over (crossed over) a coreferential pronoun. As was pointed out in Wasow (1972), trace theory provides a way to capture whatever information is captured by derivational constraints (at least in the case of movement rules which leave traces). The predictions made by Postal's crossover constraint are thus identical to those made by the restriction blocking anaphoric relations when the pronoun precedes the trace. Consequently, it would also fail in exactly the same environments.

The other solution is the one suggested briefly in Keenan and Comrie (1978) for relative clauses (which can, perhaps, be extended to *wh*-movement in general). Within the framework of trace theory, their 'preferred reference condition' can be stated to require that the trace must be higher on the accessibility hierarchy<sup>4</sup> than the pronoun, or that an anaphoric relation between a trace and a pronoun is impossible if the trace is not higher in the hierarchy. As Keenan and Comrie note, when dealing with simple sentences of SVO languages, like English, their 'preferred reference condition' yields very similar results to Postal's crossover constraint, since in such languages, if a constituent *B* is to the right of a constituent *A*, *B* is usually lower in the accessibility than *A*. Thus

- (b) \*Thinking about *his* problems, I pitied *everyone*.  
(c) I pitied *everyone*, thinking about *his* problems.

In (25), (26a) and (27a) the pronoun precedes (and also commands) the antecedent, but anaphoric relations are still possible. We have already seen in Chapter 2 (Section 2.2) that no ordering solution is possible for coreference problems. That such a solution would fail here as it did in the case of definite NPs is indicated by (26) and (27). We see that in the (b)-sentences, unlike the (a)-sentences, an anaphoric relation is impossible, although prior to the preposing of the PP, as in the (c)-sentences, the same sentence is acceptable on the anaphoric reading. The differences between the (b)- and (c)-sentences also indicate that, as was the case with definite NPs, a mere distinction between anaphora options of subjects and objects will not do, since in both the antecedent is an object and the pronoun is in a PP (i.e. 'lower in accessibility'), yet anaphora is permitted only in the (c)-sentences.

Turning now to *wh*-traces, it is more difficult to illustrate the irrelevance of linear order to such cases, since many of the sentence-structures we used as counterexamples for (18) have no parallel with traces. For example, the PP in (24) is higher than COMP, so, obviously, it is not an extractable position; in the sentences in (20) extraction from the subject is impossible as illustrated in (30). Still, we may consider those cases where extraction is possible, as in (28), and note also that in (29), where extraction is difficult regardless of anaphora, it is still much worse in the (b) than in (a) cases.

- (28a) \*Who did you place the scores in front of *t* before *his* performance?  
(b) ?Which worker did you fire *t* since *he* was corrupt?  
(29a) ?Which businessman did the gossip about *t* cause a national scandal?  
(b) \*Which businessman did the gossip about *t* ruin *his* partner's career?  
(30) \*The city all the people from *t* voted for Carter will suffer a financial disaster.

These cases have the general character of the weak crossover cases just like the sentences in (8) above, namely anaphora is very difficult to obtain, despite the fact that the trace antecedent precedes the pronoun, as required by (18). We may note here that, generally, 'cross-over' judgments in the case of *wh*-traces are less clear than in the case of (genuinely)

their constraint, just like Postal's, blocks coreference in sentences like *The man that he met t*, since the trace (or the NP relativised) is lower in the hierarchy than the pronoun. However, as we saw in Section 5.1.1, within trace theory, there is no need for a special constraint to block such sentences, since they violate the general restriction on anaphora prohibiting coreference in case a non-pronoun (here the trace) is in the domain of a pronoun. When it comes to more complicated cases, like the ones discussed in this section, the constraint of Keenan and Comrie is not sufficient to block impossible coreference. For example, in (28b) the object trace should be higher on the hierarchy than the pronoun in the subordinate clause, and in (28a) both antecedent and pronoun are oblique, so the restriction does not apply to block these cases.

### 5.1.3 The C-Command Restriction

We can now see that in fact the anaphora restriction on bound anaphora operates on precisely the same syntactic domain as the restriction on definite NPs coreference. The difference is only that NPs of the first type are more limited in their anaphora options than definite NPs, which means that they obey a stricter restriction: the one given in (32). Here again I state it as a general output condition rather than an actual coindexing procedure. (The coindexing mechanism will be discussed in Chapters 6 and 7.)<sup>5</sup>

(32) Quantified NPs and *wh*-traces can have anaphoric relations only with pronouns in their c-command syntactic domain (as defined in (17) and (12) of Chapter 1).

This means that unlike definite NPs, quantified NPs cannot have any anaphoric relations outside their domain.<sup>6</sup>

As was the case with the alternative restrictions on coreference discussed in Chapter 2, the alternative formulations of the bound anaphora restriction in (18) and (32) intersect in their predictions in a large number of cases (though not as large as in the previous case).<sup>7</sup> The restriction (18) blocks coreference in all the cases where a pronoun precedes a quantified NP. In most structures of a right-branching language, when NP<sub>2</sub> is to the right of NP<sub>1</sub>, NP<sub>2</sub> does not c-command NP<sub>1</sub> (i.e. NP<sub>1</sub> is not in the domain of NP<sub>2</sub>). Hence, in such structures, when a pronoun, NP<sub>1</sub>, precedes a quantified NP, NP<sub>2</sub>, the restriction (32) blocks anaphora, since NP<sub>1</sub> is not in the domain of NP<sub>2</sub>. The way the two rules intersect in the case of 'backward pronominalisation' can be illustrated with the sentences in (33)–(36), which have the structure (37).

- (33) \*Those who know *him* are kissing *someone* in Rosa's film.  
 (34) \*Those who know *him* are drinking champagne in *someone's* film.  
 (35) \*Those who are lucky are kissing *him* in *someone's* film.  
 (36) \*Who do those who know *him* kiss *t* in Rosa's film?  
 (37)
- 
- ```

graph TD
    S1[S] --- COMP[COMP]
    S1 --- S2[S]
    S2 --- NP1[NP]
    S2 --- VP1[VP]
    NP1 --- NP2[NP]
    NP1 --- S3[S]
    S3 --- NP3[NP1]
    VP1 --- PP[PP]
    VP1 --- V[V]
    PP --- P[P]
    PP --- NP4[NP3]
  
```

In (37), NP<sub>1</sub> precedes NP<sub>2</sub> and NP<sub>3</sub>, and NP<sub>2</sub> precedes NP<sub>3</sub>. Hence the restriction (18) seems to give the right predictions, blocking the sentences (33)–(36), in which the preceding NP is a pronoun. However, if we look at the domain relations of the NPs involved, rather than their linear order, we see that in (37) an NP to the left is not in the domain of an NP to the right: NP<sub>1</sub> is not in the domain of NP<sub>2</sub>, since NP<sub>2</sub> is dominated by the VP which does not dominate NP<sub>1</sub>. The restriction (32), then, blocks bound anaphora between NP<sub>1</sub> and NP<sub>2</sub> in (33) and (36), because the pronoun is not in the domain of the quantified NP or the trace and not because the pronoun precedes it. The same is true for NP<sub>1</sub> and NP<sub>3</sub>. NP<sub>3</sub> in the PP in (37) does not c-command NP<sub>1</sub> (the domain of an NP in a PP is only the PP). Hence, anaphora is blocked, as in (34). For the same reason, NP<sub>2</sub> is not in the domain of NP<sub>3</sub> and the restriction (32) blocks anaphora in (35). The fact that 'backward pronominalisation' is usually not permitted with quantified NPs is, thus, a consequence of the requirement that the pronoun be in the domain of the quantified NP for coreference to be possible. This consequence holds, however, only for the cases in which the NP to the left is not in the domain of the NP to the right. Although this is the common case in right-branching languages, there are several structures in which NP<sub>1</sub> is to the left of NP<sub>2</sub>, but NP<sub>1</sub> is still in the domain of NP<sub>2</sub>. In these constructions, the restrictions (18) and (32) will differ

in their predictions. The other and more substantial difference in the predictions of the two restrictions shows up when the quantified NP precedes the pronoun. The 'precede' restriction (18) permits anaphora in all such cases, while the c-command restriction (32) permits it only when the pronoun is, furthermore, within the domain of the quantified NP. Thus, the two types of cases that should be examined in evaluating the alternative restrictions are I and III of (38):

|                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                   |   |                                                                          |    |                                                                           |     |                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------|----|---------------------------------------------------------------------------|-----|------------------------------------------------------------------|
| (38) anaphora is blocked by the<br>anaphora is blocked by the<br>'c-command' restriction (32)<br>'precede' restriction (18) | <table border="1"> <tr> <td>I</td><td>A pronoun follows<br/>and is not in the<br/>domain of a quanti-<br/>fied NP</td></tr> <tr> <td>II</td><td>A pronoun precedes<br/>and is not in the<br/>domain of a quanti-<br/>fied NP</td></tr> <tr> <td>III</td><td>A pronoun precedes<br/>and is in the domain<br/>of a quantified NP</td></tr> </table> | I | A pronoun follows<br>and is not in the<br>domain of a quanti-<br>fied NP | II | A pronoun precedes<br>and is not in the<br>domain of a quanti-<br>fied NP | III | A pronoun precedes<br>and is in the domain<br>of a quantified NP |
| I                                                                                                                           | A pronoun follows<br>and is not in the<br>domain of a quanti-<br>fied NP                                                                                                                                                                                                                                                                          |   |                                                                          |    |                                                                           |     |                                                                  |
| II                                                                                                                          | A pronoun precedes<br>and is not in the<br>domain of a quanti-<br>fied NP                                                                                                                                                                                                                                                                         |   |                                                                          |    |                                                                           |     |                                                                  |
| III                                                                                                                         | A pronoun precedes<br>and is in the domain<br>of a quantified NP                                                                                                                                                                                                                                                                                  |   |                                                                          |    |                                                                           |     |                                                                  |

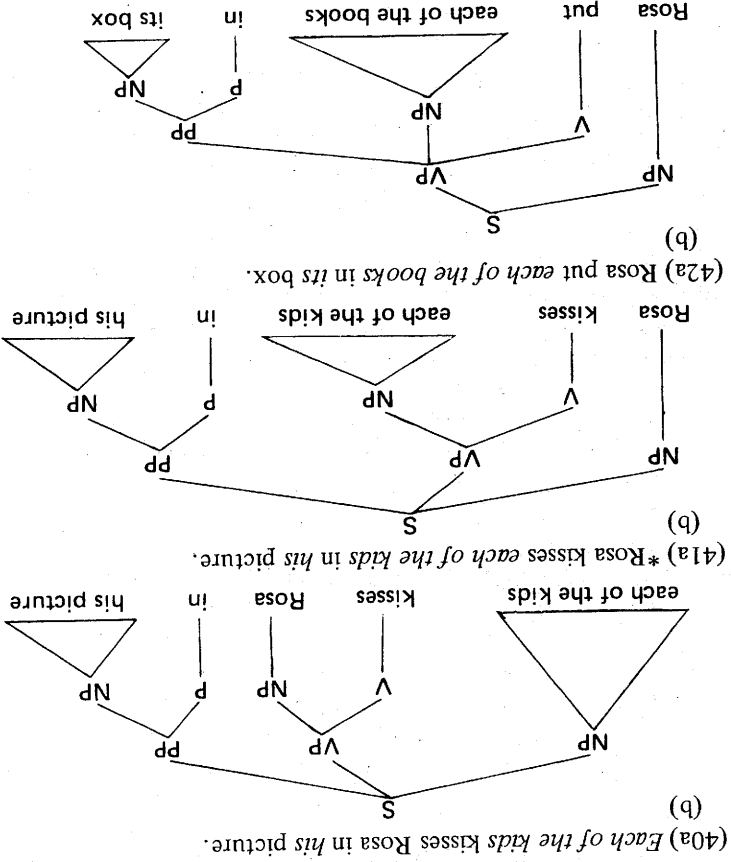
The cases of type I, unlike type III, are very common in a right-branching language, and these are the cases we should consider primarily. In fact, the counterexamples for (18) we considered in (10)-(24) and (28)-(30), some of which are repeated in (39), are of this type.

- (39a) \*The neighbours of each of the pianists hate him.  
 (b) \*People from each of the small western cities hate it.  
 (c) \*We changed the carpets in each of the apartments to make it look more cheerful.  
 (d) \*In everyone's office he is an absolute dictator.  
 (e) \*Which businessman did the gossip about t ruin his partner's career?  
 (f) \*Who did you place the scores in front of t before his performance?

For the c-command restriction these are just the expected results. In the sentences of (39) the antecedent is dominated by a PP, hence it does not c-command the pronoun, so they cannot be coindexed. Although such cases are sufficient to argue for the c-command rule, we will examine a few further supporting cases.

One test for the linguistic relevance of the c-command domain (and the non-relevance of the precede-and-command domain) which has been mentioned in previous chapters, is the asymmetry between the relations of subjects and objects to constituents dominated by S (i.e. the S which dominates the subject). While subjects have the whole

sentence in their domain, the domain of objects consists only of the VP. The same type of evidence supports the 'c-command' restriction (32): this restriction predicts that a quantified object NP cannot have anaphoric relations with pronouns outside the VP, while quantified subjects can. Let us check this first in cases with PPs:



As we saw in Chapter 3, (section 3.1) the PP in (40) and (41) is sentential, which means that it is in the domain of the subject, but not in that of the object. Consequently, anaphora is permitted in (40), but in (41), where the quantified NP *each of the kids* is in the VP, it does not c-command the pronoun, or the pronoun is not in its domain, and anaphora is correctly blocked by restriction (32). In (42), the quantified NP is also an object, but in this case the PP is verb-phrasal, hence it is in

the domain of the object and an anaphora is permitted by (32). The asymmetry of subjects and objects shows up as well in (43) and (44).

- (43a) *Anybody over 60 had to resign in order to receive his insurance.*  
 (b) \*We had to fire *anybody over 60* in order to pay his insurance.  
 (c) We had to send *anybody over 60* home to live on his pension.  
 (44a) *Anybody remotely connected with the assassination* will be arrested in spite of his alibi.  
 (b) \*The police will arrest *anybody remotely connected with the assassination* in spite of his alibi.

As was mentioned in Section 3.2, *in order to*-clauses are always sentential. Hence, anaphoric relations are permitted only when the quantified NP is the subject as in (43a). In (43b), anaphora is blocked, since the pronoun in the *in order to*-clause is not in the domain of the object. The *to*-phrase in (43c), on the other hand, is verb-phrase (arguments can be found in Williams, 1974, and Faraci, 1974), hence it is in the domain of the object and anaphora is permitted. Similarly, the *in spite of*-phrase in (44) is sentential, hence a pronoun in it can be coindexed with a quantified subject, as in (44a), but not with a quantified object, as in (44b). The examples below illustrate the same domain asymmetry between subjects and objects in cases involving traces.<sup>8</sup>

- (45a) The actress who *t* kissed Brando in *her* latest film will win the Oscar.  
 (b) \*The actress who Brando kissed *t* in *her* latest film will win the Oscar.  
 (c) \*What actress did Brando kiss *t* in *her* latest film?  
 (46a) Who *t* was arrested in spite of his alibi?  
 (b) \*Who did the police arrest *t* in spite of his alibi?  
 (c) \*The guy who the police arrested *t* in spite of his alibi has filed a complaint.

In the (b) and (c) cases, the trace precedes (and commands) the pronoun, but anaphora is nevertheless blocked, since the pronoun is not in its c-command domain.

Another test for the relevance of c-command domains is provided by sentences which have undergone extraposition. We saw in Chapter 2 (Section 2.5) that the coreference options of the matrix object in such sentences depend upon whether the extraposed S is attached to the VP or to the matrix S. In cases like (47a), the extraposed sentence is attached

to the VP, while in the case of result-clause extraposition as in (47b) or extraposition from NP as in (47c), the extraposed sentence S<sub>2</sub> is attached to the matrix S.

- (47a) \*S<sub>1</sub> It [VP amused *him* [S<sub>2</sub> that so many people wrote to Brando]]]  
 (b) S<sub>1</sub> So many reporters [VP called *him*] [S<sub>2</sub> that Brando couldn't answer them all]  
 (c) [S<sub>2</sub> Many people [VP hate *him*] [S<sub>2</sub> who had the chance to work with Brando on a film]]

Consequently, in the case of definite NPs, the general restriction on anaphora blocks coreference in (47a), where the NP in S<sub>2</sub> is in the domain of the object and, thus, must be a pronoun in order to be coreferential with the object. But it permits coreference in (47b) and (47c), since the extraposed S<sub>2</sub> is not in the domain of the object (being outside the VP), and thus, there are no restrictions on coreference options of the object and NPs in S<sub>2</sub>.  
 In the case of quantified NPs, the situation is reversed — 'forward promonominalisation' is permitted only in the structure where 'backward promonominalisation' of definite NPs is blocked:

- (48a) It surprised *each of the candidates* that he was not elected.  
 (b) \*So many people interviewed *each of the candidates* that he couldn't remember them all.  
 (c) \*Many people interviewed *each of the candidates* who knew nothing whatsoever about his background.  
 (49a) It surprised *nobody* that he wasn't elected.  
 (b) \*Many people interviewed *nobody* who had nothing to offer him.  
 (50a) Who did it bother *t* most that he wasn't elected?  
 (b) \*The actor whom so many reporters called *t* that he couldn't see them all is now in Paris.  
 (c) \*Which book do people recommend *t* most who know anything about it?

The domain relations of the objects and the NPs in the extraposed clauses are, of course, identical to those in (47). The restriction on bound anaphora applies, thus, to precisely the same domains. However, since this restriction permits an anaphoric relation only in case the pronoun is in the domain of the quantified NP, it blocks anaphora in the



(b)- and (c)-sentences, where the object does not c-command the pronoun. In the (a)-sentences, on the other hand, the pronoun is properly in the domain of the NP, and anaphora is possible. ('Backward pronominalisation' parallel to that of (47b, c) is blocked in the case of quantified NPs, since an NP in the extraposed clause does not c-command anything outside this clause).

The asymmetry of subjects and objects shows up again in sentences of this type. The c-command restrictions predicts that pronouns in extraposed sentences of types (b) and (c) in the sentences above (i.e. cases where the extraposed S is attached to the matrix S) can be anaphoric to quantified subjects of the matrix sentence, since the subject, unlike the object, does c-command the extraposed S. That this is indeed the case is illustrated in (51). And compare also (22a), repeated in (52a) to (52b).

- (51a) *Each of the candidates* was interviewed by so many people that *he* couldn't remember them all.  
 (b) *Nobody* was interviewed who didn't bring *his* c.v. and proofs of *his* loyalty.  
 (c) The actor who *I* received so many phone calls that *he* couldn't answer them all is now in Paris.  
 (52a) \*So many patients called a *psychiatrist* that *he* couldn't handle them all.  
 (b) A *psychiatrist* was called by so many patients that *he* couldn't handle them all.

We have seen that there is considerable evidence supporting the c-command restriction on bound anaphora in cases of type I of (38) – namely, cases where the precede (or precede-and-command) restriction permits anaphoric relations, while the c-command relation blocks them. We should check now the other type of non-intersecting prediction of the alternative restrictions, namely III of (38), where the c-command restriction permits 'backward anaphora', which is prohibited by the precede (and command) restriction.  
 There are much fewer structures of this type (in a right-branching language) and the major cases are sentences with preposed constituents. In such structures a pronoun in the preposed constituent can be bound by a quantified NP in the main clause, as we already saw in examples (25)–(27) of the previous section, two of which are repeated in (53) and (54).

- (53a) Near *his* child's crib *nobody* would keep matches.

- (b) \*Near *his* child's crib you should give *nobody* matches.

- (c) You should give *nobody* matches near *his* child's crib.

- (54a) Thinking about *his* problems, *everyone* got depressed.

- (b) \*Thinking about *his* problems, I pitied *everyone*.

- (c) I pitied *everyone*, thinking about *his* problems.

- (55a) For *his* birthday, each of the employees received a Mercedes.

- (b) \*For *his* birthday we bought *each of the employees* a Mercedes.

Given the full definition of c-command (see (17) of Chapter I) the subject c-commands nodes attached to S, hence it c-commands the pronoun in the PP in the (a)-sentences. As predicted by (32), bound anaphora is permitted, although the pronoun precedes the antecedent. The same subject-object asymmetry we observed before shows up here as well: in the (b)-sentences, the object does not c-command the pronoun and bound anaphora is impossible. Before the preposing of the PP in the (b)-sentences as in (53c) and (54c) the object c-commands the PP and anaphora is permitted. Other constructions of type III of (38) in a right-branching language are cases with double objects, or indirect objects which c-command the preceding direct object. (It would be recalled that in Section 2.6 of Chapter 2 indirect objects were analysed so as to c-command nodes in the VP.) It seems indeed that in such constructions bound anaphora is sometimes possible as, e.g., in (56).

- (56a) We are . . . lawyers who go into court to . . . return to *her* classroom a *pregnant girl* illegally suspended from school'. (Adversisement, Children Defense Fund, Nov. 78, quoted in Carden, 1978.)  
 (b) We are lawyers who go into court to return to *his* classroom *each of the students* who were suspended for political activities.

In the real-discourse example (56a), the antecedent is specific, so this example is not sufficient for our purposes. However, it seems that (56b) with a genuinely quantified antecedent is also possible. It may, nevertheless, be argued that the NP shift which applied to these examples is a later stylistic rule, in which case the bound anaphora rule applies to the underlying structure where the pronoun follows the antecedent. While bound anaphora in examples where this could not be the case is harder, it seems, nevertheless, that the sentences (57)–(59) are not altogether impossible, but perhaps require some discourse justification, as is always the case with backward anaphora.<sup>9</sup>

- (57) ?The secretaries reported the progress on his project to each of the managers.  
 (58) ?We will give his examination back to every student who shows up between 8 and 10 a.m.  
 (59) ?You may show his files to each patient who wants to see them.

We may conclude that the c-command restriction (32) comes much closer to handling the bound anaphora cases than the linear restriction (18). There are still several types of structures where the c-command restriction, as stated, fails systematically to capture the facts. Since these structures represent general problems for the c-command rules (and not just for the bound anaphora condition) I will discuss them all together in Chapter 8. Here, however, we may look at Higginbotham's (1980b) counterexamples to the c-command restriction on bound anaphora that I have proposed here and in Reinhart (1976). Higginbotham offers two types of structures where the c-command restriction seems to be violated. The first are cases where the quantified NP is the determiner of a possessive NP as in (60)–(61).

- (60) *Every boy's* mother thinks *he* is a genius.  
 (61) *Whose* mother loves him?

Anaphora in such cases is possible for many speakers, although the antecedent c-commands the pronoun. This, indeed, is one of the general problems for c-command, which I discuss in Chapter 8, and I propose there an (*ad hoc*) modification of c-command to handle these problems in English. (As noted by Higginbotham the possibility of anaphora in such cases might be language-specific.) The other type of structure involves a quantified PP embedded in a quantified NP as in (62).

- (62) Every daughter of every professor in some small college town wishes she could leave it.  
 (63a) \*Every daughter of some professor in each of the small university towns hates it.  
 (b) \*Some jokes about everyone upset him.

While it is true that anaphora is possible in (62) although the antecedent does not c-command the pronoun, it is also the case that the antecedent in this example is specific. Hence, this may be simply a case of co-reference rather than bound anaphora. Once we consider genuinely quantified antecedents, as in (63), anaphora is much harder to obtain.

## 5.2 Reflexive and Reciprocal Pronouns

It would seem then, that such structures do not systematically violate the c-command restriction, but the counter examples they still provide require further study.<sup>10,11</sup>

- (64) \*Zelda bores himself.  
 (65) Zelda bores him.

R(reflexive or reciprocal) pronouns unlike regular pronouns, do not have a deictic or referential use. Their reference can be obtained only from an antecedent in the sentence. For example, a sentence like (64) where the R-pronoun has no intrasentential antecedent is uninterpretable, unlike the sentence in (65).

This means, then, that R-pronouns are interpretable only as bound variables. (This will become clearer in Chapter 7.) We should note, however, that R-pronouns and particularly the reflexive ones can also be used emphatically, or as marking point-of-view (see, e.g. Cantrell, 1974), and in that use they are known to violate sentence-level restrictions. We will not consider this pragmatic use of R-pronouns, but only their standard use, in which they are interpreted as bound variables. If the bound anaphora condition we examined restricts the interpretation of pronouns as bound variables, we would expect it to apply also in the case of R-pronouns' interpretation, and this is indeed the case. While R-pronouns obey also further conditions not applying to quantified NP anaphora, they cannot be anaphoric to a non c-commanding NP, as illustrated in (66)–(67).

- (66a) \*Felix's wife respects himself.  
 (b) \*The rumour about the new neighbours bothered each other.  
 (67a) \*I spoke about Rosa with herself.  
 (b) \*I put near the boys each other's toys.

As with the other cases of bound anaphora, the linear order does not play a role in determining anaphora options of R-pronouns. In the (a)-sentences below, the pronoun precedes the antecedent, but since the antecedent c-commands the pronoun, anaphora is permitted.

- (68a) Which fancy story about himself did Felix tell you this time?  
 (b) \*Which fancy story about himself did you tell Felix this time?

- (69a) *To each other the women introduced the smartest men.*  
 (b) *\*To each other, the woman introduced the smartest men.*  
 (c) The woman introduced *the smartest men* to each other.  
 (70a) In each other's arms, *the lovers* found peace.  
 (b) *\*In each other's arms, God gave the lovers peace.*  
 (c) God gave *the lovers* peace in each other's arms.

The subject-object asymmetry typical to c-command domains is also observed in these examples. In the (b)-sentences, where the potential antecedent is the object rather than the subject, anaphora is impossible. Before the preposing of the PP, on the other hand, the R-pronoun is in the domain of the object, and anaphora is, indeed, possible as in (69c) and (70c).  
 The same subject-object asymmetry can be observed also in cases which do not involve PP preposing:

- (71a) *Felix and Zelda* are adored in each other's family.  
 (b) *\*Everyone* adores *Felix and Zelda* in each other's family.  
 (72a) *Felix and Zelda* always come out perfect in each other's stories.  
 (b) *\*People* always adore *Felix and Zelda* in each other's stories.

As we saw in Section 3.1, the PPs in (71) and (72) are sentential. Consequently, they are in the domain of the subject but not of the object. An R-pronoun in this PP can be anaphoric with the subject, as in the (a)-sentences, but not with the object, as in the (b)-sentences.  
 Just as in the case of quantified NP anaphora, there are several cases where the c-command bound anaphora restriction systematically fails. In Chapter 8 where we will consider these cases we shall see that the bound anaphora restriction fails in the same environments in both cases, which suggests that, regardless of the details of c-command, quantified NP anaphora and R-pronoun anaphora obey the same bound anaphora conditions.<sup>12</sup>  
 However, as is well known (see e.g. Chomsky, 1973), R-pronouns obey a further specific restriction which distinguishes them from regular pronouns. Roughly, they can be bound within their S or NP cycle, but not, for example, in (73).

- (73a) *\*Zelda* believes that *Felix* adores *herself*.  
 (b) *\*The managers* like *Zelda's* presents to each other.

In Chomsky (1981) the syntactic environment which allows reflexivisation is defined as the minimal governing category, a notion which will

## Notes

(74) follows essentially the formulation of the R-pronouns rule in Chomsky (1981), and we shall see more of the details of this system in the next chapter.

- (74) An R-pronoun must be interpreted as anaphoric (or coindexed) with, and only with, a c-commanding NP within a specified syntactic environment, e.g. its minimal governing category.

1. It is interesting to note that Bach and Partee (1980), who provide the only systematic attempt I am aware of to define all the anaphora conditions on semantic rather than syntactic representations (or at least on a level of logical syntax), do not provide a condition capturing these 'crossover' cases but rather note that 'some constraint will have to be placed on the syntactic operations of our Theory' (p. 18 of the original ms.), i.e. they acknowledge that a syntactic condition might be needed for these cases.  
 2. Since 'bound' is an established and recognised semantic term it seems to me more reasonable to maintain its use for semantic phenomena and to invent a different name for the relevant syntactic phenomena, rather than conversely. In Section 7.3.2 I suggest that the appropriate syntactic term may be simply 'co-indexed'.  
 3. A similar criticism of the syntactic attempt in Reinhart (1976) was made in Bosch (1980), who mentions several of the cases I bring below.  
 4. The Accessibility Hierarchy suggested by Keenan and Comrie is given in (i):  
 (i) Subj DO IO Object of Preposition Possessive NP Object of Comparatives  
 NPs higher in the hierarchy can more easily be relativised or extracted.

5. A similar condition, using *in constructing* with, has been proposed by Evans (1977, 1980). But Evans's condition assumes also linear order, requiring that the pronoun must be both to the right of and in construction with (i.e. c-commanded by) the antecedent.  
 6. As is well known, two occurrences of the same quantified NP can never be coindexed (i.e. they cannot be interpreted as operators binding the same variables). This is captured by (32) which allows quantified NPs to have anaphoric relations only with pronouns (in their domains). It would appear that this formulation of (32) does not allow coindexing of a trace by a c-commanding trace in COMP (in the case of iterative *wh*-movement, since traces can be coindexed only with c-commanded pronouns, and the c-commanded trace is not a pronoun). However, when we consider the actual coindexing procedure for such cases in Chapters 6 and 7, we will adopt Chomsky's (1981) output conditions on coindexing, where this problem does not arise, since they restrict only anaphora options of NPs in argument position' (i.e. not in COMP). An NP trace can still be coindexed with another NP since NP traces are defined as anaphors (like R-pronouns).

7. We saw in the previous section that if the restriction on bound anaphora has to mention precede, then a more adequate formulation seems to be that of Ross (1972b), which requires that the antecedent must both precede and command the pronoun, and which can be reformulated as in (i):

- (i) A quantified NP can have anaphoric relations only with pronouns to its right which are commanded by it.

The restriction in (i) has a much larger intersection with the c-command restriction in (32) than does the restriction in (18). Nevertheless most of the examples we will consider count against (i) as well.

8. As is often the case with bad anaphora in *wh*-sentences, it is much improved if the sentences are interpreted as 'quiz-show' or 'echo' questions. Thus (45c) and (46) are unacceptable as a genuine request for information. I should mention that, possibly, there is another structure of type III of (38) (namely an NP to the left is c-commanded by an NP to the right) in which the c-command restriction does not fare so well: in coordinate NPs as in (i), anaphoric relations are impossible in the (b) cases, where the pronoun precedes.

- (ia) *Each of the employees and his wife* will be invited to the party.  
 (b) *\*His wife and each of the employees* will be invited to the party.  
 (c) *?His wife and Ben* will be invited to the party.

There may be some special discourse constraint on coordinate constructions, which is indicated by the fact that coreference with definite NPs in (ic) is also hard to get. However, (ib) is much worse. If conjoined NPs are analysed as sister nodes, this is a counterexample to the c-command restriction which requires an *ad hoc* constraint. However, it is possible that, as proposed in Ross (1967), the second conjunct forms a constituent with the *and*, in which case the antecedent in (ib) does not c-command the pronoun. See also footnote 7 of Chapter 2.

10. Particularly, it seems that the cases with *wh*-antecedents of this structure, which are mentioned by Higginbotham, are generally acceptable, as illustrated in (i).  
 (i) Which books about which politician annoyed *him* (this year)?  
 (ii) Which books about which politician were published this year?

Possibly, cases like (i) have a restricted use which is not truly quantificational: It seems that a multi-value answer (e.g. a book about Carter and a book about Nixon) would not be as natural here as it is with a regular question of this type, as in (ii) (See also note 8). However, in the absence of an analysis along such lines, they still are a problem for the c-command rule.  
 As pointed out in Reinhart (1976), sentences of this quantificational type pose a problem for the c-command restriction on the interpretation of scope, which they shall examine here in Chapter 9. However, it does not follow automatically that they should present a systematic problem for the bound anaphora condition as well. If, as I argue in Chapter 7, bound anaphora is determined by surface-structure indexing, independently of the assignment of quantifier scope, we may get, in principle, cases where a given quantified NP has a pronoun in its scope, but it cannot, nevertheless, bind it.  
 11. Bach and Partee (1980) also argue against the c-command restriction proposed here and in Reinhart (1976). In the only counterexample they cite, given in (i), we seem to disagree on the judgment.

- (i) Every student claimed that one of his professors was a genius in order to influence *her*. (Bach and Partee, 1980, p. 65)  
 (ii) Some student claimed that none of his professors is a genius in order to upset *her*.  
 However, even if anaphora is possible in (i), Dowty (1980) has pointed out that the pronoun in this sentence can be analysed in the intended reading as (Cooper's) contextual interpretation is inapplicable, anaphora is impossible. So it seems that this example falls under the more general problem of the interpretation of apparently referential quantified NPs.  
 12. Since R-pronouns can occur only in a restricted set of syntactic environments (which we shall specify directly), most of the supporting tests for the c-command restriction are not available here. The counterexamples here seem, therefore, more striking. Because of these counterexamples, the c-command restriction on R-pronouns which was proposed in Reinhart (1975b) was not included in Reinhart (1976). However, in view of the fact that quantified NP anaphora poses precisely the same problems for c-command, there is no reason to assume that a different restriction is needed for R-pronouns.