THE EQUI-NOC-TIAL QUANDARY*

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This article is part of work in preparation on possible coreference relations between NPs in free adjuncts and NPs in main clauses. Here we omit the discussion and analysis of a large body of examples, and instead concentrate our attention on the attachment of free adjuncts in phrase markers. We examine the c-command condition on antecedent-anaphor relations, and suggest that c-command cannot decide in favour of the attachment of the free adjunct to a particular node in a phrase marker. A new proposal is put forward for the conditions on which Equi-NP deletion is dependent. A comparison of a transformational and an interpretive approach to free adjuncts reveals no significant differences in descriptive power with respect to antecedent-anaphor relations.

1. ANAPHORIC ELEMENTS AND FREE ADJUNCTS

We will not attempt to provide an exhaustive list of possible anaphoric relations (see Koster 1979 for an extensive survey, and Wasow 1979 for discussion). We mainly focus on one major category of what we call anaphors, namely the definite pronominals *I*, *me*, *you*, *he*, *him*, *she*, *her*, *it*, *we*, *us*, *they* and *them*. As far as free adjuncts are concerned, we analyse these structures as *surface tenseless sentence adverbials*, which may have various forms.[1] An example of a free adjunct is (1), in which the free adjunct is italicized.

(1) *Staring defiantly at Ben*, William fought back his tears.

In Beukema (1980) a proposal for the description of free adjuncts in terms of a transformational-generative approach is outlined. We provisionally adopt this proposal as the framework within which the occurrence of anaphoric

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[1] For further details of the various surface forms of free adjuncts see Beukema (1980).

elements will be investigated. For the purpose of this article, it is sufficient to point out that there are two major sub-types of free adjuncts. There is a category of free adjuncts which does not have an NP to the left of the verb, and a category which has. (1) is an example of the former, while an example of the latter category is provided in (2).

(2) *Cloten no longer having a head*, Imogen mistook him for Posthumus.

Obviously, in (2) the NP *Cloten* in the free adjunct cannot be interpreted as coreferential with the NP *Imogen*, the subject of the main clause. This is not to say that there are no examples in which there is a coreference relation between an NP to the left of the verb in the free adjunct and an NP in the main clause. An example of such a coreference relation is given in (3).[2]

(3) *William* having no money, *he* could not afford venison.

If, on the other hand, the free adjunct does not have an NP to the left of the verb, as in (1), the subject of the main clause *William* in (1) is interpreted as coreferential with a deleted NP to the left of the verb, i.e. in (1) it is William who's staring at Ben and who is fighting back his tears.[3]

2. C-COMMAND

In a transformational-generative approach specific structural conditions are imposed on possible anaphoric relations. One such requirement, which has been widely discussed in the literature, is the so-called 'c-command' condition (see Koster 1979:19, Reinhart 1976 and Culicover 1976). This condition can be described very loosely as follows:

(4) A node X c-commands a node Y if and only if the following conditions hold:
    1. X does not dominate Y,
    2. X is not the same as Y, and
    3. the first branching node dominating X also dominates Y.

We will illustrate this condition with example (5).

(5)
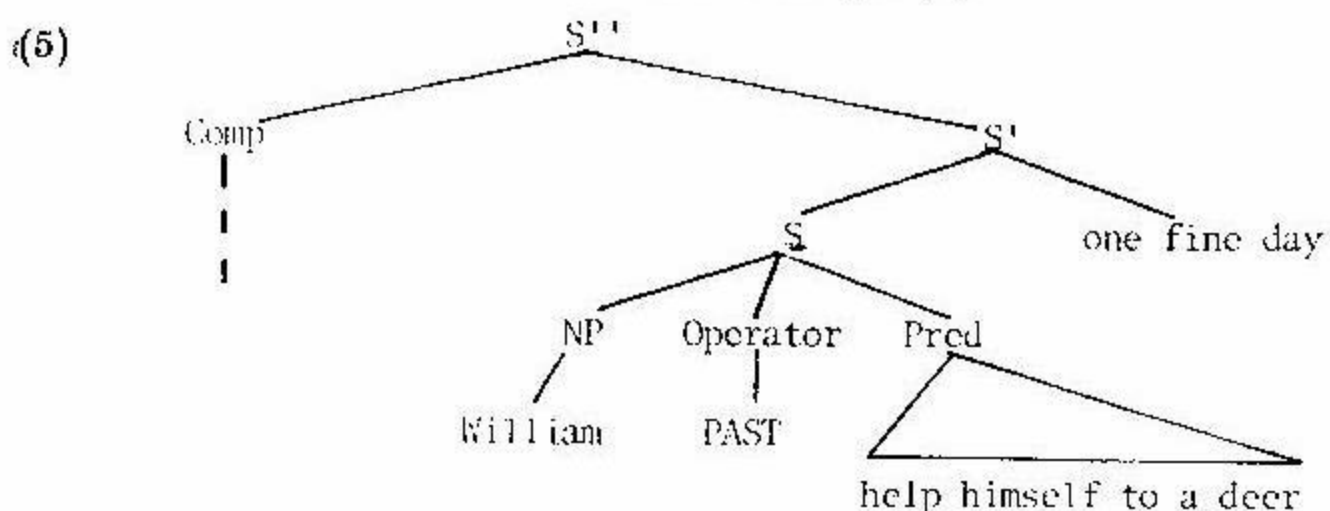
[2] For convenience we italicize the coreferential elements in the free adjunct and main clause.

[3] There are also examples of free adjuncts in which a coreference relation as in (1) and (3) does not hold. See example (36) and note 7.

In this example the NP *William*, the antecedent, and the anaphor *himself* can be interpreted as coreferential, because *William* c-commands *himself*: *William* does not dominate *himself*, and the first branching node S dominates both *William* and *himself*. Note that *one fine day* c-commands any element contained in S: here the first branching node is S'. Similarly, any single element in Comp c-commands any element contained in S': here the first branching node is S".

If c-command is involved in the establishment of coreference relations, this would seem to have implications for the place where free adjuncts can be attached in phrase markers. In Beukema (1980) the following deep structure configuration for free adjuncts is put forward (the free adjunct in this tree is circled).

(6)
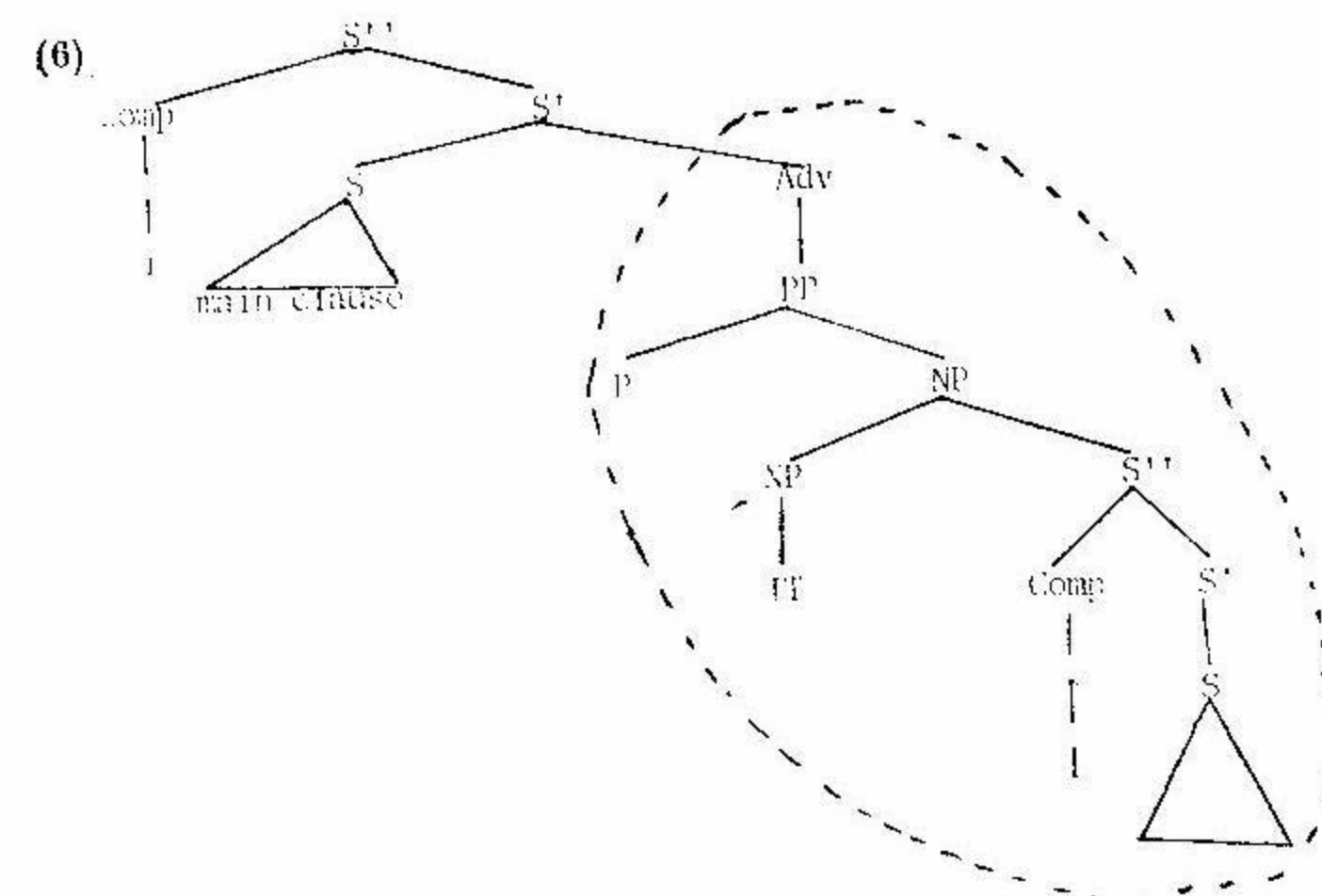
Suppose that this structure is filled in as follows:

(7)
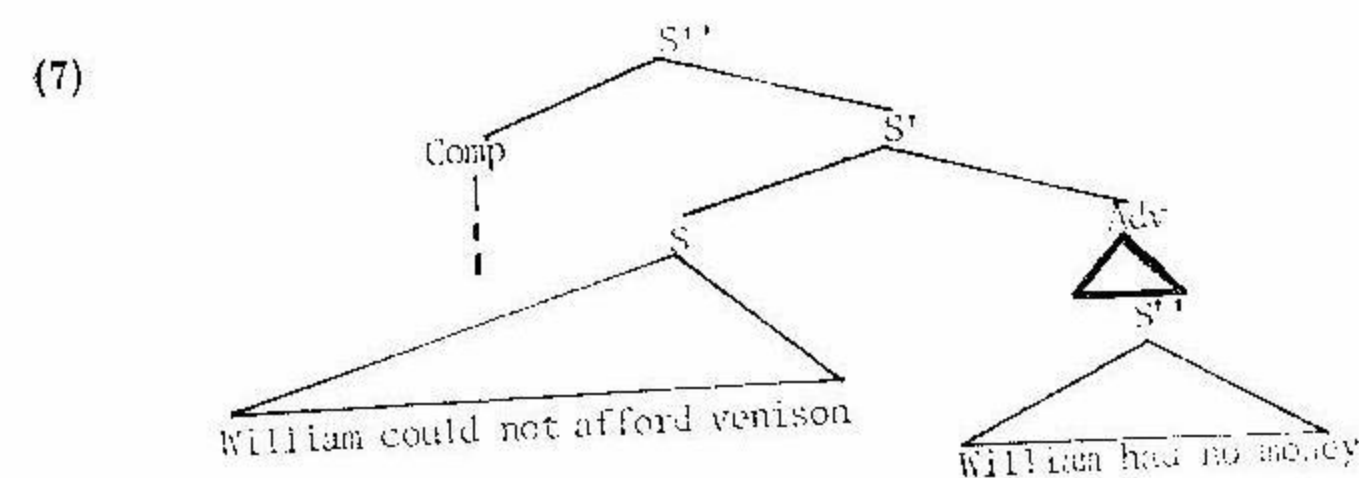
In such a deep structure, the antecedent *William*, the subject of the main clause, does not c-command the anaphor *William*, the subject of the free adjunct. However, when the anaphor *William* is deleted, i.e. when the free adjunct does not have an NP to the left of the verb (or, to put it differently, when there is an empty NP to the left of the verb in the free adjunct), the resulting sentence (8) cannot but be interpreted as a coreferential structure.

(8) William could not afford venison, having no money

We conclude therefore that the proposal in Beukema (1980) is at variance with the c-command condition.

The analysis of free adjuncts presented in Beukema (1980) was motivated by the desire to capture structural relations between different surface types of free adjuncts. One of the questions to which this paper addresses itself is whether a generalized description of the syntax of free adjuncts which accounts for their various surface forms can be reconciled with the much-vaunted c-command condition as a structural condition to be imposed on all antecedent-anaphor relations.

In order to see whether this is at all possible, we will consider the various nodes to which free adjuncts may potentially be attached, and examine the implications for both the c-command condition and the syntax of free adjuncts. If it should turn out that c-command and a generalized description of free adjuncts are not reconcilable, we may have to relinquish either the one or the other.

As a first step in this investigation let us lower the free adjunct in (7) by one node and attach it as a daughter of S. The relevant tree-structure is provided in (9).

(9)
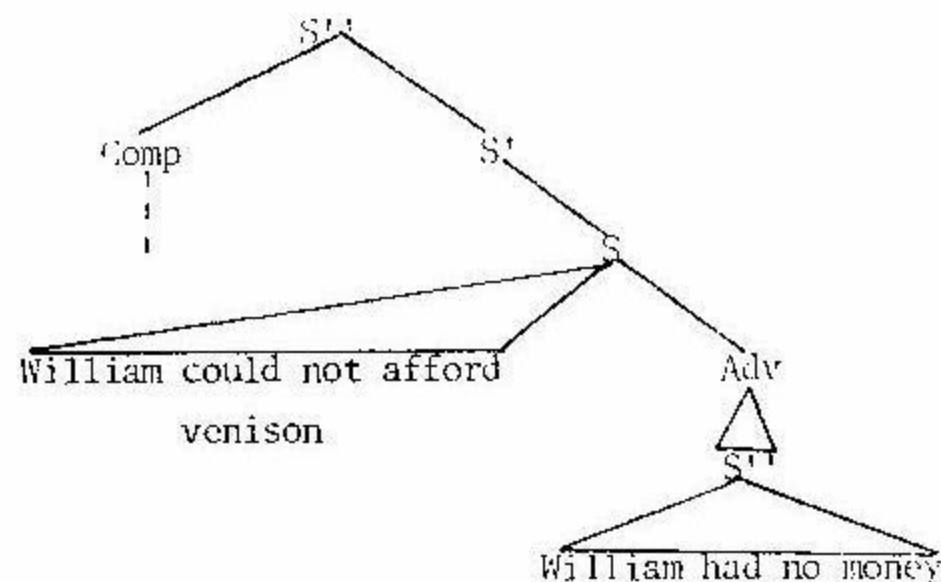
In the diagram in (9), the antecedent NP *William* c-commands the anaphor NP *William*, the subject of the free adjunct. Note that the c-command condition would also hold if the free adjunct adverbial was attached as a daughter of a lower constituent inside S, e.g. Pred. Because (9) meets the c-command con-

dition, it may seem that the analysis presented in (9) is to be preferred to that of (7). However, if it could be shown that c-command cannot be a condition on *all* antecedent-anaphor relations, the need to attach the free adjunct as a daughter of S would disappear.
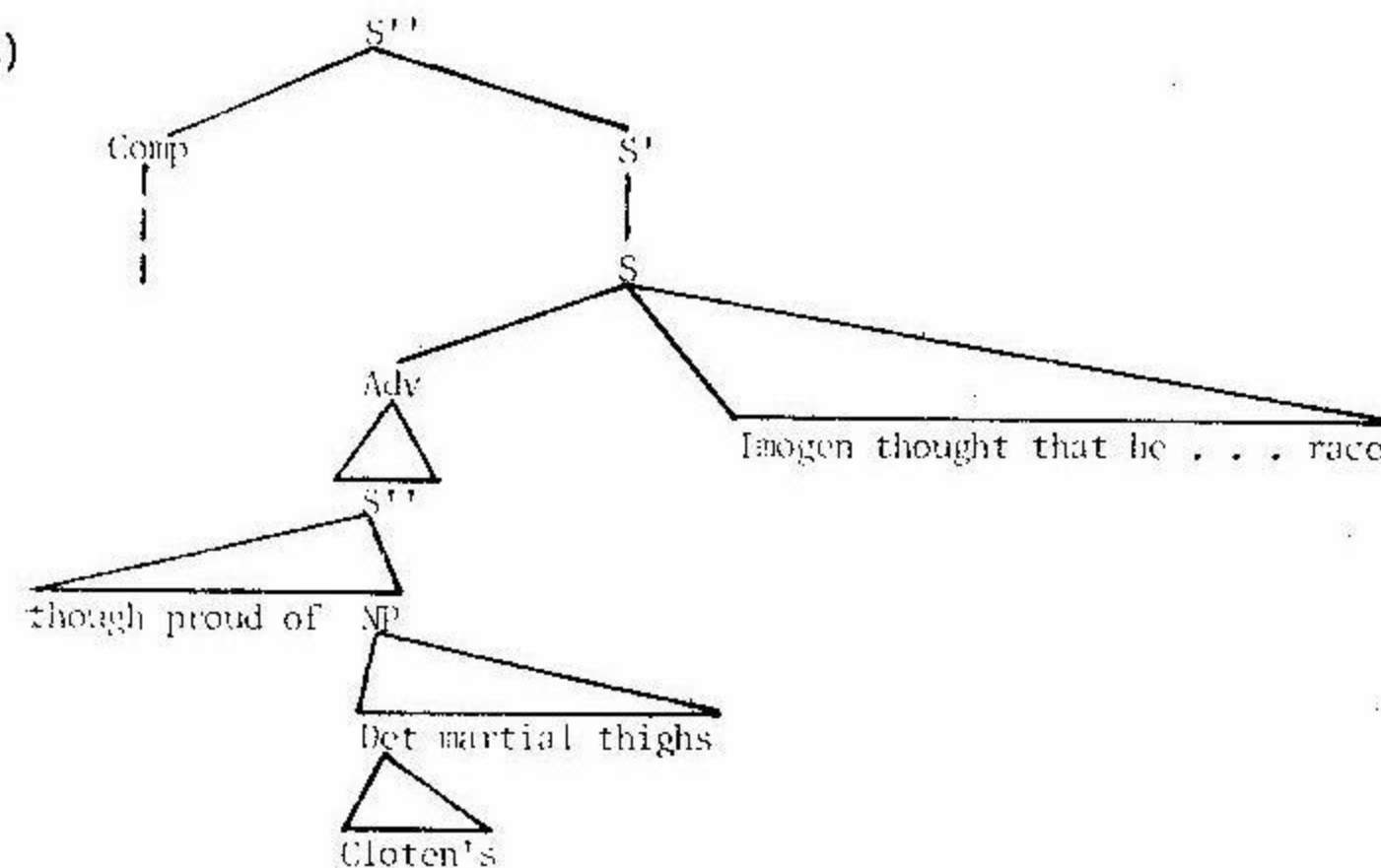
3. WHY C-COMMAND FAILS

Consider the following example.

(10) Though proud of *Cloten's* martial thighs, Imogen thought that *he* was no good in this race

Let us suppose that this sentence has the following rough underlying structure:

(11)

In this deep structure the free adjunct Adv is attached as a daughter of the main clause S. For a proper antecedent-anaphor relation the antecedent *Cloten* must c-command the anaphor *he* in the main clause. However, this is not the case, since the main clause S is not the first branching node dominating both antecedent and anaphor; the first branching node over the antecedent *Cloten* is an NP, which does not dominate the anaphor *he*. Note that in an analysis of (10) similar to the one presented in (7), the antecedent *Cloten* would not c-command the anaphor *he* either. In fact, wherever we attach the Adv, *Cloten* in (10) cannot be made to c-command *he*. Examples such as (10) therefore throw serious doubt on the viability of c-command as a general condition.

Example (10) does not stand in isolation as a counterexample to c-command. Koster (1979) and Fiengo and Higginbotham (1979) note further inadequacies of c-command. Koster (1979:19) contributes example (12), in which *John* cannot c-command *he* in the main clause, because the first branching node over the antecedent *John* is the NP node dominating *John's stories*, which does not dominate *he*.

(12) According to *John's* stories, *he* is a hero

However, there cannot be any doubt that *John* and *he* can be interpreted as coreferential.

It might be suggested that the apparent violation of c-command in (12) is the result of a preposing process, in which *according to John's stories* has been moved from a position following *he is a hero*. The source sentence for (12) would then be (13).

(13) **He is a hero, according to John's* stories

However, (13) is unacceptable when *he* and *John* are interpreted as coreferential elements. If we assume that movement transformations such as preposing leave the overall meaning of a sentence unaffected, we are forced to reject a transformational relation between (12) and (13). In order to preserve the tenet of the meaning-preservingness of transformations we assume that the phrases *according to John's stories* in (12) and (13) are generated in their respective surface positions. If this assumption is valid, one implication is that the antecedent-anaphor relation in (12) must follow from a different condition than c-command.

Now consider examples (14) and (15).

(14) According to *his* stories, *John* is a hero (Koster 1979:19)

(15) *John* is a hero, according to *his* stories

The coreference relation between *John* and *his* in (15) can be accounted for straightforwardly by the c-command condition if a constituent structure like the one presented in (16) is postulated.

(16)
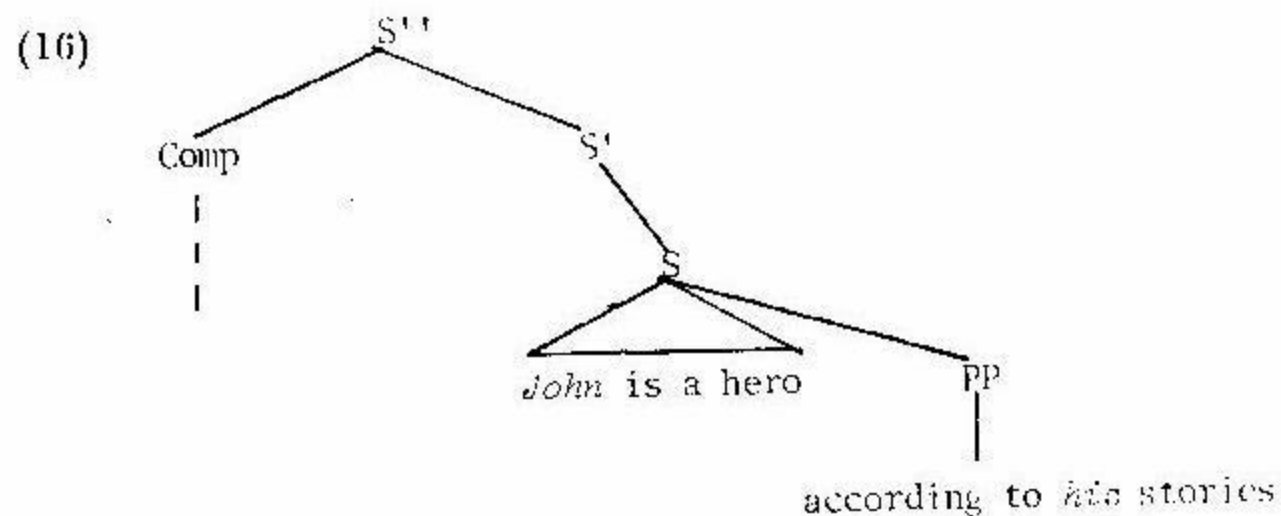
The first branching node dominating *John*, i.e. S, also dominates the anaphor *his*.

Koster (1979:20) presents (17) as the structure underlying (14).[4]

(17)
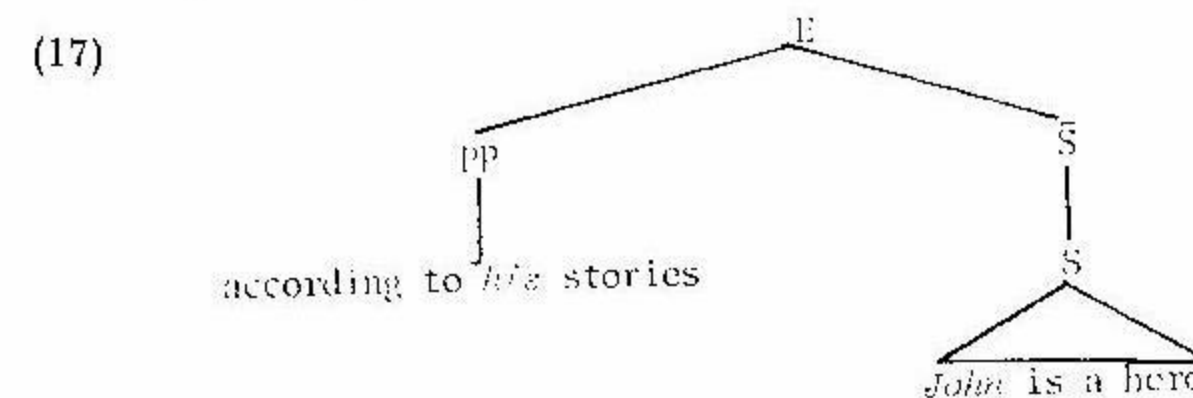
At first glance, there does not seem to be any connection between the structures found in (16) and (17). Koster's validation of constituent structure (17) can be found in sentences such as (18), in which the *according* phrase is found on the left of a filled complementizer.

(18) $\left[\left[\text{According to William's stories} \right] \left[\left[\text{WHO} \right] \left[\begin{array}{l} \text{stole the deer at} \\ \text{Charlecote Park?} \end{array} \right] \right] \right]$

E PP   S̄ Comp   S

Now, in structure (17) there cannot be a c-command relationship between *his* and *John*. If it is true that the PP *according to his stories* is also base-generated in its surface position in (14) and (15), which would mean that there is no transformational relationship between (14) and (15), it—again—follows that c-command cannot account for the coreference relation between *his* and *John* in an underlying structure like (17).

The discussion of examples (12)—(18) shows that, if c-command is to be a general well-formedness condition on antecedent-anaphor relations, it will have to be supplemented by a further condition to cater for cases like (14). In this article we present a proposal in which the antecedent-anaphor relations found in (12) - (15) are interpreted in a unitary fashion, without recourse to c-command. Our proposal—which is found in section 4—is neutral with respect to the attachment of the PP in (12)—(15), as long as the PP is dominated by the same S″ as the antecedent. This implies that the proposal put forward in Beukema (1980) remains viable within the constraints imposed by the theory put forward in this article.

4. MORE ON COREFERENCE

We suggest that a simple and elegant description of coreference relations between antecedents and anaphors can be given, if the following assumptions are accepted.

I Non-anaphoric pronominals (and non-anaphoric NPs in general) have

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[4] Structure (16) is ours, structure (17) is Koster's. We assume that our S″ is equivalent to Koster's S.

a previously established referent which is formally marked on the NP by a separate index for each NP. Therefore they are not subject to coreference assignment.

II In order to acquire a proper semantic representation, anaphoric pronominals (and anaphors in general) derive their intended reference from their antecedent. This can be represented formally by indexing anaphors with antecedents as is done in (19) for NPs.

(19) *COREFERENCE ASSIGNMENT RULE*

anaphoric coreference : $NP_I \ldots NP \rightarrow NP_1 \ldots NP_1$

cataphoric coreference : $NP \ldots NP_1 \rightarrow NP_1 \ldots NP_1$

We assume that rule (19) is a semantic interpretation rule that coindexes NPs that have compatible feature specifications. Rule (19) is subject to the following condition:

An anaphor cannot both precede and command its antecedent,
where command is defined as follows:
a node X commands a node Y if and only if X does not dominate Y (or Y X) and the first S'' dominating X also dominates Y.

(adapted from Koster 1979:14).

We assume furthermore that *at the level of semantic interpretation all NPs must have an index.* With the help of these assumptions we can handle nearly all examples like (12) — (18). For instance, in examples (12) and (15) the anaphors *he* and *his* do not precede their antecedents. This makes a coreference relation possible. In example (13) *he* both precedes and commands *John*, which makes coreference assignment impossible, according to the condition on rule (19). Hence, anaphoric *he* in (13) would not receive an index. The resulting structure with a non-indexed NP is prohibited by the requirement that every NP should have an index at the level of semantic interpretation. If example (14) has the underlying structure (17) and if (17) is correct, our coreference assignment mechanism allows a coreference relation between *his* and *John* : *his* precedes but does not command *John*.[5]

Summarizing, there appear to be three configurations in which coreference between antecedent and anaphor can be expected.

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[5] Notice that one might argue that a coreference relation is possible between *his* and *John* in (14) for reasons independent of the existence of the E-node in (17): if the *according* phrase was a reduced S, this would imply that there would be an S'' dominating the anaphor *his*, which does not dominate its antecedent *John*. In this case the anaphor would *not* command its antecedent, but only precede it, which makes a coreferential reading possible. However, we cannot accept this line of reasoning, because there can be no subject NP which precedes *according*: hence, *according* is not a verbal form in this example.

A: The anaphor precedes its antecedent, but does not command it.
B: The anaphor commands its antecedent, but does not precede it.
C: The anaphor neither commands nor precedes its antecedent.

5. COREFERENCE AND FREE ADJUNCTS

Turning our attention to free adjuncts again, we now examine the usefulness of assumptions I and II in section 4 with respect to the general framework for the derivation of free adjuncts proposed in Beukema (1980). Consider examples (20) and (21).

(20a) *William* having no money, *he* could not go to London
(20b) **He* could got go to London, *William* having no money
(21a) __ having no money, *William* could not go to London
(21b) *William* could not go to London, __ having no money

The asterisk before example (20b) indicates that *he* and *William* cannot be read as coreferential. The horizontal line in examples (21a) and (21b) indicates the place of the deleted subject of the free adjunct. The surface sentences (21a) and (21b) can—for the sake of convenience—be collapsed in one underlying structure (22), in which the free adjunct is introduced as a sister of S either to its left or to its right. The dotted lines in (22) and similar later diagrams indicate optionality, with the proviso that one of the two Adv nodes can be selected. The position on the left is called position A, and the one on the right position B.

(22)
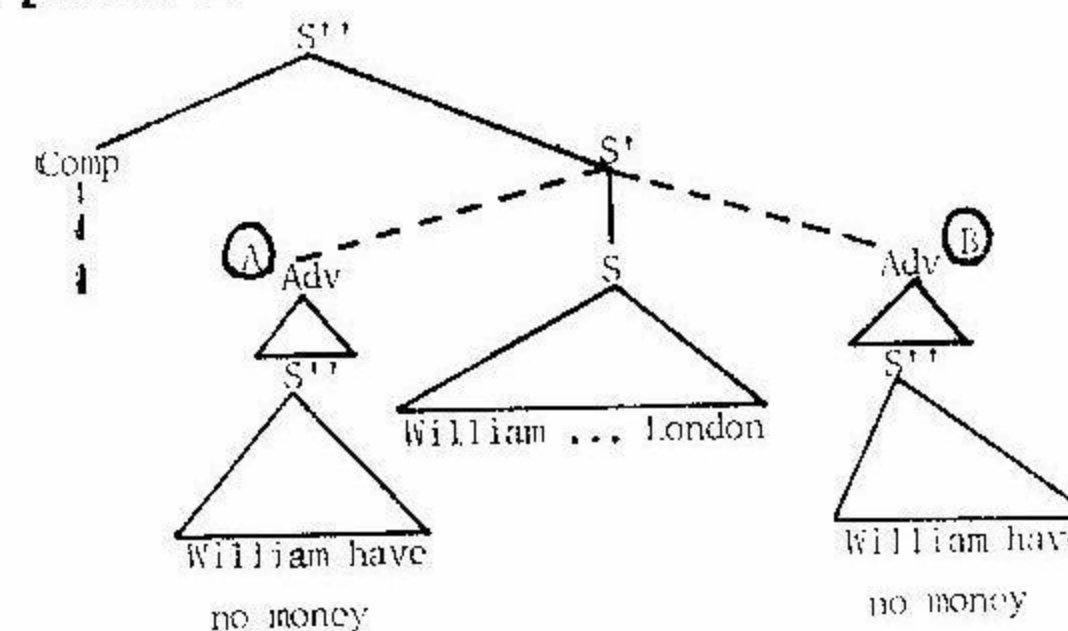
How can we arrive at surface structures (21a) and (21b)? In transformational-generative literature the semantico-syntactic transformation called Equi-NP deletion is responsible for deleting embedded coreferential subject NPs (see Wasow 1979 for further discussion). We propose to constrain this rule more rigorously by allowing it to remove embedded subject NPs only under *strict coreference* with a matrix subject NP. What is the motivation of the notion *strict coreference?*

We define two NPs as strictly coreferential when they share 1. identity of sense; 2. identity of reference; and 3. identity of morphological form.[6] Consider examples (23) — (27).

(23) $William_i$ hoped that $William_j$ would meet Anne in the park
(24)* $William_i$ hoped that $William_i$ would meet Anne in the park
(25) $William_i$ hoped he_j would meet Anne in the park
(26) $William_i$ hoped that he_i would meet Anne in the park
(27) $William$ hoped ___ to meet Anne in the park

The following observations can be made about examples (23) — (27). In example (23) the two *Williams* are referentially distinct, as indicated by the different indices, and the surface sentence is well-formed. In example (25) *William* and *he* are not only referentially distinct, but also morphologically. They are, moreover, distinct in sense, in that the conceptual specification of a definite pronominal such as *he* is more abstract, and hence more general, than that of a non-pronominal NP like *William*. In example (26) the same situation obtains, except for the fact that *William* and *he* refer to the same person. It appears from this discussion that semantically well-formed surface sentences with coreferential elements only arise if the coreferential NPs are different by at least one property. This means that example (24) cannot be semantically well-formed, because the two *Williams* share all relevant properties, and are therefore *strictly* coreferential according to our definition of strict coreferentiality. In the event that two subject NPs are *strictly* coreferential, the embedded subject NP is *obligatorily* deleted by Equi-NP deletion, which yields the correct surface structure (27). Note that this discussion presupposes that *coreference* between NPs must have been established before the application of Equi-NP deletion.

Examples (20a) and (20b) can be given the rough underlying structure presented in (28). The underlying subject of the free adjunct is preserved in examples (20a) and (20b). This is because Equi-NP deletion cannot apply, as the subject of the free adjunct is not strictly coreferential with the subject of the main clause (see p. 131).

In both (28A) and (28B) the anaphor *he* commands its antecedent *William*; in (28A) *he* does *not* precede it santecedent, and hence can be coindexed with *William* in accordance with the principles outlined in section 4. In (28B) *he* both precedes and commands its antecedent, in which case coreference assignment will be blocked. Surface structure (20b) has been excluded because it contains a non-indexed NP. If *he* already has a referential index (distinct from the one on *William*), coreference assignment cannot take place, and *William*

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[6] For further discussion of the distinction between *sense* and *reference* see Frege (1892) and also Katz (1972:8).

(28)
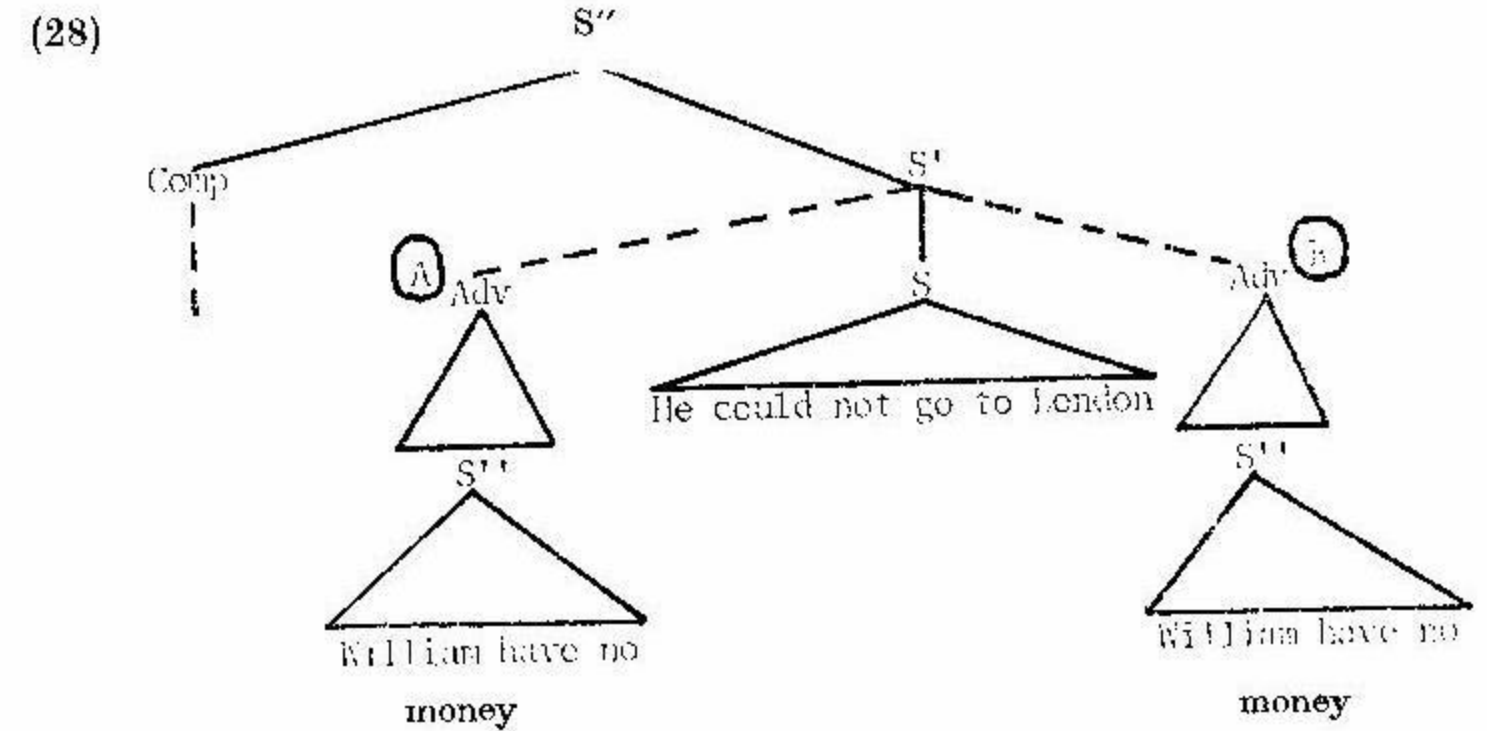
and *he* in (28A) and (28B) will be interpreted as referring to discrete entities. Similarly, in (20a) and in an unstarred version of (20b), *he* and *William* are *not* interpreted as coreferential.

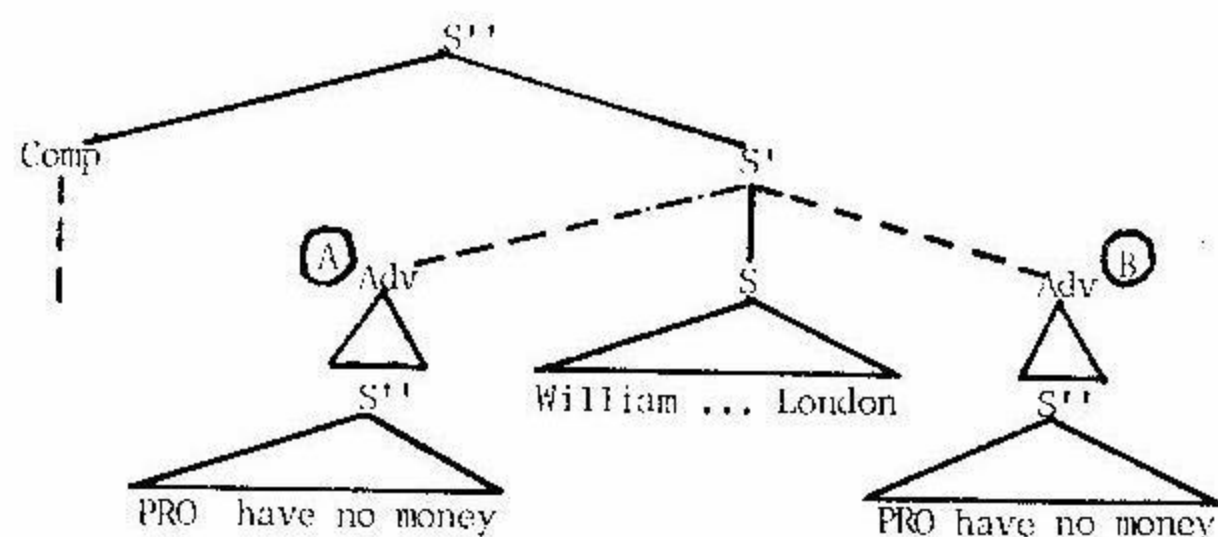## 6. THE INTERPRETIVE APPROACH

So far we have discussed derivations in which surface free adjuncts are generated with the help of a number of transformations. This is the approach adopted in Beukema (1980). Let us now consider the generation of free adjuncts in an *interpretive* approach, in which only very few—if any—transformations play a role.

In Chomsky (1980) an antecedent and an anaphor are coreferential if the antecedent *binds* the anaphor. To be bound, an anaphor has to be *in the domain of* an antecedent NP; more specifically, the anaphor must be coindexed with a c-commanding antecedent NP. Since transformations only play a marginal role in an interpretive theory, a free adjunct which has no lexical NP to the left of the verb contains a PRO, an anaphor, in the empty subject position. If this PRO is to be a proper anaphor, it must be *bound* to a c-commanding antecedent NP.

Let us reconsider examples (21a) and (21b), and sketch a rough underlying structure for these examples in (29).

In (29) the anaphor PRO (regardless of whether the free adjunct is in the A or the B position) is not in the domain of the antecedent NP *William*, the subject of the main clause: the first branching node dominating *William* is S and this S does not dominate either of the PRO's. Consequently, the c-command condition does not allow PRO in either A or B to be coreferential with *William* in (29).

(29)

In section 3, various arguments were adduced to show the inadequacy of c-command. To the extent that Chomsky (1980) makes binding conditional on c-command, we reject his approach. Instead, let us assume that some version of an interpretive approach can make use of the indexing procedure as outlined in section 4. While in orthodox transformational generative grammar the literature on free adjuncts can be said to be virtually non-existent, this is even more so in interpretive theory. Williams (1980), which is solidly within the interpretive framework, enumerates a number of properties which we think can be used to characterize free adjuncts. He postulates the binding relation *Obligatory Control* (OC) and its derivative *Non-Obligatory Control* (NOC). We shall now examine these relations to see whether free adjuncts can be characterized as cases of either OC or NOC.

Williams postulates that control structures are strictly subcategorized, i.e. the syntactic information in the lexical entry of a verb or an adjective or a noun specifies what complement structures may follow these major phrasal categories. The English verb TRY, for instance, requires a complement structure in which the subject of the embedded sentence cannot be a lexical NP, as is shown in (30) and (31).

(30) *William tried Ben to learn Latin
(31) William tried __ to learn Latin

This syntactic fact has to be incorporated in the syntactic subcategorization frame of the verb TRY.

Williams (1980 : 209) enumerates five salient properties of OC structures, which are also of interest for free adjuncts, because free adjuncts display certain properties which are the converse of OC properties.

OC1. Lexical NP cannot appear in the position of PRO.

This property is displayed by an example such as (32).

(32) John promised Bill [PRO to leave]

The PRO in (32) cannot be filled by a lexical NP.

OC2. The antecedent precedes the controlled PRO.

In example (32) the antecedent *John* precedes PRO. This is a case of *Subject Control*. *Object Control* is found in an example like (33).

(33) John persuaded Bill [PRO to leave]

OC3. The antecedent c-commands the controlled PRO.
OC4. The antecedent is thematically or grammatically uniquely determined.
OC5. There must be an antecedent.

The last three properties are also displayed by examples (31), (32) and (33), with the usual caveat concerning c-command.

Suppose that free adjuncts are OCs. We would then have to decide to which of the phrasal categories V, A, N, or P, free adjuncts should be subcategorized. In section 1 we have defined free adjuncts as *sentence adverbials*, i.e. modifiers of Ss. If free adjuncts are OCs, we would be forced to admit the possibility that Ss can also subcategorize .This is not an *a priori* impossibility, but, considering the following facts about free adjuncts, we would like to abandon the assumption that free adjuncts could be OCs in favour of their being NOCs. Let us look at the following free adjunct structures.

(34) Ben having no money, William could not go to London
(35) PRO having no money, William could not go to London

These examples show that the position which is filled by PRO in (35) can also be filled by a lexical NP, such as *Ben* in (34). Example (35) shows that a controlled PRO may also precede its antecedent. Since these two properties violate OC1 and OC2, they point to the NOC character of free adjuncts. As further NOC properties Williams states that NOCs need not have an antecedent and that, if there is an antecedent, it need not c-command. Now there is a third category of free adjuncts which have no antecedent[7]. An example is (36).

(36) Taking all things into consideration, what follows?

The fact that antecedents in NOCs need not c-command confirms the conclusions drawn in section 3 above.

Since free adjuncts are not OCs and since the various types of free adjuncts show various NOC properties—only one of which suffices to decide that a structure is a NOC—we conclude that free adjuncts are NOCs.

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[7] It should be noted that the coindexing algorithm set up in section 4 does not apply to the type of free adjuncts exemplified in (36). The underlying structure of (36) is very much like the one in (18). The reason why we bring up this type of free adjunct here is to show that almost all NOC properties are found in free adjuncts. Notice that even if free adjuncts showed only *one* NOC property, this would still be sufficient reason to classify them as NOCs.

7. A COMPARISON OF EQUI AND PRO

In the event that competing descriptions of particular linguistic phenomena can be presented, the matter of evaluation, i.e. which of the descriptions is to be preferred, becomes crucial. We shall therefore juxtapose a number of properties of the Equi-approach (the transformational-generative framework) and the more recent interpretive approach. It should be remembered that the language material presented in this article is fairly scanty, and consequently it may perhaps be deemed presumptuous to base a comparison of two theories on such a restricted amount of language data. We have, however, analysed many more examples which we hope to present in a longer article, and we feel that we have covered enough ground to warrant a number of preliminary conclusions.

In the Equi-approach lexical insertion is more constrained than in the interpretive approach. Lexical insertion must apply in an Equi-theory, whereas in an interpretive approach lexicalization is optional, thus making it possible to have empty terminal categories. The dangers of possible overgeneration in the various components of the grammar in the interpretive approach loom large, whereas in the other approach specific stipulations are imposed for instance on transformations. Compare the possible subcategorization frames for an arbitrary verb, say TRY, in these two approaches.[8]

(37) Interpretive: TRY [— [PRO [VP]]]
$$\quad\quad\quad\quad\quad\quad\quad\quad S$$
$$\quad\quad\quad\quad\quad\quad + \text{ subject control}$$

(38) Equi approach: TRY [NP_ψ — [NP_ψ [VP]]]
$$\quad\quad\quad\quad\quad\quad\quad\quad S''$$
$$\quad\quad\quad\quad\quad\quad + \text{ END}$$

Essentially, (37) stipulates that the lexical item TRY can only be inserted in a structure in which the embedded subject has not been lexicalized, the feature *Subject Control* guaranteeing that the PRO of the embedded clause will be *interpreted* as coreferential with the subject of the matrix S. In frame (38) the indices on the NPs in the main clause and in the embedded clause reflect the requirement of strict coreferentiality between these NPs, while the END feature serves as a trigger for *Equi-NP-Deletion*. In the Equi-approach the rigorously specified transformation END must apply, whereas a correct surface result in the interpretive approach is ensured by various filters, for instance in Logical Form. This has the consequence of enabling

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[8] If we assume frames like (38), we bypass Wasow's (1979:130) objection that it is not the case that 'the complements to verbs requiring Equi would allow surface structure subjects, so long as these subjects were distinct from NPs in controller positions'. The frame in (38) stipulates that the subjects of the main clause and of the embedded clause must be strictly coreferential: *other NPs cannot be inserted*.

transformations to be stated in as general a format as the instruction 'move α', in which α is 'some category' (see Chomsky 1977 for further details).

A further difference between the two theories may be found in the different phrase structure rules necessary to introduce free adjuncts and complement sentences. In an Equi-theory free adjuncts and other non-finite Ss are derived from 'full' Ss, whereas in the interpretive approach a fundamental distinction is drawn between finite and non-finite complement structures, which is reflected in the different PS rules for these complements. This dichotomy has far-reaching implications, especially for tense theory.

Note also that the organization of a grammar incorporating an Equi-approach differs from an interpretive grammar as far as coreference assignment is concerned. In an Equi-theory coreference assignment is an interpretive rule applying from deep structure. In a variant of the interpretive model such as the one proposed in Chomsky (1980), coindexing applies in Logical Form, i.e. from S structure onwards, in agreement with the type of control specified in the lexical entry.

8. CONCLUSION

We have established that c-command cannot be a general condition on all antecedent-anaphor relations, and that, consequently, c-command cannot be used as a criterion to decide between alternative possibilities of attaching a free adjunct in a phrase marker. A generalized description of the syntax of free adjuncts has been shown to be compatible with the maximally general coreference assignment rule which we propose in (19). This has allowed us to reformulate Equi-NP deletion more strictly.

Transformational-generative grammar can give a reasonably satisfactory description of the syntax of free adjuncts. No such description exists in the interpretive approach. Assuming that our generalized coreference assignment mechanism can be used in interpretive syntax, we have juxtaposed a transformational and an interpretive version of the derivation of free adjuncts. No significant differences in descriptive power have been found. Chomsky (1976, 1981) has put forward strong claims for the alleged superiority of the modular character of recent interpretive approaches. At least as far as the syntax of free adjuncts is concerned, we have found no evidence that justifies these claims.

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