

ANAPHORIC RELATIONS IN ENGLISH

by

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ABSTRACT

This thesis considers the problem of accounting for anaphoric relations within a generative grammar. Past approaches to this problem are modified in a number of ways: The concept of identity between constituents is examined and replaced. The notion of determinateness---encompassing roughly the concepts of specificity, referentiality, and genericness---is introduced and motivated. The idea that replacement or deletion transformations are involved in the derivation of anaphoric elements is rejected. Postal's WH-constraint is considered and relegated to at most a marginal role. The relevance of Frege's sense-reference distinction is discussed, leading to the discovery of a rather general constraint on the semantic relationship between anaphoric elements and their antecedents.

Thesis Supervisor: Noam Chomsky

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This is dedicated to the one I love, viz., Judith

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"I trust I make myself obscure"

--Sir Thomas More

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Chapter One

BACKGROUND MATERIALS

O. Introduction

The native speaker of any natural language knows that special relationships, called anaphoric relationships, exist between certain pairs of elements in the language. When two items A and B in a given discourse are anaphorically related, the full specification of the meaning of B involves (i) referring to the fact that A and B are anaphorically related, and (ii) repeating some part of the meaning of A. The items playing the role of B in this characterization will be referred to as anaphoric elements or anaphors. The items upon which anaphors depend for the specification of their meanings are called their antecedents. The collective term for anaphoric relations in general is anaphora.

In some cases, items which may serve as anaphors may also appear in contexts in which they are not associated with an antecedent. In such a case, other (possibly non-linguistic) factors must provide sufficient information for the determination of the meaning of the item in question.

The classic example of an anaphoric relation is that between definite pronouns and their NP antecedents.

- (1) (a) The President has promised that he will end the war.
- (b) Nixon can't expect black people to vote for him.
- (c) A man does what he thinks best.¹

Numerous other anaphoric relations have been discussed by generative grammarians. Examples of several of these are given in (2).

- (2) (a) When Billy saw Mary's tricycle, he wanted one, too.

(b) John shaved himself.

(c) After Pete tried LSD, Karen did $\left. \begin{array}{l} \text{it, too} \\ \text{so, too} \\ \text{the same thing} \\ \text{likewise} \end{array} \right\}$

(d) The book says to add the water to the beans, but I did just the opposite.

(f) Fred got reclassified I-A, and it happened to George to.

(g) The police claim that Mike and Dan robbed a bank, and the former has confessed, although the latter claims
to have an alibi.

In addition to cases like these, if we allow anaphors to be phonetically null, it is possible to treat instances of ellipsis (or what has been called "deletion under identity") as anaphoric relations. Examples of null anaphors are given in (3).

(3) (a) Mary enjoys _____ singing to herself.

(b) John left, but Bill didn't _____.

(c) John left, but he didn't say why _____.

1. Goals

Intuitively, it is clear why languages have anaphoric relations: anaphora reduces redundancy, thereby shortening (and hence simplifying) sentences. In order for this simplification to be possible, however, it is necessary that the speaker of a language be able to identify correctly the elements participating in an anaphoric relation and to determine correctly the meaning of the anaphor on the basis of meaning of the antecedent. If a grammar is to reflect the linguistic competence of a native speaker of

a language, it must include mechanisms for associating anaphor and antecedent and for specifying correctly the reading of the anaphor as a function of the reading of the antecedent.

In the past decade, a voluminous yet depressingly inconclusive literature has grown up around the problem of representing anaphora in the grammar of English. This thesis is an attempt to clarify the issues involved and to indicate in a general way how the grammar of English might reflect the speakers' intuitions regarding anaphora.

More specifically, this thesis will consider the following questions:

- (A) What sorts of mechanisms are best suited for representing anaphora in a grammar?
- (B) What are the conditions on the rule(s) associating anaphora with antecedents, especially, how are such rules ordered?²
- (C) Do the various cases of anaphora form a linguistically significant class of phenomena, and, if so, how can the grammar capture this fact? That is, is it proper to speak of "anaphoric relations" in general, or should, e.g., definite pronouns be treated quite differently from elliptical constructions?
- (D) What do the answers to (A) - (C) entail for linguistic theory?
- (E) In what (if any) ways are the philosophical problem of reference and Frege's distinction between sense and reference related to the answers to (A) - (D)?

2. Extrinsic Factors

It should be noted here at the beginning that some instances of anaphora

involve factors which are clearly non-linguistic, and hence, presumably not represented in linguistic theory. For example, facial expressions or hand gestures (pointing) may indicate the intended referent of a definite pronoun, even when no antecedent is included in the linguistic context. To try to incorporate gestures into grammar would be tantamount to requiring grammar to describe not just language, but all means of communication. Such an extension of the goals of linguistic theory (even assuming it to be possible and desirable) is well beyond the scope of this dissertation, and will hence not be considered.

A related point which ought not to require repeating is that people do use anaphoric elements in ways which violate the various anaphora rules which have been and will be proposed. This, for example, Robert Rardin claims that his grandmother uses sentences like (4), where she refers to Mrs. Smith.

(4) I saw Mr. Smith the other day; you know she died last year. No theory of anaphora ever proposed (or likely to be proposed) can assign she the proper meaning. Facts like these in no way invalidate the attempt to formulate such rules. Rather, they re-emphasize the need to distinguish between linguistic competence and performance (see Chomsky (1965)). Here, as in all linguistic research, the intelligibility and even the use of examples violating the proposed rules is of little consequence, so long as the native speaker knows the examples to be deviant. Of course, the acceptability of such examples must ultimately be explained, presumably in terms of extra-grammatical mechanisms.

It is similarly an unreliable test of a sentence's grammaticality to embed it in a context and submit it to the perusal of numerous graduate

students. The context can easily force an abnormal interpretation on a sentence in such a way that its deviance is overlooked. An especially clear example of this is Hammerton (1970). Hammerton questions Chomsky's assertion (Chomsky (1968)) that (5) does not permit the indicated anaphoric relation.

(5) *Learning that John had won the race surprised him.

In support of this position, Hammerton submitted the passage in (6) to twenty speakers of English, with the result that all of them interpreted the penultimate occurrence of him as referring to John.

(6) John is a very happy man this morning; though he was thoroughly miserable last night. He got home convinced that he had come in second in the race and that Bill had won it. In fact, he was so sour about it that he could hardly bring himself to listen to the report on the radio. Learning that John had won the race surprised him. It delighted him, too.

Hammerton's result is hardly surprising and quite irrelevant. The deviance of (5) is not a matter requiring statistical confirmation. The fact that a discourse like (5), in which John is the subject under discussion, allows any occurrence of him to be interpreted as referring to John has no bearing on the question of what anaphoric relations are possible within a sentence. All that can be legitimately be concluded from (6) is that, in linguistics, as in any empirical science, extraneous factors may obscure the data.

A less clear example of the same sort of confusion between the meaning of a sentence and the ways in which a context can supply it with an inter-

pretation is to be found in Karttunen (1971). This case is discussed in detail in chapter 5.

One reason why anaphoric relations appear to be especially susceptible to this technique of suggesting alternative interpretations by providing a context is that anaphora is in part a discourse phenomenon. That is, anaphoric relations may hold between elements in different sentences, as was illustrated in (6) above. Examples with other anaphoric relations are given in (7).

- (7) (a) John tried to seduce Mary. Bill did so, to.
 (b) Nobody believes that John will win. Even he doesn't believe it.
 (c) John plans to come. He claims that Mary will , to.
 (d) Mayor White is running for re-election. I can't imagine why .

Notice that inter-sentential anaphora is possible only if the antecedent occurs earlier in the discourse than the anaphor, and only if the anaphor and antecedent are in fairly close proximity.

- (8) (a) *He went to the store. John bought some bread there.
 (b) ??John went to the store. I go there often myself.
 Mary, however, didn't want to .

It seems, then, that inter-sentential anaphora can be described reasonably straightforwardly. The only readily apparent problems are making precise the notion of "close proximity", and accounting for the similarities between inter-sentential and intra-sentential anaphora. These problems will not be considered, and the remainder of this thesis will be concerned only with antecedents and anaphors which are contained in a single sentence.

In all that follows, therefore, an element will be termed "anaphoric" only if it has an antecedent in the same sentence.

One final comment along these lines: when different informants differ in their judgments regarding the grammaticality of a sentence, it is not necessarily an indication of dialect or "idiolect" differences. This is especially true when the speakers in question are linguists with competing theories to defend. In general, such situations arise because of the marginal character of the data. The fact that supposed dialect differences among linguists so often correlate with differences in theoretical orientation is a good indication that it is frequently not simply a matter of dialects. This is not, of course, to deny that genuine dialects exist. However, there is a tendency among generative grammarians to attribute confusion regarding marginal and unreliable data to dialect differences. Instead of worrying so much about dialects, linguists would be better off trying to find clearer examples on which to base their analyses. This policy will be adopted in the present work.

3. Assumptions

Before going on to consider (A) - (E) in detail, it seems advisable to make explicit the theoretical framework and background assumptions upon which the remainder of this thesis is to be based. This is necessary because of the current theoretical split among generative grammarians which has cast into question almost every substantive or methodological proposal ever put forward under the name of generative grammar. Because this controversy is so far-reaching and deep, it would go beyond the scope of this thesis to attempt to justify these background assumptions in any detail. Rather, references will be given to work supporting the assumptions, and, in some

cases, the arguments will be summarized. Of course, any productive results that may come out of the present work provide indirect evidence for the assumptions underlying that work.

3.1 Theoretical Framework

The fundamental problems of linguistics, as every generative grammarian agrees (see e.g., Chomsky (1971)), is to account for the fact that a child learning a language is able in the space of a few short years and on the basis of very limited and largely degenerate data to master a system so fantastically complex. The only plausible explanation of this remarkable feat appears to be that human beings are innately equipped with a highly structured language-learning mechanism, and that much of the complexity of language is not learned, but is rather a reflection of the structure of this innate mechanism. This hypothesis entails that many of the structural properties of any language are in fact manifestations of the structure of the innate language-learning mechanism, and are hence necessarily common to all languages. Thus, the discovery of linguistic universals serves to corroborate the hypothesis of innate structure, and the primary goal of linguistic research is the discovery of linguistic universals.

From these very general considerations emerge certain conclusions about desirable properties for a theory of language. Most importantly, a theory should be maximally restrictive, in the sense that it should minimize the number of possible descriptions of a given phenomenon (subject, of course, to limitations imposed by the data, i.e., by the diversity of languages). This restrictiveness serves to explain the ease with which languages are acquired. In striving for restrictiveness, it is to be expected that linguistic theory will be highly structured. That is, the theory will

postulate a variety of different kinds of mechanisms, each with highly specialized functions. In terms of methodology for research, this means that the linguist should not be afraid to postulate new sorts of rules, if he can simultaneously limit their functions and the functions of the already established kinds of rules.

In particular, these considerations refute the methodological arguments of Postal (1970c) in favor of what he calls a "homogeneous theory". This argument (and similar ones by Postal (1970a) and Lakoff (1970a, 1970c)) is based on the false assumption that the theory which most severely limits the categories of rules necessary is to be preferred over all others. In fact, however, it is the theory with the most limited generative capacity which is to be preferred. Further, this preference is dictated by facts, not methodology. Since any rule formulable in any of the other theories is formulable as a derivational constraint, but probably not conversely, it follows that Lakoff's theory is a priori the least desirable existing theory. This is not to say that it is incorrect, but rather that the burden of proof lies with its proponents, rather than its opponents, as Lakoff and Postal have claimed.

On the basis of these general considerations (together with the lack of convincing empirical evidence showing a less restrictive theory to be necessary--see Baker & Braine (1971)), this thesis will adopt the general framework of what has come to be known as the Extended Standard Theory (EST) (see Chomsky (1969, 1970, 1971)). In particular, it will be assumed that the work of derivational constraints can be done by surface structure rules of interpretation (see Jackendoff (1969)), together with a suitably restrictive notion of deep structure and powerful universal constraints on

the operation of transformational rules (Chomsky (1971), Emonds (1970)).

Further, it will be assumed that syntactic rule features (Lakoff (1965)) are an ad hoc device, the need for which has not been adequately demonstrated, and the use of which is to be avoided wherever possible (Kayne 1969)).³ Hence, where competing analyses differ with respect to the need for rule-features, the one without them⁴ is to be preferred.

3.2 Specific Analyses

In addition to these general methodological assumptions, there are a certain number of substantive points dealing specifically with anaphora which will be assumed below.

3.2.1 First of all, it will be assumed that the analysis of English reflexives presented by Helke (1970) is essentially correct. The central feature of Helke's analysis is that reflexives consist of a head noun self with a possessive pronominal determiner. The necessary agreement between this determiner and some other NP in the same clause is accounted for by a transformation which inserts pronominal copies of the NP's into empty determiner nodes. This transformation is independently necessary for examples like (9).

(9) (a) The man lost his way.

(b) The dog wagged its tail.

(c) The police lost their heads.

The constraint that reflexives and their antecedents be in the same simplex sentence (or, in Helke's terminology, "have the same sentential ancestry") is accounted for by Chomsky's "insertion prohibition" (Chomsky (1965), p. 146):

(10) "no morphological material...can be introduced into a configuration dominated by S once the cycle of transform-

ational rules has already completed its application to this configuration".⁵

Since (10) is purportedly a universal constraint applying not only to reflexivization, but also to other processes of the same general type, and since pronouns and their antecedents are not restricted to a single simplex sentence, it follows that Helke's theory requires that reflexives be handled by an entirely different kind of mechanism than that employed to account for the relationship between ordinary anaphoric pronouns and their antecedents. But this conclusion is in contradiction to the widely accepted view that pronominalization and reflexivization are simply two aspects of a single phenomenon. In support of his controversial conclusion, Helke demonstrated the falsity of the oft-repeated claim that pronouns and reflexives are in complementary distribution, using examples like (11).

- (11)(a) The young girl took it upon ^{her}herself to lead the revolution.
 (b) Mrs. Adams wrapped the stole around ^{her}herself.

Further, he pointed out that the well-known paradigm exhibited in (12) is actually evidence for the general constraint (13), which accounts for (14) as well as (12), and says nothing about the relationship between pronouns and reflexives.

- | | | |
|-------------------|--------------------|--------------------|
| (12) *I hurt me. | You hurt me. | He hurt me. |
| I hurt you. | *You hurt you. | He hurt you. |
| I hurt him. | You hurt him. | *He hurt him. |
| I hurt myself. | *You hurt myself. | *He hurt myself. |
| *I hurt yourself. | You hurt yourself. | *He hurt yourself. |
| *I hurt himself. | *You hurt himself. | He hurt himself. |

- (13) Given the configuration NP_1-V-NP_2 , NP_1 and NP_2 have non-

intersecting reference.⁶

- (14) ??I hurt us. *You (pl.) hurt you (sing.).
 *We hurt me. *You (sing.) hurt you (pl.).

Notice, by the way, that Helke's analysis of reflexives receives support from the following constraint, proposed by Ray Jackendoff:

- (15) If A, B, and C are three elements in a sentence such that an anaphoric relation holds between A and B and an anaphoric relation holds between B and C, then the sentence is marked ungrammatical unless an anaphoric relation holds between A and C.⁷

(15) will be referred to as the Transitivity Condition.

Leaving aside, for the moment, the justification for (15), consider what it entails, in conjunction with (16).

- (16)(a) Mary hoped that she would not hurt herself.

- (b) *Mary hoped that John would not hurt herself.

In (16a), there is an anaphoric relationship between Mary and she, and, according to all existing theories of reflexives except Helke's, between she and herself. Thus, by (15), there must be an anaphoric relationship between Mary and herself. However, any plausible rule which could establish an anaphoric relationship between Mary and herself in (16a) could also do so in (16b). The ungrammaticality of (16b) indicates, then, that there is no anaphoric relationship between Mary and herself in (16a). This is a direct violation of (15). In Helke's theory, however, this difficulty does not arise, since the relevant anaphoric relation holds not between Mary and herself, but between Mary and her. The ungrammaticality of (16b) does not result from the impossibility of establishing an anaphoric relationship, but

from the impossibility of generating the reflexive in the appropriate position without violating the insertion prohibition.⁸

For this reason, as well as those given by Helke himself, Helke's analysis of reflexives will be assumed in all that follows.

3.2.2 One step omitted from the previous argument was the justification of the Transitivity Condition. Jackendoff assumes that the relation holding between a definite pronoun and its antecedent is always identity of reference (which by definition is transitive), and he appears to believe that the Transitivity Condition follows from this assumption. In order to utilize the transitivity of coreference to do the work of (15), Jackendoff (1969) has to introduce a rule marking pairs of NP's which are not anaphorically related as being non-coreferent. If he did not have such a rule, then he would predict that sentences in which NP₁ and NP₂ are anaphorically related and NP₂ and NP₃ are anaphorically related would be grammatical, with NP₁ and NP₃ interpreted as coreferential, regardless of whether they are anaphorically related. Such a prediction is a variance with that made by the Transitivity Condition, and, as will be seen immediately below, it is, in fact, false. Hence, Jackendoff's idea that the Transitivity Condition follows trivially from the transitivity of identity of reference holds only if it is maintained that coreferential NP's are necessarily anaphorically related. However, as Postal (1971b) argues, the failure of two NP's to be related anaphorically does not entail that they have distinct referents. This can be seen from (17').

(17)(a) Leon Trotsky and Leon Bronstein were the same person.

(b) If you have seen the evening star, you have seen the morning star.

While Leon Trotsky and Leon Bronstein may be used to refer to the same thing, as may the evening star and the morning star, no anaphoric relation holds between these pairs in (17).

The clearest evidence for the Transitivity Condition consists of examples like (18).

(18)(a) The woman he loved said that John was a jerk.

(b) The woman John loved hurt him.

(c) *Mary told him that John was a jerk.

(d) *The woman he loved told him that John was a jerk.

The structural relations between John and he are identical in (18a) and (18d). Thus, he and John may be anaphorically related in (18d). The structural relations holding between he and him in (18d) are exactly those holding between John and him in (18b), so it must be possible for he and him to be anaphorically related in (18d). (18c) shows that him and John may not be anaphorically related in (18d). Thus the Transitivity Condition is needed to account for the ungrammaticality of (18d).

Further evidence for the Transitivity Condition is provided by (19) (due to Postal).

(19) *The man who he said Mary kissed was lying.

It is clear that an anaphoric relation holds between relative pronouns and their heads. Furthermore, every existing theory of anaphora would permit an anaphoric relation to be established between the head of a relative clause and a pronoun in the clause. In (19), then, the man and who may be anaphorically related, and the man and he may be anaphorically related. (20) shows that who and he cannot be anaphorically related (for reasons discussed in Chapter 4).

(20) *Who did he say Mary kissed?

In order that the same explanation suffice to account for (19) and (20), it is necessary to adopt the Transitivity Condition. Otherwise, it would be necessary to rule out anaphora between the man and he in (19), in addition to ruling out anaphora between who and he.

Strong support for the Transitivity Condition is given by Williams (1971). He notes that the grammaticality of (21a & b) would lead one to expect (21c) to be grammatical, were it not for the Transitivity Condition.

(21)(a) Because Mary didn't _____, James didn't want to join the party.

(b) Because nothing happened until some time after Sam joined the party, James didn't want to _____.

(c) *Because Mary didn't _____ until some time after Sam joined the party, James didn't want to _____.

(21) also shows that the Transitivity Condition is not limited to NP's and that it hence cannot be simply a trivial consequence of the transitivity of the coreference relation.⁹

For these reasons, the Transitivity Condition will be assumed to be correct.

3.2.3. A particularly important assumption for the following chapters is that there is no transformation of Pronominalization which replaces an NP by a definite pronoun when the NP meets certain conditions of identity with another NP. In other words, it will be assumed that the general approach employed in the "classic" works on anaphora (Lees & Klima (1963), Langacker (1966), Ross (1967b), Postal (1966)) is incorrect.

Numerous arguments have been advanced in support of this assumption,

and they will be summarized below. Perhaps the strongest of these is due to Bresnan (1970). She points out that, in sentences like (22a), either Pronominalization or There-insertion, but not both, may apply, as (22b-d) demonstrate.

(22) (a) Some students said that some students had been in the office.

(b) Some students said that they had been in the office.

(c) Some students said that there had been some students in the office.

(d) *Some students said that there had been they in the office.

The reason that (22d) is ill-formed is, of course, that There-insertion applies only to sentences with indefinite subjects, so that it cannot apply to sentences like the complement clause of (22b). In a theory with a transformation of Pronominalization, however, this explanation cannot be formalized, since the pronominalization (and hence the definitization) of some students would have to follow the insertion of there. This can be seen from the fact that, whereas There-insertion is known to be a cyclic transformation (as it must be, e.g., to satisfy the insertion prohibition) and hence applies on the cycle of the complement clause, Pronominalization cannot apply until the matrix cycle, owing to the identity condition involved in its operation. Thus, the only means of excluding (22d) in a theory incorporating Pronominalization would be with some ad hoc constraint blocking Pronominalization if the NP to be pronominalized had been involved in the insertion of there. But such an analysis fails to capture the obvious fact that what excludes (22d) is the definiteness of the pronoun.¹⁰

Similar arguments can be given on the basis of special conditions on

the transformations of Particle movement and Dative movement. Both of these rules are blocked in sentences whose direct objects are pronominal (assuming that the formulations of the rules in question given by Emonds (1971) are correct). This is illustrated in (23) and (24).

(23) (a) John turned the girl away.

(b) John turned away the girl.

(c) John turned her away.

(d) *John turned away her.

(24) (a) John gave a book to Mary.

(b) John gave Mary a book.

(c) John gave it to Mary.

(d) *John gave Mary it.

Consider now sentences like (25).

(25) (a) The girl claims that John turned the girl away.

(b) Bill bought the book after John gave the book to Mary.

If Particle movement and Dative movement apply cyclically (and there are good arguments that they should--See Emonds (1971)), then in a theory incorporating a Pronominalization transformation, they could apply in sentences like (25) before Pronominalization applied, and sentences like (26) would be produced.

(26) (a) *The girl claims that John turned away her.

(b) *Bill bought the book after John gave Mary it.¹¹

Dougherty (1969) advances a number of arguments against the existence of a Pronominalization transformation. These arguments consist basically of two sorts of examples: sentences which can have no source if Pronominalization exists, and sentences whose alleged sources would also underlie

ungrammatical sentences. Examples of the first sort are given in (27).

- (27) (a) Each of the men thought that he was the tallest.
 (b) Neither of the siamese twins was bold enough to ask the other to scratch his back in those places that he couldn't reach himself.
 (c) You can have an ice cream, a soda, or both.¹²

A transformation of Pronominalization would have to derive (27a-c) from the deviant sources (28a-c).

- (28) (a) *Each of the men thought that each of the men was the tallest.
 (b) *Neither of the siamese twins was bold enough to ask the other to scratch neither of the siamese twins' back in those places that neither of the siamese twins could reach himself.
 (c) *You can have an ice cream, a soda, or (both) an ice cream, a soda.

Examples which a transformational theory of Pronominalization could not derive without similarly deriving deviant sentences are given in (29).

- (29) (a) Each of Mary's sons hated his brothers.
 (b) Each of Mary's sons was hated by his brothers.

The sources for (29) would be essentially the sentences in (30).

- (30) (a) Each of Mary's sons hated each of Mary's sons' brothers.
 (b) Each of Mary's sons' brothers hated each of Mary's sons.

But such a theory could also generate the ill-formed example of (31) from (30).

- (31) (a) *Each of Mary's sons' brothers was hated by him.

- (b) *Each of Mary's sons' brothers hated him

Notice, furthermore, that the examples in (29) are not synonymous with their supposed sources in (30), since the latter, but not the former, implies that each of Mary's sons hates himself.¹³ Sentences of this sort, in which the application of the Pronominalization transformation would affect meaning, constitute a further argument against the existence of Pronominalization. Additional examples are provided in (32).

- (32) (a) Most politicians believe that everyone loves them. ≠
 (b) Most politicians believe that everyone loves most politicians.
 (c) Adolescents always eat as though they hadn't seen food for a month. ≠
 (d) Adolescents always eat as though adolescents hadn't seen food for a month.
 (e) Every bride hopes that she will have a happy marriage. ≠
 (f) Every bride hopes that every bride will have a happy marriage.

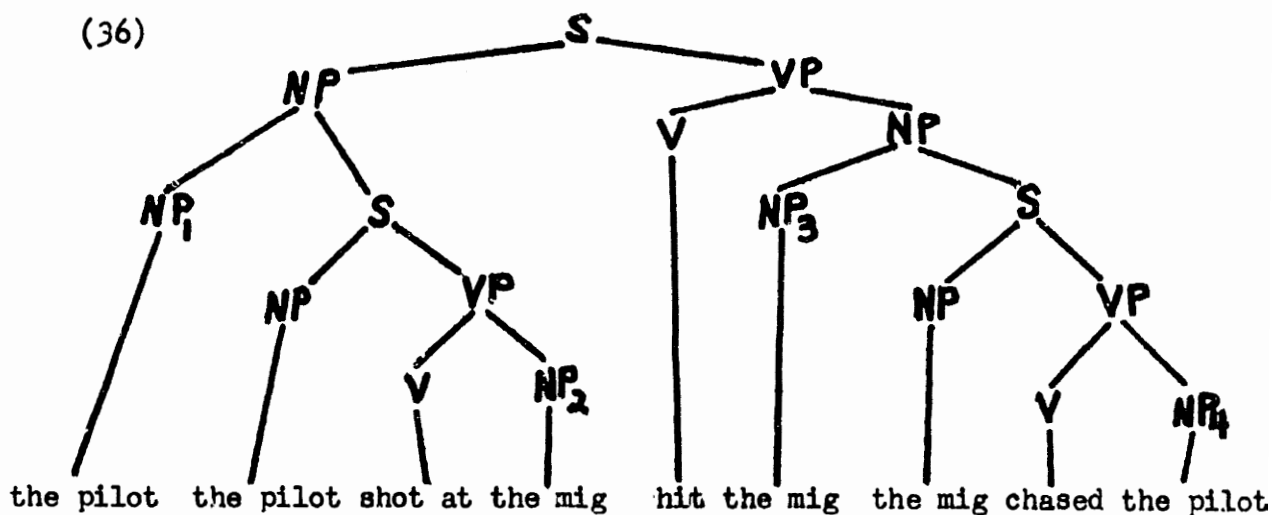
The non-synonymy of such examples with their purported sources requires the postulation of some interpretive mechanism ordered after Pronominalization which will assign the appropriate readings to the pronouns. But if such a mechanism is needed anyway, then it is possible to generate all pronouns in the base and subject them all to the interpretive mechanism, thereby rendering the transformation superfluous.¹⁴

This mode of reasoning--that independent evidence for an interpretive mechanism to account for anaphora makes a Pronominalization transformation unnecessary--is employed by Jackendoff (1969) and Dougherty (1969) in

anaphors by replacing them with their antecedents.

Although the Bach-Peters paradox certainly shows that some assumptions that had been made about the operation of pronominalization are untenable, Karttunen (1971) shows that most linguists who have considered the paradox have suggested much more radical alterations in the theory of pronouns than the argument itself necessitates.¹⁵

Karttunen observes that (36) can serve as the input to the Pronominalization transformation, if it is assumed that relative clauses have the structure $\begin{array}{c} \text{NP} \\ \text{NP} \quad \text{S} \end{array}$ at this stage, and further, that the bottom of these two NP's may serve as the antecedent for Pronominalization.



Applying Pronominalization to NP_2 and NP_4 under identity to NP_3 and NP_1 , respectively, (36) yields (34). Thus, the force of the Bach-Peters paradox is considerably weakened.¹⁶

There are, no doubt, further reasons for abandoning the idea of a transformation converting NP's into pronouns under conditions of identity (e.g., Kayne (1971) presents an ordering paradox that arises if the grammar of French is assumed to contain such a transformation). However, the arguments in this section will suffice to justify the assumption that definite pronoun

anaphora cannot be accounted for by a transformation which replaces NP's by pronouns.

3.2.4. The last three sections have presented background assumptions about the theory of anaphora, and reasons for them. The purpose of this section is to reject explicitly an assumption put forward by Jackendoff (1969).

Jackendoff claims that "coreferentiality, a purely semantic concept, cannot be referred to in transformations, and conversely, semantic rules cannot depend on what transformations have taken place, but only on the resulting structural configurations." Moreover, it is clear from the context in which this quote appears that a still stronger claim is intended, for it is on the above grounds that Jackendoff rejects Postal's "Cross-over Constraint"

(Postal (1971a)). The Cross-over Constraint, contrary to what Jackendoff seems to be suggesting, is neither a transformation nor a semantic rule. Rather, it was proposed as a universal constraint on the operation of a class of transformations in environments where certain anaphoric relations obtain. Thus, it seems that Jackendoff is claiming that the independence of syntax and semantics is such that no constraint affecting the operation of transformations may refer to semantic information.

On general methodological grounds Jackendoff is correct in wishing to maintain the distinctness of the components of a generative grammar. This is in keeping with the goal outlined above of maximizing the specialization of the various mechanisms available to a grammar in the interests of making linguistic theory more restrictive. Thus, if possible, semantic features should not be made available to individual syntactic transformations.

Notice, however, that these considerations do not apply to the Cross-over Constraint. Postal proposed this constraint as a linguistic universal,

i.e., as part of linguistic theory. As such, it restricts the operation of transformational rules on the basis of semantic information, without requiring the transformations to make mention of the semantic features involved.¹⁷ The Cross-over Constraint, if factually correct, would provide a universal statement of one of the ways in which syntax and semantics are linked, and, as such, it would restrict the class of grammars formulable within linguistic theory. Hence, the Cross-over Constraint is the sort of mechanism which is a priori desirable, and the burden of proof, contrary to Jackendoff's implication is on its opponent.¹⁸

Returning now to Jackendoff's claim that transformations may not refer to coreferentiality, consider what this implies, in conjunction with Helke's analysis of reflexives. Since Helke proposes that the pronominal determiner portion of a reflexive is the product of a copy transformation, Jackendoff would insist that the necessary coreferentiality between this determiner and the NP of which it is a copy be assigned by a semantic rule, i.e., by a rule other than the copying transformation which produced it. This semantic rule, however, cannot be the same as the rule utilized to account for the anaphoric relations of ordinary pronouns as (37) shows.

- (37) (a) Mary asked Sue to wash her car.
- (b) Mary asked Sue to wash her car.
- (c) Mary asked Sue to wash herself.
- (d) *Mary asked Sue to wash herself.

In fact, it is evident that the antecedent of the pronominal determiner of a reflexive must always be the NP of which that determiner is a copy. In other words, the conditions on the semantic rule must be identical to those on the syntactic transformation. This is clearly an unsatisfactory situation.

There are two ways in which this problem can be resolved: either Helke's analysis of reflexives can be abandoned in favor of something more akin to the analysis of Jackendoff (1969), or the obligatory anaphoric relation under discussion can be marked by the transformation involved in the derivation of reflexives, in violation of Jackendoff's suggestion. In what follows, the latter course will be adopted. There are several reasons for this. First of all, Helke's analysis is more adequately justified than Jackendoff's claim. Secondly, if an interpretive reflexive rule were adopted (as by Jackendoff(1969)), there would be no non-ad hoc way to capture the fact that reflexives differ from ordinary anaphoric pronouns by requiring an antecedent in the same simplex sentence. (Recall that Helke's analysis accounts for this very naturally, since the copying transformation is subject to the insertion prohibition, but the rule associating ordinary pronouns with their antecedents is not). Finally, it will be seen in the next section that there is reason to believe that other transformations also affect anaphoric relations, and that, in fact, anaphora must be mentioned by a number of transformations. It will be argued, however, that there is a principled way of predicting which transformations will refer to anaphora, so linguistic theory need not be enriched by this addition.

3.3 Anaphora.

The question of the obligatoriness of anaphoric relations, which played a crucial role in the preceding discussion, is one which has received surprisingly little attention in the literature on anaphora. The only attempts to utilize evidence concerning the obligatoriness of anaphora are found in Dougherty (1969) and Helke (1970). The former of these has recently been severely attacked (Postal (1971)). The purpose of this section is to defend a prop-

osal which preserves the essential features of Dougherty's argument, while at the same time resolving the difficulty which arose in the previous section.

Dougherty (1969) asserted that any pronoun allows a non-anaphoric interpretation, and that some pronouns allow only such an interpretation. That is according to Dougherty, the set \sum_a of sentences containing anaphoric pronouns is a proper subset of the set \sum_n consisting of sentences containing non-anaphoric pronouns. Dougherty refers to the relationship between \sum_a and \sum_n as the "anaporn relation".

As Postal (1971) points out, however, there are several classes of counter-examples to anaporn relation.¹⁹ (38) lists some of these.

- (38) (a) Mary washed herself.
- (b) The President lost his head.
- (c) The chairman gnashed his teeth.
- (d) The losers had to buy beer for the winners, didn't they?
- (e) She is a happy girl, is Sue.
- (f) The man who shot Liberty Valance, he was the bravest of them all.
- (g) He is a very wise man, the Maharishi.

Examples like (38a-c) have already been discussed in connection with Helke's analysis of reflexives. It was concluded that the pronouns in such examples all result from application of a transformation which makes pronominal copies of certain NP's. Examples like (38) have been frequently discussed in the literature (see, e.g., Katz and Postal (1964) and Culicover (1970)), and it is widely believed that such pronouns are also a result of copying transformations. Culicover (1970) analyzes the pronoun in (38e) similarly as the output of a copying transformation. Ross (1967a) mentions

transformations of Left and Right dislocation, which are allegedly involved in the derivations of (38f) and (38g). These transformations would move NP's, leaving pronominal copies behind.²⁰

These facts are highly suggestive. If all counter-examples to the anaporn relation are pronouns resulting from the application of copying transformations, then it might be possible to salvage the anaporn relation in spirit by stipulating that copying transformations which involve an NP always produce a pronoun whose antecedent is that NP.

One immediate advantage of such a stipulation is that it accounts for the fact that some of the pronoun-antecedent pairs in (38) seem to be in relative positions in which pronominal anaphora relations are usually prohibited. In (38a) and (38g), for instance, the pronoun is to the left of its antecedent, and might plausibly be argued to be no more deeply embedded than the antecedent,²¹ in which case no anaphoric relation should be possible (see Chapter 2 for justification of this claim). In addition, (38f) exhibits an abnormal pronoun-antecedent relation, as can be seen from the ungrammaticality of (39), in which the relevant phrases exhibit exactly the same structural relationship as in (38f). (See Chapter 2 for discussion of the constraint involved).

(39) *Behind the man who shot Liberty Valance, he saw a light.

If copying transformations necessarily stipulate an anaphoric relation between the copy and the NP copied, then these anomalies are accounted for. Another similar case is that of Extraposition. The fact that pronoun it in sentences like (40) is in an anaphoric relation with the complement clause requires an explanation, since the pronoun is to the left of and no more deeply embedded than its antecedent.

(40) (a) It is possible that John will come.

(b) It is impossible for John to come.

By supposing Extraposition to be formulated so as to move the complement, leaving it as a copy, it is possible to account for this unusual anaphoric relation. Further, such an analysis accounts for the impossibility of associating it with any other antecedent in such sentences -- given, of course, the above proposal about copying transformations.

Another class of counterexamples to the anaporn relation as Dougherty presents it consists of relative pronouns. These must always be anaphorically related to their heads. For example, in (41), which must necessarily be anaphorically related to the book.

(41) The book which was lying on the table belongs to me.

Chomsky (personal communication) has pointed out that such cases, although they may be inconsistent with the details of the formulation of the anaporn relation, are perfectly consistent with the point Dougherty makes, viz., that for elements which are sometimes interpreted anaphorically, those environments where they may be so interpreted are a proper subset of those where they may be interpreted non-anaphorically. Since relative pronouns must always be interpreted anaphorically, they are not really relevant to Dougherty's conclusion. The fact that relative pronouns must be anaphorically related to their heads can be incorporated into the grammar by including in the rule (or rules) involved in forming relative clauses a stipulation that the head must be the antecedent of the relative pronoun. This would replace a condition in almost all existing analyses of relatives that stipulates identity between the head and an NP internal to the relative.

Notice now that the traditional method of formulating copying transform-

formations would also involve stipulation of identity between NP's (viz., between the NP copied and the copy). This suggests that it might be possible to dispense with the notion of identical NP's altogether, in favor of the notion of anaphorically related NP's. This could be accomplished by replacing the term "identical to" with "under the influence of" in all grammatical rules, where "is under the influence of" is defined in (42).

(42) (a) NP_1 is under the influence of NP_2 if and only if NP_1 is a pronoun and NP_2 is its antecedent.

(b) If A and B are constituents other than NP, A is under the influence of B if and only if A and B are identical.²²

With this definition, it is possible to avoid mention of anaphora in the formulation of the transformations involved (38). Instead, operations which copy NP's can simply be formulated as inserting an NP under the influence of another NP. In this manner, individual transformations can be spared from making explicit reference to pronominal anaphora, so that the objection of Jackendoff discussed in the last section is overcome.

Another beneficial consequence of adopting (42) is that it accounts automatically for the requirement that relative pronouns be anaphorically related to their heads. This is accomplished without significant alteration of the rules involved in the formation of relative clauses.

In addition, replacing the notion of identity by that of under the influence of makes other predictions which seem to be borne out. For example, it predicts that no transformation needs to refer to true identity between NP's. In fact, the linguistic literature seems to support this prediction. Another prediction of (42) is that all transformations which delete NP's "under identity" actually delete pronouns under anaphora. It constitutes

rather striking support for (42) that Postal (1970b) makes precisely this claim on quite different grounds. Postal proposes (43), under the title, "Universal Deletion Constraint."

- (43) If a transformation T deletes an NP_a subject to the existence of a coreferent NP, NP_b, in the same structure, then at the point where T applies, NP_a must be pronominal.

Although it will be argued below (Chapter 3) that most of Postal's reasons for proposing (43) are incorrect, there do not appear to be any counter-examples to the proposal at hand among deletion rules. All in all, the substitution of "under the influence of" for "identical to" seems to be quite well supported.

Recall at this point that the discussion leading up to (42) was introduced in order to attempt to salvage Dougherty's anaporn relation. The reader might, at this point, ask in what sense the proposal above accomplishes this end. In answer to this question, consider what conclusion Dougherty draws from the anaporn relation: If, as Dougherty claims, every pronoun which could be interpreted anaphorically could also be interpreted non-anaphorically then it would be most unnatural to propose that anaphoric pronouns have an entirely different source from non-anaphoric pronouns, for implicit in such an analysis would be the claim that the anaporn relation is entirely accidental. Such a theory would derive anaphoric pronouns from NP's fully identical to their antecedents, whereas non-anaphoric pronouns would have to be generated in the base (unless the definition of transformation were so altered as to allow transformations to refer to information--including non-linguistic information--outside of the sentence being operated on). Thus, the anaporn relation, if it held, would strongly support a theory

of anaphora which would require all pronouns to be generated in the base and would postulate a filtering mechanism to determine which pronouns may have an anaphoric interpretation. (Every pronoun would be allowed a non-anaphoric interpretation).

Notice now that a minor modification of such a theory, viz., the replacement of "identical to" by "under the influence of", would serve to account for the fact that the only counter-examples to the anaphoric relations are pronouns involved in a transformation which stipulates anaphora between the pronoun and its antecedent. All pronouns not produced by copying transformations would be generated in the base, and, of these, the only ones which are obligatorily anaphoric are those whose non-anaphoric interpretations are filtered out by transformations which mention that they are under the influence of another NP. Thus, (42) makes it possible to account for the fact that most pronouns are ambiguous between anaphoric and non-anaphoric interpretations, and to utilize this fact as an argument in favor of generating most pronouns in the base and against a transformation of Pronominalization. In this way, the arguments for incorporating (42) into linguistic theory and those against a Pronominalization transformation reinforce one another.

4. Summary

Because this chapter has dealt with a great many rather loosely connected questions, it might be helpful in conclusion to summarize briefly the more important points which have been established. This is particularly advisable in view of the fact that these points will serve as background assumptions for what follows. Therefore, the conclusions of this chapter are summed up briefly in (I) - (VI).

(I) The most restrictive linguistic theory compatible with the

facts is to be preferred. In particular, Chomsky's Extended Standard Theory is preferable on methodological grounds to the theory of Derivational Constraints.

- (II) The analysis of reflexives presented by Helke (1970) is essentially correct.
- (III) Anaphoric relations are subject to the Transitivity Condition stated as (15).
- (IV) There is no transformation of Pronominalization which would convert an NP into a pronoun under identity with another NP.
- (V) The predicate "is identical to" should be replaced by the predicate "is under the influence of" in the statement of conditions of applicability of transformations.
- (VI) Counterexamples to Dougherty's anaporn relation can be eliminated using (V), from which it follows that this relation does, in fact, provide support for (IV).

FOOTNOTES

1. Throughout this thesis, underlining will be used to indicate an anaphoric relation. This notation is adopted rather than the more common device of indexing (cf. Chomsky (1965) pp. 145-146) because of the widespread confusion resulting from the use of the term "referential" in association with indices (see, e.g., Karttunen (1969) or Lakoff (1968)). Both notations fail to distinguish anaphor from antecedent. This may well require the introduction of a new notation altogether. No such move is made in this thesis, however.
2. (A) and (B) are distinct questions. This can be seen from the fact that (B) needs to be answered regardless of the answer to (A). At least four distinct proposals have been made in regard to (A): (i) grammatical transformations (Lees and Klima (1963)); (ii) lexical insertion transformations (McCawley (1970)); (iii) global derivation constraints (Postal (1970)); and (iv) rules of semantic interpretation (Jackendoff (1969)). Each of these proposals (with the possible exception of (iii)) is compatible with various formulations of specific conditions on the rule(s) and rule ordering.
3. It is important to note here, in view of what was said above, that nobody has ever claimed that the postulation of syntactic rule-features permits any restriction elsewhere in the theory. Thus, rule-features constitute a pure enrichment of linguistic theory, and are therefore to be rejected if possible.

4. In practice, this usually means one which allows idiosyncracies to be marked with selectional features.
5. Chomsky (1971) replaces (10) with another, more general, formulation. The distinction is irrelevant for the present purposes. However, see Chapter 3.
6. This is the formulation of Chomsky (1971), not of Helke (1970). However, it is perfectly consistent with everything Helke says. Notice, by the way, that (13) involves the assumption that the referent of a reflexive is not the same as that of its antecedent. This seems plausible, especially if a reflexive consists of an NP with the head noun self.
7. This constraint is more general than that stated by Jackendoff (1969), p. 44, but it amounts to the same thing in the present context, since the examples discussed involve only NP anaphora. Below it is argued that the more general constraint is correct. Noam Chomsky (personal communication) has pointed out that examples like (i) are of some interest, taken in conjunction with (15).

(i) John reproached himself for telling lies.

The subject of telling in (i) cannot be anaphorically related to John as (ii) shows.

(ii) *John reproached Mary for singing to himself.

If the antecedent of the subject of telling in (i) were him, then (15) would require that the subject of telling also be anaphorically related to John, but this has just been shown to be impossible. Therefore, the

antecedent of the subject of telling in (i) must be himself. Notice that no theory of reflexives other than Helke's can account for (i) in a manner consistent with (15). Lest it be objected that reflexives should not be allowed to serve as the antecedents for subjects (since reflexives are widely thought to be banned from subject position), notice sentence (iii), in which a reflexive is clearly in subject position.

(iii) No man is taller than himself.

8. The skeptical reader may wish to consider one case of this general argument against theories of reflexives other than Helke's. The clearest instance of its application is Jackendoff (1969), in which the Reflexivization rule ((90), p. 60) together with the Transitivity Condition (p.44) serve incorrectly to rule out examples like (16a). The matter is discussed in more detail in Wasow (1971).
9. Williams (1971) discusses at length what he calls "networks of anaphora" and defends a proposal which is, so far as I can see, completely equivalent to the Transitivity Condition.
10. Notice that this same argument applies to any analysis (such as Kuroda (1969) or Postal (1966)) which includes a transformation of Definitization in the generation of pronouns.
11. This argument was pointed out to me by Howard Lasnik, who attributed it to an unidentified M.I.T. graduate student. It can be circumvented by postulating an output condition to the effect that nothing may intervene between a verb and its pronominal direct object. Notice, however, that

such a condition must make reference to both surface structure and deep structure, so that it is not, strictly speaking, an output condition, but an otherwise unnecessary kind of constraint. Far preferable is Lasnik's proposal (personal communication) that there is a cyclic rule encliticizing post-verbal pronouns. This would also account for the fact that parentheticals are impossible between a verb and a pronominal direct object.

(i) M.I.T. owns, or so I was led to believe, the Prudential building.

(ii) *M.I.T. owns, or so I was led to believe, it.

However, Ross (personal communication) has observed that examples like (iii) support the formulation as an output condition.

(iii) Mary was given it.

12. Example (23c) is relevant only if it is assumed that both is related to its antecedents in the same way as ordinary definite pronouns are related to their antecedents. Notice, however, that exactly the same difficulty arises with examples of what have been called "split antecedents". Thus, if Pronominalization is a transformation which converts an NP into a pronoun under identity with another NP, then (i) can have no source.

(i) John told Mary that they were lost.

Given an analysis incorporating a Pronominalization transformation, the most plausible underlying structure for (i) is (ii).

(ii) John told Mary that John and Mary were lost.

If (ii) is the source of (i), however, the identity condition involved in Pronominalization cannot be one of syntactic identity, since the NP John and Mary occurs only once in (ii). What kind of condition could

replace a strict syntactic identity condition in this case is not clear. Certainly, no adequate answer has been given to the question.

13. This is so because each of Mary's sons is one of Mary's sons' brothers, so long as Mary has at least two sons. Mary is presupposed to have at least two sons by the use of the definite NP, Mary's sons' brothers.
14. Lakoff (1968) proposes a theory of anaphora which includes both a Pronominalization transformation and surface structure rules of interpretation (Lakoff calls them "output conditions"). A careful reading, however, will reveal that he offers no motivation whatever for the postulation of the transformation.
15. Of course, the other arguments in this section demonstrate that radical changes are indeed necessary. However, the Bach-Peters paradox is not sufficient justification for these changes. Further, it will be observed below (Chapter 5) that generating pronouns in the base does not guarantee that the Bach-Peters paradox will be avoided. The problem can reappear in the semantic component, once it is recognized that the meaning relationship between a pronoun and its antecedent is not always identity of reference.
16. One more argument against the transformational approach to pronouns should be mentioned. Bach (1969) attempts to prove that there can be no Pronominalization transformation on the grounds that it is impossible to order such a transformation. His arguments is divided into three parts: (i) evidence that Pronominalization is not a precyclic transformation; (ii) evidence that Pronominalization is not a cyclic transformation;

ation; and (iii) evidence that Pronominalization is not a post-cyclic or last-cyclic transformation. Although much of the evidence Bach presents is of interest (and generalizes to the other approaches to anaphora), the conclusion that he attempts to establish does not follow from his evidence, because the arguments for (ii) are faulty. Bach presents two arguments for (ii). One depends on the claim that WH-fronting (Bach calls it "Question movement") must either be last cyclic or apply on the cycle following the one determined by the clause in which the WH-word appears. Both Chomsky (1971) and Jackendoff (1969) argue against this assumption, and it does not appear to be adequately justified. The other argument offered by Bach against cyclic Pronominalization depends crucially on the supposition that an optional cyclic rule which has failed to apply to a particular structure on one cycle may subsequently apply to the same structure on a later cycle in the same derivation. Chomsky (1971) has argued that the transformational cycle should be defined in such a way as to preclude such derivations. Thus, Bach's arguments against cyclic Pronominalization are inadequate. Postal (1970) and Lakoff (1968) have also argued against a cyclic transformation of Pronominalization, but their arguments are subject to much the same criticism as Bach's. See Chapters 2 and 4 for further discussion of ordering problems.

17. The fact that Postal viewed referential indices as syntactic features and hence made no effort to avoid referring to them in transformations is irrelevant. The fact remains that Postal's Cross-over Constraint can be formulated as a universal without requiring transformations to

refer to anaphora.

18. Nevertheless, I believe the Cross-over Constraint to be incorrect on empirical grounds. Some of the arguments against it are to be found in Jackendoff (1969) and others below in Chapter 4. Further, it should be noted that Helke's analysis of reflexives, which was defended above, eliminates many of Postal's arguments in favor of the Cross-over Constraint.
19. There are, nevertheless, fewer counterexamples than Postal claims. A substantial number of Postal's examples of pronouns which must be interpreted anaphorically involve stress markings. The linguistic literature is full of ambiguous sentences which can be disambiguated by considering intonational factors. This has not led anyone to deny that those sentences are ambiguous. Rather, it has led to work on how the intonational features are linked to the meaning differences. Thus, for example, Lasnik (1970) noted that Lakoff's familiar example (i) can be disambiguated on the basis of intonation, but that did not lead him to deny that it is ambiguous.

(i) George doesn't beat his wife because he loves her.

Hence, it seems rather discriminatory for Postal to single out Dougherty and to chastise him for claiming ambiguities where stress serves to disambiguate.

20. Postal (1971a) suggests instead that examples like (35f) be derived from sentences like (i).

(i) As for the man who shot Liberty Valance, he was the bravest of them all.

Notice, however, that (i) allows an interpretation in which the antecedent

of he is Liberty Valance, whereas (38f) does not, so that Postal's analysis leaves the non-ambiguity of (38f) with respect to anaphora unaccounted for. Further, the contrast between the (a) and the (b) sentences in (ii) - (iv) casts additional doubt on Postal's analysis.

(ii) (a) As for George, I'd rather Bill got the job.

(b) ??George, I'd rather Bill got the job.

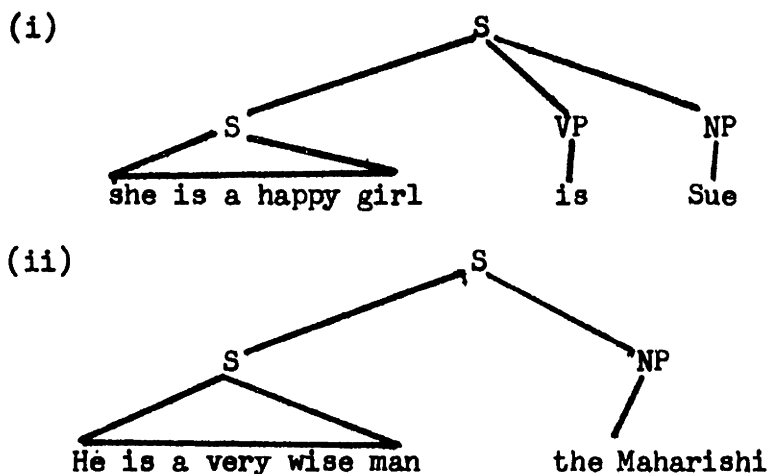
(iii)(a) As for John, I've never met him.

(b) ?John, I've never met him.

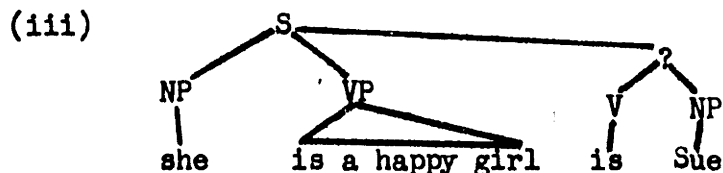
(iv) (a) As for what Pete said about Bill, don't believe a word he said.

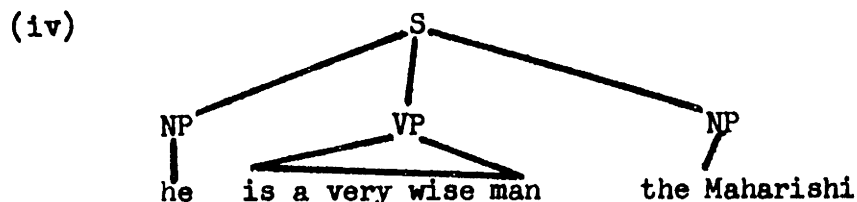
(b) *What Pete said about Bill, don't believe a word he said.

- 21 This depends on the appropriate structure for such examples. If (38e) and (38g) have structures like (i) and (ii), respectively, then this argument clearly fails.



On the other hand, if (iii) and (iv) are the appropriate trees, then the argument holds.





It is not clear to me which structures (if any of these) are correct.

If (i) and (ii) are right, then (v) and (vi) should be grammatical.

(v) ??She was afraid of him, was the woman who jilted your brother.

(vi) ??He loved her, the man who shot your sister.

Unfortunately, the data are too marginal to be of much help. Since the point is rather minor, it will not be pursued.

22. Evidence might be found to suggest that (42a) generalizes to constituents other than NP. I do not insist on the precise formulation of (42). I am merely asserting that the evidence suggests that the symmetric relation of identity between NP's is not relevant to the formulation of grammatical rules, whereas the asymmetrical anaphora relation is.

CHAPTER TWO

DEFINITE PRONOUN ANAPHORA

O. Introduction

This chapter will be concerned with attempting to answer questions (A) and (B), viz., what sorts of mechanisms are best suited for representing anaphora in a grammar, and what are the conditions on the application of the anaphora rule(s) in English.

The reader will undoubtedly have noticed that most of the arguments and examples in the previous chapter dealt with the relationship between definite pronouns and their antecedents. This should not be too surprising, for the overwhelming majority of generative studies of anaphora deal primarily with definite pronominal anaphora. Since most of the existing evidence concerning (A) and (B) has to do with definite pronouns, this chapter will be restricted to considering the mechanisms for associating definite pronouns with their antecedents and the conditions on these mechanisms. The problem of generalizing the conclusions of this chapter to other anaphoric relations will be taken up in the next chapter.

1. The Conditions On The Rule

For the purposes of exposition, it turns out to be simplest to consider question (B) before (A). That is, the conditions on the mechanism involved will be considered first, leaving for later the question of the nature of the mechanism itself. Thus, it will be assumed for the moment that some rule exists for specifying pronoun-antecedent pairs.¹ It is then possible to ask, without making any claims about the theoretical status of the rule, which pronouns may be associated with which antecedents, and how the rule involved is to be ordered. The answers to these questions may turn out to

be relevant to the question of the theoretical status of the rule.

1.1.1 Past Proposals

One essentially trivial condition on pronominal anaphora is that the pronoun must agree with its antecedent in person, gender, and number.² The sentences in (1) - (3) are examples of this.

- (1) (a) The Jones' said that they were leaving.
- (b) *We said that they were leaving.
- (c) John denied that he was a communist.
- (d) *You denied that he was a communist.³
- (2) (a) The young lady claimed that she didn't drink.
- (b) *The young lady claimed that he didn't drink.
- (c) *The young lady claimed that it didn't drink.
- (3) (a) The policemen drew their guns.
- (b) *The policemen drew his gun.
- (c) The policeman drew his gun.
- (d) *The policeman drew their guns.

1.1.2 Most attempts to formulate a pronominal anaphora rule (e.g., Langacker (1966), Ross (1967b), Jackendoff (1969), Dougherty (1969)) have included a condition along the lines of (4).

- (4) If a pronoun is to the left of an NP, then that NP may serve the antecedent of the pronoun only if the pronoun is dominated by a subordinate clause which does not dominate the NP.

(4) is illustrated in (5) with a number of different types of subordinate clauses.

- (5) (a) The fact that he was a moron didn't bother John.
- (b) *It didn't bother him that John was a moron.

- (c) The man who shot him didn't know John.
- (d) *He was unknown to the man who shot John.
- (e) The man who shot him claimed that John had attacked first.
- (f) The man who shot him didn't know the woman John loved.
- (g) Because he was famous, John always wore dark glasses.
- (h) *He always wore dark glasses because John was famous.
- (i) After meeting his wife, Mary wouldn't see John anymore.
- (j) *Mary wouldn't see him anymore after meeting John's wife.
- (k) The evidence that he was innocent cleared John.
- (l) *He was cleared by the evidence that John was innocent.

1.1.3 Another frequently mentioned condition on rules for pronominal anaphora is (6) (see, e.g., Postal (1970)).

- (6) If a definite pronoun is to the left of an NP, the NP may serve as the antecedent for the pronoun only if it is definite.

The examples in (7) are given by Postal (1970b) in support of (6).

- (7) (a) ?*The fact that he lost amused somebody in the crowd.
- (b) Somebody in the crowd was amused by the fact that he lost.
- (c) *The man who lost it needs to find something.
- (d) The man who lost something needs to find it.
- (e) ?*His realization that the world was exploding worried someone.
- (f) Someone was worried by his realization that the world was exploding.

1.1.4 A further condition on the assignment of pronoun-antecedent pairs is proposed by Lakoff (1968b). This condition involves Langacker's notion of "command" (Langacker (1966)), which was developed as part of one formulation

of (4). Since command is a term which appears frequently in the literature on anaphora, its definition is given in (8).

(8) Node A commands node B if every S dominating A dominates B.

Lakoff uses (8) in proposing a constraint essentially equivalent to (9).

(9) An NP may not serve as antecedent for a pronoun if

- (a) the NP is to the left of and commands the pronoun,
- (b) the pronoun is not a relative pronoun,
- (c) the pronoun is the surface structure subject of its clause,
and
- (d) the NP is prominent with respect to the clause containing
the pronoun.⁴

While (9) is certainly inadequate as given (see footnote 4), the basic idea behind it--that subjects may behave differently from non-subjects with respect to left-to-right anaphora--is not implausible.

- (10) (a) In Mary's apartment, a thief assaulted her.
 (b) *In Mary's apartment, she was assaulted by a thief.
 (c) Bill's apartment, Mary always talks to him about it.
 (d) *Bill's apartment, he always talks to Mary about it.
 (e) It was John's dog that bit him.
 (f) *It was John's dog that he hit.

1.2 Revisions of Past Proposals

Each of the last three conditions on pronominal anaphora mentioned has certain shortcomings. In the cases of (6) and (9), there exist outright counterexamples; in the case of (4), the condition is merely insufficiently general.

1.2.1 Consider first of all examples like (11).

(11) (a) The portrait of his mother always depresses John.

(b) The story about him that was making the rounds cost John many friends.

In such examples, the pronoun is to the left of and in the same clause as its antecedent, so according to (4), no anaphoric relation should be possible.

The lexicalist hypothesis (Chomsky (1970b)) provides a rather straightforward solution to the difficulty presented by (11). Chomsky has pointed out that the internal structure of certain NP's (such as the portrait of his mother and the story about him that was making the rounds in (11)) bears many striking similarities to the structure of sentences, and he has further argued rather persuasively that there are a number of special properties which are common to such NP's and sentences. Among these properties is that of being "cyclic", i.e., of being the domain of a transformational cycle. Much recent work has indicated that the notion of cyclic node may be relevant for the formulation of certain constraints. (11) suggests that the terms "subordinate clause" should perhaps be replaced by the term "cyclic node" in (4).⁵

Notice now that there are still other instances of anaphora violating (4), in which the pronoun is not embedded in an NP with the internal structure of a sentence. Consider the examples in (12).

(12) (a) Near him, John saw a snake.

(b) In her apartment, Mary was assaulted by a thief.

Lakoff (1968b) has shown that it is impossible to account for the inconsistency between these examples and (4) by means of rule ordering. Thus, (12) constitutes genuine counter-evidence to (4). Similarly, examples like (13), though not fully grammatical, are nowhere near as bad as those in (14), contrary to what (4) predicts.

- (13) (a) ?His mother loves John.
 (b) ?Their maid speaks well of the Smiths.
 (c) ?Her friends gave Mary a going-away present.
- (14) (a) *He loves John's mother.
 (b) *They speak well of the Smiths' maid.
 (c) *She gave Mary's friends a going-away present.

In cases like (13), speakers of English exhibit a wide range of reactions, from full acceptance to almost total rejection. This indicates that the criterion involved in right-to left anaphora may vary somewhat among speakers. Suppose, then, that (4) is reformulated as (15).

- (15) If an NP serves as the antecedent of a definite pronoun to its left, the pronoun must be more deeply embedded than the NP.

Linguistic theory must place certain limitations on the notion of "more deeply embedded than", but within these limits, there can be room for individual variation. Thus, if a pronoun is dominated by a cyclic node not dominating the NP, then the pronoun will be considered, by convention, to be more deeply embedded. Similarly, if the pronoun is part of a prepositional phrase, the NP is not, and the NP commands the pronoun, then the pronoun is more deeply embedded. On the other hand, if the pronoun is the subject or object of a sentence containing the NP, then the pronoun is not more deeply embedded. Finally, if the pronoun is a possessive determiner, linguistic theory will not specify whether the pronoun is more deeply embedded than the NP, so that individual speakers are free to make their own determination.⁶

1.2.2 Counterexamples to (6) are quite numerous. In fact, Postal (1970b) gives several in the course of defending (6). Some of these are presented

in (16).

- (16) (a) If he has an ugly wife, a man should find a mistress.
- (b) When they are angry, gorillas can be awfully mean.
- (c) Men who hunt them will tell you that gnus are smelly beasts.
- (d) The fact that he is being sued should worry any businessman.
- (e) The girl who he is going to marry can upset any bridegroom to be.

Postal correctly observes that the indefinites in (16a-c) are interpreted as generics and concludes that generics do not obey (6). He fails to note that (16d & e) also have generic force, so he makes a separate and unnecessary exception to (6) for them. There are, in addition, other exceptions to (6) which Postal does not mention.

- (17) (a) After Bill kissed her, a certain young lady blushed repeatedly.
- (b) That he was not elected upset a certain leading politician.
- (c) The woman he loved betrayed a man I know.

The examples in (17) suggest that (6) should be restricted to non-specific indefinites.⁷

Notice that the two classes of exceptions to (6) mentioned above are characterized in semantic terms. The notions of genericness and specificity refer to the manner of interpretation, not to any syntactically definable properties. There are no diagnostic environments for genericness or specificity, and, in fact, attempts to characterize these properties in syntactic terms have not been very successful (see Baker (1966), Bowers (1969), Fodor (1970), Jackendoff(1971)). Definiteness, on the other hand, is a syntactic property. There exist a number of diagnostic environments for definiteness (see Postal

(1966)), and definiteness is best characterized in terms of these. It seems somewhat unnatural that a rule of grammar like (6) which defines a criterion for anaphora in purely syntactic terms should have classes of exceptions which can be characterized only in semantic terms. It would be much more natural if the criterion of definiteness in (6) were replaced by some semantic property. This property would have to be a property common to specific and generic indefinites, if these are not to remain exceptional. No such property has been discussed in the literature, so a new term will have to be introduced, its semantic content indicated, and the consequences of reformulating (6) in terms of it explored.

What do specific and generic indefinites have in common that distinguishes them from nonspecific nongeneric indefinites? The answer is that specifics and generics are used in referring. The use of a specific NP presupposes the existence of an individual for which that NP is being used as a name. Generics are used in referring to classes. Nonspecific nongenerics, on the other hand, are those NP's for which no referent can exist (cf. Chapter 5) or for which there is nothing in the context to indicate that the speaker is referring to any particular individual or class. In what follows, generic and specific indefinites will be designated as "determinate" because of the extra information they supply regarding the existence of a referent. (6) can now be reformulated as (18).

- (18) If a definite pronoun is to the left of an NP, the NP may serve as the antecedent for the pronoun only if it is determinate.⁸

So far, all that has been accomplished is a terminological change, plus an attempt to provide an intuitive basis for it. It now remains to be shown

that the intuitive characterization of "determinate", together with (18) lead to correct predictions.

One prediction that (18) makes is the following: an anaphoric relation rendered impossible by (18) should be improved by the addition of information indicating that the NP has a specific referent. Although intuitions vary a good deal on this point, most speakers agree that the addition of tags like guess who, or but I don't know which one improve such examples. This is illustrated in (19).

(19) (a) ??The fact that he lost amused somebody in the crowd.

Guess who.

(b) ?That he had been chosen surprised one of the designates,
but I don't know which one.

(c) ?Because he has the winning sweepstakes ticket, someone
is a very rich man, but nobody knows who he is yet.

(d) ??After he sat down, somebody coughed, but I won't tell
you who.

The marginal character of such sentences suggests that perhaps determinateness might be a property of which various degrees are possible. That is, the sentences in (19) may be less than fully grammatical because the NP's involved are only partially determinate. Alternatively, it may be the case that the criteria for determinateness vary for different speakers.

A somewhat more substantial consequence of replacing (6) by (18) is that (18) allows for the possibility that definite NP's may be subject to the same constraint. It is well-known that genericness is independent of definiteness, i.e., that both definite and indefinite NP's may be either generic or nongeneric. Partee (1970) suggests that the same may be true of specificity.

She argues that the distinction between referential and attributive NP's among definites (attributed by her to Donellan (1966)) may actually be the same as the specific-nonspecific distinction among indefinites. A discussion of specificity and referentiality would be too involved to be undertaken here, being inevitably linked with the problem of opacity (see Fodor (1970)). However, if Partee's suggestion is accepted, it would be reasonable to expect that some definites might be indeterminate and that (18) might therefore have applications to definite NP's.⁹

Clear examples for testing the applicability of (18) to definites are hard to find. This is in part due to the fact that virtually all definite NP's may be interpreted referentially, so that (18) must be tested by considering whether certain sentences involving left-to-right anaphora allow ambiguities absent from the corresponding sentences in which the pronoun is to the left of the antecedent.

Consider sentence (20).

- (20) If you are looking for the fountain of youth, you'll never find it.

The NP the fountain of youth can be understood either referentially, i.e., as the name of an object assumed by the speaker to exist, or attributively, i.e., as a description to which it may or may not be possible to assign a referent. These two interpretations can be distinguished by adding to (20) one of the two clauses in (21).

- (21) (a) because it is so well hidden.

- (b) because it doesn't exist.

If (18) generalizes to definite NP's, then an NP serving as the antecedent of a pronoun to its left should not permit this kind of ambiguity, allowing

instead only the referential interpretation. This does indeed appear to be the case, as (22) shows.

- (22) If you are looking for it, you'll never find the fountain of youth $\left\{ \begin{array}{l} \text{because it is so well hidden.} \\ \text{*because it doesn't exist.} \end{array} \right.$

Further examples of the same sort are given in (23) - (25).

- (23) (a) If the winner of the election ends the war, he will be very popular.
 (b) If he ends the war, the winner of the election will be very popular.
- (24) (a) Whenever I read the newspaper, I am disgusted by it.
 (b) Whenever I read it, I am disgusted by the newspaper.
- (25) (a) Although very few Romans ever met the Emperor, they all hated him.
 (b) Although very few Romans ever met him, they all hated the Emperor.

In each of these examples, the (a) sentence permits an interpretation impossible for the (b) sentence. For example, (23a) but not (23b) could be uttered if the election had not yet taken place and the phrase the winner of the election could not yet be associated with a specific person. The contrast is clearer if the winner of the election is replaced by whoever wins the election, which tends to allow only the attributive interpretation. Thus, (26b) is substantially less natural than (26a).

- (26) (a) If whoever wins the election ends the war, he will be very popular.

- (b) ?? If he ends the war, whoever wins the election will be very popular.

Similarly (24a) but not (24b) allows an interpretation in which no particular newspaper is under discussion, and (25a) but not (25b) may be interpreted to mean that all Romans hated whoever happened to be emperor.

Additional evidence is provided by examples (27) and (28).

- (28) (a) ??A guy who didn't believe it interrupted someone's story.

- (b) Someone's story was interrupted by a guy who didn't believe it.

- (28) (a) Very few countries' presidents really care about the people they govern.

- (b) ??The people they govern really concern very few countries' presidents.

In these sentences, the antecedent NP's are definite, so (6) does not apply. Since the determiners tend to be interpreted non-specifically, however, the NP's are most naturally interpreted as indeterminate. Thus, (18) accounts for the contrasts in these examples.

All of this follows from (18) if referential NP's are said to be determinate and attributive NP's are indeterminate. These data therefore provide strong support for the decisions to replace the criterion of definiteness in (6) and to extend the notion of determinateness to definite NP's.¹⁰

1.2.3 The third condition on definite pronoun anaphora, given above as (9), cannot be correct as stated. Chomsky (personal communication) and Akamajian and Jackendoff (1970) have pointed out that examples like (10b, d, & f) are considerably improved if extra morphological material is inserted between the antecedent and the pronoun. This is illustrated in (29).

(29) (a) In Mary's newly furnished apartment, she was assaulted by a thief.

(b) ?Bill's recently redecorated apartment, he always talks to Mary about it.

(c) It was John's black thoroughbred hunting dog that he hit.

These examples suggest that the subject-non-subject distinction Lakoff uses in accounting for (10) is in fact irrelevant, and that the difference in the behavior of subjects and objects in (10) is a result of the fact that the object is always further to the right, and hence further from the proposed NP. This suggestion would receive support from examples in which the object is excluded from an anaphoric relations with a preposed NP by virtue of their proximity. It is possible that such examples could be constructed using imperatives, in which the lack of an overt subject brings the object nearer to the front of the sentence. Unfortunately, such examples are not as bad as might be hoped as can be seen from (30).

(30) (a) ?With all due respect to my worthy opponent, don't believe him.

(b) ?In a conversation with the sargeant, call him "sir".

(c) ?On a camping trip with John, trust him.

However, the fact that these examples are not fully grammatical does support Chomsky's proposal over Lakoff's.

If Chomsky is correct about (10), then the constraint involved is of a rather different type than the other conditions on anaphora discussed above, for properties like length are generally assumed to be irrelevant to the problem of writing grammars. Rather, they are linked with such aspects of linguistic performance as memory limitations (see Chomsky and Miller (1963)).

Since the constraint involved does not appear to interact in any interesting way with processes in the grammar of English, there is no reason to assume that the distance criterion suggested by Chomsky to account for (10) needs to be stated in the grammar. Instead, such examples as (10b, d, & f) and (30) can be considered grammatical but unacceptable because of the following performance constraint.

- (31) If a preposed NP serves as the antecedent for a pronoun in the same clause which is too close to it, the sentence is unacceptable.

The problem of specifying what "too close" means will not be considered here, since the problem at hand is to discover what grammatical devices are involved in English anaphoric relations.¹¹

1.2.4 A rough initial statement of the grammatical criteria determining possible pronoun-antecedent pairs in English can now be made. It is given in (32).

- (32) Given an NP and a definite pronoun in the same sentence, the NP may serve as the antecedent for the pronoun unless
- (a) the pronoun and the NP disagree in gender, person, and number;
 - (b) the pronoun is to the left of the NP and the pronoun is not more deeply embedded than the NP; or
 - (c) the pronoun is to the left of the NP, and the NP is indeterminate.

Notice that nothing has been said about the theoretical status of (32). So far, (32) is merely a summary of the facts which must be somehow incorporated into the grammar of English. The linguistic significance of (32) might be

questioned on the grounds that it is based entirely on the observation of surface structures. In the next section, however, it will be argued that if a wider range of data is considered, there is reason to believe that (32) may apply prior to surface structure. Moreover, the ordering arguments serve to support essentially the formulation of the criteria for definite pronoun anaphora given in (32), for these arguments indicate that other orderings would necessitate a more complex set of criteria.

2. Ordering

Although a tremendous number of arguments have been advanced concerning the ordering of the rule for definite pronoun anaphora, the majority of these depend crucially on particular and often unjustified details of the formulation of the rule (or of other rules). For this reason, it might be wise to consider some of the better-known arguments, and to see in what respects they fail to apply to (32).

2.1.1 Consider first the most famous ordering argument for Pronominalization, viz., that advanced in John Ross's elegant paper, "On the Cyclic Nature of English Pronominalization." Ross argues that the ungrammaticality of examples like (33) can be accounted for on the basis of a condition very much like (4), if this condition is applied cyclically.

(33) *Realizing that John was a failure upset him.

Assuming (as was commonly done at the time the article was written) that definite pronominal anaphora results from the application of a transformation of Pronominalization, Ross claims that (33) would have an underlying structure essentially like (34).

(34) $[_{s_1} [_{s_2} \text{John's realizing } [_{s_3} \text{that John was a failure}]]$
upset John].

If Pronominalization is cyclic, he argues, it will apply first on the S_2 cycle, converting the middle occurrence of John to the pronoun he. It is then impossible to derive the surface structure (33) from (34).

Lakoff (1968b) and Postal (1970b) argue against Ross's conclusion and present alternative means of accounting for (33). Jackendoff (1969) refutes Lakoff's and Postal's arguments, and attempts to resurrect Ross's argument for his own theory of pronouns. He concludes his discussion of the matter with the words, "This redeems Ross's argument, at least for the interpretive theory." (p. 127). This claim is in fact not fully justified: while Jackendoff succeeds in refuting the arguments against cyclic Pronominalization, in his system, sentences like (33) are handled by independently necessary mechanisms and hence have no bearing on the question of the cyclicity of Pronominalization. Thus, Jackendoff does not redeem Ross's argument, but only (perhaps) his conclusion. Since the framework adopted here can account for (33) in the same manner as Jackendoff did, the reason for the ungrammaticality of (33) will be explained in detail. The question of the relevance of (33) to the problem of determining whether the pronominal anaphora rule is cyclic will then have been laid to rest, at least for the remainder of this dissertation.

In the framework adopted here, the underlying structure of (33) would be something like (35), where the curly brackets indicate that the subject of S_2 might be either a dummy element or a definite pronoun, depending on whether Equi is a deletion rule or not (see Chapter 3 for arguments regarding the choice between these two possibilities).

(35) $\left[\begin{smallmatrix} s_1 \\ \text{ure} \end{smallmatrix} \right] \left[\begin{smallmatrix} s_2 \\ \text{upset him} \end{smallmatrix} \right] \{ \text{his} \} \Delta$ realizing $\left[\begin{smallmatrix} s_1 \\ \text{that John was a fail-} \end{smallmatrix} \right]$.

That the subject of S_2 cannot be the full NP John follows from the discussion in Chapter 1, §3.3. Recall that the subject of S_2 can only be deleted if it is under the influence of (i.e., anaphorically related to) another NP (because of the universal constraint that deletions must be recoverable). Hence, the subject of S_2 must be anaphorically related to him if Equi is a deletion rule. If Equi is not a deletion rule, then the subject of S_2 must be a dummy element and it must be anaphorically related to him in order to receive an interpretation. In either case, there is an anaphoric relationship between the subject of S_2 and him. Therefore, if an anaphoric relationship held between John and him (i.e., if (33) were grammatical), the Transitivity Condition would require that an anaphoric relation hold between John and the subject of S_2 . But this is excluded by (32b).¹³ Hence (33) is ungrammatical. Notice that neither (32) nor Jackendoff's alternative to (32) need apply cyclically for this argument to hold. Thus, Ross' argument is not valid, given the present framework (or Jackendoff's), and there can be no way to redeem that argument (even though its conclusion may hold).

2.1.2 Jackendoff (1969) does present an argument of his own for the cyclic ordering of his pronominal anaphora rule. He claims that the rules of Reflexivization and Equi (both of which are interpretive rules in his system) share certain conditions with the pronominal anaphora rule, so that it is necessary to collapse these rules. Further, he argues, both Reflexivization and Equi are generally agreed to be cyclic rules, and he gives the arguments supporting this position. It follows that the pronominal anaphora rule must apply cyclically.

In the framework adopted here, this argument will not work, Helke's arguments, repeated in part in Chapter, 1, §3.2.1, show that Reflexivization is less closely connected to the pronominal anaphora rule than is generally

believed. The arguments in Chapter 1, §3.3 eliminate the motivation for collapsing the pronominal anaphora rule with the Reflexivization rule. In fact, as was argued in Chapter 1, there is good reason to believe that they are very different kinds of rules and hence incapable of being collapsed. If Equi is a deletion rule, then it can only delete anaphoric pronouns, so it is freed from having to be collapsed with the pronominal anaphora rule. If, on the other hand, Equi is not a deletion rule, then it need not be cyclic. The arguments to this effect can be found in Chapter 3, pp. 127-146 of Jackendoff (1969). Although Jackendoff himself merely claims to be showing that his rule of Equi can be ordered at the end of the cycle, a careful reading of the pages cited established that none of the usual ordering arguments for Equi applies to Jackendoff's version of the rule. But if no arguments exist for the ordering of Equi, then the claim that Equi must be collapsed with the pronominal anaphora rule can have no bearing on the ordering of the latter rule. Thus, Jackendoff's arguments for ordering the pronominal anaphora rule cyclically do not go through.

2.1.3 Whereas the only two existing arguments for the cyclicity of the pronominal anaphora rule have been shown to be invalid in the present framework, the existing arguments against cyclicity are also invalid, if certain independently motivated assumptions are made. Two of the arguments in question are due to Bach and were briefly discussed and dismissed in Chapter 1, §3.2.3. A third argument is due to Postal (see Postal (1970b), and is successfully refuted by Jackendoff (1969), p. 51. It concerns the question of whether a cyclic WH-fronting rule could be prevented from moving a preposition associated with the WH-word on some, but not all, of the cycles on which it operates. If the answer is yes (as Jackendoff claims), then Postal's argument collapses.

The remaining arguments against the cyclicity of the pronominal anaphora rule depend on the existence of a transformation for deriving what have been referred to as "action nominalizations" (Fraser (1970)). Since there are rather strong arguments against the existence of such a transformation (see Wasow and Roeper (1971)), it follows that none of the existing arguments regarding the cyclicity of the pronominal anaphora rule holds in the present framework.

2.2.1. There are, nevertheless, a number of examples which do bear on the ordering of (32). For instance, (36) - (40) show that several well-known transformations, viz., Passive, Tough-movement, It replacement, Extraposition, and Extraposition from NP, affect the possible anaphoric relationships in the sentences to which they apply, thus indicating that (32) should follow them all.

- (36) (a) The woman John loved rejected him.
 (b) *He was rejected by the woman John loved.
 (c) *He loved the woman who rejected John.
 (d) The woman who rejected John was loved by him.
- (37) (a) It was easy for the woman who loved John to please him.
 (b) *He was easy for the woman who loved John to please.
 (c) *It was easy for him to please the woman who loved John.
 (d) The woman who loved John was easy for him to please.
- (38) (a) It seemed to John that he was unpopular.
 (b) *He seemed to John to be unpopular.
- (39) (a) That John was not chosen mystifies him.
 (b) *It mystifies him that John was not chosen.
- (40) (a) A man who John trusted turned him in.
 (b) *A man turned him in who John trusted.

Similar evidence shows that (32) must apply after WH-fronting, regardless of whether it is the formation of questions or relatives which is involved.

- (41) (a) The members of the team all hoped that the pros would draft some of them.
- (b) ?*Which of them did the members of the team all hope that the pros would draft.
- (c) *He married one of the girls that Bill had been dating.
- (d) Which of the girls that Bill had been dating did he marry?
- (42) (a) The woman who lived next door to the Morgans didn't share the old man's faith in them.
- (b) ??The old man whose faith in them the woman who lived next door to the Morgans didn't share has learned to be less trusting.
- (c) *She denied vigorously that Mary was guilty.
- (d) The man whose claim that Mary was guilty she had denied so vigorously finally produced some proof.

Notice that the judgements in (42) are independent of whether the relatives are read as restrictive or non-restrictive. As noted above, the fact that the pronominal anaphora rule must follow WH-fronting has been the basis of a number of (largely erroneous) claims about the ordering of the anaphora rule. It also proves to be the basis for an apparent ordering paradox which is discussed in Chapter 4.

Jackendoff (1969), pp. 54-55, mentions several other transformations which appear to increase the number of possible pronoun-antecedent pairs in a sentence. Sentences (43) - (46), due to Jackendoff, show this.

- (43) (a) *He is fond of the girl John kicked yesterday.
 (b) How fond of the girl John kicked yesterday he is!
- (44) (a) *He secretly loves the girl who kicked John.
 (b) The girl who kicked John, he secretly loves.
- (45) (a) *Though he is fond of the girl John kicked yesterday, I like her even more.
 (b) Fond of the girl John kicked yesterday though he is, I like her even more.
- (46) (a) *We all bet that Mrs. Provolone would kick someone, and his mother did kick the girl John hates.
 (b) We all bet that Mrs. Provolone would kick someone, and kick the girl John hates his mother did. (where John is understood to be Mrs. Provolon's son)

In each of (43)-(46), the (b) sentence is alleged to differ from the (a) sentence by the operation of a transformation. An important fact about these rules is that none of them is cyclic, as evidenced by the fact that none of them applies in embedded clauses (cf. Emonds (1970)).

- (47) (a) *Mary thinks how brave Bill is!
 (b) *Bill realizes (that) beans you'll never eat.
 (c) ??Mary forgot that handsome though Bill was, John was handsomer still.
 (d) *Mary believed that John would pay up, and Jane believed (that) pay up he did.

It therefore follows from (43)-(46) either that the transformations involved are last-cyclic (rather than post-cyclic) and are ordered before (32) in the cycle, or that (32) applies after the last transformational cycle.

Suppose now that an example could be constructed with the following properties: (i) It contains a pronoun and an NP, such that both are in the domain of some transformational cycle other than the last; (ii) If none of the rules operating in (43)-(46) applies, then the pronoun and the NP may enter into an anaphoric relation; and (iii) If one of the rules from (43)-(46) applies, then the pronoun and the NP may not be anaphorically related. From such an example, it would follow that (32) must apply after or near the end of the last transformational cycle, for, otherwise, the anaphoric relation excluded by (iii) could be marked on some cycle before the last one. Unfortunately, the attempt to construct examples of this sort results in sentences which are so awkward that it becomes difficult to judge whether the relevant anaphoric relations are possible.¹⁴

- (48) (a) I think the man who seduced John's wife is like him.
 (b) ?How like him I think the man who seduced John's wife is.
- (49) (a) Though the man who seduced John's wife is like him, I still disapprove.
 (b) ?Like him though the man who seduced John's wife is, I still disapprove.
- (50) (a) We all bet that Jane would kick someone, and Mary thinks the girl John loves did kick his mother.
 (b) ??We all bet that Jane would kick someone, and kick his mother Mary thinks the girl John loves did. (where Jane is the girl John loves).

These data are too marginal to be taken as evidence on any serious empirical issue. Thus, evidence for or against the cyclicity of (32) must be sought elsewhere. Nevertheless, notice that the data in this section have established

that (32) must apply either at surface structure, last-cyclically, or late in the transformational cycle. The fact that (48)-(50) are not worse than they are suggests that the last of these possibilities is the most plausible.

2.2.2 It is natural, therefore, to ask whether there are any transformations which must apply after (32). Bach (1969) mentions two rules which he claims must follow the assignment of pronominal anaphora. One of these is Equi, which Bach orders after Pronominalization in order to account for data like (33). It was seen above, however, that (33) is excluded by mechanisms other than ordering, which are independently necessary parts of linguistic theory. Thus, the first of Bach's cases does not apply in the present framework. His second case has to do with the formation of pseudo-cleft sentences and involves some rather intricate reasoning.

Bach points out that sentence (51) is ambiguous.

(51) What Descartes discovered was a proof of his existence.

As Bach explains it, (51) "can mean either that Descartes discovered a proof of his existence, or that Descartes discovered something and that someone concluded from the nature, quality, extent or whatnot of this discovery that Descartes existed." Bach assumes without argument that these two meanings are associated with different underlying structures. He also claims that there is no reason to postulate any surface structure difference between the two readings. Thus, he concludes that the two interpretations of (51) cannot be distinguished on structural grounds after the transformation of Pseudo-cleft formation has applied. He notes, however, that (52), in which the pronoun and antecedent have been reversed, is unambiguous, excluding the interpretation that Descartes discovered a proof of his existence.

(52) What he discovered was a proof of Descartes existence.

If, as Bach apparently assumes, differences with respect to pronominal anaphora must depend on structural differences, it then follows that the association of pronoun and antecedent in (52) must occur before Pseudo-cleft formation applies.

Notice that the above argument involved three plausible but completely unsubstantiated assumptions: (i) that the two readings of (51) are associated with different deep structures; (ii) that (51) has only one surface structure; and (iii) that the difference between (51) and (52) with respect to anaphora reflects a structural difference at some level. Akamjian (1970) argues at length against assumption (i). Akamjian asserts that pseudo-clefts do indeed have two possible deep structures, but that the ambiguity of sentences like (51) is a function of surface structure, not of deep structure. Assumption (iii) is cast into doubt by the fact, discussed in §1.2.2, that non-structural, purely semantic factors do affect the possibilities of anaphora. Thus, Bach's observations do not constitute very compelling evidence that Pseudo-cleft formation must apply later than (32).

Consider, further, the contrasts in (53) and (54).

(53) (a) What aggravated him was what John wouldn't tell us.

(b) *What aggravated him was that John was unpopular.

(54) (a) What irritated him was the least of John's problems.

(b) *What irritated him was the photograph of John's mother.

Using Bach's criteria, one would conclude that the (b) examples are pseudo-clefts, but that the (a) sentences are not. If this is the case, however, then the ordering of pseudo-cleft formation after the pronominal anaphora rule predicts incorrectly that the (b) sentences of (53) and (54) should be just as good as the examples in (55).

(55) (a) That John was unpopular aggravated him.¹⁵

(b) The photograph of John's mother irritated him.

Thus, the interaction between anaphora and the formation of pseudo-clefts appears to be rather more complex than Bach suggests.¹⁶

Another transformation which might need to apply after (32) is the rule involved in the derivation of the sentences in (56) from sources like (57).

(56) (a) After the thief they ran.

(b) Into the air the balloon flew.

(c) Above the rooftops it soared.

(d) Over the fence he scrambled.

(57) (a) They ran after the thief.

(b) The balloon flew into the air.

(c) It soared above the rooftops.

(d) He scrambled over the fence.

If this rule applied before (32), it could be expected to produce configurations which would allow anaphoric relations not possible in the source sentences. In other words, paradigms like those in (36)-(42) could be expected. That they do not appear is shown by (58).

(58) (a) ?*After the man who assaulted Mary she ran.

(b) ?*Into the house where Bill had seen an orgy in progress
he dashed.

(c) ?*Above the city Bill loved so well he soared.

(d) ?*Over the fence that separated Bill's yard from the neighbors' he scrambled.

This suggests that the rule in question applies after (32). It has been pointed out by some informants, however, that the complexity of the proposed

phrases in (58) renders these examples marginal at best, quite apart from questions of anaphora. That this seems to be so is demonstrated by (59).

(59) (a) ??After the man who assaulted Mary I ran.

(b) ??Into the house where Bill has seen an orgy in progress
we dashed.

(c) ?Above the city Bill loved so well John soared.

(d) ?Over the fence that separated your fence from the neighbors'
Bill scrambled.

The complexity of the preposed phrases is necessary in order to avoid violating the constraint stated in (31). Thus, the evidence regarding the relative ordering of (32) and the rule relating (56) and (57) is somewhat questionable, and, hence, so far, no clear example has been produced of a rule which must follow (32).

2.3 The evidence presented so far regarding the ordering of (32) seems to be consistent with only three possibilities: That (32) applies after all transformations have applied, that (32) applies last-cyclically, but before some transformations, or that (32) applies cyclically, but after most (or perhaps all) of the cyclic transformations. The evidence in (58), though inconclusive, tends to favor the second or third of these conclusions. The fact that (48b)-(50b) are not worse than they are suggests that (32) ought to apply cyclically. However, the very marginal character of these data makes any conclusion based on them extremely speculative.

One possibility which has not been discussed so far is that different portions of (32) apply at different levels. While this would be a highly plausible means of escaping from any legitimate ordering paradox which might arise, there is at this point no motivation whatever for adopting such an

analysis. Moreover, it will now be shown that the existing proposals to this effect are incompatible with the facts considered so far.

Williams (1969) suggests that there should be two rules for associating definite pronouns with their antecedents: one based on left-to-right order, and one based on the relation of command. The latter would apply at the level of deep structure, the former at surface structure. This proposal was defended by Wasow (1970) as a means of escaping the apparent ordering paradox of Postal (1970b). It has already been noted that the ordering arguments of Postal (1970b) do not hold in the present framework, so Williams' proposal is not well motivated. In addition, his proposal would incorrectly predict that anaphoric relationships cannot be altered by transformationally induced changes in the command relationships. Examples (38a & b) are direct counter-examples to this prediction.

Witten (1970) makes a similar proposal, but he divides the pronominal anaphora rule on the basis of the definiteness of the antecedent, rather than according to the structural relationship of pronoun and antecedent. That is, he argues that indefinite NP's are marked for anaphora in deep structures,¹⁷ while pronouns with definite antecedents are generated transformationally. Aside from the objections to the latter half of this proposal, some of which are summarized in Chapter 1, §3.2.3, Witten's analysis cannot be correct, for transformations can alter possible anaphoric relations involving indefinite antecedents. For example, Witten's proposal could not account for the contrasts in (60) and (61).

(60) (a) The dog which a friend of mine bought bit him.

(b) *He was bitten by the dog which a friend of mine bought.

(61) (a) *He beat the mistress of a famous actor.

(b) The mistress of a famous actor was beaten by him.

2.4 One further factor ought to be considered with respect to the ordering of (32), viz., stress. It has often been noted (Lakoff (1968b), Akmajian and Jackendoff (1970), Jackendoff (1969)) that stress and anaphora interact. Perhaps if the nature of this interaction is made explicit, it might reveal something about the ordering of (32) in relation to the stress marking rules.

Akmajian and Jackendoff (1970) suggests that at least part of the connection between anaphora and stress is simply "that reduced relative stress level on both the NP and the pronoun is essential for a coreferential interpretation." Although they are certainly on the right track, their use of the term "essential" here is too strong, as their own example, given here as (62), shows.

(62) John hit Bill and then George hit HIM.¹⁸

(62) suggests that, while stress may be reduced on elements participating in an anaphoric relation, this does not prevent contrastive stress from being assigned to these elements. In fact, (63) suggests that contrastive stress may apply to elements participating in anaphoric relations just as freely as to any other elements.

(63) (a) John hit Bill and then George hit HIM.

(b) John hit Bill and then George hit JOHN.

(c) *John hit Bill and then George hit HIM.

(d) *John hit Bill and then George BILL.

(e) John hit Bill and then George hit him.

(f) John hit Bill and then George hit Bill.

(g) *John hit Bill and then George hit him. (normal stress)

(h) *John hit Bill and then George hit John. (normal stress)

However, Akmajian and Jackendoff deny this conclusion, claiming instead that there are interactions between anaphora and contrastive stress.

They support this claim with examples like (64).

(64) (a) After he woke up, John went to town.

(b) *After HE woke up, John went to town.

(c) *After he woke up, JOHN went to town.

A little reflection, however, will reveal that (64b & c) are perfectly acceptable, given the proper contexts. For example, the discourse in (65a) is quite acceptable, and (64c) may be used after (65b).

(65) (a) Was it after YOU woke up that John went to town? No.

After HE woke up, John went to town.

(b) After he woke up, one of my roommates went to town. Do you know which one?

Notice, by the way, that the above seems to be violating the methodological suggestion (Chapter 1, §2) that wider contexts should not be used in judging possible anaphoric relations. The difference in this case is that contrastive stress always requires a wide enough environment to provide a contrast. The reason the anaphoric relations in these examples are impossible in isolation is that the lack of a wider context allows only one possible contrast, viz., a contrast between John and he. Since anaphors are in some sense replacements for their antecedents, it is rare or impossible for anaphor and antecedent to be in contrast. But this need not be built into the anaphora assignment mechanism, nor into the stress rules. Rather, (64b & c) are assigned inconsistent readings, in which items are at once necessarily coreferential and contrasted, and this accounts for their deviance.

Akmajian & Jackendoff's further examples along these lines are similar,

although it is more difficult to construct the appropriate contexts for them. Thus, (66a), which they judge as anomalous, is acceptable as an answer to (66b).

(66) (a) That George would be TOM'S thesis advisor never occurred to him.

(b) That George would be a certain student's thesis advisor never occurred to him. Do you know who I mean?

Notice that (66b) is itself awkward, since there seems to be a tendency to choose a definite antecedent for a definite pronoun, if one is available. Replacing George by Mary in both sentences corrects this situation. In either case, the acceptability of (66a) corresponds to the acceptability of (66b), so the deviance of (66a) in isolation can also be attributed to the inconsistency of contrasting anaphorically related elements.

It appears, then, that the relationship between stress and anaphora is quite simple: anaphora leads to a reduction in stress, except when the stress is contrastive. Notice, now, that this relationship is in fact merely a particular instance of a more general phenomenon, viz., that stress is reduced on items which do not introduce new information. For example, consider the contrast between (67a) and (67b). (examples due to Chomsky)

(67) (a) Hard work matures people.

(b) Hard work matures teaching assistants.

The normal stress pattern for (67a) is with the main stress on matures; the normal stress pattern for (67b) is with the main stress on teaching. The usual rules for assigning stress (see Chomsky and Halle (1968)) would make the correct prediction for (67b), but would predict that (67a) should receive its main stress on people. The reason the stress pattern of (67a) is not as predicted is that people provides no new information, and hence receives

reduced stress. That is, since it would normally be assumed that discussions of hard work and maturity are about people, the word people is de-emphasized through stress reduction. Contrastive stress, however, may be given to people, as (68) shows.

(68) Hard work matures PEOPLE, but not MULES.

Cases like these are clearly very closely related to the cases involving anaphora. In fact, whatever mechanism reduces stress in examples like (67a) can also be utilized to account for the interaction between stress and anaphora.¹⁹ More examples of the same phenomenon are alluded to below in Chapter 3.

How are these observations relevant to the problem of ordering the nominal anaphora rule? Aronoff (1971) proposes that there is a destressing rule for anaphors and uses the interaction of this rule with the Nuclear Stress Rule (which was shown by Bresnan (1970) to be cyclic) in constructing an apparent ordering paradox. Without going into the details of Aronoff's argument, it is evident that his approach is insufficiently general, for it is clear that the destressing of anaphors should not be separated from the destressing of other redundant elements (that is, elements bearing no new information). If, however, the destressing rule is to reduce stress on all redundant elements, then it is clearly not an ordinary phonological rule expressible in the usual Sound Patterns of English formalism. Rather, it is some sort of a constraint on discourse, involving the interaction of semantics and phonology. Further, it seems to be an excellent candidate for a linguistic universal, for it is highly plausible that the function of stress is to mark the relative importance of elements in a discourse. Elements bearing no new information would naturally require no emphasis. Given the novel and

probably universal character of this destressing rule, then, there is little reason to suppose that it should be possible to order the rule with respect to the other rules of the grammar.²⁰ Depending on the formulation of the destressing rule, almost any ordering for it seems to be possible. Thus, there appears to be very little reason to believe that considerations of stress bear on the ordering of (32).

2.5 Briefly, then, the following conclusions regarding the ordering of (32) have been reached: (i) there are no grounds for separating (32) into two or more rules and requiring them to apply at different levels; (ii) (32) must apply cyclically (at or near the end of the transformational cycle), post-cyclically, or last-cyclically (at or near the end of the last cycle); and (iii) there is some reason to believe that (32) applies cyclically, although the evidence is far from conclusive.

3. Theoretical Status

The question now arises as to the theoretical status of the pronominal anaphora rule, i.e., is it a rule of semantic interpretation, a syntactic transformation, or something else entirely? A great deal of attention has been devoted to this question in the literature, but it is not at all clear that anything except terminology is actually at issue. The fact is that syntactic, semantic, and phonological factors interact with anaphora, and there is no a priori criterion for assigning anaphora rules to any particular category. Considerations of ordering are of no real help, for much recent research has indicated that different types of rules are not so strictly separated by ordering as was once believed--besides which it was seen above that it is difficult to pinpoint the ordering of (32). Apparently, then, the best criterion for deciding the theoretical status of (32) is whether it obeys

the various constraints which have been proposed for the different categories of rules. Judging by this criterion, anaphora rules seem to belong to none of the usual categories, for they obey none of the constraints on syntactic and semantic rules proposed in Ross (1967a) and Chomsky (1971). Hence, it seems most reasonable to say simply that anaphora rules constitute a separate category.

This conclusion is supported by the fact that anaphoric relations may hold between elements of different sentences. In this respect anaphora differs from all other syntactic and semantic phenomena which have been studied by generative grammarians. Although the study of discourse clearly involves many factors other than anaphora, these have been largely neglected. Hence, the apparent uniqueness of anaphora rules may simply be a function of the limitation of past research.

One rather attractive suggestion that has been made with respect to the theoretical status of anaphora rules is that they are not rules of any particular grammar, but part of linguistic theory. That is, it has been claimed that the syntactic, semantic, and phonological criteria determining anaphora are universal, in which case the fact that anaphora rules behave differently from other known categories of rules would be neither surprising nor disturbing. Although little work has been done on anaphora in languages other than English, the fact that no grammar book of any language ever includes instructions for associating pronouns and antecedents suggests that people learning foreign languages do not have much trouble with this aspect, which in turn suggests that the rule involved may be universal. (This was pointed out by Witten (1970)). If this conjecture proves correct, then (32) (and presumably every other anaphora rule as well--see Chapter 3) can be regarded

as a universal constraint on certain phonological and semantic properties of sentences, on the basis of the syntactic configurations at some late point in the derivation.

FOOTNOTES

1. It might alternatively be possible to formulate the rule so as to mark the impossibility of anaphora between certain pronouns and NP's. Whether such a formulation is to be preferred might be a non-trivial question. Unfortunately, I know of no empirical evidence bearing on this question.

2. Actually, there are some problems with number agreement. In particular, a pronoun with split antecedents must be plural, even if each of its antecedents is singular. Further, some plural pronouns may have a single indefinite antecedent. (i) and (ii) illustrate these difficulties.
 - (i) John told his wife that they had been evicted.
 - (ii) John bought a Veg-o-matic, after seeing them advertised on TV.

3. No examples are given in which first or second person pronouns serve as anaphors, because if such pronouns ever do serve as anaphors, they must be fully identical with their antecedents, which makes it impossible to tell that an anaphoric relationship holds at all. I take no stand here on the question of whether first and second person pronouns do enter into anaphoric relations.

4. The notion of "pronimence" is not defined by Lakoff, but he assumes that it can be formalized and argues for its inclusion in linguistic theory on the basis of the contrast between (i) and (ii).
 - (i) *John's house, he always talks about it.
 - (ii) John's house, Mary says that he always talks about it.

The alternative to (9) adopted below does not involve this notion.

Lakoff also adds to (9) that the pronoun must "have the appropriate stress level." Since anaphora is usually dependent on stress (see Akmajian and Jackendoff (1970) and below), and since Lakoff fails to specify what "appropriate" means, this condition will be ignored for the moment. Chomsky (personal communication) has pointed out that sentences like (iii) are counterexamples to (9) as stated.

(iii) John claims that he is a genius.

Thus, in addition to its ad hoc character, (9) fails to account for the facts. The crucial point in Lakoff's proposal, however, is that it is the subject-non-subject distinction which is crucial in (10), and it is this point which is argued against below.

5. Helke (1970) uses the term "sentential phrase" to mean S's and NP's with the internal structure of sentences. This term and "cyclic node" might not be equivalent, since there is evidence to indicate that AP might be a cyclic (see Bowers (1969) and Selkirk (1970)), although AP is clearly not a sentential phrase as characterized above. It will be seen below that neither term is quite appropriate in (4), so I shall not concern myself here with the question of whether both are needed.
6. Except for the variation among speakers, it appears that the condition in question could be formulated in terms of the notion "is superior to" (Chomsky (1971)). A is superior to B if every major category dominating the minimal major category dominating A dominates the minimal major category dominating B. (15) could perhaps be replaced by (i).

(i) An NP may not be the antecedent of a pronoun if the pronoun is to the left of and superior to the NP.

7. Witten (1970) also recognizes the falsity of (6). In its place he proposes that left-to-right anaphora between an indefinite NP and a definite pronoun is impossible if the pronoun commands the NP but the NP does not command the pronoun. Notice, however, that this proposal is inconsistent with (7d) and fails to account for the deviance of (7a, c, and e). Similarly, reversing the positions of pronoun and antecedent in (16a and b) provides counterexamples to Witten's suggestion. Notice, further, that the impossibility of reversing pronouns and antecedents in (16b and e) does not support Witten, since the constraint involved has to do with the distribution of any, rather than with anaphora, as (i) and (ii) show.

(i) *The fact that any businessman is being sued should worry me.

(ii) *The girl who any bridegroom to be is going to marry can upset John.

The kind of example with which Witten attempts to justify his claim is discussed in Chapter 5.

8. Ken Hale (personal communication) has pointed out that (i) and (ii) appear to violate (18).

(i) If you ask for it nicely, you can have an ice cream.

(ii) If you really want it, you can have a lollipop.

A number of possible accounts of the non-deviance of these sentences suggest themselves (e.g., that it serves as part of an idiomatic expression, rather than as an anaphor, in these examples), but at present, I have no convincing analyses.

9. Actually, determinateness can be extended to definites without requiring the collapsing of the notions of specificity and referentiality.
10. Any readers who might be uncomfortable because of the lack of precision concerning the new terminology would do well to survey the literature on specificity, for the meaning of the term "specific" appears to be equally imprecise. Not the least of the numerous causes for confusion regarding specificity is that different authors seem to mean very different things by it. Although existing lack of clarity regarding specificity does not, of course, justify further unclarity, it can be seen from the the above discussion that whatever the proper criterion in (18) is, it is closely related to specificity. Hence, a clear and precise reformulation of (18) probably depends on a better understanding and definition of specificity than now exists.
11. Notice, by the way, that Lakoff's inclusion of the notion of "prominence" in (9) probably requires that (9) be considered a condition on linguistic performance as well. In fact, if the subject-nonsubject distinction is dropped from (9) (as it must be) and "prominence" is defined in such a way as to account for (29), then Lakoff's proposal can probably be made into a terminological variant of (31).
12. Jackendoff has different reasons for excluding John as a possible subject for S_2 . Nevertheless, he does assume that the subject of S_2 is Δ .
13. Δ is treated as if it were a pronoun for the purposes of this discussion--See Chapter 3.

14. (ii) appears to be an exception to this, for the indicated anaphoric relation is clearly impossible.

(i) Mary thinks the girl who kicked John secretly loves him.

(ii)*him, Mary thinks the girl who kicked John secretly loves.

In this case, however, there are reasons for the deviance having nothing to do with ordering. Topicalized phrases always require heavy stress, whereas anaphoric elements generally require reduced stress. As a result, (ii) might be excluded because of the impossibility of providing the pronoun with an appropriate stress level.

15. If, as Emonds (1970) suggests, Extraposition is done "backwards" and last-cyclically, then (53b) and (55a) are irrelevant to the argument here. However, (54b) and (55b) suffice to establish my point.
16. Of course, some account of the non-ambiguity of (52) and the deviance of (53b) and (54b) is required. I strongly suspect that the relevant factor is non-structural, for there seems to be a general prohibition against right-to-left anaphora across the equative be. Thus (i) is impossible, just as (53b) and (54b) are, although it is very unlikely that any transformation like pseudo-cleft formation is involved in the derivation of (i).

(i) *The photograph which he cherishes most is the photograph of John's mother.

Just what the underlying reason for this prohibition is, I do not pretend to understand, although it may be related to the material discussed in Chapter 5.

17. Actually, Witten's proposal seems to be rather more complex, but if I understand what he says, it does involve the untenable claim that pronominal anaphora with indefinite NP's is determined in deep structure.
18. Capitals indicate contrastive stress.
19. Actually, this mechanism can only account for the reduction of stress on anaphors. If it is in fact true that the stress on antecedents also gets reduced, then some other mechanism is required to handle this fact.
20. Of course, the same might be said of (32). That is, anaphora rules appear to be quite different from other rules, and they are probably largely universal. Yet I have argued above that (32) is crucially ordered with respect to some rules. There are, however, no comparable facts to indicate that the destressing rule in question is ordered, except, perhaps, for its interaction with the Nuclear Stress Rule.

Chapter Three

OTHER ANAPHORIC RELATIONS

0. Introduction

This chapter is concerned with the question formulated as (C) in Chapter 1 §1: Do different kinds of anaphora constitute a linguistically significant class, and, if so, how can the grammar capture this fact? In other words, do the conclusions arrived at regarding pronominal anaphora generalize to other anaphoric relations? Consideration of this question will be divided into three parts. First of all, properties common to different anaphoric relations will be presented, indicating that they should, if possible, be treated uniformly. Second, certain arguments which apparently show that a uniform treatment of anaphora is not possible will be summarized. Finally, an approach which is somewhat different from existing ones and which allows a uniform treatment of anaphora will be outlined and defended.

It is interesting to note, by the way, that despite the tremendous amount that has been written on English anaphora, there has been no treatment of the problem considered in this chapter, aside from the frequent observation (Ross (1967a), Postal (1971b)) that it ought to be treated.

1.1.1 The Unity of Anaphora

The most compelling piece of evidence for treating different anaphoric relations uniformly is pointed out by Ross (1967a), §5.3.3. It consists of the observation that various anaphoric relations are subject to the same structural conditions, viz., the antecedent may be to the right of the anaphor only if the latter is more deeply embedded (cf. Chapter 2, (15)). This is illustrated in examples (1) - (8).

- (1) (a) John dropped out after he tried LSD.
 (b) After John tried LSD, he dropped out.
 (c) After he tried LSD, John dropped out.
 (d) *He dropped out after John tried LSD.
- (2) (a) John tried LSD after Bill did.¹
 (b) After Bill tried LSD, John did.
 (c) After Bill did, John tried LSD
 (d) *John did after Bill tried LSD.
- (3) (a) John tried LSD after Bill had done so.
 (b) After Bill had tried LSD, John did so.
 (c) After Bill had done so, John tried LSD.
 (d) *John did so after Bill had tried LSD.
- (4) (a) John believes that Bill takes LSD, although no one else believes it.
 (b) Although no one else believes that Bill takes LSD, John believes it.
 (c) Although no one else believes it, John believes that Bill takes LSD.
 (d) *John believes it although no one else believes that Bill takes LSD.
- (5) (a) John will take LSD if Bill does it.
 (b) If Bill takes LSD, John will do it.
 (c) If Bill does it, John will take LSD.
 (d) *John will do it, if Bill takes LSD.
- (6) (a) John takes LSD, although I don't know why.
 (b) Although John takes LSD, I don't know why.

- (c) Although I don't know why, John takes LSD.
- (d) *I don't know why, although John takes LSD.
- (7) (a) John dropped a capsule of LSD after Bill took one.
- (b) After Bill took a capsule of LSD, John dropped one.
- (c) After Bill took one, John dropped a capsule of LSD.
- (d) *John dropped one after Bill took a capsule of LSD.
- (8) (a) John freaked out, although it wouldn't have happened to Bill.
- (b) Although John freaked out, it wouldn't have happened to Bill.
- (c) Although it wouldn't have happened to Bill, John freaked out.
- (d) *It wouldn't have happened to Bill, although John freaked out.

There are basically two possible approaches to the problem of accounting for these facts. One possibility is to claim that the constraint illustrated in (1) - (8) is a universal part of all anaphora rules. The other is to claim that there is only one rule which accounts for all these different anaphoric relations. In the former case, it is assumed that the anaphora rules constitute a formally distinguishable class. Otherwise, it would be impossible to formulate a constraint applicable to all and only anaphora rules. If this is the case, then it is necessary that all anaphora rules be of the same type, i.e., different anaphoric relations must be handled uniformly. If, on the other hand, there is only one anaphora rule, then it goes without saying that all anaphoric relations will be handled uniformly.

1.1.2 Another condition which seems to be common to a number of anaphoric

relations is mentioned briefly by Akmajian (1968). Akmajian observes that the antecedent in an anaphoric relation may contain a negative element not included in the interpretation of the anaphor. (Example (9a) due to G. Lakoff).

- (9) (a) John didn't marry Mary, even though the fortune-teller had predicted it.
- (b) John isn't going to Washington, but he won't say why not.
- (c) Nixon won't drop the bomb in his first term, but it might happen in his second term.
- (d) ?Although John will trust nobody over 30, Bill will.
- (e) John has no bicycle, but Bill has one.²

1.1.3 Similarly, certain adjectival and adverbial modifiers may sometimes be ignored by anaphora rules. This is illustrated in (10) - (14). In each case the interpretation of the anaphor may optionally exclude a modifier of the antecedent. Thus, each of the (a) sentences is ambiguous between a reading synonymous with the (b) sentences and one synonymous with the (c) sentence.

- (10) (a) John has a big fancy car, but Bill doesn't have one.
- (b) John has a big fancy car, but Bill doesn't have a big fancy car.
- (c) John has a big fancy car, but Bill doesn't have a car.
- (11) (a) John beats Mary because he hates her, and Bill does

$$\left\{ \begin{array}{l} \text{it too} \\ \text{likewise} \\ \text{the same thing} \end{array} \right\}.$$

- (b) John beats Mary because he hates her, and Bill beats Mary because he hates her.
- (c) John beats Mary because he hates her, and Bill beats

Mary too.

- (12) (a) John has been approached by strange women in New York,
and it has also happened to Bill.
- (b) John has been approached by strange women in New York,
and Bill has also been approached by strange women in
New York.
- (c) John has been approached by strange women in New York, and
Bill has also been approached by strange women.
- (13) (a) I suspect that the DA accidentally suppressed evidence,
and even Perry believes it.
- (b) I suspect that the DA accidentally suppressed evidence,
and even Perry believes that the DA accidentally suppressed
evidence.
- (c) I suspect that the DA accidentally suppressed evidence,
and even Perry believes that the DA suppressed evidence.
- (14) (a) Yesterday, John jogged a mile in spite of the rain, and
today Mary did so.
- (b) Yesterday, John jogged a mile in spite of the rain, and
today Mary jogged a mile in spite of the rain.
- (c) Yesterday, John jogged a mile in spite of the rain, and
today Mary jogged a mile.³

1.1.4 Another constraint which seems to apply to different kinds of anaphora is stated in (15).

- (15) No Part of the complement of the specifier of a cyclic
node may be anaphorically related to the head of that
node.⁴

Following Chomsky (1970b), I take the head of S to be the VP and the head of an NP to be the \bar{N} . The specifier of an S is the subject, and of an NP, the determiner. So interpreted, (15) accounts for the ill-formedness of examples (16) - (19).

(16) (a) *A proof that God exists does.

(b) *A proof that God does exists.

(17) (a) *Learning that vitamin C improves people's health does so.

(b) *Learning that vitamin C does so improves people's health.

(18) (a) *The fact that LSD causes people to freak out

does $\left\{ \begin{array}{l} \underline{\text{it (too)}} \\ \underline{\text{likewise}} \\ \underline{\text{the same thing}} \end{array} \right\} .$

(b) *The fact that LSD does $\left\{ \begin{array}{l} \underline{\text{it (too)}} \\ \underline{\text{likewise}} \\ \underline{\text{the same thing}} \end{array} \right\}$
causes people to freak out.

(19) (a) *A trainer of horses' ones are generally healthier than mustangs.

(b) *The winner of the game's one was off today.⁵

(15), then, is still another reason for trying to handle different anaphoric relations uniformly.

1.1.5 Finally, recall that the Transitivity Condition (Chapter 1, §3.2.1) applies to different anaphoric relations.

1.2 The arguments above suggest that either a single mechanism or a single type of mechanism should be employed in accounting for a number of different anaphoric relations. Since one of the relations involved is definite pronoun

anaphora, the previously established conclusions regarding the kind of mechanism needed to account for definite pronominal anaphora should, if possible, also be maintained for the other affected anaphoric relations. In particular, this suggests that no replacement or deletion rule is involved in the anaphoric relations cited in §1.1.1 - 1.1.5. This is a rather surprising result, for it is widely accepted that many of these examples involve deletion. In fact, there are several arguments in existence purporting to prove that deletion rules must be involved. The next few sections will therefore be devoted to discussing these arguments. It will be seen that, although a certain type of non-deletion approach is untenable, it does not follow that deletions must be involved.

2. Existing Arguments for Deletion

Only one non-deletion approach to anaphora is discussed in the literature (see e.g., Akmajian (1968)). This approach, to be referred to as the non-expansion hypothesis, asserts that every phonetically null anaphor consists simply of a dummy symbol (say Δ) which is associated by interpretive rules with an antecedent.⁶

All of the existing arguments ostensibly for deletions are actually arguments against the nonexpansion hypothesis. Later sections will argue for a non-deletion approach which does not incorporate the nonexpansion hypothesis, and which is therefore immune to the existing arguments in favor of a deletion theory.

2.1 Ross (1969) presents a number of arguments showing that the missing strings in examples like (20) are relevant to some purely syntactic phenomena, from which he concludes that there must be transformation of Sluicing.

(20) John heard someone out back, but he doesn't know who.

Some of Ross's arguments involve unjustified assumptions about the form a non-deletion theory would have to take. These arguments will not be considered here. The others will be very briefly summarized.

2.1.1 First of all, the fact, illustrated in (21), that case marking seems to apply within the missing clause of sentences like (20) is inexplicable if the nonexpansion hypothesis is accepted.

- (21) (a) Ralph is going to invite somebody from Kankakee, but they
don't know $\left\{ \begin{array}{c} \text{who} \\ \text{whom} \end{array} \right\}$.

- (b) Somebody from Kankakee is going to be invited, but they
don't know $\left\{ \begin{array}{c} \text{who} \\ * \text{whom} \end{array} \right\}$.

2.1.2 Secondly, Ross points out that the distribution of data in (22) follows immediately from (23) if Sluicing is a transformation, but is difficult or impossible to reconcile with the nonexpansion hypothesis.

- (22) I know he has a picture of somebody, but I don't know
 $\left\{ \begin{array}{c} \text{who} \\ \text{of whom} \\ * \text{a picture of whom} \end{array} \right\}$.

- (23) (a) I don't know who he has a picture of.
(b) I don't know of whom he has a picture.
(c) *I don't know a picture of whom he has.

2.1.3 Similarly, a transformation of Sluicing relates (24) to (25), whereas the nonexpansion hypothesis would make them unrelated.

- (24) Bill is planning to do away with one of his inlaws, but
I don't know $\left\{ \begin{array}{c} \text{which} \\ \text{with which} \end{array} \right\}$.

(25) (a) I don't know which of his inlaws Bill is planning to do away with.

(b) *I don't know with which of his inlaws Bill is planning to do away.

2.1.4 Finally, if Sluicing is a transformation, it is possible to explain the difference between (26a) and (26b) in terms of the facts in (27) and (28).

(26) (a) She was dancing but I don't know $\left\{ \begin{array}{l} \text{with whom} \\ \text{who with} \end{array} \right\}$.

(b) He would report me under some circumstances but I can only guess $\left\{ \begin{array}{l} \text{under which} \\ \text{*which under} \end{array} \right\}$.

(27) (a) I don't know with whom she was dancing.

(b) I don't know who she was dancing with.

(28) (a) I can only guess under which circumstances he would report me.

(b) * I can only guess which circumstances he would report me under.

2.2 Ross (1969) also presents (29) as evidence against the nonexpansion hypothesis (and in favor of a transformation of VP deletion), pointing out that it is generally accepted that such occurrences of there are transformationally inserted and that number agreement must take place in the second clause before there is inserted.

(29) Some people think there are no such rules, but
there $\left\{ \begin{array}{l} \text{are} \\ \text{is} \end{array} \right\}$.

How, Ross asks, is it possible to make the correct predictions in (29), unless

the second clause has a plural subject at the point where number agreement takes place? But if this subject is present in deep structure, then it seems that a deletion rule is needed to account for its disappearance.

2.3 Grinder and Postal (1971) argue for VP deletion and against the non-expansion hypothesis as well, on the basis of facts like (30).

(30) (a) *John doesn't have a car, and it is a convertible.⁷

(b) John doesn't have a car, but Bill has a car, and it is a convertible.

(c) John doesn't have a car, but Bill does, and it is a convertible.

The anomaly of (30a) is due to the fact that it has no antecedent. If the nonexpansion hypothesis were correct, then one would expect (30c) to be ill-formed for exactly the same reason. On the other hand, a transformation of VP deletion could account for the well-formedness of (30c) by relating it to (30b). This argument is called "the missing antecedent argument".

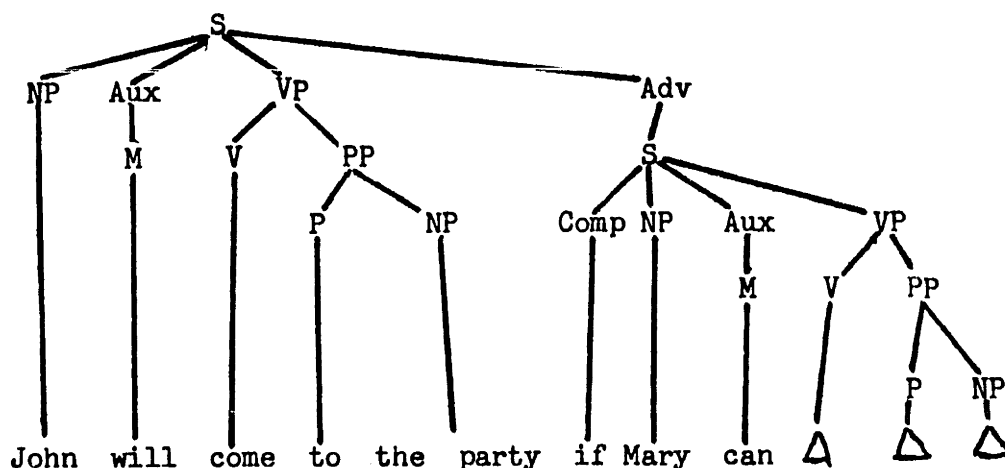
3. An Alternative

The arguments above all show that a theory employing deletion rules to account for at least some anaphoric relations is to be preferred over one incorporating the nonexpansion hypothesis. However, in a theory with transformations of Sluicing and VP deletion, the kinds of mechanisms utilized to account for different kinds of anaphora must be different (given that pronominal anaphora does not involve deletion). This makes it difficult or impossible to account for the similarities among different kinds of anaphora noted in §1. It is hence worth considering whether it might be possible to account for the various anaphoric relations without utilizing either deletions or the nonexpansion hypothesis.

3.1 The Empty Structures Hypothesis

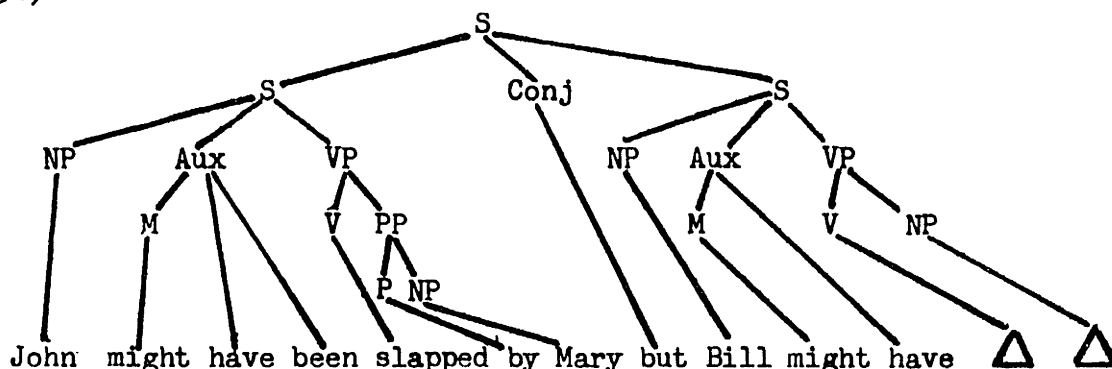
Since the fatal assumption of the nonexpansion hypothesis seems to be that the anaphor has no internal structure, it seems reasonable to propose instead that null anaphors have all the structure of their antecedents, lacking only phonetic material.⁸ More specifically, suppose that lexical insertion is always optional (an assumption which is made on other grounds much current research--see, e.g., Jackendoff (1969), Emonds (1970), or Grinder (1971)). This makes it possible to generate structures with all of their normal syntactic properties, but lacking any phonological or semantic material. If the anaphora rule or rules are allowed to associate such an empty structure with an antecedent, then the reading of the antecedent can be associated with the empty node. Surface structures containing uninterpreted empty nodes would be regarded as semantically anomalous. For an anaphora rule to associate two structures, they would have to be non-distinct (in some sense which must include near identity of the structures⁹ but obviously does not include identity with respect to lexical insertion). Thus, the structure of (31a) will be interpreted like sentence (31b), but (32) is anomalous since the VP can have no antecedent.¹⁰

(31) (a)



(b) John will come to the party if Mary can come to the party.

(32)



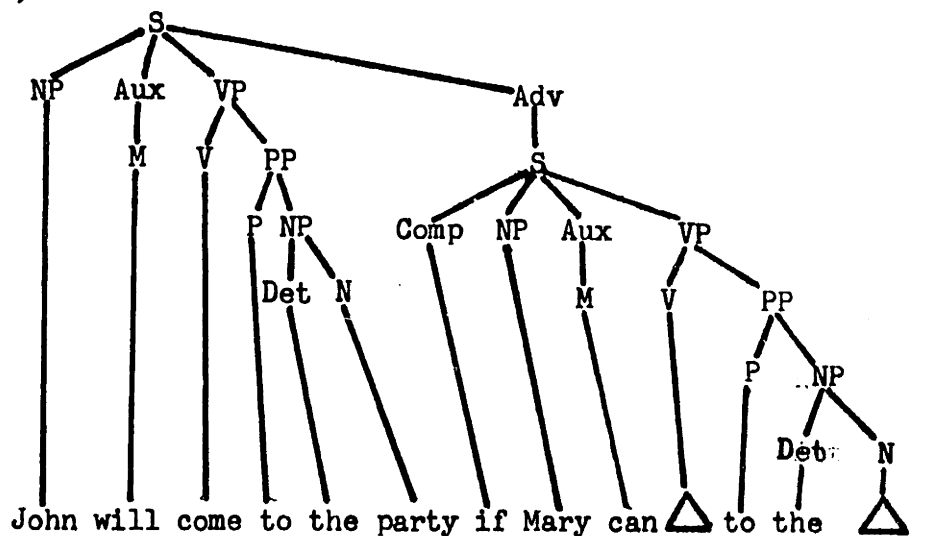
Such an analysis will be referred to as "the empty structures hypothesis".

If the anaphora rule in question is also allowed to pair two structures both of which are lexically filled, then the rule which reduces stress on anaphors (alluded to in Chapter 2) can be utilized to account for the lack of stress on strings like the second occurrence of come to the party in (31b).

A natural objection to this proposal is the following: if anaphora assignment may apply either to empty or to nonempty structures, then what blocks the generation of (33a) from a structure like (33b)?

(33) (a) *John will come to the party if Mary can to the.

(b)



The answer is that the anaphora rule involved must be formulated so that it would have to associate the entire VP's of the two clauses. Then the rule which assigns the reading of the antecedent to the anaphor¹¹ could optionally apply. If it does not apply, then the uninterpreted empty nodes render the structure anomalous. If, on the other hand, the reading of the first VP is assigned to the second VP, then the reading of the second VP contains the semantic material corresponding to the words to and the twice. It is plausible to rule out such redundancy as semantically anomalous.¹²

The anaphora rule which the empty structures hypothesis postulates would be very similar to the one needed to account for pronominal anaphora. The primary difference appears to be that these rules require a relatively complex non-distinctness condition on the anaphors and antecedents, in place of agreement in person, number, and gender. This similarity supports the empty structures hypothesis, for it offers hope of treating different anaphoric relations uniformly.

It might be objected that the above description proposes that the rule identifying anaphorically related pairs be distinct from the rules associating their readings, although the pronominal anaphora rule did not need to be followed by a rule associating meanings. It will be seen in Chapter 5, however, that the same sort of semantic rule is, in fact needed for pronouns, because there are two distinct kinds of meaning relationship possible between definite pronouns and their antecedents.

Notice that none of the objections to the nonexpansion hypothesis summarized earlier applies to the empty structures hypothesis. The missing antecedent argument, for example, is inapplicable, since the antecedent would not be missing, but just lexically empty. Similarly, the facts illustrated in (21) - (29) are handled in this analysis just as they are in

a deletion analysis. §§2.1.1-2.3 demonstrate that phonetically null anaphors must, at some stage of their derivations, have the same structure as their antecedents; the question of whether lexical insertion ever occurs in those structures is independent of the evidence presented so far.

It is interesting to note, by the way, that the empty structures hypothesis requires less drastic modifications of the standard theory than the non-expansion hypothesis. Under the nonexpansion hypothesis, nodes like S and VP which ordinarily do not directly dominate terminal symbols must be allowed to directly dominate a dummy element (say Δ) which serves as a phonetically null anaphor. That is, the nonexpansion hypothesis requires the otherwise unmotivated phrase structure rules $S \rightarrow \Delta$ and $VP \rightarrow \Delta$. No new phrase structure rules are needed under the empty structures hypothesis, since preterminal nodes are assumed to dominate Δ prior to lexical insertion anyway. All that is required is that lexical insertion be optional.

3.2 Arguments Against Deletion

Although it was argued in §1 that certain theoretical considerations suggest that a non-deletion approach to anaphora is to be preferred, more concrete arguments against deletion would greatly strengthen the case for the empty structures hypothesis.¹³ There will not be many differences between the empty structures hypothesis and a deletion approach, since the two theories postulate underlying structures which are syntactically identical. There might, however, be some real differences. For example, since sentence stress is determined between syntactic cycles (Bresnan (1971a, 1971b, 1971c)), the underlying differences with respect to phonological material might manifest themselves as surface structure stress contrasts.¹⁴ Further, the necessity to alter structure in a deletion theory might be expected to affect.

certain surface structure phenomena. Finally, it might be possible to show that if deletion rules are involved in the generation of phonetically null anaphors, then these rules behave differently in significant ways from other deletion rules. This would favor a theory (such as the empty structures hypothesis) in which the abnormal deletions do not exist. The next two sections present arguments of this latter sort.

3.2.1 One property of ordinary deletions (pointed out by various people) which the rules involved in generating phonetically null anaphors do not have is that they are subject to the Complex NP Constraint (Ross (1967a)), given here as (34).

- (34) No element contained in a sentence dominated by an NP with a lexical head noun may be moved out of that NP by a transformation.¹⁵

Bresnan (personal communication) has mentioned two deletion rules which are so constrained. The first is a rule involved in generating sentences like (35).

- (35) John is not the doctor that his father was.

(36) suggests that WH-fronting may not occur in the derivation of sentences like (35).

- (36) *John is not the doctor who his father was.

Instead, sentences like (35) are derived by a deletion rule.¹⁶ Notice that it is implausible to suggest that WH-fronting does occur in such examples, but is followed by obligatory deletion of the WH-word. This follows from the fact (cf. Bresnan (in preparation)) that WH-words in relatives are derived from definite pronouns anaphorically related to their heads, for, as (37) shows, a NP like the doctor in (35) may not serve as the antecedent for a definite pronoun.¹⁷

- (37) *John is not the doctor that his father was before Mary
left him.¹⁸

Accepting, then, that the derivation of (35) involves deletion without WH-fronting, the contrast in (38) shows that this deletion rule is subject to the Complex NP Constraint.

- (38) (a) John is not the doctor that you claim he is.

- (b) *John is not the doctor that you made the claim that he is.

Further, it is generally agreed that a deletion rule is involved in forming comparatives. Assuming this to be correct, then the generalization of the Complex NP Constraint to deletions can account for the facts in (39).

- (39) (a) John is taller than Mary believes that Bill is.

- (b) *John is taller than Mary believes the claim that Bill is.¹⁹

Ross (1967a), Chapter 6, cites these and other deletions which appear to obey the Complex NP Constraint.

In contrast, notice that the pronominal anaphora rule does not obey the constraint.

- (40) (a) John believes the prediction that he will win.

It is clearly desirable to make a formal distinction between the kinds of rules which obey the Complex NP Constraint and the kinds which do not. It is therefore to be expected that anaphora rules will obey the Complex NP Constraint if they are formally deletion operations and that they will not if they are formally similar to the pronominal anaphora rule. In other words, the applicability of the Complex NP Constraint to various anaphoric relations provides a basis for choosing between the empty structures hypothesis or the deletion alternative to it. (41) shows that the empty structures hypothesis is supported by this argument.

(41) (a) John didn't take LSD, but Bill believed that claim that he did.

(b) John takes LSD, but I don't know the reason why.

(c) John ignored Mary's admonition to shave himself.²⁰

(42) shows that various other anaphoric relations are also not subject to the Complex NP Constraint, which suggests that they are also not the results of deletion transformations.

(42) (a) John didn't take LSD, but Mary believed the claim that he had done it.

(b) The man who had tried to do so twice before finally succeeded in climbing Everest.

(c) John has taken LSD, but most of the people who know it won't talk about it.

(d) The man who had always wanted one finally bought an okapi.

(e) Mary was raped, but I don't believe the claim that it happened in Harvard Square.²¹

3.2.2 Ross (1967a) claims that there is a correlation between the directionality of deletion rules and the applicability of the Complex NP Constraint to them. That is, he claims that those deletions immune to the constraint are precisely those which may operate both left-to-right and right-to-left. Notice, now, that this is a natural consequence of the empty structures hypothesis, if it is assumed that there are no bidirectional deletion rules. Then all rules which appear to be bidirectional deletions must be anaphora rules, and it follows that they do not obey the Complex NP Constraint. Furthermore, the assumption that bidirectional deletions do not exist is quite reasonable, since the standard formalism for writing transformations would make these cumbersome to write, and hence relatively costly in terms of the evaluation metric.

Thus, if Ross' claim is factually correct, then the empty structures hypothesis provides an explanation for what appears to be a rather arbitrary correlation.

Chomsky (1971) proposes the following constraint:

- (43) No rule can apply to a domain dominated by a cyclic node A in such a way as to affect solely a subdomain of A dominated by a node B which is also a cyclic node.

(43), in conjunction with sentences like (44), would entail that VP deletion, if it exists, must be a cyclic rule.

- (44) The newspapers reported that reliable sources claim that Tricia won't come unless Ed does.

Now consider (45).

- (45) $[_{S_1} [_{S_2}$ The man $[_{S_3}$ who claimed he didn't have a car] actually did $] ,$ and $[_{S_4}$ it was a convertible $]]$.

Since the pronominal anaphora rule cannot apply pre-cyclically (see Chapter 2), it follows that it in (45) cannot be associated with an antecedent until the S_1 cycle. Given (43), however, if VP deletion is a rule, it would have to apply on the S_2 cycle. Thus, it could not be associated with an antecedent until after VP deletion had applied. Since VP deletion would delete the antecedent of it, sentence (45) would be rendered underivable. Thus, the missing antecedent argument applies to analyses which postulate a rule of VP deletion, unless that rule is made an exception to (43). If the empty structures hypothesis is adopted in place of VP deletion, then this problem does not arise, for the antecedent of it would be an empty node present throughout the derivation of (45).

3.2.3 Chomsky (class lectures, 1971) has proposed an analysis of VP deletion and Sluicing which avoids the arguments of the last two sections. Chomsky

suggests that there is an independently necessary rule which reduces stress on certain repeated strings (cf. Chapter 2). He suggests that VP deletion and Sluicing can be formulated as very late rules which delete unstressed strings. Since the deletion rules would then not make reference to the antecedent, they could be used in deriving (41) and (45), without violating the Complex NP Constraint. It need only be assumed that the stress reduction rule is not subject to the Complex NP Constraint.

The first thing to notice about such a proposal is that it requires that VP deletion precede the rule which inserts do into auxiliaries with stranded tense markers (see Chomsky (1957)). This follows from examples (46).

(46) (a) John will come if Bill does.

(b) *John will come if Bill does come. (normal stress)

But this means that Do-support violates (43) in (46a).²² Under the empty structures hypothesis, do may be inserted cyclically and will be inserted when there is no lexical item for the tense marker to be attached to.²³

A more serious ordering difficulty follows from the assumption that Sluicing is a deletion rule. This has to do with examples like (47).

(47) (a) John can't come along, but he won't say why not.

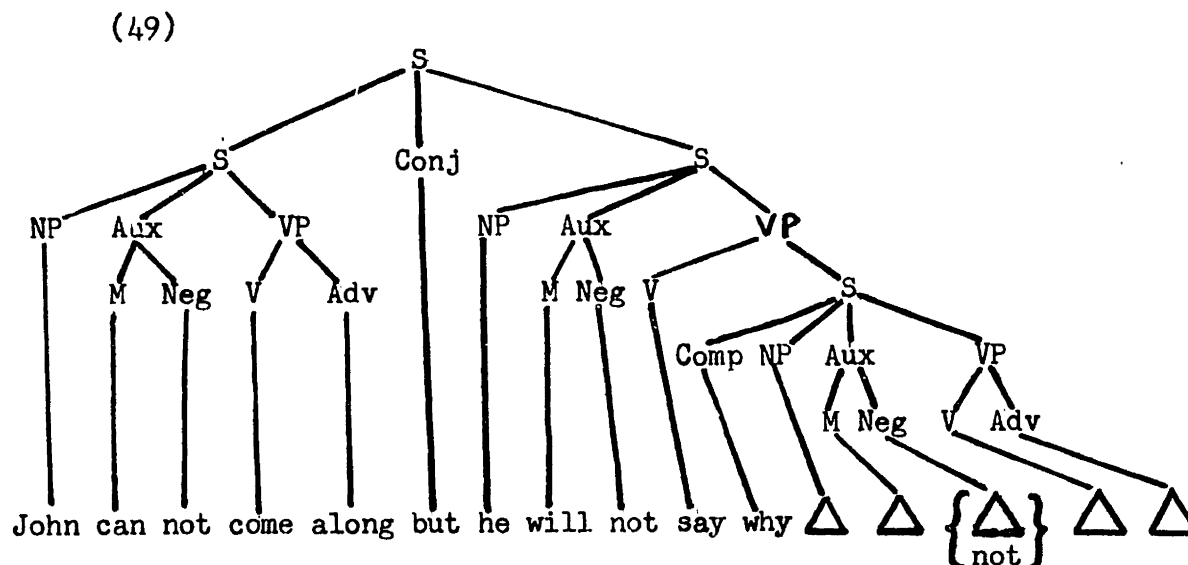
(b) *John can't come along, but he won't say why not he can('t) come along.

If Sluicing is formulated as a rule deleting unstressed strings, (47a) can have no source, as (47b) shows. It cannot be claimed that (47a) derives from a structure preceding the placement of not into the auxiliary, because Bresnan (1971b) has shown that the contraction of not is cyclic, from which it follows that not must be in the auxiliary before Sluicing could apply in (47a).

Notice that (48) is a grammatical alternative to (47a).

(48) John can't come along, but he won't say why.

Under the empty structures hypothesis (47a) and (48) both have the structure (49), differing only in that the lexical item not has been inserted in (47a), but not in (48).²⁴



In this theory, the synonymy of (47a) and (48) is a consequence of the fact, noted in §1.1.2, that anaphora rules may optionally ignore negatives in the antecedent.

Thus, it appears that the existence of (47a) is compatible with the empty structures hypothesis, but not with the existence of Sluicing.

Another problem for Chomsky's proposed account of Sluicing is illustrated in (50).²⁵

(50) (a) John believes their claims about some products, but
I don't know which products.

(b) *John believes their claims about some products, but I
don't know which products he believes their claims about.

Chomsky (lectures, 1971) proposed that clauses containing violations of the Complex NP Constraint (or of his alternative to it) be marked with # (where surface structures containing # are deemed ungrammatical). Then the deletion

rule could eliminate #, along with the rest of the clause, and the difference between (50a) and (50b) is accounted for.

While such a mechanism appears to do the job, notice that the facts in (50) are an automatic consequence of the empty structures hypothesis, given Ross' formulation of the Complex NP Constraint, viz. (34). Thus, the empty structures hypothesis can account for (50) with less theoretical machinery than a theory including a deletion transformation of Sluicing.

Summarizing the last few pages now, it was shown first that deletion transformations supposedly involved in anaphoric relations must differ in significant ways (e.g., the applicability of the Complex NP Constraint to them) from other deletion transformations. Since Chomsky has proposed a kind of deletion rule for these cases which would, in fact, differ crucially from other deletions, it was then necessary to investigate the tenability of his proposal. It turned out that Chomsky's approach could not handle all of the data. Further, it was seen that its acceptance entailed adopting a particular mechanism for dealing with violations of certain constraints and that no such mechanism was required under the empty structures hypothesis. It seems, then, that the empty structures approach to these phenomena is to be preferred over any deletion theory which has been proposed.

3.2.4 The arguments given so far for adopting the empty structures hypothesis and rejecting a deletion analysis of anaphora have been limited to examples traditionally derived by VP deletion and Sluicing, except where an argument could be immediately generalized to other anaphoric relations. In the remainder of this chapter, evidence will be presented to show that neither Equi nor derivation of phonetically non-null anaphors involves deletion. It will further be argued that phonetically null anaphors differ from phonetically non-

null ones in that the latter do not contain empty structures.

Akmajian (1968) and Chomsky (1969) argue that if deletions are to be limited either to constituents or continuous strings, then certain anaphoric elements cannot be derived by deletion. The examples in (51) illustrate this point, with the bracketed phrases representing the items presumed to have been deleted. ((51a) due to G. Lakoff).

- (51) (a) Goldwater won in the West, but it couldn't have happened
in the East. [Goldwater won]
- (b) Although nobody knows it, John beats his wife every night.
[John beats his wife every night]
- (c) John punched Bill in the nose, but he wouldn't have done
it to Pete. [punched...in the nose]
- (d) The bouncer threw John out because he was making too much
noise, but he did it to Pete because of the length of his
hair. [threw.....out]
- (e) We may manage to eliminate water pollution, but we'll
never do it with air pollution. manage to eliminate
- (f) These shoes could be repaired with epoxy, but it can't be
done with bubble gum. [these shoes.....repaired]
- (g) Eight years ago, Johnson defeated Goldwater in California,
but he couldn't do so today. defeat Goldwater in California
- (h) John hoisted Mary up into a tree and poured paint on her,
and I'd like to do {likewise} with Jane. [hoist....up
{the same}]
into a tree and pour paint on her]

Akmajian and Chomsky point out that none of the bracketed expressions in (51)

are single constituents and that many of them are not even continuous strings. For this reason, they claim, if the anaphors in (51) are derived by deletion, then it will be difficult or impossible to specify what sorts of items may be deleted by a transformation. Such a specification is desirable in order to maximize the restrictiveness of linguistic theory.

Akmajian (1968) proposes that examples like (51) should be handled by a surface structure interpretive principle. This principle would associate with each anaphor the reading of another constituent, minus the reading of those elements in contrast. For example, in (51h), the reading of the anaphor turns out to be the reading of the first conjunct, minus John and Mary, which are the two items in contrast.²⁶

Ross (1969) and Leben (1970) have countered this argument by showing that a suitable relaxation of the notion of "deletion under identity" leads to plausible underlying structures for examples like (51), without necessitating abandonment of the deletion approach. Although consideration of the details of this proposal would involve going too far afield, it should be observed that Ross and Leben do not succeed in providing any basis for choosing between the deletion and interpretive approaches to such examples; rather, they show that deletion cannot be ruled out simply because of sentences like (51).²⁷

A survey of the literature on anaphora will reveal that there are, in fact, no other arguments for believing that the generation of non-null anaphors involves deletion. Since some evidence against such a conclusion has already been given (e.g., in §3.2.1), the matter might be dropped here. Before leaving the question, however, two further arguments against the deletion approach to non-null anaphors will be given.

First, consider sentence (52a), which a deletion theory would have to

derive from (52b).

- (52) (a) Although nobody believes that John is a junkie, it is true.
 (b) Although nobody believes that John is a junkie, that John is a junkie is true.

If such a derivation of (52a) were possible, then a completely parallel derivation of (53a) from (53b) would be possible.

- (53) (a) *Although nobody believes that John is a junkie, it.
 (b) Although nobody believes that John is a junkie, John is a junkie.

The complete parallelism between (52) and (53) would make it very difficult to account for the deviance of (53a) in a deletion theory. If no deletion is involved, the explanation is very simple: it is an NP and (53a) would therefore, require the nonexistent phrase structure rule $S \rightarrow \text{Adv NP}$. Thus, the rule often referred to in the literature as S-pronominalization cannot exist.

The second argument against deriving non-null anaphors by deletion has to do with a peculiar property of the dialect of English spoken in eastern Massachusetts. In this dialect, a semantically empty not is added in certain instances where the anaphor so is used. For example, speakers of this dialect would use the sentences in (54) to mean what speakers of the majority dialect of American English would mean by the same sentences without the negative elements.

- (54) (a) John will go to the movies tonight, and so won't Mary.
 (b) You have brown hair, and so don't I.

If a deletion transformation is involved in the generation of (54), then either the negative element is present in the underlying structure or it is inserted

by the transformation inserting so. In the former case, the underlying structures of (54) would correspond to the sentences in (55).

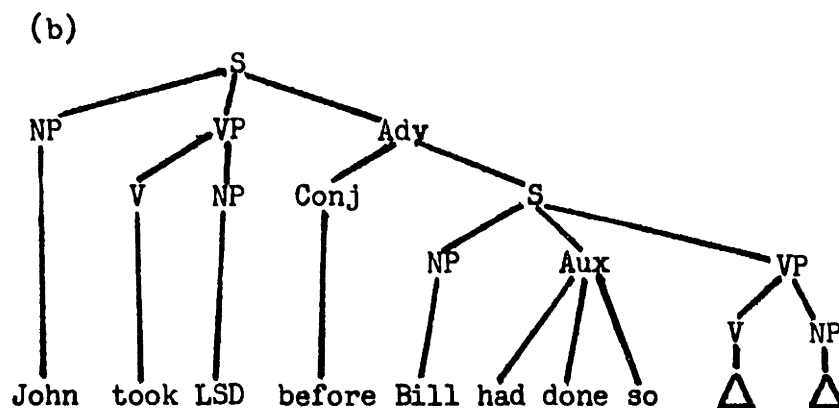
(55) (a) John will go to the movies tonight, and Mary won't go to the movies tonight.

(b) You have brown hair, and I don't have brown hair.

Thus, the deletion transformation would have to affect the meaning of the sentence in a radical and unprecedented manner. Alternatively, it might be argued that the negative element is transformationally inserted together with so. If this is the case, however, the fact that not ends up in the auxiliary and behaves just like ordinary negative elements (except semantically) is rendered purely accidental. Further, the fact that not contracts in (54) is incompatible with such an approach, since not would not be inserted until the last cycle, whereas contraction occurs cyclically (Bresnan (1971b)). Thus, the dialect in which (54) occurs cannot be plausibly described in a deletion theory. It seems unlikely that this dialect difference would involve the replacement of a deletion rule by a non-deletion rule, so the argument against deletion in the eastern Massachusetts dialect supports the contention that deletion is not involved in the majority dialect.

3.2.5 Before leaving the question of these non-null anaphors, one more aspect of the proposal put forward in this chapter should be investigated. If the empty structures hypothesis is correct for null anaphors, it is entirely conceivable that non-null anaphors are themselves merely parts of larger, otherwise empty structures. For example, sentence (56a) might possible have a surface structure something like (56b).

(56) (a) John took LSD before Bill had done so.



If such an analysis were correct²⁸, it would follow that the arguments for preferring the empty structures hypothesis to the nonexpansion hypothesis would also apply in sentences with non-null anaphors. Bresnan (1972) argues persuasively that the missing antecedent argument does not apply in these cases, indicating that non-null anaphors are not associated with any larger anaphoric structures. Some of Bresnan's examples are given in (57).

- (57) (a) *My uncle didn't buy anything for Christmas, so my aunt did it for him, and it was bright red. [it= something]
 (b) *My uncle has never ridden a camel, but his brother finally managed it, although it was lame. [it=camel]
 (c) *Jack didn't get picked off by throw to first, but it happened to Bill, and it singed his ear. [it=throw to first]

Notice also that it is not the only non-null anaphor exempt from the missing antecedent argument.

- (58) *My uncle has never ridden a camel, but his brother finally did so, although it was lame. [it=camel]

Similarly, the argument in §2.2 against the nonexpansion hypothesis fails to carry over to non-null anaphors. Thus, while the grammaticality of (59a) shows that the structure of the missing string must, at some point in the

derivation be present, the ungrammaticality of (59b) would follow from the assumption that the missing string is never present in such examples (together with the assumption that there is transformationally inserted).

(59) (a) For John there came a day when he could no longer keep silent, and for Bill there did, too.

(b) *For John there came a day when he could no longer keep silent, and for Bill there did so, too.

Other evidence distinguishing null from non-null anaphors is given by Leben (1970). For example, (60) shows that non-null elements may differ from their antecedents with respect to passivity, while (61) shows this not to be the case for phonetically null anaphors.

(60) (a) Angela's phone was tapped by FBI agents, and they tried to do it to me, too, but failed.

(b) ?The cup was finally won by the Australians after trying to do so for 20 years.

(61) (a) *My phone was tapped by the FBI, but the CIA wouldn't.

(b) *The cup was finally won by the Australians after trying to for 20 years.

These facts would follow immediately from a theory which included the empty structures hypothesis instead of the transformation of VP deletion, but which treated forms like do so and do it as simple anaphors, not associated with any empty structures. This is because null anaphors would have to match their antecedents node by node, whereas the non-null anaphors would simply be associated with a single non-terminal node (such as VP).²⁹

Further, Leben points out that (62a) is ambiguous, while (62b) is not.

(62) (a) Kennedy always expected to be assassinated, but I never expected it.

(b) Kennedy always expected to be assassinated, but I never did.

(62a) may mean either "I never expected Kennedy to be assassinated" or "I never expected to be assassinated", but (62b) has only the latter interpretation. If it in (62a) were part of an empty structure corresponding to the infinitive in the first clause, then (62a) and (62b) should be synonymous. If, on the other hand, it is assumed to be a simple pronoun, whose antecedent is $[_s \Delta \text{ be assassinated}]$, the interpretive principle outlined by Akmajian (1968) will correctly predict two readings for (62a).³⁰

There is, then, some evidence in favor of limiting the empty structures hypothesis to phonetically null anaphors. Notice that this evidence also provides arguments against any theory which treats all of the phenomena in question as instances of deletion, since the latter cannot account for differences between null and non-null anaphors.

3.2.6 Very little has been said so far about the status of Equi. One argument (§3.2.1) has been presented to suggest that Equi is not a deletion rule, but nothing has been said explicitly about the alternative.

Jackendoff (1969), chapter 3, outlines an interpretive approach to Equi which turns out to be a special instance of the empty structures hypothesis. Jackendoff's analysis would allow a lexically unfilled NP in complement subject position to be anaphorically related to any NP in the matrix clause, so long as this relationship is consistent with lexically marked control properties of the matrix verb. Jackendoff argues that these latter properties should be expressed in terms of what Gruber (1965) calls "thematic relations". Despite his claims to the contrary, Jackendoff (1969) presents no evidence which would favor his approach to Equi over a deletion theory.³¹ His reasons

for employing an interpretive Equi rule are essentially non-empirical, being based largely on his conception of what functions should be performed by what components of a grammar. The remainder of this chapter will be devoted to arguments against postulating a deletion rule of Equi. These arguments will hence provide support for Jackendoff's approach to Equi, and will further strengthen the case for the empty structures hypothesis.

3.2.6.1 The first argument against treating Equi as a deletion rule has the following form: (i) the interpretation of respectively cannot be done in deep structure; (ii) the rule for the interpretation of respectively must have available to it information regarding missing complement subjects; (iii) therefore, either respectively is interpreted between deep structure and the operation of Equi, or Equi is not a deletion rule. Since there is no evidence of any transformations which follow the interpretation of respectively, and since there are no well documented cases of interpretive rules³² which must apply between deep structure and surface structure, it is natural to assume that the interpretation of respectively is determined in surface structure. If this is the case, then it follows that Equi cannot be a deletion rule.

The first part of the argument, namely that respectively cannot be interpreted in deep structure, is shown by the examples in (63).

- (63) (a) The negative numbers and the positive numbers precede and
are preceded by zero, respectively.
- (b) John and Bill are easy to please and eager to please,
respectively.
- (c) Why and when did you come and leave, respectively?

In each sentence in (63), the parallelism which is a prerequisite for interpreting respectively is the result of the operation of a transformation.

Hence, if the respectively interpretation rule applied to deep structure, then it would have to be formulated so that it could anticipate the operation of Passive, Tough-movement, and WH-fronting, which is clearly out of the question.

The second part of the argument, that missing complement subjects must be available to the respectively interpretation rule, follows from (64).

- (64) (a) *John and Bill expected Mary to go to New York and Los Angeles, respectively.
- (b) Mary expected John and Bill to go to New York and Los Angeles, respectively.
- (c) *John and Bill told Mary to go to New York and Los Angeles, respectively.
- (d) Mary told John and Bill to go to New York and Los Angeles, respectively.
- (e) John and Bill promised Mary to go to New York and Los Angeles, respectively.
- (f) *Mary promised John and Bill to go to New York and Los Angeles, respectively.³³

The judgments in (64) show that the complement subject of such sentences must be plural or have a plural antecedent, in order for the interpretation of respectively to be possible. This means that the respectively interpretation rule must have available to it information regarding the number of the complement subject. It could not have this, if Equi is a deletion rule and respectively is interpreted after the operation of Equi.³⁴

3.2.6.2 The next argument against formulating Equi as a deletion rule depends crucially on accepting Ross' pruning convention (viz., that non-branching S nodes are deleted). Chomsky (1971) has seriously questioned both the need for this convention and the desirability of including it in linguistic theory,

so the argument that follows is also in question.³⁵

The pruning convention may be relevant to the choice between a deletion rule of Equi and the empty structures hypothesis because deletion of a subject NP could leave S exhaustively dominating VP, i.e., in a configuration requiring pruning. Suppose some rule R can then be found which must follow Equi and which refers in some way to S-nodes. Then if R treats subjectless VP's like sentences, it provides support for the empty structures hypothesis; otherwise, a deletion analysis would be indicated.

One rule which meets the requirements of R is the rule for assigning scope to negative elements. Lasnik (1969) argues quite persuasively that any constituent which is to the right of and is commanded by a negative element may be the negated element. Further, he has argued that this rule applies at the level of surface structure. Thus, (65a) is ambiguous between a reading in which George does beat his wife and one in which he doesn't, whereas (65b) and (65c) are unambiguous.

(65) (a) George doesn't beat his wife because he loves her.

(b) Because he loves her, George doesn't beat his wife.

(c) Not because he loves her does George beat his wife.

(65a) allows either the VP or the adverb to be negated; (65b) allows only the VP to be negated, since the adverb is to the left of the negative; and (65c) allows only the adverb to be negated, because the negative does not command the VP.

Now consider (66).

(66) George tries not to beat his wife because he loves her.³⁶

Suppose that Equi is a deletion rule. Then the surface structure for (66) is something like (67).

(67) $[_S \text{George } [_{VP} \text{tries } [_{VP} \text{not to beat his wife}]]]$

[_{Adv} because he loves her]]

In (67), not is to the left of the and commands the adverb. Lasnik's rule would therefore predict that (66) has a reading in which the adverb is negated, i.e., a reading synonymous with (68).

(68) Not because he loves her does George try to beat his wife.
This prediction is not borne out: (66) cannot have the same meaning as (68).

If, on the other hand, Equi does not involve deletion, then not remains embedded in the complement sentence, so that it never commands the adverbial, and Lasnik's rule correctly predicts the meaning of (66).³⁷

3.2.6.3 The final and best argument in favor of the empty structures hypothesis as applied to Equi makes use of the undesirability of syntactic rule-features, referred to in Chapter 1, § 3.1. The argument takes the following form: (i) Equi must be generalized to the subjects of nominals (regardless of what kind of a rule Equi is); (ii) certain nominals must be marked as exceptions to Equi, and this can only be done with rule-features if Equi is a deletion rule; (iii) under the empty structures hypothesis the selectional feature needed for these cases is independently motivated.

That Equi should be generalized to nominals is suggested by the fact that the interpretation of certain nominals requires that their subjects be understood to be identical with another NP in the sentence. For example, in (69), the person seeing and knowing must be John.

(69) (a) John hated the sight of his apartment.

(b) The knowledge that the end was near frightened John.

The natural hypothesis about (69) is clearly that the interpretation of the subjects of the nominals is accounted for by the same mechanism as is operative in (70), viz., Equi.

(70) (a) John hated to see his apartment.

- (b) It frightened John to know that the end was near.

Further, cases in which the operation of Equi interacts with the pronominal anaphora rule (cf. Chapter 2, §2.1.1) exist for the subjects of nominals, as well as for the subjects of sentences.

- (71) (a) *Realizing that John was unpopular upset him.

- (b) *The realization that John was unpopular upset him.

This parallelism is most naturally accounted for by generalizing Equi to nominals.

Now consider cases like (72).

- (72) (a) The reading of the honor roll embarrassed John.

- (b) The report that Mary was pregnant upset John.

In these examples, the understood subject of the nominal must be someone other than John. If Equi is a deletion rule, then this fact must be expressed by marking the nouns reading and report with the rule-feature $[-\text{Equi}]$. Notice that it is not possible to substitute the selection feature $[-\text{Spec}^{\text{NP}}]$ because of examples like (73).

- (73) (a) Bill's reading of the honor roll embarrassed John.

- (b) The doctor's report that Mary was pregnant upset John.

If, on the other hand, the empty structures hypothesis is adopted for Equi, then Equi applies only to sentences and nominals with empty subjects, so Equi can be blocked from applying by marking the appropriate nominals with the selectional feature $[-\text{Spec}^{\text{NP}} \Delta]$

One consequence of handling (72) with the selectional feature $[-\text{Spec}^{\text{NP}} \Delta]$ is that the structure-preserving transformations (see Edmonds (1970) for discussion of this concept) would be unable to move NP's into the subject position of nominals like report or reading, since such rules may move an NP only into previously unfilled NP nodes. Thus, the feature

$[-[_{\text{Spec}}[_{\text{NP}}\Delta]] \text{ ---}]$ on report predicts correctly that (74a) may not be transformed into (74b) (since Passive is structure-preserving).

(74) (a) The report of the invasion surprised John.

(b) *The invasion's report surprised John.

Further, the fact, illustrated in (75), that nominal gerunds never passivize, follows from the hypothesis--argued for on independent grounds by Wasow and Roeper (1972)--that nominal gerunds are always $[-[_{\text{Spec}}[_{\text{NP}}\Delta]] \text{ ---}]$.

(75) (a) *The honor roll's reading embarrassed John.

(b) *The aria's singing bored John.

(c) *The general favored the city's leveling.

Contrast these examples with the well-formed nominals in (76), which result from passivizing nominals not marked $[-[_{\text{Spec}}[_{\text{NP}}\Delta]] \text{ ---}]$.

(76) (a) The honor roll's publication embarrassed John.

(b) The aria's composition bored John.

(c) The general favored the city's destruction.³⁹

(76) and (75) provide indirect support for adopting the empty structures hypothesis for Equi by providing evidence for a selectional feature required by such an analysis.

4.0 Summary

Since much of this chapter has involved fairly detailed and often confusing arguments, the overall structure of the chapter will now be reviewed. First, it was shown that different anaphoric relations are similar in certain nontrivial respects, indicating that a uniform treatment of anaphora would be desirable. It was further observed that because of what is known about definite pronoun anaphora, anaphora could not be treated uniformly if some anaphoric relations result from deletion operations. It was shown that the nonexpansion hypothesis was an inadequate alternative to deletion, at least

in certain cases, and the empty structures hypothesis for phonetically null anaphors was suggested instead. Certain advantages of the empty structures hypothesis over a deletion theory were demonstrated, and it was argued that the generation of non-null anaphors does not involve deletion either. Finally, it was seen that the best existing approach to Equi is a special case of the empty structures hypothesis.

4.1 The conclusion to be drawn from this is that all anaphoric relations should be accounted for by rules of the same formal type, perhaps even by a single rule. Exactly how anaphora rules should be formalized is a question which must await further research. However, the arguments in this chapter serve to limit the possibilities to some extent. No attempt will be made here to state any of the rules, but it is possible at this point to say that something like (77) will be part of each anaphora rule or a universal constraint on anaphora rules.

(77) A constituent A may serve as the antecedent for a pro-form B if

- (a) B is to the right of A or B is more deeply embedded than A;
- (b) A and B are nondistinct; and
- (c) B has reduced stress.

Additional conditions (such as something like (15)) will be needed, together with specifications of precisely what is meant by "pro-form" and "nondistinct". Further, a formalism for marking anaphora will be required.

Finally, some principled explanation is needed for the fact that anaphora rules differ from all other rules in that they appear to be immune to virtually every general constraint on grammatical rules ever proposed (e.g., those in Ross (1967a) and Chomsky (1971)).

FOOTNOTES

1. The underlining of blank spaces used in Chapter 1 to indicate the presence of phonetically null anaphors is abandoned here, except where there is doubt regarding the location or antecedent of such an anaphor.
2. (9e), it will be noticed, is less persuasive than some of the others, since it is possible that the antecedent of one is simply bicycle.
3. Akmajian suggests that modifiers of the antecedent are ignored if there is an overt contrast between them and the modifiers of the anaphor. I believe that there is a larger generalization (illustrated in (10)-(14)), viz., that modifiers may be optionally ignored by whatever mechanism associates the readings of the antecedents with anaphors, within the limits of semantic compatibility. Notice that this does not seem to hold for phonetically null anaphors, although the judgements are not entirely clear. Thus, the (a) sentences cannot be understood as synonymous with the (b) sentences in (i) and (ii).

(i) (a) Yesterday, John jogged a mile in spite of the rain, and today Mary did.

(b) Yesterday, John jogged a mile in spite of the rail, and today Mary jogged a mile.

(ii) (a) John beats Mary because he loves her, and Bill does too.

(b) John beats Mary because he loves her, and Bill beats Mary, too.
4. (15) is clearly unsatisfactory as stated; it is an ad hoc description of the facts, devoid of any explanatory power. However, since I know

of no more enlightening account of the phenomena handled by (15), I must use the formulation of (15) to establish my conclusion.

5. The examples in (19) can be ruled out on independent grounds, viz., one can never have a possessive determiner, e.g.

(i) *Wild horses are less healthy than a trainer's ones.

(ii) *The loser's game was worse than the winner's one.

However, such impossible NP's can ordinarily be made acceptable by deleting one, e.g.,

(iii) Wild horses are less healthy than a trainer's.

(iv) The loser's game was worse than the winner's.

Note that this device in no way improves (19).

(v) *A trainer of horses' are generally healthier than mustangs.

(vi) *The winner of the game's was off today.

Thus, it seems that (15) is needed to account for (19).

6. Frieden (1970) suggests an interpretive analysis of Equi lacking even the dummy symbol, but I believe this to be an untenable position (for reasons having to do with reflexivization, passivization, and other transformational processes). This possibility will not be discussed here.
7. I am only interested here in the non-specific interpretation of a car. If a car is interpreted specifically, then, (30a) is probably acceptable.
8. Jerry Katz first suggested this approach to me.
9. Full identity is not needed, since they may differ with respect to the presence of a negative element.

10. These diagrams are oversimplified in that (among other shortcomings) they do not show the syntactic features on the empty nodes. These features must match with those on the corresponding nodes of the antecedent. My use of the node Aux should not be taken as an indication that I have any confidence in the existence of such a node.
11. A concrete proposal for such a rule may be found in Akmajian (1968). More will be said about it below.
12. Those negatives and modifiers which may be ignored for the purposes of anaphora (see §§1.1.2 & 1.1.3) are, of course, not counterexamples to this account of (33).
13. The need for such arguments is reenforced by the following observation: if the concept of deletion under identity is replaced by the concept of deletion under anaphora (as suggested in Chapter 1), then at least some of the facts in §1 can be accounted for even if deletion rules are involved in the generation of phonetically null anaphors. Since the deleted elements must first be marked as anaphors, it follows that deletions under identity will exhibit many of the same properties as anaphoric relations.
14. I have unfortunately been unable to find any convincing evidence of this sort. It is possible that the contrast between (i) and (ii) may support the empty structures hypothesis.

(i) John won't go unless Bill can go.

(ii) John won't go unless Bill can.

In (ii), can receives stress, but in (i) it is unstressed. (This is the

reason that the vowel in can is reduced in (i), but not in (ii)). The empty structures hypothesis can account for this if it is supposed that the low stress on can in (i) is a result of the operation of the Nuclear Stress Rule, which assigns primary stress to go, thereby lowering the stress on can. The subsequent reduction of stress on go is due to the fact that go repeats material in the previous clause. The heavy stress on can in (ii) also results from the normal operation of the Nuclear Stress Rule, since this rule places primary stress on the last word in the clause. Unfortunately, this account of (i) and (ii) is probably incorrect, for it seems to be the case that modals are always unstressed unless they are in contrast. If this is so, then the Nuclear Stress Rule cannot assign stress to can in (ii), since the Nuclear Stress Rule only stresses words which have primary stress. It seems to me that the contrast between (i) and (ii) shows that can contrasts with won't in (ii), but not in (i). Why this should be so is a mystery to me, but whatever the solution to this mystery turns out to be, it seems unlikely that it will have any bearing on the correctness of the empty structures hypothesis.

15. The reader may perhaps be confused by the assertion that a constraint explicitly limited to movement rules applies to deletions. What is meant, of course, is that no element of a complex NP may be deleted under identity with something outside of that NP.
16. I will not speculate here on the form of the rule, although a plausible guess might be that the pronoun one is deleted under anaphora with the doctor.
17. Such an NP may, however, serve as the antecedent for an indefinite pronoun.

- (1) John is not the doctor that his father was before Mary became one.

18. The deviance of (37) is, of course, a problem, since nothing said in Chapter 2 would account for it. The reason for the ungrammaticality of (37) is indicated in Chapter 5.
19. Chomsky (1971) suggests that the derivation of comparatives involves a movement rule. If independent evidence for this can be found, then (39) does not support the extension of the Complex NP Constraint to deletions.
20. To this point little has been said about the status of Equi. Several arguments later in this chapter support the conclusion suggested by (41c) that Equi is not a deletion rule.
21. Chomsky (1971) proposes a set of constraints which would render the Complex NP Constraint largely or wholly unnecessary. The argument given above also holds for Chomsky's alternative to the Complex NP Constraint.
22. Chomsky (1971), footnote 21, states without argument that (43) might not apply to "housekeeping rules", of which Do-support is presumably one, so this argument is not decisive. Notice that if VP deletion is a transformation, then Do-support must also violate the insertion prohibition of Chomsky (1965), given above in Chapter 1.
23. It might be objected that this would predict that do would also be inserted in "sluiced" sentences. This objection does not hold, however, for, unlike (46a) "sluiced" sentences do not have a lexical item (i.e., Past or Present) in the position of tense. If Do-support applies just

in case there is a tense marker not adjacent to a lexical item into which it can be incorporated.(i.e., a verb), then the empty structures hypothesis makes exactly the right predictions.

24. If there is a rule moving not into the auxiliary from a presentential position (as suggested by Klima (1964) but questioned by Lasnik (personal communication)), then (49) represents the structure after the application of this transformation.
25. Facts like (50) were first noted by Ross (1969).
26. If the notion of contrast is associated with contrastive stress, then Akmajian's principle cannot adequately account for (51b), since John beats his wife is probably not a constituent, but Although nobody knows it is not in contrast. This can be handled by the modification of Akmajian's principle proposed in §1.1.3, viz., that modifiers may optionally be ignored without contrast. In (51b), of course, the modifier (viz., the adverbial clause) must be ignored, since otherwise the interpretation of it leads to an infinite regress.
27. Ross (1969) does attempt to provide an argument for choosing the deletion approach. The structure of the argument is the following: (i) shows that "sloppy identity" is a necessary part of linguistic theory, so long as Sluicing is a deletion rule; with sloppy identity it is possible to handle cases like those in (51) without Akmajian's interpretive principle (i.e., with deletions); therefore, if Sluicing can be shown to be a deletion, then the interpretive principle need not (and hence should not) be included in the grammar, and the examples of (51) should be treated

as deletion under sloppy identity.

(i) Bob knows how to crane his neck, but I don't know how.

Ross then presents the arguments of § 2.1 to try to show that Sluicing is a deletion rule. Quite apart from the fact that none of the arguments of § 2.1 applies to the empty structures hypothesis, the above argument fails to be convincing because it is possible to argue in a perfectly analogous manner that sloppy identity should not be a part of linguistic theory. The argument is the following: it in (ii) may be interpreted to mean the second man's paycheck; this shows that the rule associating a pronoun with the reading of its antecedent--a rule which cannot be a deletion--may in some cases ignore anaphoric relations within the antecedent; since this is just like the phenomena sloppy identity is meant to handle, we should try to account for these phenomena in the same way, viz., not in terms of conditions on deletion, but in terms of conditions on copying semantic material.

(ii) The man who gave his paycheck to his wife was wiser than the man who gave it to his mistress.

The arguments above boil down to the idea that where there are two possible mechanisms for accounting for certain facts, if one mechanism can be shown to be necessary in some cases, then the other mechanism should be abandoned. Ross claims to have shown sloppy identity to be necessary, and I argue that the interpretive mechanism is necessary. It would seem to follow that both are needed. Recall, however, that one crucial step in Ross' argument was faulty, namely the demonstration that Sluicing is a deletion. Thus, it appears that sloppy identity is not needed after all. This conclusion predicts that genuine deletions require strict

identity. Whether this prediction is borne out is not completely clear, because the data are rather uncertain.

(iii) John is less worried about his thesis than Bill is.

(iv) Mary is less worried about her thesis than Bill is.

My own intuitions regarding these examples are that (iii) permits a reading on which it is his own thesis that Bill is worried about, but that (iv) does not. If this is correct, then strict identity is too strong a requirement for deletion, and sloppy identity is too weak. Rather, what would be required is morphological identity. If other speakers feel that (iv) is ambiguous, then perhaps the notion of sloppy identity is needed (although it still might be avoided if "deletion under identity" is really deletion under anaphora). Notice, however, that the need for sloppy identity would not be inconsistent with a theory in which the deletion rules of Sluicing and VP deletion are replaced by interpretive rules. Rather, such a theory would simply require both sloppy identity and something like Akmajian's interpretive principle.

28. Actually, such an analysis is highly implausible for syntactic reasons. For one thing, this would be the only case in English where have and do appear in the same auxiliary (although they may cooccur if either one is a main verb). If, however, do so is made part of the VP, then it ruins the necessary symmetry of the two VP's.
29. Note that a completely parallel account of the facts mentioned in footnote 3 (§1.1.3) can be given. That is, null anaphors cannot ignore modifiers on their antecedents because this would leave the corresponding modifiers on the anaphors without an interpretation.

30. As for (62b), the empty structures hypothesis can handle it, if it is assumed (as it apparently must by--cf. Jackendoff (1969), chapter 3) that verbs are marked in the lexicon for their control properties. Then the main verb of the empty VP in (62b) must share with expect the property of requiring its complement's subject, if empty, to be anaphorically related to the matrix agent. Formally, this would be a result either of the nondistinctness requirement obtaining between anaphor and antecedent (if the relevant feature is syntactic), or of the copying of the semantic material from the antecedent into the anaphor (if the feature is semantic).
31. Jackendoff suggests that the idea that thematic relations are involved in the lexically determined control properties of verbs is incompatible with a deletion rule of Equi. In fact, however, it would be possible to mark the verbs as he suggests, delete complement subjects quite freely, and then filter out those sentences in which the interpretation required by the lexical marking is not the same as what the structure preceding deletion would lead one to expect.
32. See Dougherty (1970) for evidence that it is a rule of semantic interpretation that is involved.
33. Not all speakers agree with these data, but (64) represents the most common responses.
34. Dougherty (1970) suggests that the scope of respectively can be only a single surface structure sentence. This suggestion, together with the assumption that Equi does not involve deletion makes the correct

predictions in (64). Chomsky (1971) suggests instead that (i) can account for the scope of respectively.

- (i) No rule can involve X, Y in...X... [...Z...-WYV...]
 where Z is the subject of WYV and is not controlled by a category containing X.

(i) makes exactly the right predictions in (64), without requiring any special conditions on the respectively interpretation rule. Note, however, that this account also requires that Equi be a non-deletion rule (so long as respectively is interpreted after Equi has applied), for otherwise Z has been deleted at the point where (i) applies.

35. At one time, I believed that the contrast between (i) and (ii) provided support for the pruning convention (and for a grammar of English which does not include Raising into object position).

(i) *John and Bill expected Mary to go to New York and Los Angeles, respectively.

(ii) Mary was expected by John and Bill to go to New York and Los Angeles, respectively.

(i) and (ii) differ only by the application of Passive. However, since Passive would remove the complement subject from (i), pruning would apply, and the grammaticality of (ii) would be accounted for. Unfortunately, such an analysis of (i) and (ii) predicts incorrectly that (iii) should not be improved by passivization, i.e., that (iv) should be deviant.

(iii) *John and Bill told Mary to go to New York and Los Angeles, respectively.

(iv) ?Mary was told by John and Bill to go to New York and Los

Angeles, respectively.

The fact that (iv) is not worse than it is is rather unfortunate for the analysis adopted here, and it hence casts doubt on the respectively argument for a non-deletion Equi rule.

36. (66) is ambiguous because the adverbial clause may be a daughter either of the matrix sentence or of the infinitive. These structures correspond roughly to the surface structures (i) and (ii) (where (ii) itself has two readings, parallel to the ambiguity of (65a)).

(i) Because he loves her, George tries not to beat his wife.

(ii) What George tries to do is not beat his wife because he loves her.

The second possibility is irrelevant for the purpose of my argument.

37. This argument can be circumscribed by supposing that the negative in the infinitive is not part of the complement VP. In this case, the presence of the negative would block pruning. Notice however that such a way out would not be very plausible for (i), which behaves exactly like (66) with respect to the relevant phenomena.

(i) George tries to not beat his wife because he loves her.

38. Lest it be objected here that the feature $[-[_{\text{Spec}} [_{\text{NP}} \Delta]] \text{ —}]$ is, in fact, a rule-feature, but one limited to lexical insertion transformations, it should be pointed out that all selectional features can be thought of as rule-features on lexical insertion rules. This in no way legitimizes the general use of syntactic rule-features.

39. A similar argument to the one presented here is given by Wasow and Roeper (1972). That argument, however, involves the rather questionable

assumption that nominals like (i) and (ii) are grammatical and are derived from sources like (iii) and (iv) by a structure-preserving transformation.

- (i) ?John's likelihood of leaving.
- (ii) ?Tom's probability of winning.
- (iii) the likelihood of John('s) leaving.
- (v) the probability of Tom('s) winning.

Chapter Four

SOME DIFFICULTIES

0. Introduction

The purpose of this chapter is to consider some very interesting data which are unaccounted for by the mechanisms discussed in the previous chapters. the facts in question were first noted by Postal, who has proposed several different (but closely related) analyses of them. The structure of the chapter will be as follows: (i) the relevant data will be presented and discussed; (ii) an analysis of them will be proposed and its consequences explored; and (iii) the analysis proposed here will be compared with Postal's most recent analysis of these data.

1. The Facts

Consider the contrast between the (a) and (b) sentences of (1) and (2).

(1) (a) Who said Mary kissed him?

(b) *Who did he say Mary kissed?

(2) (a) The man who said Mary kissed him was lying.

(b) *The man who he said Mary kissed was lying.

Since it was concluded in Chapter 2 that WH-fronting applies before the pronominal anaphora rule, there is nothing in the preceding chapters that accounts for the deviance of (1b) and (2b).

Further, as Postal (1970a) argues, the contrast in (1) and (2) cannot be accounted for by any constraint statable in terms of deep structure or surface structure.¹ (3) and (4) (in which the (a) and (b) sentences presumably have the same deep structures) show that deep structure does not suffice to account for such contrasts.

(3) (a) Who fed his dog?

(b) *Who was his dog fed by?

(4) (a) Who did Mary talk to about his sister?

(b) ?*Who did Mary talk about his sister to?

The inadequacy of a surface structure constraint to account for this phenomenon is demonstrated by the fact that relatives with the WH-word deleted in surface structure behave similarly.

(5) (a) The man Mary talked to about his sister is a friend of mine.

(b) ?*The man Mary talked to his sister about is a friend of mine.

In addition, the contrast in question cannot be a function of whether the pronoun is a subject, nor of the relative proximity of pronoun and antecedent (cf. Chapter 2, §1.2.3), for in (6), the pronoun is both an object and far from the WH-word.

(6) *Who did your favorite second cousin tell him I had seen?

Rather, the correct generalization in all these cases (as has been observed by several people) is that such sentences are grammatical whenever the WH-word is fronted from a position to the left of the pronoun.

Given this generalization, there are two sorts of analyses which immediately suggest themselves. On the one hand, one could formulate a constraint blocking anaphora between WH-words and pronouns whose relative positions had been reversed by WH-fronting. Such a solution will be referred to as a "cross-over solution". On the other hand, one could apply the pronominal anaphora rule prior to WH-fronting in these cases. Both approaches entail serious difficulties.

Notice first that since the pronominal anaphora rule has been shown to apply after WH-fronting (Chapter 2, §2.2.1), it follows that the cross-over approach requires the pronominal anaphora rule to refer to a previous stage

of the derivation, i.e., the pre-WH-fronting structure. Thus, the cross-over solution requires a derivational constraint. Furthermore, such an analysis would not differentiate between cases in which the pre-fronting position of the WH-word is less deeply embedded than the pronoun and cases in which it is not. For ease of reference, cases of the former sort will be called weakly crossed sentences, and those of the latter type, strongly crossed sentences.² The sentences in (7), however, demonstrate that such a differentiation is necessary, for although weakly crossed sentences would violate a cross-over constraint, they are far less deviant than strongly crossed sentences. ((7a) from Remembered Death by Agatha Christie, Pocket Books, p. 58; (7b) from Travels with My Aunt by Graham Greene, Bantam Paperback, p. 190; and (7c) from Murder in Retrospect by Agatha Christie, Dell, p. 108).

- (7) (a) He was the type of man with whom his work would always come first.
- (b) On December 23rd, the postman brought a large envelope which, when I opened it at breakfast shed a lot of silvery tinsel into my plate.
- (c) He was the kind of man who when he loses his collar stud bellows the house down.
- (d) ?How many copies of Aspects does your friend who collects them own?
- (e) ?Which well-known actor did the policeman who arrested him accuse of being drunk?³

It seems, then, that the cross-over solution to the problem posed by (1) and (2) cannot be maintained. There remains, therefore, the possibility of applying the pronominal anaphora rule before WH-fronting. The difficulty

with this idea is that, as (8) shows, the pronominal anaphora rule must be allowed to apply after WH-fronting.

(8) (a) *He finally married one of the girls Bill had been dating.

(b) Which of the girls Bill had been dating did he finally marry?

Applying the anaphora rule both before and after fronting would not alleviate the problem, for (1) requires that certain anaphoric relations be blocked prior to WH-fronting, whereas (8) requires that other anaphoric relations not be blocked so early. It might be suggested that anaphora assignment applies both before and after WH-fronting, but that WH-words may not be marked for anaphora once they have been fronted. This would account for all the data presented so far, and it seems plausible to claim that WH-words, when put into complementizer position (see Chomsky (1971)), lose the ability to enter into anaphoric relations with pronouns. Formally, this could be accomplished by depriving WH-words in complementizer position of their NP status. Unfortunately, such a solution fails because of sentences like (9).

(9) (a) Who killed Cock Robin, and why did he do it?

(b) If I knew who stole the jewels, I would turn him in.

In these examples, WH is fronted on a cycle in which the pronoun is not even included, so the indicated anaphoric relations cannot be marked prior to WH-fronting. In fact, such examples show that in some cases, WH-words must be marked for anaphora after fronting.

Thus, it seems that (1) and (8) entail a genuine ordering paradox.

2. An Analysis

2.1 The Trace Proposal

That there is an escape from this apparent paradox was pointed out by

Peter Culicover (personal communication). Culicover suggested that WH-fronting could be formulated so that a phonetically null copy of the WH-word is left behind in its pre-fronting position. By the arguments of Chapter 1 §3.3, this copy would necessarily be anaphorically related to the WH-word. Hence, if the WH-word itself enters into an anaphoric relation with a pronoun, then by the Transitivity Condition (Chapter 1, §3.2.1 & 3.2.2), the copy and the pronoun must enter into an anaphoric relation. If this relation is blocked, then the sentence is deviant. It therefore follows that WH-words' behavior with respect to anaphora should be just what it would be if they were in their pre-fronting positions. This consequence is discussed in the next section.

The trace analysis is illustrated in (10).

(10) (a) $[_{S_1}$ He said $[_{S_2}$ Mary kissed someone $]]$.

(b) $[_{S_1}$ Who did he say $[_{S_2}$ Mary kissed Δ $]]$.

The transformation of WH-fronting converts a structure like (10a) into one like (10b). Now, if who and he in (10b) are to be allowed to enter into an anaphoric relation, the Transitivity Condition requires that NP and he also be anaphorically related. Consequently, the resultant sentence will be ungrammatical for the same reason that (11) is.

(11) *He said Mary kissed someone

One immediate objection to such an analysis is the following: if, as the previous chapter suggested, empty nodes are to be treated by the anaphora rules just like pro-forms, then there is no reason why he may not serve as the antecedent for Δ , in which case the relevant anaphoric relations would always be possible (see Chapter 2, (30)). So some means must be found to

keep he from serving as the antecedent of Δ .⁵

This can be accomplished formally simply by marking the traces left behind by WH-fronting with some feature (e.g., [-pro]) which distinguishes them from pronouns. This does not prevent these traces from having the WH-words as their antecedents, for this anaphoric relation is marked by the rule of WH-fronting, and, as was shown in Chapter 1, copying rules may produce anaphoric relations forbidden by the anaphora rules.

The analysis suggested above is admittedly quite ad hoc. In fact, it amounts to a weakening of the standard requirement that the rules of a grammar be simply ordered. There are, however, some reasons (beyond the arguments given above) to believe that it may be correct.

The first of these reasons is that Chomsky (1971) proposes precisely the same analysis as that suggested above, but on entirely different grounds. Chomsky's arguments are too involved to consider here, but they boil down to the fact that the transformation of each-movement (Dougherty (1970)) must be blocked from applying in certain structures. Chomsky argues that independently necessary constraints will suffice to do this, if WH-fronting is formulated in such a way as to leave a trace behind.

Chomsky (1971) also points out that other movement transformations behave exactly like WH-fronting with respect to these phenomena. This led him to suggest that movement rules universally leave behind a trace. This is an attractive suggestion, for a theory in which all movement transformations must leave behind a trace is certainly more restrictive (i.e., compatible with fewer possible grammars) than one in which only some such rules do.⁶

If all movement rules leave behind a trace, then other movement rules should interact with pronominal anaphora in much the same way as WH-fronting.

That is, paradigms like (1) and (2) ought to exist in cases involving movement transformations other than WH-fronting. That such paradigms do, in fact, exist is shown by (12).

(12) (a) It was John that said Mary kissed him.

(b) *It was John that he said kissed Mary.⁷

Notice, by the way, that (12) cannot be accounted for by ordering Cleft sentence formation after the pronominal anaphora rule, because of examples like (13).

(13) (a) *He finally married the girl Bill had been dating.

(b) It was the girl Bill had been dating that he finally married.

Thus, Chomsky's proposal to require all movement transformations to leave behind a trace receives support from (12).

Topicalization behaves much like Cleft sentence formation, thereby providing further support for Chomsky's proposal. (14) shows that the pronominal anaphora rule must be allowed to apply after Topicalization, and (15) shows that the paradigm of (1) generalizes to Topicalization.

(14) (a) *He loves the woman John married.

(b) The woman John married, he loves.

(15) (a) John, Mary claims said Jane kissed him.⁸

(b) *John, Mary claims he said Jane kissed.

Further supporting evidence involves the rules of Tough movement and It-replacement. Both of these rules were shown to follow the pronominal anaphora rule in Chapter 2, §2.2.1. One would therefore predict that the marginal⁹ sentences in (16) could be made fully grammatical by applying Tough movement and Subject raising.

(16) (a) ??It was easy for his brother to help John.

(b) ??It seems to his brother that John is unhappy.

That this expectation is not borne out is shown in (17).

(17) (a) ?John was easy for his brother to help.

(b) ??John seems to his brother to be unhappy.¹⁰

These facts follow immediately from an analysis which requires Tough movement and It-replacement to leave behind a trace, since the trace may be anaphorically related to a pronoun only if the NP could have been, had it not been moved. (Recall that the Transitivity Condition requires that the trace be marked for anaphora whenever the moved NP is).

2.2 Some Consequences

The most obvious prediction this analysis makes is that all strongly crossed sentences are ungrammatical. This prediction is fully borne out for all speakers, as is evidenced by the complete agreement among informants regarding (1b), (2b), (12b), and (15b). Similarly, this analysis correctly predicts that a preposed NP can always serve as the antecedent of a pronoun to the right of its pre-fronting position, as, e.g., in (1a), (2a), (12a), and (15a).

In weakly crossed sentences, the analysis suggested above predicts that an anaphoric relation is possible only if the antecedent is determinate. Since there is a good deal of individual variation regarding the possibility of right-to-left anaphora (and hence regarding determinateness--cf. Chapter 2, §1.2.2), the trace analysis correctly predicts that reactions to weakly crossed sentences will differ widely as well. Further, it predicts a correlation between judgements regarding right-to-left anaphora and judgements regarding weakly crossed sentences.

For movements other than WH-fronting, such a correlation can easily be seen to exist.

(18) (a) A man who had heard it before interrupted Bill's story.

(b) ?*A man who had heard it before interrupted someone's story.

(19) (a) It was Bill's story that a man who had heard it before interrupted.

(b) ?*It was someone's story that a man who had head it before interrupted.

(20) (a) Bill's story, a man who had heard it before interrupted.

(b) ?*Someone's story, a man who had heard it before interrupted.

In the case of WH-fronting, the situation is a bit more complex, for it is not a priori clear how to assign determinateness to WH-words. Chomsky (1964) argues that WH-words in questions are derived from "unspecified indefinites". If this is correct, then these words are indeterminate, and should yield ungrammatical weakly crossed sentences. In fact, it appears that questions beginning with who, whose, or what behave just like the corresponding declarative sentences with someone, someone's, or something. Thus, the examples in (21) are just about as bad as those in (22).

(21) (a) ?*Who did the woman he loved betray?

(b) ?*Whose story did a woman who had met him before interrupt?

(c) ?*What did the man who lost it need to find?

(22) (a) ?*The woman he loved betrayed someone.

(b) ?*A woman who had met him before interrupted someone's story.

- (c) ?*The man who lost it needed to find something.

Weakly crossed questions involving which and how many sound a good deal more natural, as do the corresponding declaratives.

- (23) (a) ?Which picture did the man who painted it refuse to sell?
 (b) ?How many dachshunds does your friend who breeds them own?
 (24) (a) ?The man who painted it refused to sell one picture.
 (b) ?Your friend who breeds them owns many dachshunds.

This is consistent with the claim that it is the determinateness of the antecedents which is relevant in such cases, for the intuitive characterization of the determinateness given in Chapter 2, §1.2.2 would lead one to expect that forms like which picture and how many dachshunds would be more determinate than forms like who and what. This corresponds to the fact that NP's like one picture and many dachshunds are more likely to be interpreted specifically than NP's like someone and something.

If the antecedent is separated from the WH-word by a preposition, then the sentences are still better, both in their interrogative forms and in their declarative forms.

- (25) (a) Which of John's teachers do the people who know them all respect most?
 (b) How many of the demonstrators did the police who arrested them beat up?
 (26) (a) The people who know them all respect one of John's teachers most.
 (b) The police who arrested them beat up many of the demonstrators.

It is quite likely that some readers will disagree with the judgments assigned in (18)-(26). This is not surprising, for there seems to

be a great deal of variation among speakers with respect to determinateness.¹¹ It is, however, striking that speakers tend to give the same response to the interrogative sentences as to the corresponding declaratives. Thus, though the data themselves may be rather marginal, the correlation that emerges from them seems reasonably clear. This is strong supporting evidence for something akin to the proposal in this chapter.

Do similar correspondences hold for relative clauses? At first it might seem that the answer to this question is "no" because of contrasts like (27).

(27) (a) ??Mary pities the man who the woman he loved betrayed.

(b) The woman he loved betrayed the man.

It is, however, not implausible to suggest that a simple NP like the man in (27b) differs from the head NP of a relative clause with respect to determinateness. If such a difference can be justified, then facts like (27) can be accounted for without having to abandon the idea under consideration.

Unfortunately, it is very difficult to find an independent criterion for judging the determinateness of relative pronouns. A plausible guess would be that a relative pronoun is determinate just in case the relative clause is non-restrictive.¹² This proposal is not tenable, however, because of sentences like (28) (due to Paul Kiparsky).

(28) (a) The mushroom that I'm talking about still grows in Kashmir.

(b) A beaver who has any self-respect builds dams.

Nevertheless, some speakers do feel that weakly crossed relative clauses are better if they are non-restrictive.

(29) (a) ?*I just met the doctor who the patients he treats detests.

- (b) ?I just met Dr. Morgan, who the patients he treats detests.
- (c) ?*Mary wants to meet a man who the policeman who arrested him said was innocent.
- (d) ?Mary wants to meet a certain man, who the policeman who arrested him said was innocent.
- (e) ??Everyone avoids the city which even the people who live in it can't stand.
- (f) Everyone avoids the City, which even the people who live in it can't stand.

Unfortunately, these judgements are quite uncertain and subject to considerable individual variation.

In general, then, it appears to be rather difficult to test the proposal in this chapter on weakly crossed relative clauses. There is, however, one fact concerning relatives which does support this analysis. Larry Horn (personal communication) has noticed that right-to-left anaphora from indeterminates is often possible in environments containing even or only.¹³ This is illustrated in (30).

- (30) (a) ??The man who designed it can understand a computer.
- (b) Only the man who designed it can understand a computer.
- (c) ??If you are looking for it, you'll never find a unicorn.
- (d) Even if you are looking for it, you'll never find a unicorn.

Avery Andrews (personal communication) has observed that even and only also improve some weakly crossed relative clauses. This is demonstrated by (31) ((31b) due to Joan Bresnan).

(31) (a) ??I have a friend who those who know him well can appreciate.

(b) I have a friend who only those who know him well can appreciate.

(c) ?John owns a machine which the man who designed it can't understand.

(d) John owns a machine which even the man who designed it can't understand.

Whatever the underlying reason for this property of even and only, it seems clear that the phenomena illustrated in (30) and (31) are closely related. The analysis suggested in this chapter captures this fact by treating weakly crossed sentences as instances of right-to-left anaphora. Thus, (30) and (31) provide support for this analysis.

3. Postal's Analysis

Postal's most recent analysis of the problems considered in this chapter suggests that weakly and strongly crossed sentences should be handled in rather different ways. The remainder of this chapter will consider the mechanisms Postal proposes, and compare them with the analysis described in §2.

3.1 The Two-Rule Proposal

To account for strongly crossed sentences, Postal orders his pronominal anaphora rule before such movement rules as WH-fronting, Cleft sentence formation, and Topicalization. Specifically, Postal (lecture at MIT, January, 1972) proposes that pronominal anaphora should be marked "at the end of the first covering cycle." i.e., at the end of the first cycle including both the anaphor and the antecedent. He argues that this entails

that it will always apply before WH-fronting, Topicalization, and certain other movement rules. In order to account for sentences like (8b), (13b), and (14b), Postal proposes a second pronominal anaphora rule, applying after all of these movement transformations, which allows anaphoric relations to be established between definite pronouns and NP's to their left, so long as the NP does not command the pronoun.

This analysis has the same basic effect as the trace proposal, viz., it finds a way around the strict ordering of the movement rules with respect to the pronominal anaphora rule. There are, nevertheless, differences between the two analyses.

The most important difference is that the trace proposal predicts that movement transformations may sometimes reduce the number of possible pronoun-antecedent pairs, whereas Postal's analysis predicts that this is not the case. The former prediction appears to be somewhat more accurate, as (32) shows.

- (32) (a) Bostonians who know the police believe that many of them are on the take.
- (b) ??How many of them do Bostonians who know the police believe are on the take?
- (c) Those people who had encountered the gang always recognized the sheriff's picture of them.
- (d) ?The sheriff whose picture of them those people who had encountered the gang always recognized was ultimately gunned down.
- (e) The members of the band all thought one of them was a fugitive from justice.

(f) ??It was one of them that the members of the band all thought was a fugitive from justice.

(g) ??One of them, the members of the band all thought was a fugitive from justice.¹⁴

To account for such facts, Postal's two-rule proposal would have to be augmented by still another constraint blocking sentences like (32b), (32d), (32f), and (32g). The analysis suggested in §2, on the other hand, makes just the right predictions here.

Another difference between the trace analysis and the two-rule proposal is that Postal's second anaphora rule applies only to NP's which do not command the relevant pronouns. The trace analysis, on the other hand, restricts anaphoric relations only for NP's which leave behind a trace, i.e., for NP's mentioned by movement rules (cf. §3.2.2 below). Thus, Postal would predict that sentences like (33b) are impossible, whereas the trace proposal correctly permits them.

(33) (a) *He likes many of John's teachers.

(b) How many of John's teachers does he like?¹⁵

It seems, then, that the evidence, while not overwhelming, tends to support the trace analysis of §2 over Postal's two-rule proposal.

3.2 The WH-Constraint

Postal (1972) suggests that the derivational constraint given here as (34) is part of the grammar of one dialect of English.

(34) Mark as ill-formed any derivation in which:

(i) there are two nominal constituents, A and B, in the input structure of a WH-movement rule, where:

(a) A is a pronoun

(b) B is a WH form¹⁶

(c) A is to the left of B

and:

(ii) the corresponding constituents of A and B in the output structure of the WH-movement rule, call them A' and B', respectively, are aligned such that B' is to the left of A'

and:

(iii) in the Semantic Representation, A and B (or more precisely, their corresponding elements) are marked as stipulated coreferents.¹⁷

Postal calls (34) "the WH-Constraint".

The effect of the WH-Constraint is to mark as ill-formed all weakly or strongly crossed questions and relative clauses. Since strongly crossed sentences are ungrammatical for independent reasons, the WH-Constraint is actually relevant only to weakly crossed sentences. Postal's claim is that, in his dialect, all weakly crossed questions and relatives are ungrammatical.

Although it would obviously be presumptuous to contradict anyone's claims about his own judgements of grammaticality, in this case it seems that Postal's dialect is exceedingly rare. While some weakly crossed questions and relatives are rejected by many speakers, others appear to be acceptable to virtually everyone. There are a great many borderline cases, and wide variation exists among speakers. For example, few (if any) speakers reject (35a), many speakers reject (35b), and reactions to (35c) are extremely mixed.

(35) (a) This is the kind of article which even the person who

wrote it doesn't understand.

(b)*What did the man who needed it lose?

(c) ?Which councilman did the woman he was dating vote against?

Postal's analysis allows for only two dialects: the one with the WH-Constraint and the one without it. The real situation is certainly far more complex than that. Postal might perhaps postulate that there are other dialects with modified versions of the WH-Constraint, but it is far from obvious what form this modification would take.

On the other hand, Postal could say that the variation among speakers is a function of the variation regarding right-to-left anaphora. This would be consistent with everything he says, and it would be an automatic consequence of his ordering of the pronominal anaphora rule with respect to WH-fronting. Notice, however, that such an approach renders highly questionable the need for the WH-Constraint in the first place. If Postal's dialect does indeed reject all weakly crossed questions and relatives, it could simply be stipulated that, for Postal, all WH-words are indeterminate. It would follow that weakly crossed questions and relatives are ungrammatical in his dialect, and the WH-Constraint would no longer be needed. Such an alternative would be preferable to the WH-Constraint in several ways. First, it would correlate the individual variation regarding weakly crossed questions and relatives with the individual variation regarding determinateness. Secondly, it would eliminate the need for a rather lengthy and apparently ad hoc derivational constraint. Thirdly, it would permit weakly and strongly crossed sentences to be treated uniformly.

3.2.1 Postal (1970a, 1972) argues against any analysis constructed along these lines. His argument is based on the fact that, under certain circum-

stances, WH-words in questions do not get fronted. He observes that the WH-constraint predicts that such sentences would differ considerably from ordinary questions with respect to possible anaphoric relations. The analysis suggested above, on the other hand, would predict that the fronting of WH-words does not affect the possible anaphoric relations. Postal gives a number of examples which allegedly support the prediction of the WH-constraint.

These examples fall into two groups: those in which Postal's factual claims are very questionable,¹⁸ and those in which intonational factors provide an explanation for the facts. Examples of the latter type consist of what Postal calls "incredulity question clauses" and "legalistic question clauses." Incredulity question clauses are formed by replacing words or phrases in the immediately preceding sentences with WH-words, and assigning these WH-words extra heavy stress and, in Postal's words, "a special sharply rising intonation." Legalistic question clauses, according to Postal, "seem natural only in the mouths of courtroom attorneys, police investigators, and quiz program announcers," and are characterized by falling intonation. Examples of these are given in (36).

(36) (a) Nixon appointed who to the Supreme Court?

(b) The person you saw was walking in which direction?

In many cases, certain anaphoric relations in incredulity question clauses and legalistic question clauses seem far more natural than in the corresponding ordinary questions. Thus, in (37)-(40), the (a) sentences seem much better than the (b) sentences.

(37) (a) The newsman who criticized him later belted which
official?¹⁹

(b) ??Which official did the newsman who criticized him
later belt?

(38) (a) Finding out he won surprised which candidate?

(b) ?Which candidate did finding out he won surprise?

(39) (a) Mr. Jones, for \$100,000, the man who appointed him
later said what Secretary of State was an imbecile?

(b) ?What Secretary of State did the man who appointed him
later say was an imbecile?

(40) (a) Remembering you are under oath, the witness who claimed
he had never seen it was walking towards what building?

(b) ?What building was the witness who claimed he had never
seen it walking towards?

The key fact about such examples is that the intonation and context indicate that the questioner knows the answer, and is trying to elicit this answer from his listener. Thus, it would not be implausible to say that the underlined NP's in the (a) sentences are determinate (i.e., specific). If this is the case, then the non-deviance of the (a) sentences is no problem for the analysis defended here. As for the marginality of the (b) sentences, this can be attributed to the fact that the normal contexts and intonation patterns for these sentences do not force a specific interpretation of the underlined NP's. In fact, if the (b) sentences occur in the same contexts (e.g., after the initial phrases of (39a) and (40a)) and with the same intonation patterns as the (a) sentences, then there is no difference with respect to possible anaphoric relations. Thus, the data in (37)-(40) do not support the WH-constraint over the analysis defended here.

In the remaining examples Postal presents in defense of the WH-constraint, his data are extremely questionable, at best. They consist of questions containing more than one WH-word. In these cases, only one WH-word may be fronted, and the WH-constraint predicts that the other WH-words in the sentence may serve as antecedents to pronouns on their left. Specifically, the WH-constraint predicts a difference in acceptability between the (a) and (b) sentences in (41) and (42).

(41) (a) ?Which columnist reported her victory to which actress'
father?

(b) ?To which actress' father did Joseph Alsop report her
victory?

(42) (a) ?What company had his wife spy on what well-known indust-
rialist?

(b) ?What well-known industrialist did General Motors have
his wife spy on?

In these cases, Postal's claims to the contrary notwithstanding, there is little or no difference, so the analysis defended here makes the right prediction, but the WH-constraint does not.²⁰

3.2.2 Another argument in favor of the WH-Constraint might be constructed on the basis of examples like (43).

(43) (a) *He hung Bill's gold-plated cast of Barbara Streisand's
nose on the wall.

(b) *Whose gold-plated cast of Barbara Streisand's nose did
he hang on the wall?

(c) ?Bill's gold-plated cast of Barbara Streisand's nose, he
hung on the wall.

(d) ?It was Bill's gold-plated cast of Barbara Streisand's

nose that he hung on the wall.

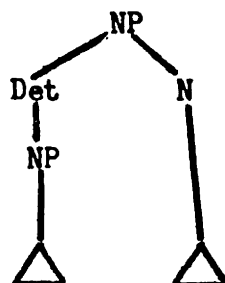
The difference between WH-fronting and other NP preposing transformations illustrated in (43) could be argued to be a reflex of the WH-Constraint. A little reflection, however, indicates that this is not the case. The most obvious defect in the claim that (43) supports Postal's position is that his reanalysis incorrectly predicts that all of the examples in (43) should be equally deviant (since Bill commands he in both (43c) and (43d)). Furthermore, the intuitions given in (43) are not subject to the same individual or dialectical variations as the WH-constraint. That is, speakers who are perfectly willing to accept weakly crossed sentences like (7) will nonetheless recognize the contrast in (43). For such speakers, Postal would have to say that the WH-constraint operates selectively--a rather unsatisfactory conclusion, especially in the absence of a principle for determining in which cases it does operate.

A further reason for suspecting the claim that (43) supports the WH-constraint is that (43c) and (43d) are acceptable only if Bill receives very weak stress. In each case, if Bill is the item being focused, then the indicated anaphoric relation is impossible. Since in (43b) whose must necessarily be the focus, it appears that the contrast in (43) ought to be explained in terms of anaphoric relations involving the focused element, rather than through an ad hoc device like the WH-constraint.

One way of capturing facts like (43) in the analysis presented here would be to stipulate that, in cases of what Ross (1967a) terms "pied piping," the NP mentioned in the structural description of the movement transformation leaves behind a trace, and the entire NP which actually gets moved does too. Specifically, in (43b), since the fronting rule mentions

only the WH-word, the trace left behind will be something like (44).

(44)



Therefore, both whose and whose gold-plated cast of Barbara Streisand's nose will be able to enter into only those anaphoric relations which would have been possible from their pre-fronting positions. This analysis also provides an account of the correlation between stress and anaphora in (43c) and (43d). From the rather plausible assumption that Cleft sentence formation and Topicalization should be formulated as rules fronting the focused element, it follows that the indicated anaphoric relations in (43c) and (43d) will be impossible just in case Bill is the NP mentioned by the rule, i.e., just in case Bill is the focus. Since the stress indicates the focus, the relevance of stress in these examples is explained.

Another case in which WH-fronting appears to behave differently from other fronting rules is given in (45).

(45) (a) ??Whose mother did the girl he married insult?

(b) John's mother, the girl he married insulted.

(c) It was John's mother that the girl he married insulted.

Since (45) does exhibit the variation characteristic of the WH-constraint, and since stress does not affect the judgements in (45), this contrast might at first be taken as support for Postal's reanalysis against the position taken here. There is, however, a perfectly straightforward explanation for (45), namely that whose tends to be interpreted indeterminately,

whereas John is determinate. This explanation is supported by the fact that (45b) and (45c) become at least as bad as (45a) if someone is substituted for John.

4. Summary

It was shown early in this chapter that an ordering paradox involving the pronominal anaphora rule and WH-fronting could be duplicated using several other NP movement rules. It was seen that these paradoxes could be resolved either by modifying the notion of movement rule or by introducing a second pronominal anaphora rule. Some evidence in favor of the former solution was given.

It was then shown that either of these solutions to the ordering paradox eliminated the need for Postal's WH-Constraint, provided that individual speakers are permitted a great deal of leeway in assigning determinateness to WH-words. The absence of an independent criterion for assigning determinateness to WH-words (at least in relatives) detracts to some extent from the force of this argument. It has, however, been shown that much of the evidence purportedly supporting the WH-Constraint has an independent explanation, so the need for the constraint is extremely questionable. Certainly, the burden of proof has been shifted back to its proponents.

FOOTNOTES

1. Postal also claims to show that the constraint cannot be formulated in terms of shallow structure or in terms of any combination of deep structure, surface structure, and shallow structure. However, his arguments for these claims are circular in that they depend on acceptance of his claim about what the relevant generalization is. Since I cannot see any way to account for the facts in terms of one or more of these levels, I will not consider the question of whether there is some argument against doing so in principle.
2. These terms are used below in a more general sense, viz., to denote any sentence in which an NP is crossed over a pronoun to which it is anaphorically related. In what follows, the context should indicate fairly clearly which sense is intended.
3. There is a great deal of individual variation in judgements of weakly crossed sentences. However, all speakers recognize that they are incomparably better than strongly crossed sentences. In many cases, I found it necessary to explain to informants that the indicated anaphoric relations in examples (1b) and (2b) were logically possible. On the other hand, judgements about the examples in (7) tend to be unsure, often taking the form of remarks to the effect that the examples were awkward, but comprehensible. Notice that three of the sentences in (7) were published; in contrast, it is inconceivable that strongly crossed sentences would ever be used.

4. Notice that this proposal does not block (8b), since the trace left by WH-fronting will be anaphorically related to which of the girls John dated, not to John, so that the Transitivity Condition does not apply.
5. One logical possibility would be to block any anaphoric relation between NP's if the leftmost one is pronominal and the rightmost one is indeterminate, regardless of which serves as antecedent. That this will not work is shown by (i), in which both he and him are presumably indeterminate (since their antecedent is) and an anaphoric relation must exist between them, in order to conform with the Transitivity Condition.

(i) I don't trust anyone who says he wants me to help him.

6. This proposal might be objected to on the grounds that it in essence formulates "chopping rules" (Ross (1967a), Chapter 6) as copying rules in which the copy is phonetically null. This obscures to a large degree the distinction between these types of rules (see Ross (1967a)). If this distinction is indeed as vital as Ross claims, it might be possible to say that chopping rules are those in which the trace is ultimately deleted. If this proposal is tenable, then the Complex NP Constraint (and perhaps Ross' other constraints) can be restricted to deletion rules alone (cf. Chapter 3, §3.2.1). This might also make it possible to account naturally for dialects in which sentences like (i) are acceptable (cf. Ross (1967a), §6.2.3).

(i) King Kong is a movie which you'll laugh yourself sick if you see it.

7. It might be argued that (12) involves WH-fronting followed by optional deletion of the WH-word, i.e., that sentences like (i) are derived from sentences like (ii).

(i) It was John that left.

(ii) It was John who left.

The judgements in (12) would then be an immediate consequence of such an analysis, given example (2). Under this analysis, however, it would be difficult to account for the fact that (iii) and (v) are so much better than their purported sources, viz., (iv) and (vi).

(iii) ?It was a doctor that John wanted to become.

(iv) *It was a doctor $\left\{ \begin{array}{l} \text{which} \\ \text{who} \end{array} \right\}$ John wanted to become.

(v) It was a blonde that John brought to your party.

(vi) ??It was a blonde who John brought to your party.

It seems likely that whatever analysis is adopted for (iii) and (v) could also account for (i). If this is so, then the deviance of (12b) does not follow from the deviance of (2b).

8. (15a) is rather awkward, but this has nothing to do with anaphora, as evidenced by the fact that (i) is equally awkward.

(i) John, Mary claims said Jane kissed Bill.

On the other hand, the deviance of (15b) definitely has something to do with anaphora, as the grammaticality of (ii) shows.

(ii) John, Mary claims Bill said Jane kissed.

9. These examples are not out for all speakers because of the individual variation regarding the definition of "more deeply embedded than";

see Chapter 2, §1.2.

10. The examples of (17) are somewhat better than those of (16), but they are considerably less natural than the superficially similar sentences in (i) and (ii).

(i) John is eager for his brother to help.

(ii) John writes to his brother to be careful.

11. I hesitate to label this a case of "idiolect" variation. Rather, I tend to believe that determinateness cannot really be clearly defined, so that there is often a good deal of doubt regarding the feasibility of right-to-left anaphora. This view is supported by the fact that it often happens that a given speaker will respond differently on different days to examples of this sort.
12. If the relative clause is restrictive, there is some reason to think that the head NP is indeterminate, for the restrictiveness of the relative clause indicates that the rest of the context fails to provide sufficient information to assign a referent to the head. If, for example, a complex NP like the man Mary saw is used, it is implicit that the use of the NP the man in its place would not have sufficed to indicate what man is intended. Thus, it seems intuitively correct to stipulate that the head of a restrictive clause is indeterminate. Since the head of a relative is anaphorically related to (and hence non-distinct from) the relative pronoun, it seems reasonable to suppose that relative pronouns in restrictive relative clauses are indeterminate.

Similar reasoning leads to the conclusion that the heads of non-restrictive relative clauses are determinate. The non-restrictiveness of a relative clause is an indication that the information contained in that relative clause is not needed for the purpose of identifying the referent of the head NP, i.e., that the head is determinate.

In spite of the very informal character of the above discussion, the hypothesis that the restrictive-non-restrictive distinction for relative clauses corresponds to the determinate-indeterminate distinction for the NP's makes certain empirical predictions which can be tested. In particular, it predicts that proper and generic NP's allow only non-restrictive relatives, and that necessarily indeterminate NP's allow only restrictive relatives. Some facts, given in (i)-(x), seem to bear this prediction out, but others, such as (28), contradict it.

- (i) John, who was here yesterday, is now gone.
- (ii) *John who was here yesterday is now gone.
- (iii) I don't trust anyone who votes.
- (iv) *I don't trust anyone, who votes.
- (v) John is a man who keeps his word.
- (vi) *John is a man, who keeps his word.
- (vii) I met someone who knows you yesterday.
- (viii) ??I met someone, who knows you, yesterday.
- (ix) Something that I own is very valuable.
- (x) ??Something, which I own, is very valuable.

13. This fact is a mystery to me. No existing theory of anaphora can come close to accounting for it. This shows that the problem is rather more complex than existing analyses would suggest.
14. None of these is bad enough to establish my point very strongly. This is because the pronouns are all objects of prepositions, thus leaving somewhat uncertain the question of whether they are less deeply embedded than their antecedents. Sentences like (i)-(iii) might constitute stronger evidence for my position, but their significance is somewhat dubious because considerations of stress may be sufficient to exclude (ii) and (iii).
- (i) The woman who loved John betrayed him.
- (ii) *It was him that the woman who loved John betrayed.
- (iii) *Him, the woman who loved John betrayed.
15. This argument is not terribly decisive, since it would be quite simple for Postal to modify his proposed second pronominal anaphora rule to account for (33b). Nevertheless, (33) does show clearly that the specific proposal Postal made in the lecture cited above is inadequate.

A third difference between the analyses in question has to do with the ordering of Tough movement and It-replacement. Postal orders these rules before the pronominal anaphora rule, unlike the other NP fronting rules discussed. In contrast, the trace proposal treats these rules just like other NP fronting rules. The crucial examples here are sentences like (17). The trace analysis predicts that they should be just as bad as (16), whereas, according to

Postal's analysis, they should be fully grammatical. Unfortunately, it appears that both predictions fail here, for the examples of (17) are too good for my analysis and not good enough for Postal's.

16. There is a problem regarding the notion "WH-form". Postal (1970a) uses (34) in excluding (i).

(i) *Whose friend's father did he criticize?

If the underlined NP in (i) is a WH form, why are sentences like (ii) not similarly excluded?

(ii) How many of John's teachers does he call by their first names?

Postal (1970a) recognizes this problem and devotes a lengthy footnote (footnote 14) to it, but instead of providing an answer, he merely assures the reader that it is possible to provide one. It is interesting to note, by the way, that in his discussion of this problem, Postal refers to "WH-marked nominals". If he conceives of WH-marking as a process which precedes WH-fronting, then he has implicitly abandoned his "orphan preposition" argument against cyclic WH-fronting, for, as Jackendoff (1969), p.51, shows, the orphan preposition argument fails if WH is a feature of entire nominal phrases.

17. Postal uses the phrase "stipulated coreferents" to mean what I would call "anaphorically related NP's".
18. Since my intuitions on weakly crossed sentences tend to differ from those of most other speakers, I have checked Postal's claims with a number of informants. I have been unable to find a speaker who

agrees with Postal's judgements.

19. (37a) and similar sentences seem to be fully acceptable to most speakers only if they receive the heavy stress of incredulity. If pronounced as normal echo questions, the reactions are mixed.
20. As noted, Postal makes the opposite claim about (41) and (42), but I have been unable to find other speakers who share his judgements.

Chapter Five

SENSE, REFERENCE, AND ANAPHORA

0. Introduction

In the previous chapters, the notion of anaphoric relation has been taken as a primitive, i.e., no attempt has been made to explicate it in terms of the manner in which the meanings of anaphor and antecedent are related. This appears to be justified in that speakers are able to determine which pairs of elements may be anaphorically related, even in the absence of a precise definition of anaphora.¹ It is nevertheless of some interest to explore just how the meanings of anaphorically related pairs are related.

In this chapter it will be assumed that rules of the sort sketched in Chapters 2 and 3 for determining possible anaphor-antecedent pairs exist, and the manner in which the meanings of the elements of these pairs are related will be investigated. It will be seen that the well-known distinction between sense and reference plays a role in grammatical descriptions, although it is a less important role than some recent work (e.g., Grinder and Postal (1971)) has suggested. Keeping this distinction in mind makes it possible to clarify in a plausible way some rather confusing issues surrounding the meaning of the examples illustrating the Bach-Peters paradox. Finally, it will be shown that a very simple constraint on the meanings of anaphors serves to account for some apparently anomalous facts, as well as eliminating the motivation for certain rather unusual mechanisms which have been proposed.

1.0 Sense and Reference

In most cases, the semantic relationship between anaphor and antecedent is simply that the reading (i.e., the sense) of the anaphor includes the reading of the antecedent (except, in some cases, for negative elements and certain modifiers--cf. Chapter 3, §1.1). Assuming that each constituent in a sentence corresponds to a portion of the semantic representation of that sentence, the meaning of anaphors can be accounted for by a rule or convention which copies the portion of the semantic representation corresponding to the antecedent into the portion corresponding to the anaphor. This rule may optionally ignore negatives and modifiers attached to the antecedent. In some cases (e.g., with the anaphor the opposite) there will already be some semantic material corresponding to the anaphor (but there must, of course, be room for more, if copying is to take place). A rule of this sort is proposed by Akmajian (1968).

There are, however, some instances of definite pronominal anaphora which this rule will be unable to account for. For example, if the antecedent is a proper name, then it has no sense. In a sentence like (1), the anaphoric relation serves to indicate that John and he cannot be used to refer to different individuals.

(1) John claims that he is a genius.

Thus, (1) could be handled by the sort of semantic copying rule suggested above only if it is assumed that the reference of an NP is included as part of its reading. It is argued below that such an assumption is untenable. In addition, consider sentences like (2).

(2) The boy who wanted it got the prize he deserved.

If the meaning of definite pronouns were always supplied by a semantic copying rule, then (2) could receive no reading, because an infinite regress would result. Thus, it is clear that the grammar must, in some cases, mark anaphorically related NP's for identity of reference. Sentences like (2) are considered in more detail below.

1.1 Before proceeding to consider which pairs of NP's are to be marked for identity of reference, it is necessary to say something about the relationship between reference and grammar, for a great deal of past confusion regarding anaphora has resulted from confusion regarding reference.

As Strawson (1950) observes, linguistic expressions may be used in referring, but they themselves do not refer. Put in the terminology of generative grammar, the assignment of reference is an aspect of linguistic performance and hence not part of grammar. The reason that reference cannot be assigned by the grammar is that it involves such extra-grammatical factors as hand gestures, facial expressions, and the speaker's knowledge of the world.²

It is nevertheless possible for the grammar of a language to place certain constraints on how a speaker may use the expressions of the language in referring. For example, the grammar of the English does not allow the speaker to use a feminine pronoun in referring to a man.³ More pertinently, the grammar may require that two NP's be used in referring to the same thing, without specifying what the referent is. The situation is analogous to that in mathematics, where a variable which occurs twice in the same formula must always receive the same interpretation, although what that interpretation is may be quite free. This is what is meant by the oft-repeated remark that one can talk about coreference

without talking about reference. Unfortunately, this point has been frequently misunderstood, and a good deal of confusion has resulted.⁴

1.2 Adding to this confusion regarding reference has been the fact that much of the literature on anaphora has used the term "coreference" to mean definite pronominal anaphora, although it is not the case that all instances of definite pronominal anaphora involve identity of reference. In fact, coreference is neither necessary nor sufficient for definite pronominal anaphora, as (3) illustrates.

(3) (a) The man who gave his paycheck to his wife was wiser than the man who gave it to his mistress.

(b) If the morning star is inhabited, then the evening star is inhabited.

In (3a) (due to Karttunen), it can be understood as denoting the second man's paycheck, while its antecedent denotes the first man's paycheck. Hence, pronoun and antecedent are anaphorically related, but not coreferential. In (3b), the NP's the evening star and the morning star may both be serving as names for the planet Venus, but they are not anaphorically related.

Examples like (3a) show that the rule assigning the reading of the antecedent to the anaphor must in some cases apply to definite pronouns.⁵ It must now be asked which anaphorically related pairs have the same sense and which have the same reference. This question has no simple answer, and it will not be answered in full here. In certain cases, however, the answer is relatively straightforward, and these cases have interesting consequences.

1.3.0 Consider, first of all, NP's which are necessarily determinate.

By the intuitive characterization of determinateness given in Chapter 2, determinate NP's are just those used in referring, so one might expect that definite NP's with determinate antecedents would always be coreferent with them. This proves to be the case. Thus, pronouns with proper antecedents always share the reference of their antecedents. Further, definite pronouns to the left of their antecedents must always be interpreted as coreferential with them. Hence, if (4) is acceptable at all, only one paycheck is involved.

- (4) ?The man who gave it to his wife was wiser than the
 man who gave his paycheck to his mistress.

Similarly, in (5)-(9), the (a) sentences allow either identity of sense or identity of reference, but the (b) sentences, in which the antecedent is necessarily determinate, allow only coreference ((5a)-(7a) due to Partee (1970)).

- (5) (a) John claimed to have found the solution to the problem,
 but Bill was sure he had found it.
 (b) Although Bill was sure he had found it, John claimed
 to have found the solution to the problem.
(6) (a) Senator Green believed that he had nominated the winner
 of the election, but Senator White believed that she
 had nominated him.
 (b) Although Senator White believed that she had nominated
 him, Senator Green believed that he had nominated the
 winner of the election.
(7) (a) John thought the author of the book was probably a man,
 but Bill thought it was more likely a woman.

- (b) Although Bill thought it was more likely a woman, John thought the author of the book was probably a man.
- (8) (a) In 1960 the President was a Catholic, but now he's a Quaker.
- (b) Although in 1960 he was a Catholic, now the President is a Quaker.
- (9) (a) Last year Miss America was a brunette, but this year she is a blonde.
- (b) Although this year she is a blonde, last year Miss America was a brunette.

Further, evidence for the claim at hand is provided by the fact that sentences like (10) allow only the coreferential reading.

- (10) Last year Miss America, who is a very lucky girl, was a brunette, but this year she is a blonde.

It seems accurate to claim, then, that coreference obtains between a definite pronoun and its antecedent if the antecedent is determinate.⁶

1.3.1 Before considering whether identity of sense holds of all pronouns with indeterminate antecedents, one consequence of the above conclusion will be explored.

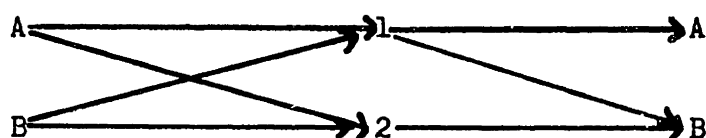
Karttunen (1971) considers sentences like (11) and (12).

- (11) The pilot who shot at the mig that chased him hit it.
- (12) The mig that chased the pilot who shot at it was hit by him.

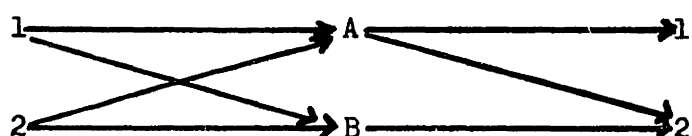
(11) and (12), Karttunen observes, differ with respect to their presuppositions of uniqueness, and he presents hypothetical situations ("data bases" in his terminology) to illustrate these differences. In particular, (11)

presupposes that there is a unique pilot with the properties that exactly one mig chased him and he shot at that mig; (12), on the other hand, presupposes that there is a unique mig with the properties that exactly one pilot shot at it and it chased that pilot. Thus, (11), but not (12) is appropriate in the situation schematized as (13), and (12), but not (11), is appropriate in the situation schematized as (14).⁷

(13) Pilots shot at Migs chased Pilots



(14) Migs chased Pilots shot at Migs



In each case, the appropriate sentence means that Pilot A hit Mig 1.

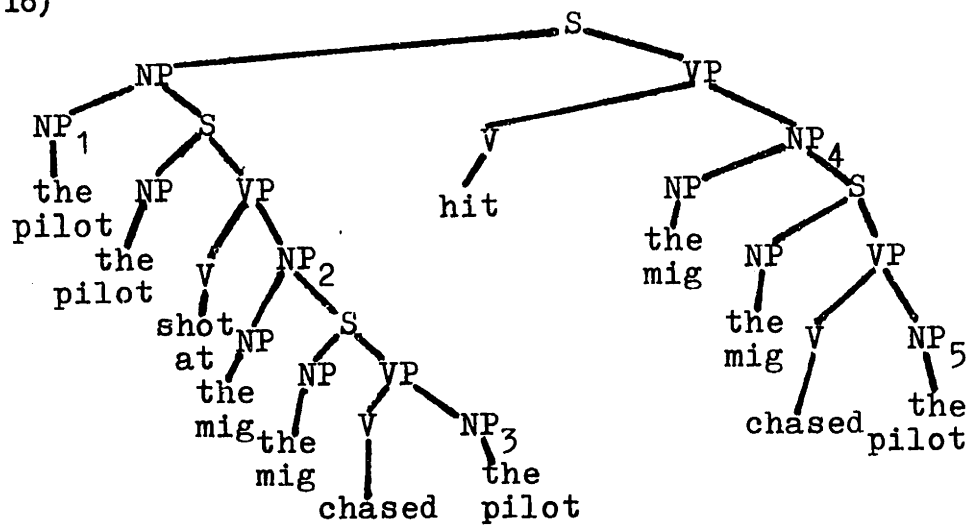
(12) is not appropriate in situation (13) because there is no mig fitting the description "the mig that chased the pilot who shot at it." Similarly, no pilot in (14) can be described as "the pilot who shot at the mig that chased him."

Karttunen (1971) claims further that (15) is ambiguous between a reading synonymous with (11) and a reading synonymous with (12).

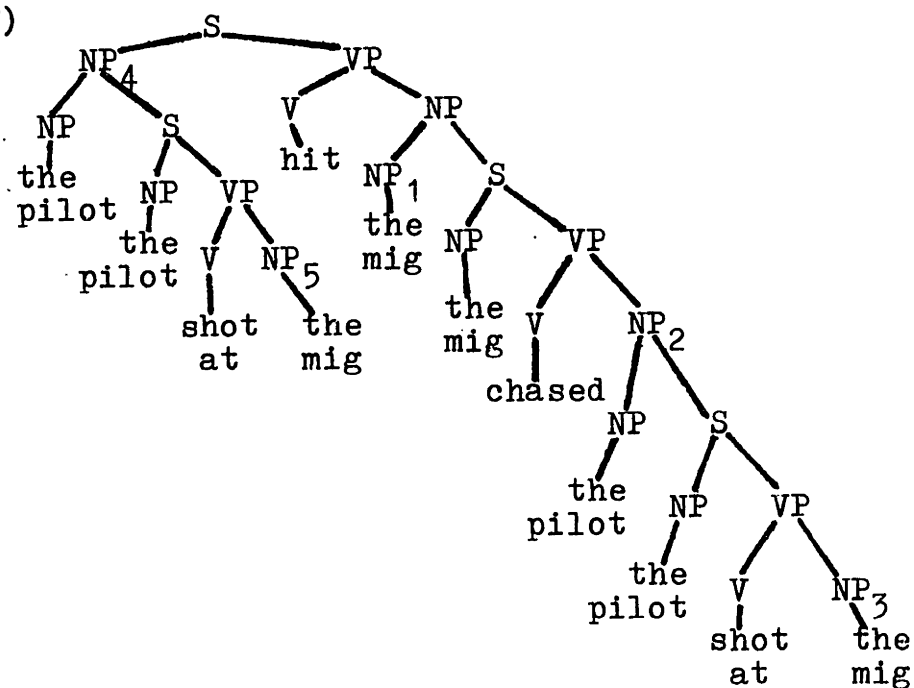
(15) The pilot who shot at it hit the mig that chased him.

Kuroda (1971) argues that (15) also has a third reading in which both of the presuppositions discussed above hold. Karttunen points out that these judgements follow from an analysis in which (11) and (12) are derived by a transformation of Pronominalization from (16) and (17), respectively, and (15) can be derived from (16), (17), or (18).

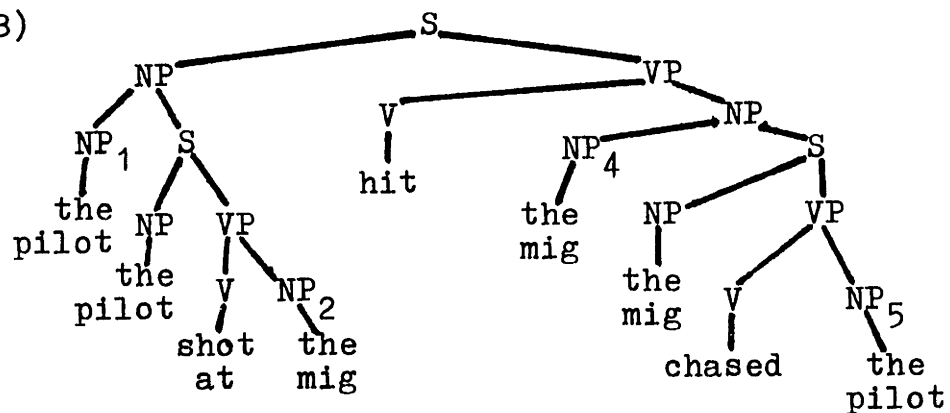
(16)



(17)



(18)



The derivations of (11) and (12) from (16) and (17), respectively, are effected by pronominalizing NP_3 under identity with NP_1 and pronominalizing NP_4 under identity with NP_2 . (15) is derived from any of these structures by pronominalizing NP_5 under identity with NP_1 and pronominalizing NP_2 under identity with NP_4 .

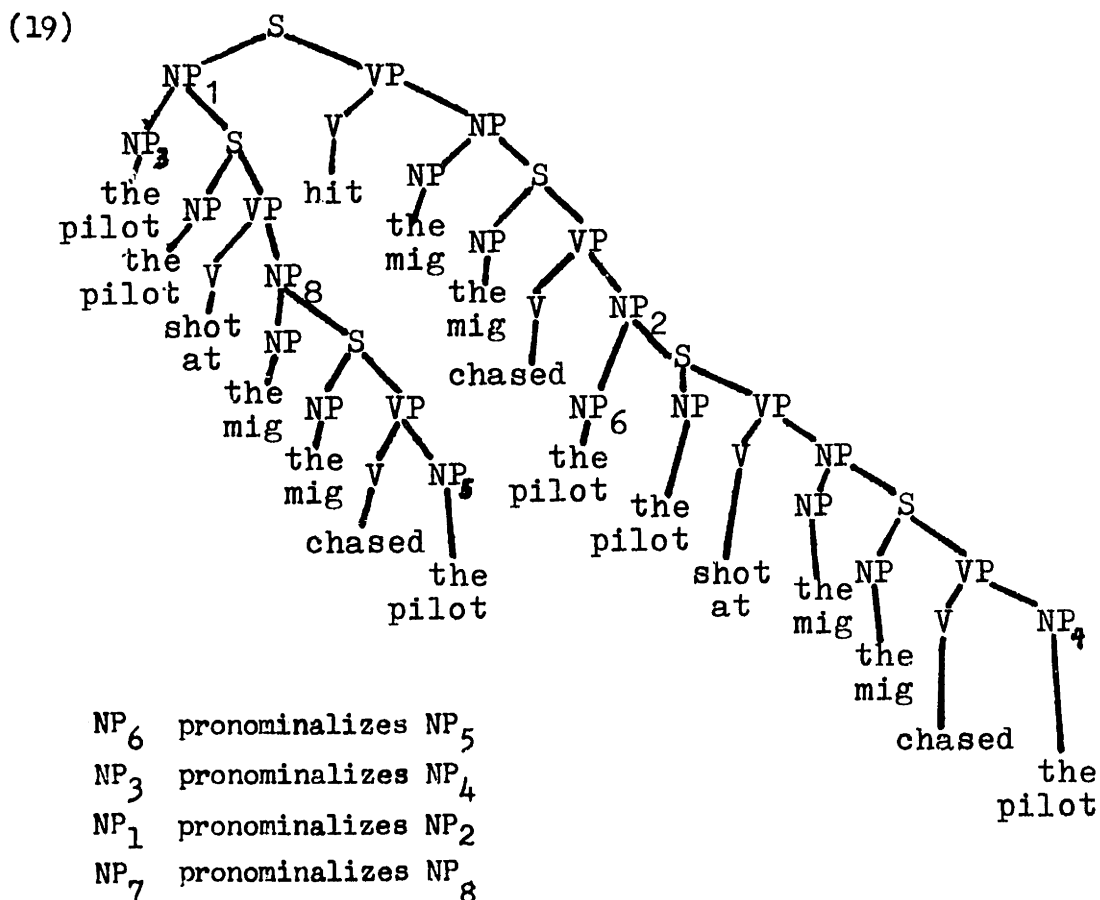
Karttunen therefore claims that this argues for the existence of a Pronominalization transformation. Since such a transformation is known to be untenable (see Chapter 1), if Karttunen's data are correct, then some attempt must be made to account for them, without employing a Pronominalization transformation. The mechanisms for assigning identity of sense and identity of reference might provide a method for doing this.

Suppose the rule copying readings is permitted to apply to either pronoun in (15), but not both (since this would result in an infinite regress). Then applying it to it results in a semantic structure essentially equivalent to (16), and applying it to him results in a semantic structure like (17). Marking both pronouns for coreference would result in a semantic structure more or less like (19). Thus, at first glance, it seems that Karttunen's analysis has been duplicated without making use of a Pronominalization transformation.

Recall, however, that definite pronouns which precede their antecedents must be coreferential with them. In other words, the copying rule cannot apply in cases of right-to-left definite pronominal anaphora, so (15) should be only two ways ambiguous, viz., (15) should be inapplicable to situation (13). While judgements on this question are far from clear, this conclusion does not seem any less reasonable than Karttunen's. The fact that Karttunen's informants were, in fact, able to interpret

(15) in situation (13) could arise from the fact that they were required to find an interpretation and hence picked the least deviant one.⁸ Thus, it is possible to provide a plausible account of the meaning of (15) without requiring a resort to untenable mechanisms like the Pronominalization transformation.

Notice, further, that Karttunen's analysis would force him to claim that (15) is not just three ways ambiguous, but infinitely ambiguous. This would follow from his assumption that any two distinct deep structures must correspond to different readings, together with the fact--which he overlooked--that under his analysis, (15) can also be derived from structures obtained from (16) or (17) by adding more relative clauses and pronominalizing more often. For example, (15) could be derived from the structure (19) as indicated.



Further relative clauses can be appended ad nauseum. This problem does not arise in the alternative to Karttunen's analysis because the copying of semantic material can only take place between pairs marked as anaphorically related.

Thus, the claim that definite pronouns with determinate antecedents are coreferential with them provides a means of accounting for the interpretation of (15) which does not lead to any of the undesirable consequences of Karttunen's analysis.

1.3.2 Returning now to the question of which anaphorically related pairs of NP's share sense and which share reference, a little reflection makes it clear that the determinateness of the antecedent, while sufficient, is not necessary for coreference. For example, the pairs in (20) are certainly coreferential although the antecedents are indeterminate.

(20) (a) John wants to build a yurt and live in it.

(b) If Mary had a son, she would name him Max.

(c) Bill will grow a beard and braid it.

What, it must now be asked, does it mean to say that two NP's are coreferential, if they are not used in referring?

Jackendoff (1971) provides the key to answering this question. Part of the meaning of items like want, if, and will is a specification of what conditions would have to be fulfilled in order for indefinite NP's within the scope of such items to be assigned referents. Jackendoff provides a formalism for expressing this by associating with these items what he calls "modal operators". For each such operator one can specify just how the assignment of reference to NP's within its scope⁹ is affected. For example, the modal operator associated with want is Unrealized, which

can be interpreted as meaning that a yurt could be assigned a referent in (20a) only if John's wants were fulfilled.

With this interpretation of Jackendoff's notion of modal operator, it becomes possible to answer the question posed above: to say that anaphorically related NP's like those in (20) are coreferential means that if the conditions imposed by the modal operator were fulfilled, then the NP's in question could only be used in referring to the same item. In other words, if they could be used in referring, then they would have to refer to the same thing.

1.3.3 Since it has been shown that determinateness of the antecedent only partially determines whether identity of sense or identity of reference obtains between anaphorically related NP's, it is natural to ask what other factors are relevant and why. One relevant observation is that ambiguities like those in (5a)-(9a) do not exist unless both the antecedent and the pronoun are definite. This results from a combination of two independent facts: first that indefinite pronoun one can never be marked for coreference with its antecedent, regardless of the definiteness of the antecedent¹⁰; and second, that definite pronouns with indefinite antecedents must always be coreferential with them.

The former fact can be accounted for by restricting the rule marking coreference to definite anaphors. Notice that since pronouns with determinate antecedents must be marked for coreference, it follows that indefinite pronouns cannot have determinate antecedents. This is illustrated in (21).

(21) (a) *Osgood said that Mary knew one.

(b) *The badger never harms (another) one.¹¹

(c) *A democrat votes for one for President.

The fact that definite pronouns with indefinite antecedents must be coreferential with them requires a more complex account, for neither definite pronouns nor indefinite NP's may be excluded from anaphoric relations involving identity of sense. This is shown by (3a) and (22).

(22) John owns a car and Bill owns one, too.

It is therefore by no means obvious why, in a sentence like (23), the underlined NP's must denote the same solution.

(23) John thought that he had found a solution to the problem, but Bill believed that he had discovered it.

Intuitively, the non-ambiguity of (23) is a function of the presupposition of uniqueness associated with definite NP's--in this case the pronoun it. If identity of sense were to obtain in (23), then it would follow that the problem might have two different solutions, contrary to the presupposition of it. Unfortunately, this intuitive argument carries over to (24), which is, in fact, ambiguous.

(24) John thought that he had found the solution to the problem, but Bill believed that he had discovered it.

If the presupposition of uniqueness associated with it entailed that Bill and John had found the same thing, then (24) could only have the coreferential reading. In fact, however, the only difference between (23) and (24) appears to be that no presupposition of uniqueness in (23) is associated with the antecedent. Suppose, then, that the following constraint is adopted as part of the theory of language.

(25) An anaphor may not introduce any presuppositions not associated with its antecedent.

(25) will be referred to as the Novelty Constraint. The non-ambiguity of

(23) follows from the Novelty Constraint, since only the specific (hence determinate) reading of the antecedent has a presupposition of uniqueness (i.e., a presupposition that a solution to the problem suffices to identify a referent). (24), on the other hand, is unaffected by the Novelty Constraint, since both the pronoun and the antecedent are presupposed to have unique referents, irrespective of the determinateness of the antecedent.¹² It appears, then, that the Novelty Constraint, if tenable, can account for the fact that definite pronouns with indefinite antecedents must be coreferential with them.

This, then, is all that will be said on the question of which anaphorically related NP's share sense and which share reference: determinate antecedents require coreference; indefinite pronouns require identity of sense; and the Novelty Constraint provides the criterion in some other cases. Whether other factors also play a role is not entirely clear, but the problem is at least partially solved.

2.0 Arguments for the Novelty Constraint

It is clear that the Novelty Constraint interacts in many more ways with the grammar of English. In this section, it will be shown that the Novelty Constraint makes the correct predictions in these cases, and that it should therefore be adopted as part of the theory of language.

2.1.1 Consider first of all examples like (20). In order for (20) to be consistent with the Novelty Constraint, it must be claimed that part of the meaning of such sentences is a presupposition that if the conditions imposed by the modal operators were fulfilled, then the antecedent NP's could be assigned unique referents. If this claim is made, then the examples of (20) do not violate the Novelty Constraint, because the

existence of unique referents for the pronouns is also contingent on the fulfillment of the modal conditions (since each pronoun is within the scope of a modal operator). One might object to this line of argument, however, because of examples like (26).

(26) John wants to build a yurt and live in one.

If the fulfillment of the modal conditions would establish a unique referent for a yurt, it might be said that (26) ought to be a very odd sentence, for the use of the indefinite pronoun suggests non-uniqueness. The answer to this objection is that the interpretation of (26) is that John wants two separate things, whereas in (20a) he wants only one thing. That is (20a) is interpreted like (27a), and (26) is interpreted like (27b).

(27) (a) John wants to build and live in a yurt.

(b) John wants to build a yurt, and he (also) wants
to live in a yurt.

Thus, in (26) there are two independent sets of modal conditions, and the objection raised above does not apply. Hence, (20) and (25) are consistent.

2.1.2 Moreover, sentences like (20) can be cited as positive support for the Novelty Constraint. It has long been noted (see, e.g., Karttunen (1968)) that definite pronouns which are not in the scope of modal operators may not have indefinite antecedents which are. Thus, the examples of (28) are deviant.

(28) (a) *John wants to build a yurt, and it is green.

(b) *If Mary had a son, she would be unhappy because
he is not cute.

(c) *Bill will grow a beard, and it is blonde.

Such facts are an immediate consequence of the Novelty Constraint, since the underlined pronouns in (28) presuppose the existence of referents, independent of the fulfillment of any modal conditions, whereas the antecedents do not.¹³ Jackendoff (1971) proposes what he calls "coreference conditions" to account for facts like (28). These are given as (29a) and (29b).

(29) If NP_1 and NP_2 are intended to be coreferential, they must be dependent on [i.e., in the scope of--TW]

(a) the same type modal operators (weak form)

(b) the same token modal operators (strong form)

The modal operator associated with want is subject to (29b), while the operator associated with will is subject to (29a), as (30) shows.

(30) (a) ??John wants to build a yurt, and I want to live in it.

(b) Bill will grow a beard, and it will be blonde.

Jackendoff gives no principled method for determining which coreference condition applies to which modal operator, although he does suggest the following hypothesis: "whenever a modal operator makes a definite claim about the existence of an identifiable referent, the weak condition holds; whenever a modal operator leaves uncertainty as to the existence of an identifiable referent, the strong condition holds".

Notice, now that the coreference conditions, plus something vaguely like Jackendoff's hypothesis regarding the determination of which one applies, are direct consequences of (25). Violations of the coreference conditions are also violations of the Novelty Constraint, since a pronoun outside the scope of a modal operator always has different presuppositions

of existence from its antecedent, if the antecedent is within the scope of the operator. Further, the Novelty Constraint predicts that the weak coreference condition will apply to just those modal operators whose conditions of fulfillment are the same for every token. That is a modal operator with the property that the fulfillment of the conditions for one token entails that the conditions for all tokens have been fulfilled is subject to the weak coreference condition. For example, the condition imposed by will is futurity, and an object asserted by one instance of will to exist in the future must exist in the future for all instances of will. On the other hand, the existence of an object in one person's wants is independent of its existence in another person's wants, so it follows from the Novelty Constraint that the modal operator associated with want is subject to the strong coreference condition.¹⁴

Of course, all of this has been presented extremely informally. It is reasonable to suppose, however, that an adequate semantic theory would provide an analysis of the semantic content of each modal operator, from which it would be possible to use the Novelty Constraint in the manner outlined above in order to eliminate the need for a separate statement of the coreference conditions.¹⁵

2.2 A further consequence of the Novelty Constraint is illustrated in (31).

- (31) (a) In John's picture of Mary, she is smiling.
- (b) In John's picture of her, Mary is smiling.
- (c) *In John's picture of Mary, she found a hole.
- (d) In John's picture of her, Mary found a hole.¹⁶

That the deviance of (31c) is not the result of structural factors can be seen from the complete structural parallelism between it and (31a).

In fact, the only difference between (31a) and (31c) which is of any conceivable relevance is that (31a) is about the content of John's picture, but (31c) is not. The Novelty Constraint makes it possible to exploit this difference in accounting for the contrast with respect to anaphora. The crucial fact is that the existence of a picture does not presuppose the existence of whatever is depicted in the picture. Hence, in (31c), but in none of the other examples in (31), the use of the pronoun presupposes that Mary exists, while the use of the antecedent does not. Thus, the Novelty Constraint predicts the facts in (31).

2.3 The Novelty Constraints also applies to a rather different kind of sentence illustrated in (32).¹⁷

(32) (a) John realizes that Mary is a junkie, but Bill doesn't

$$\left\{ \begin{array}{l} \text{realize} \\ \text{believe} \end{array} \right\} \quad \underline{\text{it}}.$$

(b) John realizes that Mary is a junkie, but Bill doesn't

$$\left\{ \begin{array}{l} \text{realize} \\ \text{believe} \end{array} \right\} \quad \underline{\text{it}}.$$

(c) *John believes that Mary is a junkie, but Bill doesn't
realize it.

(d) John believes that Mary is a junkie, but Bill doesn't
realize it.

(e) John believes that Mary is a junkie, but Bill doesn't
believe it.

As Kiparsky and Kiparsky (1970) point out, realize, but not believe, is a factive predicate, i.e., a verb whose complement is presupposed to be true. In (32a), (32b), and (32d), the antecedent of it is a sentence

which is either asserted or presupposed to be true, so the indicated anaphoric relations are permitted by the Novelty Constraint. In (32e), neither the pronoun nor the antecedent is presupposed to be true, so the Novelty Constraint is also satisfied. In (32c), however, the antecedent is a sentence which is not presupposed to be true, and the pronoun serves as the complement of a factive. Hence, in (32c) the use of the pronoun introduces the presupposition that Mary is a junkie, in violation of the Novelty Constraint. This accounts for the deviance of (32c). Notice, by the way, that (32c) is acceptable in contexts where the speaker has already indicated that he believes Mary to be a junkie. This is just what the Novelty Constraint predicts.

A similar case, but involving a presupposition not induced by factives, is given in (33).

- (33) (a) John understands why Nixon is dishonest, but Bill doesn't (even) believe it.
- (b) John understands why Nixon is dishonest, but Bill doesn't believe it.
- (c) *John believes that Nixon is dishonest, but Bill doesn't understand why_____.
- (d) John believes that Nixon is dishonest, but Bill doesn't understand why..._____.

It is interesting to note that (33) involves phonetically null anaphors, thereby showing that the Novelty Constraint cannot be restricted to pronominal anaphora. Thus, the Novelty Constraint also serves as an additional respect in which different anaphoric relations form a natural class. (cf. Chapter 3).

2.4 Finally, an indirect consequence of the Novelty Constraint is the well-known fact that certain indefinite NP's cannot serve as the antecedent of definite pronouns. These include examples like (34).

- (34) (a) *John is a fool, and Bill is $\left\{ \begin{array}{c} \underline{\text{he}} \\ \underline{\text{him}} \\ \underline{\text{it}} \end{array} \right\}$, too.

- (b) *The cowboys look like winners, and the Lakers look like them, as well.

It was argued above that the Novelty Constraint entails that definite pronouns with indefinite antecedents must share their reference. From this it follows that an indefinite NP which could not, in principle, be used in referring could never serve as the antecedent of a definite pronoun. "Non-referential" NP's like those in (34) are just such NP's. In contrast, notice that similar sentences are possible if the pronoun is indefinite, or (at least in certain cases) if the antecedent is definite.

- (35) (a) John is a fool, and Bill is one, too.

- (b) In football, the Cowboys look like the winners, and in basketball, they seem to be the Lakers.

In these cases, of course, it is identity of sense, and not coreference, which obtains.

3. Conclusion

For a variety of reasons, then, it appears to be desirable to incorporate the Novelty Constraint into linguistic theory.¹⁸ A similar constraint is proposed by Lakoff (1970) in order to account for a subset of the facts presented above. Lakoff's constraint is given in (36).

- (36) The antecedent must have a referent in all the worlds

in which the anaphoric NP (or pronoun) has a referent.

(Lakoff (1970), p. 92).

There is a variety of reasons for preferring the formulation in (25) to that in (36). The most obvious of these have to do with the fact that (25) is more general. That is, while any predictions which follow from (36) also follow from (25), the converse is not the case. For example, (36) cannot account for facts like (32) or (33), in which the anaphor or the antecedent, or both, are not NP's. Similarly, (36) cannot account for facts having to do with presuppositions of uniqueness, whereas (25) was utilized above in just such cases (e.g., (22) and (23)). Thus, simple considerations of generality dictate that (25) be adopted in place of (36).

There are, however, more significant methodological reasons for preferring (25) to (36). These are, basically, that (36), but not (25), involves the notions of "possible world" and "referent of an NP in a world", and allows quantification over possible worlds. The conception of semantic representation outlined by Jackendoff (1971) and adopted here in formulating (25) involves instead only the notion of "conditions which would have to be fulfilled in order for an NP to be used in referring". While the choice between these conceptions is admittedly largely subjective, the approach adopted here seems more coherent and less likely to involve the grammarian in fruitless metaphysical controversies regarding the properties of possible worlds. In particular, the approach to anaphora adopted in this thesis seems to allow the investigation of the linguistically significant facts about pronouns, while minimizing the involvement of the linguist in the philosophical questions concerning reference.

The grammar gives some indication of which NP's can be used in referring and under what conditions, but it does not require representation of "intended referents" or any such thing. Further, Frege's famous distinction between sense and reference is relevant only to certain systematic ambiguities involving definite pronouns. It does not, as has been suggested by Grinder and Postal (1971), affect the fundamental unity of anaphoric relations. The evidence in Chapter 3 supported the idea that the anaphora relation be regarded as a primitive of linguistic theory, and this chapter has shown such an approach to be compatible with the purely semantic relationships involved.

FOOTNOTES

1. Similarly, grammarians utilize the notion of grammaticality without having a fully explicit definition of this notion, because the speakers of natural languages appear to know which strings are grammatical.
2. For example, if a speaker did not know that the morning star is the planet Venus, I do not think he could be said to be referring to Venus if he uses the phrase "the morning star".
3. It is possible that this would be false for some other languages. In German there exist certain terms which are syntactically neuter, but semantically feminine. Cases of syntactically feminine but semantically masculine terms might exist in certain languages.
4. For example, McCawley (1970) claims that in the standard theory, "each NP occurrence in a syntactic representation [has] attached to it an 'index' which corresponds to the 'intended referent' of that NP occurrence." Similarly, Karttunen (1969) asks the very misleading question, "What do Referential Indices Refer to?".
5. Lest someone question that the same mechanism is involved here as in the case of other anaphoric relations like those corresponding to VP deletion, Sluicing, and S-pronominalization, note that (3a) behaves like these other relations in that the phenomenon generally referred to as "sloppy identity" appears in it. That is, the coreference between his and the man who gave his paycheck to his wife

need not be copied by the semantic copying rule, just as in the case of (i).

(i) Although John gave his paycheck to his wife, Bill didn't. This suggests that a single sort of mechanism is at work in both cases. (cf. Chapter 3, footnote 27 and Akmajian (1970)).

6. Since generics are determinate, this means that definite pronouns with generic antecedents must be coreferential with them. I know of no clear evidence either supporting or disconfirming this conclusion. Notice, however, that (i) is interpreted to mean that every black man fights back when he is attacked, rather than that every black man fights back when black men in general are attacked.

(i) The black man fights back when he is attacked. This might be taken as supporting the claim that coreference obtains between generic NP's and definite pronouns to which they are anaphorically related.

7. Karttunen uses somewhat more elaborate "data bases", involving three migs and three pilots. I find the data rather confusing, so I am trying to illustrate his point as simply as possible.
8. This was suggested to me by Noam Chomsky. cf. Chapter 1, §2.
9. If I were being entirely faithful to Jackendoff (1971) here, I would say "dependent on it" rather than "within its scope".
10. This is not to say that it must always be assigned a distinct referent. For example, (i) does not entail that John wants to live in a yurt different from the one he builds.

(i) John wants to build a yurt and live in one.

All I am claiming is that there is no reading of (i) which requires the yurts in question to be identical.

11. Notice that it is possible for indefinite pronouns to have definite antecedents, as in (i).

(i) The man in the grey suit has another one at home.

12. Of course, except in cases of opaque contexts such as that in (24), contrasts in time or place such as those in (8) and (9), or "sloppy identity" readings such as (3a), it will be difficult or impossible to distinguish identity of sense from identity of reference if both pronoun and antecedent are presupposed to have unique referents. Thus, the analysis of this chapter would force me to say that the anaphoric relation in (i) can be interpreted either as coreference or identity of sense, although there is no clear ambiguity.

(i) Although the President is a Quaker, he is a warmonger.

13. Note that sentences like (i) are not too bad.

(i) ?John wants to build the tallest building in the world
in Chicago, although at present it is in New York.

This is due to the fact that definite antecedents (unlike indefinite ones) may share sense with definite pronouns.

14. Observe that Jackendoff's analysis cannot distinguish between (30a), which sounds quite strange, and (i), which is fairly natural.

(i) John wants to build a yurt, and he wants to live in it.

The analysis based on the Novelty Constraint could conceivably handle this contrast on the basis of the fact that (i) is, in fact, des-

cribing a single wish on John's part, despite the fact that two tokens of want appear.

15. In order to derive the weak coreference condition for will from the Novelty Constraint, it might be necessary to modify (25) to allow for the case in which the presuppositions of the pronoun are assertions of the antecedent.

There is actually some question about just what sorts of information anaphoric elements are capable of introducing. Sentences like (i) might be taken as counterexamples to the Novelty Constraint.

- (i) The professor ate her lunch.

Noam Chomsky (personal communication) has suggested that the Novelty Constraint should be limited to presuppositions which are a function of the context, excluding presuppositions (like the presupposition of femaleness in (i)) which are intrinsic to the lexical item in question. Examples like (ii) might also be taken as evidence against the Novelty Constraint, on the grounds that the phrase our photograph of Mary presupposes the existence of Mary.

- (ii) *In our photograph of Mary, she found a hole.

Since the deviance of (ii) is obviously related to the deviance of (31c), it might be argued that the apparent inapplicability of the Novelty Constraint to (ii) show the Novelty Constraint to be irrelevant to (31c). This criticism does not seem very serious to me.

I see no reason why the existence of Mary should be called a presupposition (rather than, say, an entailment) of our photograph of Mary. Even if some reason can be given, it is clear that the speaker's knowledge of the world (in this case his knowledge of the fact that

photographs can be made only of existing things) enters into the presupposition in question much more than into any of the other presuppositions discussed. Hence, at most, (ii) indicates that the Novelty Constraint should be modified to exclude certain types of presupposition.

16. These examples were the result of an interesting discussion between Ray Jackendoff and me in the spring of 1971. It was these examples which first suggested the Novelty Constraint to me.
17. William Leben has pointed out to me that Akmajian (1970) contains similar examples.
18. It seems intuitively absurd to me to suppose that the Novelty Constraint might be language-particular, although I know of no arguments against such a supposition.

EPILOG

This thesis has dealt with a great many topics--some of them only loosely connected to one another--in a number of different contexts. It is therefore appropriate to conclude with a brief review of the major conclusions arrived at, plus a summary of some of the more serious problems left unsolved.

Anaphora rules are conceived of in this thesis as a category of rules--distinct in several respects from other categories which have been studied by generative grammarians--for pairing certain elements under appropriate syntactic, semantic, and phonological conditions. They are used to account for a number of phenomena generally handled by means of deletion transformations. While immune to the constraints which have been proposed for other categories of rules, anaphora rules are governed by certain constraints of their own. Perhaps the most interesting of these are the Transitivity Condition, i.e., that "is anaphorically related to" is a transitive relation in all grammatical sentences, and the Novelty Constraint, which restricts the ability of anaphors to introduce new information. These constraints, along with certain structural conditions (e.g., that right-to-left anaphora is possible only if the anaphora is more deeply embedded than the antecedent), are very probably part of universal grammar.

Two conclusions of this thesis which have interesting ramifications for other areas of generative grammar are that transformations need never refer to identity between NP's, but only to anaphora, and that NP movement transformations always leave behind a phonetically null trace.

These conclusions made it possible to maintain a modified version of Dougherty's anaphora relation and to do without Postal's WH-constraint.

Finally, the analysis proposed here, making use of Jackendoff's notion of "modal operator", appears to make it possible to handle the linguistic facts about anaphora while minimizing the philosophical pitfalls so common in this area of investigation.

Probably the greatest weakness of the thesis is its failure to characterize more precisely the notion of determinateness, for this notion plays a central role in a number of key arguments. Hopefully, however, further investigation of modal operators will shed additional light on this problem. Another weak point is the failure to account for (or, in some cases, even to mention) a number of interesting cases in which anaphoric relations are unexpectedly blocked. One such case is mentioned in Chapter 3, §1.1.4 and another in Chapter 2, §2.2.2. Leben (1971), Ross (personal communication), and Postal (lecture at MIT, January, 1972) have pointed out still others. A final problem, perhaps more illusory than real, is that the ban on right-to-left anaphora from indeterminate NP's is not related by the analysis in this thesis to the Novelty Constraint. While there is a priori no reason to suppose that these two constraints have any direct relationship with one another, it seems intuitively rather unsatisfying to claim that they don't.

Any future work which can iron out these difficulties will be greatly appreciated.

BIBLIOGRAPHY

- Akmajian, A. (1968), "An Interpretive Principle for Certain Anaphoric Expressions", unpublished MIT paper.
- Akmajian, A. (1970), Aspects of the Grammar of Focus in English, unpublished MIT dissertation.
- Akmajian, A. and R. Jackendoff (1970), "Coreferentiality and Stress", Linguistic Inquiry I.1.
- Aronoff, M. (1971), "Stress and Anaphoric Objects", paper delivered at the second NELS Conference in Montreal.
- Bach, E. (1969), "Anti-pronominalization", unpublished University of Texas paper.
- Bach, E. (1970), "Problominalization", Linguistic Inquiry I.1
- Baker, C. L. (1966), "Definiteness and Indefiniteness in English", unpublished University of Illinois Masters thesis.
- Baker, C. L. and M. Brame (1971), "'Global Rules': a rejoinder", to appear in Language.
- Bowers, J. (1968), "Adjectives and Adverbs in English", unpublished MIT paper.
- Bowers, J. (1969), "Generic Sentences in English", unpublished MIT paper.
- Bresnan, J. (1970), "An Argument against Pronominalization", Linguistic Inquiry I.1
- Bresnan, J. (1971a), "Sentence Stress and Syntactic Transformations", Language 47. 257-281.
- Bresnan, J. (1971b) "Contraction and the Transformational Cycle in English" unpublished MIT paper.
- Bresnan, J. (1971c), "Stress and Syntax: a Reply", to appear in Language.
- Bresnan, J. (1972), "A Note on the Notion 'Identity of Sense Anaphora'", Linguistic Inquiry II.4.
- Bresnan, J. (in preparation), The Theory of Complementation in English Syntax, MIT dissertation.
- Chomsky, N. (1955), The Logical Structure of Linguistic Theory, unpublished manuscript.

- Chomsky, N. (1957), Syntactic Structures, Mouton, The Hague.
- Chomsky, N. (1964), Current Issues in Linguistic Theory, Mouton, The Hague.
- Chomsky, N. (1965), Aspects of the Theory of Syntax, MIT Press, Cambridge, Massachusetts.
- Chomsky, N. (1968), Language and Mind, Harcourt, Brace, and World, New York.
- Chomsky, N. (1969) "Deep Structure, Surface Structure, and Semantic Representation", in Steinberg and Jakobovits (1971).
- Chomsky, N. (1970a), "Some Empirical Issues in the Theory of Transformational Grammar", to appear in Peters (to appear).
- Chomsky, N. (1970b), "Remarks on Nominalization", in Jacobs and Rosenbaum (1970).
- Chomsky, N. (1971), "Conditions on Transformations", to appear in Festschrift for Morris Halle, S. Anderson and P. Kiparsky (eds.).
- Chomsky, N. and M. Halle (1968), The Sound Pattern of English, Harper and Row, New York.
- Chomsky, N. and G. Miller (1963), "Introduction to the Formal Analysis of Natural Languages", in Handbook of Mathematical Psychology, Vol. II, R. D. Luce, R. Bush, and E. Galanter (eds), Wiley, New York.
- Culicover, P. (1970), Syntactic and Semantic Investigations, unpublished MIT dissertation.
- Donellan, K. (1966), "Reference and Definite Descriptions", in Steinberg and Jakobovits (1971).
- Dougherty, R. (1969), "An Interpretive Theory of Pronominal Reference", Foundations of Language 5.
- Dougherty, R. (1970), "A Grammar of Coordinate Conjoined Structures: I", Language 46.4.
- Emonds, J. (1970), Root and Structure Preserving Transformations, unpublished MIT dissertation.
- Emonds, J. (1970), "Evidence that Indirect Object Movement is a Structure Preserving Rule", unpublished paper.
- Fodor, J. (1970), The Linguistic Description of Opaque Contexts, unpublished MIT dissertation.
- Fodor, J. and J. J. Katz (1964), The Structure of Language, Prentice-Hall, Englewood Cliffs, New Jersey.

- Fraser, B. (1970), "Some Remarks on the Action Nominalization", in Jacobs and Rosenbaum (1970).
- Frieden, R. (1970), Interpretive Semantics and the Syntax of English Complement Constructions, unpublished University of Indiana dissertation.
- Grinder, J. (1971), On Deletion Phenomena, unpublished University of California at San Diego dissertation.
- Grinder, J. and P. Postal (1971), "Missing Antecedents", Linguistic Inquiry II.3.
- Gruber, J. (1965), Studies in Lexical Relations, unpublished MIT dissertation.
- Hammerton, M. (1970), "Disputed Interpretation of a Pronoun", Nature, vol. 227, p. 202.
- Helke, M. (1970), The Grammar of English Reflexivization, unpublished MIT dissertation.
- Jackendoff, R. (1969), Some Rules of Semantic Interpretation for English, unpublished MIT dissertation.
- Jackendoff, R. (1971), "Modal Structure in Semantic Representation", Linguistic Inquiry II.4.
- Jacobs, R. and P. Rosenbaum (1970), Readings in English Transformational Grammar, Ginn and Co., Waltham, Mass.
- Karttunen, L. (1969a), "Discourse Referents", paper presented at the 1969 International Conference on Computational Linguistics, Stockholm.
- Karttunen, L. (1969b), "What do Referential Indices Refer to?", unpublished University of Texas paper.
- Karttunen, L. (1971), "Definite Descriptions with Crossing Coreference", Foundations of Language 7.2.
- Katz, J. J. and P. Postal (1964), An Integrated Theory of Linguistic Descriptions, MIT press, Cambridge, Mass.
- Kayne, R. (1969), "On the Inappropriateness of Rule Features", in the Quarterly Progress Report of the Research Laboratory of Electronics of MIT, No. 95.
- Kayne, R. (1971), "A Pronominalization Paradox in French", Linguistic Inquiry II.2.

- Kiparsky, P. and C. Kiparsky (1971), "Fact", in Steinberg and Jakobovits (1971).
- Klima, E. (1964) "Negation in English", in Fodor and Katz (1964).
- Kuroda, Y. (1969), "English Relativization and Certain Related Problems" in Reibel and Schane (1970).
- Lakoff, G. (1965), On the Nature of Syntactic Irregularity, in Mathematical Linguistics and Automatic Translation, Report no. NSF-16 to the National Science Foundation, Harvard University Computation Laboratory.
- Lakoff, G. (1968a), "Counterparts, or the Problem of Reference in a Transformational Grammar", unpublished paper.
- Lakoff, G. (1968b), "Pronouns and Reference", unpublished paper.
- Lakoff, G. (1970a), "Global Rules", Language 46.3.
- Lakoff, G. (1970b), Linguistics and Natural Logic, Studies in Generative Semantics, No. 1, Phonetics Laboratory, The University of Michigan, Ann Arbor, Michigan.
- Lakoff, G. (1970c), "On Generative Semantics", in Steinberg and Jakobovits (1971).
- Langacker, R. (1966), "On Pronominalization and the Chain of Command", in Reibel and Schane (1970).
- Lasnik, H. (1970), "The Scope of Negation", unpublished MIT paper.
- Leben, W. (1970), "On the Status of VP Deletion", unpublished MIT paper.
- Leben, W. (1971), "Two Constraints on Pronominalization", unpublished MIT paper.
- Lees, R. B. and E. Klima (1963), "Rules for English Pronominalization", Language, 39.
- McCawley, J. (1970), "Where Do Noun Phrases Come From?", in Jacobs and Rosenbaum (1970).
- Partee, B. (1970), "Opacity, Coreference, and Pronouns", Synthese 21.
- Peters, S. (to appear), Goals of Linguistic Theory, Prentice-Hall, Englewood Cliffs, New Jersey.
- Postal, P. (1966), "On So-Called 'Pronouns' in English", in Reibel and Schane (1970).

- Postal, P. (1970a), "Global Constraints on Pronominalization", early unpublished version of Postal (1972).
- Postal, P. (1970b), "On Coreferential Complement Subject Deletion", Linguistic Inquiry I.4
- Postal, P. (1970c), "The Best Theory" in Peters (to appear).
- Postal, P. (1971a), Cross-over Phenomena, Holt, Rinehart and Winston, New York.
- Postal, P. (1971b), "Some Further Limitations of Interpretive Theories of Anaphora", unpublished paper.
- Postal, P. (1972), "A Global Constraint on Pronominalization", Linguistic Inquiry III.1.
- Reibel, D. A. and S. A. Schane (1970), Modern Studies in English, Prentice-Hall, Englewood Cliffs, New Jersey.
- Ross, J. R. (1967a), Constraints on Variables in Syntax, unpublished MIT dissertation.
- Ross, J. R. (1967b), "On the Cyclic Nature of English Pronominalization", in Reibel and Schane (1970).
- Ross, J. R. (1969), "Guess Who?", in Papers from the Fifth Regional Meeting of the Chicago Linguistic Society, R. I. Binnick, et al, Department of Linguistics, University of Chicago, Chicago, Illinois.
- Selkirk, E. (1970), "On the Determiner Systems of Noun Phrase and Adjective Phrase", unpublished MIT paper.
- Steinberg, D. and L. A. Jakobovits (1970), Semantics, Cambridge University Press, Cambridge, England.
- Strawson, P. F. (1950), "On Referring", Mind.
- Wasow, T. (1970), "Some thoughts about Anaphora", unpublished MIT paper.
- Wasow, T. (1971), "English Reflexivization and the Transitivity of Anaphora", to appear in Papers from the Second NELS Conference, D. Lightfoot (ed.)
- Wasow, T. and T. Roeper (1972), "On the Subject of Gerunds", in Foundations of Language 7.1.
- Williams, G. (1969), "Two Rules of Pronominalization", unpublished MIT paper.

Williams, G. (1971), Networks of Anaphora, unpublished MIT dissertation.

Witten, E. (1970), "Pronominalization: a Handbook for Secret Agents",
unpublished Brandeis University paper.