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DELETION AND INTERPRETATION
IN COMPARATIVES

by

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DELETION AND INTERPRETATION IN

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ABSTRACT

This thesis attempts, firstly, to specify a constrained set of interpretation rules that map comparative sentences onto their logical form. Secondly, it attempts to reduce the diverse deletion rules postulated for comparatives to a rule deleting an underlying what; the semantic functions fulfilled by the other deletion rules are shown to be better handled by interpretive mechanisms. Subdeletion is explained as a case of interpolation into a gap. Thirdly, it argues that Subjacency is neither a condition on transformations, nor a condition on trace binding, but a condition on quantifier binding at the level of Logical Form.

Chapter One identifies five deletion processes that have been postulated in comparatives: Comparative Deletion, Subdeletion, and three rules of Comparative Ellipsis. It also gives evidence for a preposition-triggered deletion of what. In Chapter Two, the Comparative Ellipsis rules are eliminated. Chapter Three proposes the interpretation rules that map comparatives onto their logical form. Chapter Four sets out the new analysis of Subdeletion, and Chapter Five argues that Subjacency is a condition on quantifier binding.
to

the memory of

Joel Hust

(1944–1978)

teacher

and friend
CHAPTER ONE
INTRODUCTION

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This thesis, as it was originally planned, was to have provided a "possible worlds" semantics for comparatives. As the reader will see, now it does nothing of the kind. Somewhere along the way, syntactic questions ran away with the thesis.

I was very fortunate to have Prof. Brian Newton as my senior supervisor. Brian's patience with me, as I kept changing my mind, was immense. I owe him a special debt of gratitude for his willingness to go with me into such fairly difficult areas as Montague Grammar. I wish to thank him for all this, and for his encouragement and guidance. My thanks are also due to my second supervisor, Prof. Richard DeArmond, for his help, encouragement, and friendship.

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CHAPTER ONE
INTRODUCTION

1. Five Deletions in Comparatives

Five deletion rules have been postulated as applying in comparative sentences in English. Since we shall be repeatedly referring to them, it will be convenient to distinguish them clearly, and "label" them.

1.1. Comparative Deletion

The rule commonly referred to in the literature as "Comparative Deletion" (CD) is illustrated by the following sentences:

(1) a. John has more horses than Bill has ___.
   b. John is cleverer than Bill is ___.
   c. John words his letters more carefully than Bill words his letters ___.

These sentences have a missing element (or elements) at the position indicated by ___. The verb have (cf. (1a)) must normally have a direct object; the copula be (cf. (1b)) must have a complement; and the verb word (cf. (1c)) is rather
peculiar in that it strictly subcategorizes an adverb of manner
(cf. *'John worded his letters', but 'John worded his letters
carefully').

A 'deletion-under-identity' analysis of these sentences can
be found in all the early Transformational Generative treatments
of comparatives, cf. Lees (1961), Smith (1961), Doherty and
Schwartz (1967); a typical example of this analysis is Chomsky
(1965,178-179), where it is suggested that our sentence (1b) is
derived from a deep structure like (2):

(2) John is more than [#{Bill is clever#}] clever.

The deletion rule is described as "an erasure operation that
uses the Adjective of the matrix sentence to delete the

 Ross (1967) and Hankamer (1971) repeat this
deletion-under-identity analysis. Bresnan (1972,1973,
1975,1976a,1976b) pursues this analysis furthest, giving it its
most careful, and precise, formulation. Bresnan's analysis would
derive the sentences of (1) from the deep structures (omitting
details) given in (3):

(3) a. John has er many horses than Bill has x many
    horses.

     b. John is er much clever than Bill is x much clever.

     c. John words his letters er much carefully than Bill
words his letters *much* carefully.

In each of these sentences, there are two "compared constituents" (underlined). The first one is the 'head' of the comparative clause. The structure of the head-cum-comparative clause is roughly as diagrammed in (4) (we use (3a) as an example):

\[\text{(4)}\]

```
(4)
\begin{tikzpicture}
  \node (NP) [text width=1.5cm, text height=1cm] {\textbf{NP}};
  \node (S) [text width=1.5cm, text height=1cm] at (NP.east) {\textbf{S}};
  \node (COMP) [text width=1cm, text height=0.5cm] at (S.east) {\textbf{COMP}};
  \node (VP) [text width=1cm, text height=0.5cm] at (COMP.east) {\textbf{VP}};
  \node (than) [text width=1cm, text height=0.5cm] at (COMP.west) {\text{than}};
  \node (NP) [text width=1cm, text height=0.5cm] at (than.north) {\textbf{NP}};
  \node (N) [text width=0.5cm, text height=0.5cm] at (NP.north) {\textbf{N}};
  \node (D) [text width=0.5cm, text height=0.5cm] at (N.north) {\text{D}};
  \node (Q) [text width=0.5cm, text height=0.5cm] at (N.south) {\text{Q}};
  \node (NP) [text width=1cm, text height=0.5cm] at (VP.west) {\textbf{NP}};
  \node (N) [text width=0.5cm, text height=0.5cm] at (NP.north) {\textbf{N}};
  \node (D) [text width=0.5cm, text height=0.5cm] at (N.north) {\text{D}};
  \node (Q) [text width=0.5cm, text height=0.5cm] at (N.south) {\text{Q}};

  \node (er) at (D) {\text{er}};
  \node (many) at (Q) {\text{many}};
  \node (horses) at (er) {\text{horses}};

  \node (Bill) at (VP.west) {\text{Bill}};
  \node (has) at (VP.east) {\text{has}};
  \node (Q) at (has.north) {\text{Q}};
  \node (NP) at (Q.north) {\textbf{NP}};

  \node (x) at (D) {\text{x}};
  \node (many) at (Q) {\text{many}};
  \node (horses) at (x) {\text{horses}};
\end{tikzpicture}
```

The two "boxed in" parts of the structure are the compared constituents. Comparative Deletion is an operation that deletes the compared constituent in the comparative clause under identity with the 'head'.
1.2. Subdeletion

"Comparative Subdeletion", or simply "Subdeletion", is the term Bresnan uses to refer to the process which produces the gap in the following sentences: 2

(5) a. John has more horses than Bill has ___ cows.
   b. John is cleverer than Bill is ___ brave.
   c. John words his letters as carefully as Bill words his letters ___ carelessly.

Subdeletion is best understood by contrasting it with Comparative Deletion. Bresnan assumes the deep structures (6) for the sentences of (5):

(6) a. John has er many horses than Bill has x many cows.
   b. John is er much clever than Bill is x much brave.
   c. John words his letters as much carefully as Bill words his letters x much carelessly.

In contrast to the deep structures of (3), the compared constituents (underlined) are not identical in these sentences; only subparts of them are. We can see this more clearly if we again represent the relevant constituent in a diagram:
Here the NP's (in solid-line boxes) are not identical; only the Quantifier Phrases (in broken-line boxes) are. But this difference is only superficial: if we (again) delete the identical constituent in the comparative clause, we obtain the surface sentence.

One of Bresnan's central claims (Bresnan (1973, 1975, 1976a, 1976b)) is that Subdeletion and Comparative Deletion are the same rule -- which is a rule that deletes in the comparative clause the largest constituent subpart of the compared constituent (dominating the QP) that is identical to a constituent subpart of the head.
It is not as obvious that there is a gap in the sentences of (5), as it is in those of (1). It has sometimes been suggested that there is no syntactic gap at all in Subdeletion-type comparatives (see Grosu (1972, fn.1); for a very recent example, see Taraldsen (1978, 638-639)). However, it seems to me that Bresnan's three arguments for a gap (Bresnan (1973, 1975, 1976b)) still hold: Firstly, there are sentences in which the compared constituent of the comparative clause is obviously "incomplete", cf. (8). (Examples (8), (9), and (10) below are either taken or adapted from Bresnan (1975)):

(8)  a. North America has a larger share of the world's exportable supplies of food grains than the Middle East has ___ of the world's exportable supplies of oil.

b. There isn't as large a number of women as there was ___ of men.

A phrase like of the world's exportable supplies of oil (in (8a)) cannot normally be the direct object of the verb have. Secondly, no QP can appear at the (postulated) site of Subdeletion in the comparative clause, although (syntactically) this is a QP position:

(9)  * Next year, as many women will be admitted as most/many/l6 men will be (admitted).
Thirdly, English auxiliary contraction -- which is known to be blocked before a deletion site -- is blocked also before the Subdeletion site:

(10) a. * I'm as unlikely a hatcheck girl as you're ___ a bouncer.
    b. * I'm cleverer than I'm ___ prudent.
    c. * This is as much trouble as it's ___ fun.

(These sentences are acceptable in a version without the contraction in the comparative clause.)

We shall henceforth assume (in this thesis) that there is a process corresponding to the name of Subdeletion.

1.3. The Three Rules of Comparative Ellipsis

Bresnan seems to use the term "Comparative Ellipsis" simply as a cover term for a number of deletion operations that she postulates but does not investigate in any detail. In Bach, Bresnan and Wasow (1974), an attempt is made to distinguish them from CD, and to give them a common characterization, in the following terms: "CD is an obligatory rule which deletes under identity to the head of the comparative clause. ... CE, an optional rule, deletes under identity to the matrix in which the head is embedded" (p. 612). Although none of these operations have (to my knowledge) ever been explicitly formulated, we can (I
believe) distinguish three separate processes.

1.3.1. Comparative Ellipsis 1 (CE1)

Consider the sentences:

(11)  
  a. John ate more apples than Bill ate.
  b. John ate more apples than Bill did.

(11a) is derived (for Bresnan) from the underlying structure

(12)  
  John ate x-many apples than Bill ate x-many apples

by the application of CD. But how is (11b) derived? Bach et al (1974) suggest that it is derived by the further (optional) process of Comparative Ellipsis applying to (11a) (i.e., to a sentence to which CD has already applied).

Here are some more pairs of sentences, the (a) sentence derived by CD, and the (b) sentence by CE:

(13)  
  a. Mary wrote as many books as John wrote.
  b. Mary wrote as many books as John did.

(14)  
  a. John can't jump through as many hoops as his mother wants him to jump through.
  b. John can't jump through as many hoops as his mother wants him to.

(15)  
  a. John thinks that he walks faster than Bill thinks
that he walks.

b. John thinks that he walks faster than Bill thinks that he does / than Bill does.

The process that we are discussing can be recognized by the fact that it always deletes a VP, and that its deletion site must always follow an auxiliary element. These are also properties of the rule of VP Deletion (Sag (1976)). We shall see that it has also other properties of VP Deletion. Following a suggestion of Sag (1976), we shall argue that it is the same rule as VP Deletion. But in the meanwhile, we shall label it (following Sag (1976, 2.3.2)) CE1.

1.3.2. Comparative Ellipsis 2 (CE2)

Consider the following pairs of sentences:

(16)  a. John ate more apples than Bill ate.
   b. John ate more apples than Bill.

(17)  a. She is more stately than she is beautiful.
   b. She is more stately than beautiful.

(18)  a. I have more peanuts in my left pocket than I have in my right pocket.
   b. I have more peanuts in my left pocket than in my right pocket.
The 'traditional wisdom' -- embodied in the grammar books of English -- is that the (b) sentences are derived from the (a) sentences by the application of an ellipsis rule. Bresnan (1973) provides some arguments in support of this analysis. (Bach et al (1974) include this process in the rule they call Comparative Ellipsis.) Note that the assumption is that than or as is always generated with an S-complement; its being followed (in the surface structure) by a bare NP, AP, or PP, is the result of CE.

Following Sag (1976) again, we shall call this rule CE2.

1.3.3. Comparative Ellipsis 3 (CE3)

In Bresnan (1975), Bresnan refers to a process which derives (19b) from (19a) (= Bresnan's (88) and (89)) as Comparative Ellipsis:

\[(19)\]

a. Next year, as many women will be admitted as most men fear ___ will be admitted.

b. Next year, as many women will be admitted as most men fear ___.

(19a) is of course derived (for Bresnan) from the underlying:

\[(20)\]

Next year, as many women will be admitted as most men fear x many women will be admitted.)
This type of CE (apparently) applies to a sentence to which CD has already applied, and deletes an S containing the deletion site of CD. Other examples are:

(21)   a. John shot more elephants than we expected that he would shoot.
       b. John shot more elephants than we expected Ø.

(22)   a. She is more clever than you realize that she is.
       b. She is more clever than you realize Ø.

We shall call this rule CE3.

I believe these three processes are sufficient to sort out all the phenomena which have been vaguely grouped under 'the ellipsis rules of comparatives'. There is a type of sentence which may seem not to fit into any of these categories:

(23)   a. I have more peanuts in my left pocket than you in your right pocket.
       b. I fly to Paris more often than you to Moscow.

A sentence like (23a) easily lends itself to an analysis in which it is derived from an underlying "... than you have ___ in your right pocket" by a deletion of the verb have. This viewpoint makes it tempting to analyze this process as 'Gapping', a rule which deletes an identical verb in the second conjunct of two conjoined S's. But we must remind ourselves that there are also sentences like (24),
(24). I gave more apples to Mary than peaches to Jane which cannot be explained by Gapping; since Gapping (supposedly) never deletes the subject (but see Hankamer (1971)).

A different way to look at these sentences is to say that they are cases of CE2, with two elements to the right of than instead of the (usual) one. I shall show later on (sections 3.1.3 and 3.2 of Chapter Two) that this is the right way to look at them.

2. The Long-Distance Property of the Deletion Rules

The process we called CE2 is not a long-distance rule, cf.

(25) a. I have more marbles than kites.
   b. * I have more marbles than Peter says kites.

But all our other rules are long-distance rules, cf.

(26) a. I have more marbles than Peter has ___.
   b. I have more marbles than Peter claims that he has ___.
   c. I have more marbles than anyone expects Peter to claim that he has ___.

(27) a. I have more marbles than Peter has ___ kites.
   b. I have more marbles than Peter claims to have ___ kites.
c. I have more marbles than anyone expects Peter to claim to have ___ kites.

(28) a. I ate more apples than Peter did ___.
   b. I ate more apples than Peter says that he did ___.
   c. I ate more apples than anyone expects Peter to say that he did ___.

(29) a. I have more apples than Peter realizes ___.
   b. I have more apples than Peter claims that anyone realizes ___.
   c. I have more apples than Mary expects Peter to claim that anyone realizes ___.

Obviously, these last four rules must be formulated with an essential variable in their structural descriptions. Ross (1967), who noted this fact, also noted that these rules are subject to the 'constraints on variables' (the island constraints). The following sentences illustrate the subjection of these rules to the Complex NP Constraint:

(30) a. * I have more marbles than Mary knows a boy who has ___.
   b. * I have more marbles than Peter has made the claim that he has ___ kites.
   c. * I ate more apples than I know anyone who did ___.
d. * I have more money than Mary made the claim that Peter realizes ___.

The rules are also subject to the Wh-Island Condition and the Sentential Subject Condition:

(31) a. * I have more marbles than Mary wonders if Peter has ___.

b. * I have more marbles than that I have ___ is known to my friends.

3. Two Problems with the Deletion-Under-Identity Analysis; and An Alternative Analysis

We have set out the deletion rules postulated for comparatives in some detail, and have taken the trouble to sort them out. A deletion-under-identity analysis suggests itself so naturally in the case of comparatives, that (I believe) they have received this explanation — sometimes more explicitly, sometimes less so — since well near the beginnings of transformational grammar. Yet there are reasons why one should be unhappy about this analysis.
3.1. Sentences Without a Possible "Controller" of Deletion

It was pointed out by Chomsky (Chomsky (1977)) that there are some types of sentences, which are not strictly comparatives, which exhibit a process that has all the properties of Comparative Deletion. Consider the following sentences:

(32) a. The circumstances are different than they were __ last year.
   b. The circumstances are different than (the FBI claims that) you said that they were __ last year.
   c. * The circumstances are different than you believe the claim that they were __ last year.
   d. * The circumstances are different than you might wonder if they were __ last year.

(33) a. His name is the same as his father's name is __.
   b. His name is the same as (the report suggests that) the FBI believes that his father's name is __.
   c. * His name is the same as they believed the story that his father's name is __.
   d. * His name is the same as I wonder if his father's name is __.

(34) a. She isn't like she was __ in those days.
b. She isn't like (the reporter claims that) people
say that she was __ in those days.

c. * She isn't like you believe the report that she
was __ in those days.

d. * She isn't like I wondered if she was __ in
those days.

(35)  a. Mary is (more or less) as she was __ five years
ago.

b. Mary is (more or less) as (the report suggests
that) they say she was __ five years ago.

c. * Mary is (more or less) as they believe the
report that she was __ five years ago.

d. * Mary is (more or less) as they wonder if she was
__ five years ago.

The (a) sentences contain a clause headed by than or as, which
has a gap in it. The (b) sentences show that the process which
generates the gap is 'unbounded'. The (c) and (d) sentences show
that this process is subject to the Complex NP Constraint and
the Wh-Island Constraint (respectively).

Obviously, it would be extremely artificial to treat the
process which we see operative in these sentences as a different
rule than Comparative Deletion. But a problem (for a
deletion-under-identity analysis of CD) is that there is no
plausible source for these sentences. Thus (33a) will have to be
derived from a deep structure like:

\[(36) \text{his name is the same as his father's name is the same.}\]

Similar observations apply to (32a), (34a), and (35a). In fact, in a sentence like (35a) there is no overt matrix phrase at all, to trigger and control the deletion.

3.2. Variants of CD Sentences With WHAT

In some dialects of English, comparatives derived by CD have variants with a what adjacent to than (or as), cf.

\[(37)\]

a. John ate more apples than Bill ate ___.
b. John ate more apples than what Bill ate ___.

Such variants are also found for sentences derived by Subdeletion, CE1, and CE3; cf.

\[(38)\]

a. John ate more apples than what Bill ate ___ peaches. (Subdeletion)
b. John ate more apples than what Bill did ___. (CE1)
c. John ate more apples than what I expected ___. (CE3)

The types of (semi-comparative) sentences that we just considered in 3.1. also have such variants:
(39) a. The circumstances are different than what they were ___ last year.

b. His name is the same as what his father's name is ___.

c. She isn't like what she was ___ in those days.

d. Mary is (more or less) as what she was ___ five years ago.

If we make the obvious assumption that the gap in these variants is the 'gap of what', -- thereby treating it exactly as we treat the gap in questions and relative clauses -- we have a ready explanation for the gap.

Now the deletion-under-identity account of CD must say that sentences (37b), (38), and (39) represent a different process of comparative formation in the language. This is in fact what Bresnan does, in Bresnan (1975, 1976b). But what we now have (under such a proposal) are two parallel processes which produce results which (at least superficially) are different only in one detail, namely the presence or absence of a what. A different tack to pursue would be to claim that the what in these sentences does not control the gap, which is produced by the usual rule of CD. We must now show that the what belongs to a different category than the wh-phrase that shows up in questions and relatives. (We shall show that there is in fact some plausibility to this latter position.)
Chomsky's alternative analysis of comparatives (Chomsky (1977)) is that sentence pairs like (37a) and (37b) are related by a minor deletion rule which deletes a what in certain restricted syntactic environments. It is not a deletion "under identity", but a deletion of a designated element. It is also a 'local' deletion rule (in the sense that the environment of its application can be stated without the use of a variable), since Chomsky assumes that the what is always deleted in the COMP adjacent to than (or as).

4. Some Further Points at Issue

Consideration of the 'what-variants' of comparatives also throws a new light on another point at issue, namely the syntactic category of the "comparative particles", than and as. In traditional grammar, these particles were sometimes considered relative pronouns, and sometimes conjunctions (see Jespersen, MEG III 9.1 ; Jespersen himself prefers the latter classification). In TG, they have most commonly been analyzed as "complementizers" ever since Bresnan (1972; 1973; 1974) analyzed them as such and assigned the following structure to the comparative clause:
A view that there are two than's -- one of them a preposition which takes a bare NP complement (as in 'John is taller than Bill'), and the other a complementizer which takes an S complement -- has found favor since Hankamer (1973) argued for it. (Thus Jackendoff writes: "as, than must double as prepositions and complementizers" (Jackendoff (1977, 208)).) Even for advocates of this view, than (or as) is a complementizer when it takes an S complement.

However, the evidence of the what variants of comparatives enables us to reject this claim (and thereby 'reunite' the two than's). Consider (37b), which we repeat below as (41):

(41) John ate more apples than what Bill ate.

If than is a complementizer, what structure can we give to what Bill ate? It cannot be a free relative clause (since complementizers cannot take free relative clauses). It cannot be an \( \bar{S} \), since a complementizer selects an S, not an \( \bar{S} \). But it cannot be an S either, since what (which has been moved) has
presumably been moved into the COMP-node. The only solution seems to be maintain that both than and what are in the COMP-node, in a structure roughly like (42):

(42)

```
S
  \(\overline{\text{COMP}}\)
    \(\overline{\text{S}}\)
      than
  what
    Bill ate t
```

But present-day English does not allow a doubly-filled COMP. Earlier stages of the language, which did have this option, invariably attached the wh-phrase to the left of the complementizer, never to the right. Thus the structure which Bresnan's analysis must assign to (41) never existed at any stage of the language.

On the other hand, if we treat than and as as prepositions, several facts about the comparative construction fall into place. It now becomes possible to give a likely structure to the embedded sentence in (41), which can now be treated as a free relative. There are several advantages to treating the comparative clause as a free relative clause. The alternative would be to treat it as an \(\overline{\text{S}}\) complement of a preposition, as shown in (43):
But there is no evidence that prepositions take \( \overline{5} \) complements. (The putative evidence -- cited in Emonds (1976), Jackendoff (1977) -- is simply a misanalysis, as I argue below.) Moreover, consider the 'right-node-raised' sentence (44):

(44) The situation is different from, and much better than, what it used to be.

Here, what it used to be is obviously a free relative clause in its function as the object of the preposition from; it cannot very well be a different type of clause in relation to than.

However there are genuine difficulties in the way of treating the comparative clause (or just the 'what-variant' of the comparative clause) as a free relative clause; these have been pointed out by Bresnan (Bresnan (1976b; personal communication)). The first problem is the 'invariance' of the what. A normal free relative can take any of the wh-phrases in English as its head:

(45) a. I'll eat what you eat.
b. I'll live where you live.
c. I'll dress how you dress.
d. I'll leave when you leave.
e. I'll marry whoever you choose.
f. I'll take whichever train you plan to take.

It can also take a PP as its head, provided the preposition is locative or temporal (examples from Bresnan and Grimshaw (1978)):

b. I'll open an account at whatever bank you open an account.
c. I'll move to whatever town you move.
d. The nurse was present during whatever operations the doctor was present.

But comparatives (and the semi-comparatives that we considered) take only a what as the head. Thus in (47), we get a what in a position where we should expect how:

(47)   a. I hope you can eat quicker than what you walk ___.
b. He walks like what he talks ___.

If what is an NP, generating it in the gap in (47a) would violate the subcategorization of walk (which is an intransitive verb). (This violation cannot be avoided by generating what as
the head of the clause, and generating the gap as an empty AdvP; for if we now wish to let what bind the empty node, this would violate normal principles of trace binding -- since an NP cannot bind an AdvP position.)

Also, the comparative clause cannot take a PP as its head, as shown by (48) ((48a) was provided by Bresnan):

\(\text{(48)}\)
\[\text{a. } \ast \text{He convinced me in more ways than in what he did her.}\]
\[\text{b. } \ast \text{I have lived in more places than in what you have lived.}\]

(Both these sentences are okay without the in, cf. 'I have lived in more places than what you have lived.')

Bresnan has pointed out to me that there is an alternative to treating the what in comparatives as the head of a free relative. It can be analyzed as a complementizer. There are dialects of English in which we get sentences like (49):

\(\text{(49)}\)
\[\text{a. I met a boy what knows you.}\]
\[\text{b. I met the boy what you were talking to.}\]

Here what seems to be functioning (more or less) like that. It is invariant with respect to animacy (as (49) shows); it is also an exception to well-known properties of wh-movement, such as optional "pied piping":
Now if we analyze this what as a complementizer, and so also the what in comparatives, we explain two of their properties, namely their invariance with respect to animacy and category (cf. (49) and (47)), and their inability to "pied pipe" a preposition.

Since than and as must (under such an analysis) be reanalyzed as prepositions, the structure of the comparative clause that we now get is the same as (43); except that what will now be assigned to the category of "complementizer", not NP; and it will not control the gap. The gap can be generated (as formerly) by Comparative Deletion; or if we wish, it can be base-generated and interpreted by a copying rule.

This analysis brings back into linguistic theory prepositions which take S complements, and is thus open to our objection that there is no independent motivation for such a structure. It is also vulnerable to our argument based on sentence (44): in that sentence, if what it used to be is a free relative with respect to from, it cannot be an S with respect to than. Moreover, if the what we are talking about is a complementizer, it has a peculiar distributional property. It occurs only in relatives and comparatives, both structures which must contain a gap. It will be the only complementizer which invariably takes an S with a gap in it.

Thus it would appear that we must choose between an
analysis which will give us a peculiar head of a free relative, and one which will give us a peculiar complementizer. I shall choose the former analysis, for the reasons I have given, and some which will appear in the course of the thesis. But if further research should show the latter analysis to be correct, most of what I say in this thesis can be easily adapted to the new analysis.

5. A Mechanism for the Deletion of WHAT

The history of the analyses of than and as (which we looked at) has some parallels in the history of the analyses of two other prepositions, before and after. We shall now take a brief look at these latter prepositions, in order to adduce a property of them that may suggest to us a mechanism for the deletion of what in comparatives.

In traditional grammar, before and after used to be called "subordinating conjunctions" when they took a sentential complement, as in (51b). When they took a NP complement, as in (51a), they were called prepositions.

(51)  a. Bill arrived three days before the conference.
       b. Bill arrived three days before the conference started.

Klima (1965) pointed out that these subordinating conjunctions could be analyzed as (simply) prepositions which take sentential
complements. This analysis has since been widely adopted (see Emonds (1976), Jackendoff (1977)).

What has not (to my knowledge) been noticed hitherto, is that the sentential complements of before and after contain a 'gap' (indicated in (51b')) which has all the familiar properties of wh-movement gaps.

(51b') Bill arrived three days before the conference started ___.

The gap is that of a temporal adverb. Its presence can be very simply proven by showing that while the sentence The conference started can normally take a temporal modifier (as in The conference started yesterday), the embedded sentence in (51b) cannot take this:

(52) * Bill arrived three days before the conference started yesterday.

The gap is a case of "unbounded dependency":

(53) Bill arrived three days before Mary claims that he arrived ___.
(54) Bill arrived three days before Mary says that the FBI claims that he arrived ___.

It is subject to the Complex NP Condition:
(55) * Bill arrived three days before Mary has made the claim that he arrived ___.

(56) * Bill arrived three days before Mary knows a man who arrived ___.

It is also subject to the Wh-Island Condition:

(57) * Bill arrived three days before Mary asked me if he arrived ___.

(58) * Bill arrived three days before Mary wonders whether the FBI believes that he arrived ___.

However, before and after should not be treated as peculiar among prepositions in having an obligatory gap of this nature in their sentential complements. It is well-known that any preposition which can take a complement of category C, can also take a free relative clause which is dominated by a C node. Cf. (59)-(63):

(59) a. I cannot see very well from here.

b. I cannot see very well from where I am standing ___.

(60) a. My circumstances are different from your circumstances.

b. My circumstances are different from what your circumstances are ___.
(61) a. I have great faith in the government.
   b. I have great faith in what the government promises
to do ___.

(62) a. I will build my house on this piece of land.
   b. I will build my house on whichever piece of land
   the government is willing to give me ___.

(63) a. I refuse to look at your antics.
   b. I refuse to look at what you are doing ___.

The sentential complements to the prepositions in the (b)
sentences have (each) a gap, and are (so far) quite parallel to
the complements of before and after. The former are different
only in that they have (each) an overt wh-phrase which has been
"moved" from the gap. (We are not interested here in whether a
movement rule is involved, or only a construal rule.) Now, if we
say that the complement sentences of before and after are free
relative clauses which have had their wh-phrases deleted, we
immediately account for the obligatory presence of a gap in
them, and for the fact that the gap has the properties that it
has.

We also explain why before and after are never followed by
a free relative clause 'headed' by the temporal wh-phrase when;
cf.
(64) * I arrived there before when Mary arrived there.

Other prepositions can be followed by free relatives headed by when:

(65) The times are different now from when I first came to this country.

Also, the sentence corresponding to (64) which has a 'regular' relative clause with an NP head, is acceptable:

(66) I arrived there (long) before the time when Mary arrived there.

The simplest explanation for the absence of sentences like (64) is to postulate a deletion.

There are two theoretical questions of interest to us, on which this reanalysis of before and after appears to have some bearing. The first question is that of the PS rule for PP's. According to our reanalysis, the relation of before to its sentential complement is that which is shown in (67):

(67)

```
           PP
           |
           P
           |
           AdvP
           |
           AdvP
           |
           S
           |
           the conference started
```

before when
If this analysis is correct, we must backtrack on Klima's proposal that before and after are prepositions which are subcategorized to take an S-complement. In (67), before strictly subcategorizes the category AdvP, not S. If every preposition which appears to take a sentential complement can be similarly reanalyzed as taking (in fact) free relative clauses, we should be able to simplify the PS rule for the expansion of PP's.

Jackendoff (1977) has proposed the following PS rule for PP's (see Jackendoff's (4.58)):

\[(68). \quad P' \rightarrow P \begin{cases} (NP) - (PP) \end{cases} \quad (a) \\
\quad \begin{cases} (S) \end{cases} \quad (b)\]

We should be able to eliminate the (b) expansion. (The (a) expansion is probably in need of modification, cf. (67), but we leave aside this question.)

Besides before and after, we have at least four other prepositions which can be cited as evidence for the (b) expansion -- since, while, till, until. It is possible to show that the sentential complements of all these prepositions contain a gap, by the same type of evidence that we used in the case of before and after. Consider till, in (69):

\[(69) \quad \text{We waited till Mary arrived } \_\_.\]

Some evidence for the presence of the indicated gap in (69) is
that, while the sentence *Mary arrived* can normally be modified by a time expression like *at 4 o'clock*, the embedded sentence in (69) cannot take such a modifier:

(70) * We waited till Mary arrived at 4 o'clock.

Also, *till* never takes a free relative clause complement headed by *when*, a lacuna that must be accounted for:

(71) * We waited till when Mary arrived.

(Cf. *We waited till the time when Mary arrived.*)

The simplest explanation for these two facts would seem to be that the sentential complement of *till* is a free relative clause headed by *when*, from which *when* has been deleted.12

We now come to the second theoretical question, which has to do with the analysis of comparatives. We saw that *before* and *after* obligatorily delete the *wh*-phrase in their free relative clause complements. (This property may belong to 'temporal' prepositions, for note that all our six prepositions, *before*, *after*, *since*, *while*, *until*, *till*, belong to this class.) The prepositions *in*, *on*, *at*, *from*, never allow this deletion. Thus we get (72a)(= (60b)), but not (72b):

(72) a. My circumstances are different from what your circumstances are.

b. * My circumstances are different from your
circumstances are.

From this perspective, than and as can be said to represent the intermediate case. In some dialects they behave like before and after, obligatorily deleting the wh-phrase of their free relative clause complement. In other dialects, they allow an optional deletion. Thus, in contrast to (72), we get (in these latter dialects) both (73a) and (73b):

(73)  
a. My circumstances are different than what your circumstances are.

b. My circumstances are different than your circumstances are.

The claim that the rule which deletes the what in comparatives is triggered by certain marked prepositions explains a number of the properties of this rule. In dialects which allow the what-variant, the what surfaces in all sentences containing than or as, not just in the class of comparative sentences. This argues that the crucial factor is the preposition, not comparison. We saw an instance of the rule's idiosyncracy in (73a) and (72a): the first has a variant with the what deleted, but not the second, although the sentences are semantically and syntactically identical. This type of idiosyncracy is even better illustrated by the case of like and unlike. Like optionally deletes the what, but unlike never does:
a. She isn't like what she used to be.
b. She isn't like she used to be.

(75)  

a. She is unlike what she used to be.
b. * She is unlike she used to be.

I cannot think of any device except lexical marking of particular prepositions, that can reasonably account for facts like these. In particular, an analysis which treats the what-variants of comparatives and 'regular' comparatives as different syntactic processes (Bresnan (1975;1976b)) will have great difficulty accounting for such facts.

In summary, a wider examination of prepositions shows that the notion that a preposition deletes the wh-phrase head of a free relative clause complement has some plausibility.
Bresnan (1973) postulates rules which change er much and er many to more; also rules which (in a structure like (3b)) change er much clever to cleverer.

Chomsky abbreviates the name of this rule as "C-Sub" in Chomsky (1977).

Taraldsen seems to deny Subdeletion only in sentences in which the compared constituent of the comparative clause is superficially "complete" (as in our sentences (5)); he admits it in cases where the compared constituent is obviously "incomplete", as in some examples we consider immediately below. He maintains that Subdeletion is not "a unitary phenomenon".

This fact (in isolation) can perhaps be explained away in terms of semantic factors.

Subdeletion sentences tend to 'decay' with increasing depth of embedding. But this is a matter of decreasing acceptability, rather than a case of ungrammatical. (Thus the reader can contrast (27b) with (25b); the latter is truly ungrammatical, the former not.) I shall give an explanation for this property
of Subdeletion in Chapter Four.

6 Bresnan (1975) maintained -- citing some grammaticality judgments of Hankamer -- that Subdeletion sentences do not have variants with what. However it has since been established that they do have such variants (Bresnan, personal communication).

7 Bresnan (1972, 228) cited the following sentences as evidence of the parallel structures of comparatives and relatives:

(i) Tell him all that, and perhaps more than he'd like to know.
(ii) Tell him almost as much as, but certainly not all that, he'd like to know.

Here in (i), he'd like to know is obviously an S in relation to the complementizer that. How then can it be a free relative in relation to than? Thus our argument appears to cut both ways, it could be pointed out.

But in fact it doesn't. We can say that (i) has the underlying structure (iii) before the deletion of what:

(iii) Tell him all that, and perhaps more than what, he'd like to know.

Since a free relative has the structure, (iv) (see Bresnan and Grimshaw (1978)):
(iv) [wh-phrase [S ...]]

the string he'd like to know is an S, and therefore satisfies the subcategorization of both that and than (what).

8 It could be argued -- on the basis of a (Subdeletion) sentence like (i), wherein the gap represents the left branch modifier of a phrase (in this case, an AP):

(i) The door is longer than what it is wide

-- that the what must also be an exception to the left branch condition. (This condition prohibits the left branch modifier of a phrase from being moved away from its head, cf.

(ii) How wide is the door?
(iii) * How the door is wide?)

However we show in Chapter Four that a different analysis of Subdeletion is possible which makes the left branch condition irrelevant.

9 No confusion should be caused by a sentence like (i):

(i) The shootout occurred before what happened at the party.

Here, before takes a free relative clause complement; but since this clause is headed by what, it cannot be also headed by when.
Is a *when* deleted in this clause? And if so, is it deleted "in place"?

Actually, no deletion of *when* has taken place in this clause. To see why, note (first) that this clause is an NP. The NP complements of *before*/*after* belong to three types, according to how they are interpreted. The three types are illustrated in (ii):

(ii)  John arrived before * Bill arrived.  
      o'clock  

          the explosion  

The NP complement in (iia) denotes a point of time, and therefore can be interpreted straightway. The NP complement in (iib) is interpreted by assigning it a participant role in a sentence, which is reconstructed by means of a copying rule. Thus (iib) will be interpreted as (something like) (iii):

(iii) John arrived before *(when)* Bill arrived.

The "expanded" complement explicitly denotes a point of time (as *Bill didn't*). The third type, illustrated in (iic), is a NP which must be marked for the semantic feature [+ Event]. The free relative in (i) belongs to this type. Note that a [- Event] NP in its slot yields a starred sentence:

(iv)  * The shootout occurred before what you told me at
the party.

Sentences (iic) and (i) are interpreted along the lines of (v) and (vi), respectively:

(v) John arrived before (when) the explosion took place.
(vi) The shootout occurred before (when) [what happened at the party] took place.

Here again, the "expanded" complement denotes a point of time.

Note (however) that when (or its semantic equivalent) figures here only in the output of the interpretation rules, namely, (v) and (vi); it is not present syntactically, in (iic) or (i).

10 Bresnan and Grimshaw (1978) propose an analysis of free relatives in which the wh-phrase introducing the clause is generated as the head of the clause (instead of generating, say, a as the head of the clause). I shall adopt this analysis here, although nothing that I say here depends on any particular analysis of free relatives.

11 Emonds (1976,173) also cites because, but I think because belongs with particles like if, in case, etc. whatever the syntactic category of these particles may be.

12 I must however point out a problem for applying this analysis to till, until, since, and while. In the case of before and
after, one of the strong arguments for saying that the deleted element in the complement was a wh-phrase, was that the gap was "unbounded". But "unbounded" gaps are not equally acceptable if the sentences contain one of these other prepositions. Consider (i) and (ii):

(i) * We waited till Mary had promised that she would arrive ___.
(Cf. We waited till the time when Mary had promised that she would arrive ___.)

(ii) * The show went on till the newspaper says that the Police closed it down ___.

At present I have nothing useful to suggest regarding why there should be this difference.
CHAPTER TWO

ELIMINATING COMPARATIVE ELLIPSIS

It was pointed out in Chapter One that Comparative Ellipsis is not a unitary phenomenon, but a cover term for three distinct processes. These processes have up to now been commonly analyzed as deletions "under identity". The purpose of this chapter is to show that each of these processes must be reanalyzed in terms of an interpretive account. Also, they must be assimilated to three distinct interpretation rules. As a result, the category of 'Comparative Ellipsis' can be eliminated.

1. CE1 as VP Deletion

The operation of CE1 is illustrated by the sentences of (1):

(1) a. John shot more tigers than Bill did.
    b. You have eaten more apple pie than you should have.
    c. Hans will not be as considerate as Pete has been.

These sentences have variants with what (in the dialects which permit a surface what):
(2)  
  a. John shot more tigers than what Bill did.  
  b. You have eaten more apple pie than what you should have.  
  c. Hans will not be as considerate as what Pete has been.  

We shall assume the comparative clause of CEI sentences to have the structure of a free relative clause, as we did in the case of CD sentences.

1.1. Common Properties of CEI and VP Deletion

CEI has a number of properties in common with VP Deletion. There are some putative differences between the two rules, which we shall discuss presently. But meanwhile, let us note some of the common properties.

VP Deletion deletes a VP immediately following an auxiliary element (see Sag (1976,1.1)). It is important that the rule leave AUX as the immediate left context of the deletion site; for if it takes the AUX also along with the VP, we get an ungrammatical sentence:

(3)  
  a. John wants to leave, but Mary doesn't want to.  
  b. * John wants to leave, but Mary doesn't want.  

In (3a), the deletion site is immediately preceded by to, an auxiliary element; this is not the case in (3b). The same
property is exhibited by CE1:

(4)  
   a. John is determined to walk faster than Mary is determined to ___.
   b. John is determined to walk faster than Mary is ___.
   c. * John is determined to walk faster than Mary is determined ___.

In (4a) and (4b), the deletion site is preceded by to and be, both elements of AUX. (Be and have behave like auxiliary elements in this respect, see Sag (1976).) In (4c), the site is preceded by a nonauxiliary element.

Sentences (4a) and (4b) illustrate a property of the two rules that is inherent in their structural descriptions: if there are n "suitable" VP's (i.e., n VP's which immediately follow AUX, and are "recoverable"), the rules give n different grammatical outputs. This property is nicely illustrated by the following examples ((5) taken from Bresnan (1976a)):

(5)  
   a. Frankie will [vp seem to [vp want to [vp leave St.Louis]]], but Johnny won't [vp seem to [vp want to [vp leave St.Louis]]]
   b. Frankie will seem to want to leave St.Louis, but Johnny won't.
   c. Frankie will seem to want to leave St.Louis, but
Johnny won't seem to.

d. Frankie will seem to want to leave St. Louis, but Johnny won't seem to want to.

(6)  
a. Frankie will \((\text{VP seem to}) \text{VP want to}\) \((\text{VP leave more towns than Johnny will}\) \((\text{VP seem to}) \text{VP want to}\))

b. Frankie will seem to want to leave more towns than Johnny will __.

c. Frankie will seem to want to leave more towns than Johnny will seem to __.

d. Frankie will seem to want to leave more towns than Johnny will seem to want to __.

In (6a), note that we close the brackets opened in the antecedent clause only at the end of the comparative clause. This is because the comparative clause is a subordinate clause, which is contained in all the VP's of the matrix clause. This illustrates an apparent problem for the formulation of CE1: how can a constituent A be deleted under identity with a constituent B which also contains A? Without offering a solution for the problem here (we take it up again later in the chapter), let us simply note that this property (or problem) too is shared by VP Deletion; cf. (7):

(7)  
a. Bill will \((\text{VP visit any girl who asks him to}) \text{VP visit her})\]
Here VP Deletion must delete a VP, visit her, under identity with the string, visit any girl, which is part of an antecedent VP that also contains the first VP. ¹

A property of VP Deletion which has been studied in several places (Halliday and Hasan (1973), Quirk et al (1972), Sag (1976)) is the way this rule ignores nonidentity of verbal affixes. Quirk et al (1972,580-581) cite the following data to illustrate the point (quoted by Sag (1976,1.2)):

(8)  

a. Present and Modal

John understands the situation and surely Peter should Ø. [Ø = understand the situation]

b. Past and Modal

Bob entered the competition and Paul may Ø. [Ø = enter the competition]

c. Progressive and Modal

Peter is complaining about the noise but John won’t Ø. [Ø = complain about the noise]

d. Perfect' and Modal

John hasn’t met my brother yet, but (he) will Ø soon. [Ø = meet my brother]

e. Progressive and Perfect

John may be questioning our motives, but Peter hasn’t Ø. [Ø = questioned our motives]
f. Past and Perfect

Peter **saw** your parents last week, but he hasn't \( \emptyset \) since. \( [\emptyset = \text{seen your parents}] \)

Quirk et al also note an exception to the rule's general disregard of affixal identity: if the delendum is passive, and the antecedent is active, no VP Deletion is possible, cf.

\[(9) \quad \ast \text{Paul denied the charge, but the charge wasn't } \emptyset \text{ by his friends. } [\emptyset = \text{denied}]\]

Precisely this configuration of properties is also exhibited by CE1: the sentences of (10) illustrate this rule's general disregard of affixal identity, and sentence (11) shows that it (however) does not disregard the active-passive nonidentity:

\[(10) \begin{align*}
\text{a. Present and Modal} \\
\text{John understands the situation as well as he should } \emptyset. \quad [\emptyset = \text{understand the situation}] \\
\text{b. Past and Modal} \\
\text{Bob ate more apple pie than he said he could } \emptyset. \quad [\emptyset = \text{eat}] \\
\text{c. Progressive and Modal} \\
\text{You are eating more apple pie than you said you would } \emptyset. \quad [\emptyset = \text{eat}] 
\end{align*}\]
d. Perfect and Modal

You have eaten more applepie than you may ø. [ø = eat]

e. Progressive and Perfect

Bob is doing more work for us than Peter ever has ø. [ø = done]

f. Past and Perfect

I saw more movies last week than I have ø since. [ø = seen]

(11) * Paul denied the charge more vehemently than it was ø by his friends. [ø = denied]

A minor quirk of VP Deletion noted in Akmajian and Wasow (1975) and Sag (1976) is that "VPD can never take place immediately after -ing" (Sag (1976,1.2)). Sentence (12) illustrates this property. Sentence (13) shows that CEI also has this property.

(12) * Bill is being hassled by the police; and Peter is being ø, too.

(Cf. Bill is being hassled by the police, and Peter is ø, too.)

(13) * Bill is being hassled by the police more often than Peter is being ø.

(Cf. Bill is being hassled by the police more often than Peter is ø.)
A property of VP Deletion that we shall have much to say about in Chapter Four is its apparent ability to delete less than the whole VP. Consider the following examples (from Sag (1976,1.2)):

(14)  a. John could pull you out of a plane, like he did Ø his brother Ø.
     b. Mary hasn’t dated Bill, but she has Ø Harry.

In (14a), the rule seems to delete the following discontinuous elements of the VP: pull • • out of a plane. In (14b), it seems to delete (just) dated. Examples like (14) make Sag talk of the possibility of formulating VP Deletion as a variable-deleting rule; but we shall give a different type of solution in Chapter Four. But in the meanwhile, note that CE1 also does similar things:

(15)  a. John pulled his girlfriend out of the plane more willingly than he did Ø his brother Ø.
     b. Mary hasn’t known Bill for as long a period as she has Ø Harry.

To sum up, there is a point-by-point correspondence between the properties of VP Deletion and CE1, which ought to force us to the conclusion that they are the same rule. A suggestion in this direction has indeed been made (Sag (1976), Brame (1979)).
But there are two possible objections to this move; and these have made many linguists hesitate to make the move.

### 1.2. Two Putative Differences Between CE1 and VP Deletion

CE1 (like CD, Subdeletion, and CE3) is known to observe the island constraints; cf.

(16)  
\begin{align*}
a. & \quad * \text{John eats more peanuts than Mary knows a boy who does } \\
b. & \quad * \text{John eats more peanuts than Mary believes the claim that he does } \\
\end{align*}

(17)  
\begin{align*}
a. & \quad * \text{John eats more peanuts than you asked me if he does } \\
b. & \quad * \text{John eats more peanuts than Mary wonders whether he does } \\
\end{align*}

(16) shows the rule's subjection to the Complex NP Constraint, and (17) its subjection to the Wh-Island Constraint. But one of the best known properties of VP Deletion is that it is not subject to Ross's constraints. (This has been noted as early as Ross (1967), Hankamer (1971).) Thus we get sentences like (18):

(18)  
\begin{align*}
a. & \quad \text{A man who doesn't love cats shouldn't marry a woman who does } \\
b. & \quad \text{John returned the money two days after you asked me if he had } \\
\end{align*}

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(18a) violates the Complex NP Constraint, and (18b) the Wh-Island Constraint.

A second (putative) difference between the two rules is that VP Deletion may apply "across utterance boundaries"; i.e., the deleted VP and its antecedent need not be in the same sentence. Cf.

(19) A: Does Bill like cats?
     B: No, he doesn't.

But CE1 appears to behave differently in this respect (example adapted from Williams (1977)):

(20) A: Did John see cows?
     B: Yes, but Sam saw more horses than John did.

Here the missing VP in B's reply cannot be interpreted as see cows; it must be see horses. (I.e., the sentence cannot be given the reading, 'Sam saw more horses than John saw cows'; it can only mean 'Sam saw more horses than John saw horses'.) Thus CE1 appears to be "sentence-bound".

Owing (perhaps) to these differences Williams (1977) classifies CE1 as a rule of Sentence Grammar (p.120); while VP Deletion is treated as a rule of Discourse Grammar.
1.3. Explaining Away the Differences

Let us see if these objections can be answered. We shall look at the second objection first. Observe that (19) and (20) are not completely parallel. In (20) (unlike in (19)), there is much intervening material (in fact, an S) between the missing VP and the VP we were trying to interpret as its antecedent. A case of VP Deletion which is more fully parallel to (20) would be (21):

(21) A: Did you see tigers?
    B: No, Sam saw elephants but I didn't.

Here it is difficult to read the second conjunct of B's reply as but I didn't see tigers. Yet (at the same time) there are examples like (22) (= Williams's (2)) which are more or less parallel to (21):

(22) John didn't immediately open the door -- first he shut the window, and then he did.

Here (as Williams intends to point out) it is possible to read the missing VP as open the door. What all this may show is that when the missing VP and the antecedent VP are not 'proximate', one needs strong "contextual help" (of some kind) to get the intended reading. 2

There is also another (and a stronger) reason why the missing VP in (20) cannot be interpreted as see cows. Assuming
for the moment (for the sake of easier illustration) a deletion analysis of VP Deletion -- we shall later on adopt Williams's "copying" analysis of this rule --, the structure of the comparative sentence in (20) before deletions will be (23):

(23) Sam saw more horses than what John saw.

Here, saw (or see) is simply not identical to see cows.

This point can be illustrated with an example which does not involve a comparative at all:

(24) John will visit Mary. And Bill will visit any girl whom he wants to .

The missing VP here cannot be interpreted as visit Mary, simply because the pre-deletion structure is:

(25) ... Bill will visit any girl whom he wants to visit.

And visit is not identical to visit Mary.

What we see (from (24)) is that, in all cases involving a VP containing a trace bound by a phrase outside the VP, the rule of VP Deletion cannot apply "across utterance boundaries". The fact about CEI that we noticed could simply be a subcase of this.

Let us now look at the second objection, namely that CEI and VP Deletion behave differently with respect to the island
constraints. Here again we see that the objection is completely misdirected. VP Deletion is a rule which does not involve 'trace binding'; therefore there is no reason to expect this rule to obey the island constraints. (There is a generalization -- to which there is no exception that I am aware of -- that copying rules do not observe the island constraints.) But there are cases like (24), in which the "deleted" VP contains a trace bound by a wh-phrase outside the VP. Such sentences do obey the island constraints, cf.

(26) a. * Bill doesn't visit the girl who(m) Pete believes the claim that he does __.

(Cf. Bill doesn't visit the girl who(m) Pete believes that he does __.)

b. * Bill visited a girl who(m) I know a man who wouldn't __.

(27) a. * Bill doesn't visit the girl who(m) Pete asked me if he does __.

b. * Bill doesn't visit the girl who(m) Pete wonders whether he does __.

These sentences are ungrammatical because an intervening island boundary blocks trace binding, as shown below (we again assume, for convenience, a deletion analysis of VP Deletion):
(26a') Bill doesn't visit the girl whom Pete believes [NP the claim that [S he visits t₁]

Now a comparative sentence involves 'trace binding', as shown in (28):

(28) Sam saw more horses than what₁ Bill saw t₁.

An intervening complex NP blocks the trace binding:

(29) Sam saw more horses than what₁ Mary believes [NP the claim that [S John saw t₁]

The case of (29) is completely parallel to that of (26a'). I.e., there is no special property of CE1 illustrated here, which is not also present in VP Deletion sentences.

Thus we see that there is no reason at all for treating CE1 as a different rule from VP Deletion, and we shall therefore collapse these rules.

2. Interpreting VP Deletion in Comparatives

An account of how a comparative sentence involving VP Deletion is interpreted brings us face to face with a problem which has primarily to do with the analysis of VP Deletion (and nothing specifically to do with comparatives). Before we describe the problem, it may be necessary to give an outline of the two current analyses of this rule, namely that of Sag (1976)
and that of Williams (1977). Sag's account of the rule employs an operation of 'deletion-under-identity' (like traditional accounts); however, "identity" is not defined at the syntactic level (as in traditional accounts), but at the level of Logical Form (LF). In Williams's version of the rule, the "deleted" VP is generated as a "null" VP in the deep structure. The difference between the two rules can be illustrated as follows: sentence (30) will be derived from a deep structure more or less like (31a), in Sag's account; its logical representation will be (ignoring AUX) (31b). The VP of the second conjunct can be deleted, since its logical representation is identical to that of the antecedent VP, and is therefore recoverable. In Williams's analysis, the deep structure of (30) will be (32a), and its logical representation (ignoring AUX) (32b). The copying rule will give us (32c), which is the interpretation we want.

(30) John runs; and Bill does too.
(31) a. John AUX [vp run]; and Bill AUX [vp run] too.
    b. John, λx [x run]; and Bill, λx [x run] too.
(32) a. John AUX [vp run]; and Bill AUX [vp △ △] too.
    b. John, [vp λx [x run]]; and Bill [vp △ △] too.
    c. John, [vp λx [x run]]; and Bill [vp λx [x run]] too.
In this thesis we shall adopt the "copying" account of VP Deletion, for reasons given in Williams (1977) and Brame (1976), and for additional reasons which will appear in Chapter Four.

The problem that we spoke of concerns sentences like (33), in which a wh-phrase binds a trace 'within' the "null" VP:

(33) Bill will visit any girl whom he wants to ___.

In Sag's account of VP Deletion, this sentence presents no special problem. Its structure at the point of application of VP Deletion will be:

(34) Bill will visit any girl whom he wants to visit tₕ

(34) will be generated by moving whom from the position of the trace, in the normal way. Sag would solve the problem of how visit tₖ can be deleted under "identity" with visit any girl, by appealing to their identity at the level of LF. Although Sag doesn't specify the rules which will output the "logical forms" he requires (see his discussion of his example (2.1.36)), we shall assume rules which will give (34) a logical representation along the lines of (35):

(35) \((\forall x : x \text{ is a girl} \land \text{Bill, } \lambda y [y \text{ want } [y, \lambda z [z \text{ visit } x]]]) \land \text{Bill, } \lambda w [w \text{ visit } x]\)

The two underlined expressions of (35) are the reflexes of the two underlined VP's of (34). They have the required identity
(being simply alphabetic variants), and therefore visit t₁ can be deleted under identity with visit any girl.

In Williams's account of VP Deletion, the missing VP of (33) will be generated as a "null" VP. There are two questions now: Where is whom generated? And if it is generated in its surface position (the COMP), what happens to its trace? We saw that trace binding does take place in such cases, cf. (26) and (27).

I shall suggest a tentative solution, prior to adding that whatever is the correct solution for this problem is also the solution for the identical problem that arises in the interpretation of VP Deletion in comparatives. Let us assume that whom (in (33)) is generated in the COMP. Let us also assume (with Williams, see p.105) that the "null" VP is generated with all the internal structure of its antecedent. We can think of 'trace' as being 'established' by an interpretation rule, which can be one of the earliest rules of the interpretation component. An algorithm which does precisely this has been described in Brame (1978); we shall not repeat it here.

The structure of (33) after the establishment of trace will be:

(36) Bill will visit any girl whom₁ he wants to \[ VP [VΔ] \]
\[ NP₁ Δ ]

We shall assume (for reasons given in Chapter Five) that all
traces are replaced by bound variables prior to LF. The LF-level representation of (36) will be (assuming the same interpretation rules that we assumed in the case of (35)) something along the lines of (37):

\[(\forall x: x \text{ is a girl} \land \text{Bill}, \lambda y [y \text{ want } y, [VP \Delta [\Delta x]]]) [\text{Bill, } [VP \lambda w [w \text{ visit } x]]]\]

Normally, a copying rule will now copy \(\lambda w [w \text{ visit } x]\) into the "null" VP. But in this case, the VP is not completely null, but contains one argument position which is 'taken'. The copying rule could now either "superimpose" one \(x\) on top of the other; or it could copy only into the empty places.

The correct solution to this problem will also take care of VP Deletion in comparatives. In Chapter Three we describe how a CD-type comparative is interpreted. The main operation (in this interpretation) is the copying of (the LF-level reflex of) the 'head' of the comparative clause into the position of the trace of what. We shall assume that the same operation takes place in the interpretation of a comparative involving VP Deletion (a "CEl-type" comparative) like (38):

\[(38) \quad \text{John ate more apples than (what) Bill did } [VP \Delta \Delta]\]

The "establishment of the trace" of what, and the copying of \(x\) many apples into the position of the trace, will yield the LF-level representation, (39):
The copying which interprets VP Deletion, which must now copy \textit{eat x-many apples} into the partly-null VP, will either "superimpose" \textit{x-many apples} on \textit{x-many apples}, or copy only into the empty positions.

3. Reanalyzing CE2

The notion that comparatives like the (a) sentences below are derived from the (b) sentences is as old as the grammar books of English:

(40) a. She is taller than I/me.
    b. She is taller than I am.

(41) a. John has more horses than Bill.
    b. John has more horses than Bill has.

(42) a. I have more peanuts in my left pocket than in my right pocket.
    b. I have more peanuts in my left pocket than I have in my right pocket.

However, the first attempt to present arguments to establish this claim was perhaps that of Bresnan (Bresnan (1973)). Bresnan offered to explain a 'mystery' about comparatives that had already been noticed (e.g., in Chomsky (1965)); namely that
while the sentences of (43) are fully acceptable (and roughly synonymous), this is not the case with the analogous sentences of (44) -- here the (b) sentence is felt to be semantically odd.

(43)  
a. I have never seen a man taller than my father.  
b. I have never seen a taller man than my father.  

(44)  
a. I have never seen a man taller than my mother.  
b. I have never seen a taller man than my mother.

Bresnan's explanation was that these sentences were derived by a rule of ellipsis from the deep structures (omitting details):

(45)  
a. I have never seen a man taller than my father is an x-much tall man.  
b. I have never seen a taller man than my father is an x-much tall man.

(46)  
a. I have never seen a man taller than my mother is an x-much tall man.  
b. I have never seen a taller man than my mother is an x-much tall man.

Here, (46b) is semantically anomalous, since it implies that 'my mother is a man'; hence the unacceptability of (44b).

Bresnan uses this as an argument for the rule of ellipsis; but it is very weak in this function. Consider the following sentences:
(47)  a. A peacock is (a bird which is) very stately, compared to a pheasant.

 b. A peacock is a very stately bird, compared to a pheasant.

c. A peacock is (a bird which is) very stately, compared to a monkey.

d. # A peacock is a very stately bird, compared to a monkey.

(48)  a. My father is (a man who is) tall, compared to my uncle.

 b. My father is a tall man, compared to my uncle.

c. My father is (a man who is) tall, compared to my aunt.

d. # My father is a tall man, compared to my aunt.

The (d) sentences here are semantically odd, and apparently in the same way as (44b) is odd. (Thus (47d) implies that 'a monkey is a bird', and (48d) that 'my aunt is a man'.) Yet it would be difficult to maintain that the phrase compared to NP is derived from an underlying S by a rule of ellipsis. What these sentences do seem to show is there is a semantic constraint on comparison; I shall speak of this constraint again presently.
3.1. The Nonunitary Nature of CE2

The discussion of CE2 can make substantial progress (I believe) if we recognize that CE2 is not a unitary phenomenon. The complements of than/as in CE2-type comparatives can be grouped into three classes, according to the way they are interpreted. The reader may recall that in fn. 9 of Chapter One, we claimed that the NP complements of before/after belonged to three classes. The following was our example:

(49) John arrived before 4 o'clock (a) 
     Bill (b) 
     the explosion (c) 

The (a)-type complement (we said) can be interpreted straightaway, because it denotes a point of time. The (b)-type complement needs to be "plugged into a slot" in a sentence generated by a copying rule. The (c)-type complement must meet the semantic requirement that it denote an event. Now, than and as have precisely the same three types of complements.

3.1.1. The (a)-Type Complement

The (a)-type complement is a measure phrase, and is illustrated by the underlined phrases of (50):

(50) a. John is taller than six feet. 
     b. John is more than six feet tall.
c. Bill made as many errors as twenty.
d. Bill made as many as twenty errors.

Some effort was made (early on, in the analysis of comparatives) to derive these complements from deep structure S's such as...

than six feet is x-much or ...than twenty is x-many (see Bresnan (1973,330); also see Lees (1961)). But such derivations have neither syntactic, nor semantic, justification, since the proposed deep structure is farther from the logical structure of comparison than the surface structure complement. (See Huddleston (1967) for an early suggestion that complements of than which denote 'explicitly defined standards' should be distinguished from the other types of complements.)

3.1.2. The (c)-Type Complement

It is the (c)-type complement that has to do with the semantic constraint that we spoke of. This type is illustrated in (51) ((51b)= (43b)):

(51) a. The Second World War killed off more people than the entire population of France.
b. I have never seen a taller man than my father.
c. We need a richer benefactor than Henry.

The complement here does not directly denote a measurement on the scale of comparison (like the (a)-type complement does);
however it indirectly specifies a point on this scale. To take a concrete example, Henry (in (51c)) is not a measure phrase, but it does help to pick out a point on the scale of "x-much rich benefactors". The semantic constraint on this complement is (roughly) that the object the complement denotes (Henry, in (51c)) must belong to the set denoted by the 'head' (in (51c), the 'head' is 'an x-much rich benefactor'), for some value of the variable x in the 'head'. This requirement accounts for the anomaly of (44b) (repeated below):

(44b)  # I have never seen a taller man than my mother.

Here, 'my mother' does not belong to the set denoted by 'an x-much tall man', for any value of the variable x.

This "set-inclusion" requirement was what Bresnan (1973) was trying to capture in syntactic terms by proposing deep structures like (52), for sentences like (51):

(52)  a. The Second World War killed off more people than the entire population of France is x-many people.

b. I have never seen a taller man than my father is an x-much tall man.

c. We need a richer benefactor than Henry is an x-much rich benefactor.

There is little to recommend such a syntactic derivation (however). Thus suppose we assume (with Bresnan (1973)) that CD
deletes \textit{x many people} in (52a). We still need to delete \textit{is}. This deletion cannot be a deletion under identity, since the matrix clause has no \textit{is} (or \textit{be}). So we need a special \textit{be-deletion} rule. In the analogous case of the (c)-type complements of \textit{before/after}, if we try to derive \textit{John arrived before the explosion from John arrived before the explosion took place}, we need a \textit{take-place-deletion} rule. Neither of these rules has any independent motivation; and they are best avoided.

3.1.3. The (b)-Type Complement

The (b)-type complement of \textit{than/as} is illustrated by (53):

\begin{itemize}
  \item[(53)] John got more peanuts than Bill.
\end{itemize}

This sentence is "understood" as \textit{John got more peanuts than Bill got peanuts}; an informal way of speaking of how it is construed would be to say that \textit{Bill} is substituted for \textit{John} in a copy of the matrix clause.5

Unlike the other two types of complements, the (b)-type complement provides some strong arguments for deriving it from an underlying \textit{S}. Firstly, the complement can be any phrasal category (including \textit{S}):

\begin{itemize}
  \item[(54)]
    \begin{itemize}
      \item[a.] John is taller than Bill. \textit{(Noun Phrase)}
      \item[b.] He is more handsome than clever. \textit{(Adjective Phrase)}
    \end{itemize}
\end{itemize}
c. She eats more elegantly than quickly. (Adverb Phrase)
d. There are more birds in the woods than in the garden. (Prepositional Phrase)
e. More people want to swim than ride. (Verb Phrase)
f. That the earth is spherical seems more certain than that it is flat. (Sentence)

Since it is unlikely that than (a preposition) is subcategorized to take these various types of complements, a way of accounting for these complements would be to say that they are generated as elements of an underlying S.

An even stronger argument is provided by sentences in which than (or as) is followed by more than one element. Bresnan (1972,286) gives the following very interesting example:

(55) I'm as willing to visit you there on Monday as her here on Tuesday.

We certainly wouldn't want our phrase structure rules to generate a string like as her here on Tuesday -- unless we can defend a radically different view of phrase structure rules than we have today.
3.2. CE2 (b)-Type Comparatives: Deletion or Interpretation?

Assuming (then) that in the case of comparatives involving (b)-type complements, an S is syntactically present as the complement of than/as in the deep structure, an interesting question still remains: do we have deletion here, or interpretation? In the first case, we start out with a "full" S (an S with its nodes lexically filled) as the complement of than/as; in the second case, we perhaps have a "skeletal" S in the deep structure, in which only a few positions may be filled. To take a concrete example, sentence (53) (repeated below) will either have (56) or (57) as the deep structure of the than-phrase:

(53) John got more peanuts than Bill.

(56)
Another possibility would be to generate the complement of than fully empty, and have Bill generated as a "satellite", Chomsky-adjointed to (perhaps) S:

Bill will now be "interpolated" into an NP position in the S by
means of mechanisms that we describe in some detail in Chapter Four.

Whether we adopt deletion or interpretation, the process that is operative here is probably the same process that we see in coordinate structures such as (59): 7

(59) a. Jane is handsome, but not Betsy.
    b. I gave John a nickel, and Peter a dime.
    c. Either you take Jane to school, or Betsy to the store.

The second conjuncts of these sentences are interpreted as: 'but Betsy is not handsome', 'and I gave Peter a dime', 'or you take Betsy to the store'. Since 'not Betsy', 'Peter a dime', and 'Betsy to the store' are not constituents, we have the same problem as in the (the (b)-type complements) of CE2-type comparatives: these strings cannot be directly generated by phrase structure rules. Other similarities with the comparatives are that the process is 'bounded' (cf. * Joan likes Richard, but Mary says that not Betsy); that it can "remainder" (in the reduced sentence) more than one element (as we have already shown); and that these elements can be any phrasal category, as shown in (60):

(60) a. John is handsome, but not clever. (Adjective Phrase)
b. John sings enthusiastically, but not well. (Adverb Phrase)

c. John can sing, but not dance. (Verb Phrase)

d. The bird is in the woods, not in the garden. (Prepositional Phrase)

e. That the sun is hot is obvious, but not that the earth is flat. (Sentence)

Assuming (then) the identity of the processes in coordinate structures and in CE2-type comparatives (with (b)-type complements), we may have an argument in favor of an interpretive account of this process (as opposed to a deletion account). Consider the position of not in (59a) (repeated below):

(59a) Jane is handsome, but not Betsy.

If the second conjunct is derived by deletion from the "full" S (61) but Betsy is not handsome,

we need not only a deletion rule (which, incidentally, may be a very difficult rule to formulate), but a "not-preposing" rule. Suppose (on the other hand) that we generate the second conjunct of (59a) as an "empty" S, Chomsky-adjointing not and Betsy to the S, roughly as shown below:
Three things ought to be kept in mind here: Firstly, a copying rule always accesses the logical representation of its antecedent (never its surface structure); therefore its output is always a logical representation too. (This is evidenced by the interpretation of VP Deletion, see Williams (1977), and the interpretation of CD', CE3 and Subdeletion, see Chapters Three and Four.) Secondly, not is a logical operator and has 'scope'; therefore in the logical representation of an S, its position is to the left of the S (where all scope bearing elements in English go). Thirdly, -- as our examination of "interpolation into gaps" in Chapter Four will show -- the left-to-right order of the "interpolated" elements must correspond to the left-to-right order of the positions which they 'bind' ('substitute for') in the structure output by the interpretation rules. Now, the logical representation of the second conjunct of
(59a) is (omitting details) (63):

(63) . . . NOT (Betsy be handsome)

The interpretive theory predicts that the order of the "interpolated" elements should be not Betsy, and not Betsy not. The deletion theory must account for the order in terms of an ad hoc "not-preposing" rule.

In concluding our discussion of CE2, I wish to suggest that a better understanding of the interpretation of CE2 comparatives must await an in-depth study of coordinate structures, and how they are interpreted. This is a task which I have not been able to undertake.

4. Eliminating CE3

The rule which we decided to call CE3 in Chapter One deletes a whole \( \bar{S} \) (containing the deletion site of CD) in the comparative clause, under identity with an \( \bar{S} \) in the matrix clause. Its operation is illustrated in (64), where it derives (64a) from the immediately underlying (64b):

(64) a. John shot more elephants than we expected .
   b. John shot more elephants than we expected that he
       would shoot .

(64b) itself is derived (for Bresnan) by the application of CD to the deep structure (omitting details) (65):
(65) John shot more elephants than we expected that he would shoot x-many elephants.

Now, both (64a) and (64b) have variants with what (in the dialects which permit a surface what in comparatives), cf.

(66) a. John shot more elephants than what we expected ____.

b. John shot more elephants than what we expected that he would shoot ____.

Since, for reasons given in Chapter One, we take the 'what-variants' to be basic (and sentences like (64) to be derived by a deletion of what), we shall focus our discussion on sentence pairs like (66). The question we face is: is there any motivation for deriving (66a) from (66b)? In other words, is there a rule of CE3?

Before we proceed, let us note that the type of relationship exhibited by (66a) and (66b), is also shown by the class of 'semi-comparatives' that we looked at in Chapter One. Thus, cf.

(67) a. The situation was different than what we expected ____.
The situation was \{different than\} what we
\{different from\}
\{the same as\}
\{like\}
\{as\}
expected that it would be ___.

Obviously, whatever device relates (66a) and (66b), must also
relate the sentences of (67a) and (67b).

Given a sentence like (66a), an obvious hypothesis to make
(regarding it) would be that what is the direct object of
expected in the deep structure; and that it has simply been
fronted by \textit{wh}-movement, as shown in (68): 8

(68)

\[
\begin{array}{c}
S \\
\text{COMP} \\
\triangle \\
NP \\
V \\
VP \\
\text{we expected} \\
\text{what} \\
S \\
\end{array}
\]

In fact, this is what I shall argue. I shall show that (in this
clause) only a fronting of what has taken place (or
equivalently, only a deletion of a PRO object by what, see
fn.8), and that no other elements have been deleted.

In the alternative analysis involving CE3, what we expected
will be derived from (69) by way of the two transformational operations, (70) and (71):

(69)  \[ \overline{S} \text{ [COMP] we expected that John would shoot what} \]

(70)  Wh-Movement

\[ \overline{S} \text{ [COMP what} \_\_ \text{] we expected that John would shoot t} \_\_ \]

(71)  Comparative Ellipsis

\[ \overline{S} \text{ [COMP what} \_\_ \text{] we expected } \varnothing \]

I shall show that such a derivation is not possible.

4.1. Argument from the Subject Condition

If my analysis of (66a) is correct, and what is the direct object of expected, the derivation of sentences (72) and (73) is straightforward. In (72), what has been promoted to the subject position by passivization; in (73), from its derived subject position, what has been raised to the subject position of a containing higher S, by Raising.

(72)  John shot more elephants than what was expected (by us).

(73)  John shot more elephants than what seems to have been expected (by his friends).

But let us examine how the alternative analysis of (66a) (making
use of CE3) will generate these sentences. The deep structure of the comparative clause in (66a) (as well as in (72)) will now be (74) (cf. (i) of fn.8):

By applying Passive in the cycle of $S_1$, we get (75) (we ignore the optional by-phrase here):
Now, before we can delete $S_2$ (by CE3), we must extract what from it (and place it in the COMP of $S_1$). This will be done either by successive-cyclic movements (as indicated by the solid-line arrows in (75)), or by a single movement (as shown by the broken-line arrow). Either way, the extraction will be blocked, since $S_2$ is the subject of $S_1$, and subject phrases are islands for extraction and deletion.

There are several versions of the condition which prohibits extraction or deletion from subject phrases; happily, any one of them will do for us. Let us first examine the "Subject Condition" of Chomsky (Chomsky (1973,249f.)). This prohibits extraction (or deletion) of an element which is properly contained in a subject phrase. (This does not prohibit the extraction or deletion of a whole subject phrase.) This
condition accounts for the contrast in grammaticality between (76b) and (77b), and between (78b) and (79b). (Examples are from Chomsky (1973). The (a) structures are the deep structures of the (b) sentences.)

(76)  
   a. COMP John heard [NP stories about who]  
   b. Who did John hear stories about?  

(77)  
   a. COMP [NP stories about who] terrified John?  
   b. *Who did stories about terrify John?  

(78)  
   a. COMP it surprised John [S Mary saw what]  
   b. What did it surprise John that Mary saw?  

(79)  
   a. COMP [NP [S COMP John saw what]] surprised Mary  
   b. *What did that John saw surprise Mary?  

Apparently there are exceptions to the prohibition of extraction from a subject phrase, if it is a Noun Phrase (see (ia) of fn.11 below); but there are no known exceptions if the subject is a sentence. Ross (therefore) proposes the "Sentential Subject Constraint" (Ross (1967)), which prohibits extraction (only) from a subject phrase which is a sentence.

Kuno (1973) attempts to subsume the "Sentential Subject Constraint" under a more general constraint, the "Incomplete Subject Constraint", which he states as (80) (= Kuno's (65)):
(80) **The Incomplete Subject Constraint**

It is not possible to move any element of a subject noun phrase/clause if what is left over constitutes an incomplete noun phrase/clause.10

Since the removal of an element from a sentential subject would leave an "incomplete" clause in the subject position, Kuno's condition will cover the data covered by the "Sentential Subject Constraint". (It also explains some additional data which we are not immediately interested in.11)

Let us note (at this point) that, no matter whether we choose Chomsky's, or Ross's, or Kuno's condition, we have a prohibition (in the grammar) against the removal of an element from a sentential subject phrase. Therefore the alternative analysis of (66a) (involving ellipsis) cannot generate sentences like (72) at all. This is evidence against this analysis.12

4.2. "Two Mysteries" and Their Solutions

The difficulty that we noted above (about the generation of sentences like (72)) has in fact been noted earlier; but instead of this leading to the rejection of the ellipsis analysis, it has (so far) led to an analysis which attributes a "melioration" property to the ellipsis rule. Thus Bresnan (1975), in the course of demonstrating that CD and Subdeletion are subject to the Sentential Subject Constraint, also notes a set of (what she
takes to be) exceptions to this constraint: these are "cases where ellipsis removes an incomplete subject constituent and thereby restores grammaticality" (p. 55, emphasis added). The example she discusses is (81) (= Bresnan's (116)), which she derives from the deep structure, (82a), via the intermediate ungrammatical stage, (82b) ((82a,b) = Bresnan's (118), (119)):

(81) These constraints should be revised more radically than ___ has been suggested.

(82) a. These constraints should be revised more radically than [that they should be revised x radically] has been suggested

b. * These constraints should be revised more radically than that they should be (revised) ___ has been suggested.

This "melioration" phenomenon had already been noticed by Higgins (1973), who discusses the following sentence (=Higgins's (36a)):

(83) John's contributions are more important than was originally realized/thought.

Higgins (tentatively) proposes to derive this from a deep structure like (84) (= Higgins's (37)):

(84) John's contributions are more important [S than [S
Higgins remarks (p.162) that "the compared constituent is deleted straight out of the (sentential) subject in [(84)] (which ... suggests that violations of the sentential subject constraint ... can be redeemed by later deletions)."

Bresnan cites two other instances of this type of "melioration" in comparatives; and Higgins cites some data first discussed by Ross (Ross (1969)), and then by Chomsky (Chomsky (1970)), in support of this "redemption by later deletions".13 But since none of these authors offers an explanation, what we have is just a collection of 'mysterious' facts.

Now, if we reject the ellipsis analysis and adopt the analysis that I am proposing, we immediately get rid of the 'mystery' about sentences like (81) and (83). For, under my analysis, these sentences are derived from (81') and (83'):

(81') These constraints should be revised more radically than what has been suggested.

(83') John's contributions are more important than what was originally realized.

A minor rule now deletes the what; this deletion is permissible because it deletes the entire subject phrase.

Higgins (1973) also notes a second curious fact about the ellipsis rule, namely that it seems inapplicable if the (target)
S has been extraposed. He gives the following examples (= his (36d,e)):

(85)  a. John's contributions are more important than it was originally realized that they were.  
      b. ?* John's contributions are more important than it was originally realized.  

(Contrast (85b) also with (83), which is fully grammatical.) To the best of my knowledge, this fact still remains unexplained. However, in my analysis of CE3-type comparatives, it follows simply from the fact that the phrase structure rules do not generate what (or any NP) in the extraposed position, cf.

(86)  a. * It was realized what/ * What was it realized? 
      b. * It was realized Bill.

4.3. Argument from Formal Difficulties of CE3

CE3 has never been stated formally; and there seem to be insuperable difficulties in the way of so stating it. In order to generate the sentences (66a) and (64a), CE3 must apply to the intermediate structures (87) and (88) (respectively). (I indicate here only the relevant bracketing; also I ignore a possible Δ 'head' of the free relative (comparative) clause.)
(87) \[ [S \text{ John shot more elephants than what we expected } [S \text{ that John would shoot } t_j]] \]

\[ \text{Deletion Target} \]

(88) \[ [S \text{ John shot } [\text{NP} \text{ more elephants}] \text{ than we expected } [S \text{ that John would shoot } t_j]] \]

\[ \text{Deletion Target} \]

(In 87), the trace \( t \) has been indexed by the movement rule which moves \textit{what}, or the deletion rule which deletes a PRO under the "control" of \textit{what}. In (88), the trace has been indexed by CD, which deletes an underlying \textit{x-many elephants} (or a PRO, see Bresnan and Grimshaw (1978)) under identity with \textit{more elephants}.) Several arguments can be given to show that CE3 must apply to a structure to which the movement (or deletion) rule of (87), or the deletion rule of (88), has already applied. CE3 is a rule of deletion under identity. Following Hankamer (1971), I have labelled the elements which are to be deleted the "Deletion Target", and the elements identical to the Target (which control the deletion) the "Deletion Trigger". On the face of it, CE3 would appear to be a rule whose SD contains two terms which are stipulated to be identical (or 'nondistinct', see Bresnan (1975)). The rule should be (schematically) of the form (89):
Here $X_i$ are variables; and $C_1$ and $C_2$ are the Deletion Trigger and the Deletion Target, respectively. Obviously, the fourth term $(C_2)$ must be an $S$; but what should the second term be?

Consider the structure of (87) in greater detail, as represented in (90):
We see now that Term 2 cannot be characterized (at all) in terms of a syntactic category; it cannot (in particular) be called an $S$, because the $S$ which dominates it is a larger constituent which also contains Terms 3 and 4. Transformational-Generative theory does not allow a proper analysis of a string which contains a dominance relation like that exhibited by (90).
This difficulty (in itself) does not condemn CE3 as a possible rule of grammar. It is known that VP Deletion also faces this difficulty. The trick now is to state the rule without mentioning the deletion trigger at all, in the SD. I.e., we must try to state CE3 roughly in the form, (91):

(91) \[ X_1 \rightarrow \overline{S} \rightarrow X_2 \]

\[ 1 \quad 2 \quad 3 \]

\[ \emptyset \quad 3 \]

General principles of Universal Grammar will ensure that the \( \overline{S} \) (Term 2) is deleted only if it is "recoverable". An element (or elements) is "recoverable" if its reflex in LF -- i.e., the logical formula which represents it at the level of LF -- is identical to the reflex of another element (or string of elements) elsewhere in the sentence (or the discourse). (See Sag (1976,2.0,2.1) for a discussion.)

A solution along these lines has been shown to be adequate in the case of VP Deletion. However CE3 is subject to some peculiar restrictions which have no analogue in VP Deletion. In VP Deletion, the trigger and the target need not stand in any particular structural relation to each other. So it is reasonable to suppose that a general recovery procedure can handle this case. (The procedure just looks for a 'proximate' VP antecedent.) But, in CE3, the target and the trigger must be (respectively) within a comparative clause, and within the
matrix clause containing the comparative clause. This structural condition (obviously) cannot be handled by a general recovery procedure. But neither can it be indicated in the SD of the transformation, for a reason that we have just mentioned.

More importantly, CE3 can only delete an \( \bar{S} \) which dominates the trace left either by CD, or by the rule which fronts the what which introduces the comparative clause (cf. the traces in (87) and (88)). Note that the deletions indicated in (87) and (88) meet this condition. Without this stipulation, the rule will incorrectly derive (92b) from the intermediate structure (92a):

(92)  

\[
\text{a. [More] women believe that the world will soon come to an end, than } t_1 \text{ men believe that the world will soon come to an end.}
\]

\[
\text{b. * More women believe that the world will soon come to an end, than men believe.}
\]

Here, \( t_1 \) is the trace left by CD, which deletes an underlying \textit{x-many} under identity with \textit{more}. Note that the \( \bar{S} \) which is the deletion target does not contain the trace.

But how shall we build this condition into the SD of the rule? Not by stipulating that the delendum contain a trace; for not any trace will do, as (93) shows:
(93) a. [QP] More] girls believe what their teachers
tell them that the world is like \( t_j \), than \( t_j \) boys.

Deletion Trigger

believe what[k their teachers tell them

that the world is like \( t_k \)

Deletion Target

b. More girls believe what their teachers tell them

that the world is like, than boys believe what

their teachers tell them.

In (93a) we have a potential deletion target containing a trace, but we do not want CE3 to delete it, to yield (93b). (The latter is a grammatical sentence; but it does not have the same interpretation as (93a), and therefore should not be derived from it.)

We have no way of stating -- with the mechanisms which linguistic theory allows us at present -- that the \( \tilde{s} \) which CE3 deletes must contain the "distinguished" trace left by CD, or by the rule which moves the ("distinguished") what which introduces the comparative clause. 16

For the reasons given above, we shall throw out CE3 from our grammar. However any proposal to do this will be incomplete, unless it is accompanied by an explicit proposal for an alternative mechanism that will fulfill the semantic function now vacated by this rule. Our first task in the next chapter
will be to provide some interpretation rules which will fulfill this function.
FOOTNOTES TO CHAPTER TWO

1 The reader will also note a problem in the lexical nonidentity of visit any girl and visit her. This problem does not arise if "identity" is defined at the level of Logical Form, as shown by Sag (1976), and Williams (1977).

2 Williams offers (22) as an example which shows that VP Deletion does not observe the Coordinate Structure Constraint. Note that both (21) and (22) should be violations of this constraint (under the readings we were trying to give them). Sag maintains that VP Deletion does obey the Coordinate Structure Constraint; see Sag (1976,1.1) and references cited there.

3 There is a question (of course) how (in (25)), visit \( t_1 \) can be deleted under identity with visit any girl, and how (in (23)), see \( t_1 \) can be deleted under identity with see more horses. We take up these questions presently.

4 The reader will notice a great deal of additional structure in (39). This will be generated by some rules which are described in Chapter Three.

5 The (a)- and (c)-type complements are not construed in this
way. Thus (for example), in (5lc), the results of substituting Henry for either of the NP's of the matrix clause would be 'We need a richer benefactor than we need Henry' and 'We need a richer benefactor than Henry needs a rich benefactor'. Neither of these is the intended reading.

The (b)-type complement typically gives rise to ambiguity: if there are n slots in the matrix clause into which the complement can go, the sentence is n ways ambiguous. Examples with both than and before are given below:

(i) He loves his dog more than his wife.
    (ii) He kisses his dog before his wife.

(i) can either mean 'He loves his dog more than his wife loves his dog' or 'He loves his dog more than he loves his wife'. (ii) has a similar ambiguity.

In both (56) and (57), we represent the than phrase with the structure of a free relative clause, on the strength of 'unreduced' comparatives. This is of course subject to revision.

The similarity between CE2-type comparatives and coordinate structures was first brought to my attention by Bresnan, who credits the idea originally to Jessie Pinkham.

The comparative clause in (66a) has either of the following structures, depending on whether we choose the traditional
analysis, or Bresnan and Grimshaw's (1978) analysis, of free relatives.

(i) PP
   P
   than NP
   \triangle COMP
   S
   what_i we expected t_i

(ii) PP
   P
   than NP
   S
   what_i we expected t_i

(The arrow indicates a movement in (i), a "controlled PRO deletion" in (ii). In both structures, t_i is the trace of what_i.) I have arbitrarily chosen the structure (i) in (68), because it makes our presentation simpler. Everything that I say with the help of (i) can also be said with the help of (ii).

I may add that the analysis of the comparative clause as a free relative is not crucial for my arguments in this section.

9 Actually, movement (i) will take place in the cycle of S_2, before passivization applies in the cycle of S_1. But this point is irrelevant for our discussion.

10 Kuno later restates this condition in an even more general form, as the "Clause Nonfinal Incomplete Constituent Constraint" (p. 381), but (80) is all that is relevant for us.
Note that although Kuno's condition speaks only of "movement", it must also be extended to deletion, as Bresnan (1975) shows.

For the curious reader: It explains the contrast in grammaticality between sentence pairs like (i):

(i)  

a. Of which cars were the hoods damaged by the explosion?

b. *Which cars were the hoods of damaged by the explosion?

In these sentences we have (respectively) the hoods and the hoods of in the subject position; of these, the second is "incomplete" (in some intuitive sense), while the first is not.

Data like (i) had originally led Ross (1967) to propose that "pied piping" is obligatory in the subject phrase. Kuno's condition subsumes both this condition and the Sentential Subject Constraint.

Note that we cannot avoid the difficulty posed by this problem (in (75)) by saying that what is not moved out of $S_2$, that CE3 (simply) deletes everything in $S_2$ except what. This leads nowhere, since this deletion would now be deleting a proper subpart of a subject phrase, and therefore would be prohibited by any one of the three conditions we spoke of.
Observe also that nothing depends (for our argument) on how we represent the structure of the free relative clause in (74)-(75). If we adopt Bresnan and Grimshaw's (1978) alternative analysis of free relatives, the equivalent of (73) will be (i):

(i)

```
   PP
      \   / \
   P   NP
        \   /
      than NP
           \ / \
            S  \\
            |  |
            COMP S
            |  |  \\
            |  |  |
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The application of "controlled PRO deletion" (indicated by the arrow) will again be blocked by any one of our three conditions.

Nor does our argument depend on our assumption that the comparative clause is a free relative clause; provided that in the alternative that we choose, what still controls a trace in the subject phrase. Thus, suppose we go along with the claim that than is a complementizer, which (like all complementizers) is followed by an S. The equivalent of (75) now is the very improbable structure (ii), wherein the fronted wh-phrase is adjoined to the right of the complementizer (instead of to the left, as is normal in English).
Here again, the indicated movement violates all three of our conditions.

Ross's (and Chomsky's) discussion concerns data like the following (examples from Chomsky (1970)):

(i) He believes their claims about some products, but I don't know which (ones).

(ii) I don't know which products he believes their claims about.

Here (ii), which is ungrammatical (because it violates the Complex NP Constraint) seems to underlie the second conjunct of (i); but (i) is fully acceptable. Therefore the "deletion" of he believes their claims about seems to improve the sentence.

Bresnan's two instances are the following (= Bresnan's (113)-(115)):

(i) a. ?? They aren't admitting as many of the women as
they were admitting ___ of the men.

b. They aren't admitting as many of the women as they were ___ of the men.

(ii) a. *There were as many of the boys accepted as there were of the girls accepted.

b. There were as many of the boys accepted as there were of the girls.

Bresnan points out that the deletion of admitting in (i), and of accepted in (ii), seems to improve the sentences. This is indeed so. (I have no explanation for it.)

14 Let us assume for the moment Bresnan's position (in Bresnan (1975,1976b)) that these are generated by different rules: the first by a movement of what (or a PRO-deletion controlled by what), the second by CD.

15 See the discussion of this point in Sag (1976,1.3,2.1). Sag cites (i), which is derived from (ii)(a slightly modified version of Sag's (1.3.30)) by deletion of VP₂ under identity with the string hit everyone, which is part of VP₁ (which also contains VP₂).

(i) Sandy hit everyone that Bill did.
Owing to the difficulty presented by sentences like (i), VP Deletion cannot be stated in terms of an SD of the form, X -- VP₁ -- Y -- VP₂ -- Z. Instead, its SD must not mention the deletion trigger at all. Sag states VP Deletion as follows:

(iii) \[ X \quad \text{AUX} \quad \text{VP} \quad Y \]

\[
\begin{array}{cccc}
\text{SD:} & 1 & 2 & 3 & 4 \\
\text{SC:} & 1 & 2 & \emptyset & 4 \\
\end{array}
\]

Bresnan (personal communication) has pointed out that the problem of "antecedent contained deletion" can be avoided if one can motivate a conjunctive structure for comparatives. Such a
structure is not without some plausibility, considering that comparatives permit "across-the-board" deletions (cf. 'Who does John love ___ more than Mary loves ___?'). If we follow this proposal, we shall have a structure like (i) in the place of (90):

(i)

Observe that the antecedent can now be clearly characterized as an $\bar{S}$.

Although this solution gets around one of the formal problems for CE3, I cannot see any way of avoiding the second (and more serious) problem that we pointed out -- namely the "unstatability" of the requirement that the deletion target contain a "distinguished" trace. Thus in Bresnan (1976a,fn.10), Bresnan suggests a solution to the question, How does CD "pick out" the correct phrase of the form $[\frac{x}{X} Q ...]$ for deletion? Her answer is that the Q of the compared constituent is generated as
a △; and if this △ is not deleted, it surfaces and causes the sentence to be filtered out. (A general convention filters out surface △'s.) It may be worth pointing out that this solution cannot be extended to the case of CE3, since CE3 must apply after CD has applied. (This is so, because CE3-type sentences are subject to the island constraints; and island constraints are diagnostics of trace binding, or quantifier binding. Only CD, not CE3, establishes a trace.) Therefore CD will have already converted the △ (or the phrase containing the △) into a trace; and one cannot very well prohibit the surfacing of a trace.
CHAPTER THREE

INTERPRETATION RULES FOR COMPARATIVES

1. Two Rules for Interpreting CE3

It was decided that in CE3-type comparatives with a surface what, no rule of ellipsis has applied; and that in this type of comparatives without a surface what, only a deletion of an underlying what has applied. We can now turn our attention to the rule which interprets the what in these sentences. This rule is obviously a copying rule, probably very similar to the rule which interprets it in the following sentence:

(1) John roasted a pig in the fireplace, but we didn't realize it.

Here, in the most obvious reading of (1), it is taken to mean that John roasted a pig in the fireplace.

Many linguists and logicians -- Postal (1974), Cresswell (1976), Williams (1977) (to mention only a few) --, take the logical representation of a comparative sentence to be roughly like (2). Let us initially follow their lead. (In fact, I shall be arguing that (2) is not quite the way a comparative sentence is represented at the level of LF; but my modification can

100
wait.) In (2), MORE THAN is a two-place predicate, and the two \( \lambda \)-expressions are its arguments.

\[ \lambda x \ldots x \ldots \) MORE THAN \( \lambda x \ldots x \ldots \)

Sentence (3) (= (66a) of the last chapter) should (accordingly) receive the interpretation (4):

\[ \lambda x [\text{John shoot } x\text{-many elephants}] \) MORE THAN \( \lambda x [\text{we expect } [\text{John shoot } x\text{-many elephants}]] \)

(3) John shot more elephants than what we expected.

(4) \( \lambda x [\text{John shoot } x\text{-many elephants}] \) MORE THAN \( \lambda x [\text{we expect } [\text{John shoot } x\text{-many elephants}]] \)

The mapping of (3) onto (4) must take place in several stages. I propose that one rule which takes part in this mapping performs the following operation: treating more and the than-phrase as a single semantic unit -- as a QP modifying the head-of-phrase\(^3\) --, it 'raises' it out of the sentence, leaving in its place a variable bound by a \( \lambda \)-operator. The raised QP (then) 'binds' the \( \lambda \)-operator, i.e., becomes its argument. The rule can be formulated as (5):

\[ S \ldots \text{QP} \ldots \) \( \Rightarrow \lambda x [S \ldots x \ldots ] \) \( \text{(QP)} \)

I shall show below that the rule is of more general applicability (applying to noncomparatives as \( \text{all} \)), and should have the more general form, (6):

\[ S \ldots C \ldots \) \( \Rightarrow \lambda x [S \ldots x \ldots ] \) \( \text{(C)} \)
where C is any phrasal category. Note that rule (5) (or (6)) is simply the reverse of \( \lambda \) Conversion. Thus, by applying \( \lambda \) Conversion to the output of this rule, we get the original expression that we started with. We shall refer to this rule as "Reverse \( \lambda \) Conversion".

In the case of (3), the string which is raised by this rule is more ... than what we expected, which is (semantically) a QP modifier of elephants. This gives us (7): 4

\[
\lambda x [\text{John shoot } x\text{-many elephants}] \text{ (more than what we expect t)}
\]

On this structure, it is now possible to define what the copying rule (the rule which interprets what ) must copy. Observe that this is not possible on the syntactic structure of (3), which is (8):

\[
(8)
\]

\[
S
\]

\[
\overline{S}
\]

\[
S
\]

\[
NP
\]

\[
VP
\]

\[
V
\]

\[
NP
\]

\[
QP
\]

\[
N
\]

\[
PP
\]

\[
\text{John}
\]

\[
\text{shot}
\]

\[
\text{more elephants}
\]

\[
\text{than what we expected t}
\]
In (8), the elements to be copied, namely John shot more elephants, do not form a constituent.5

Assuming the weakest possible theory, we shall say that the copying rule which interprets what is constrained only by a general principle of proximity; in this respect, it is like the copying rule which interprets VP-Deletion, or pronominal anaphora.6 However, a comparative sentence will 'make sense' only if, at the interpreted level, it has two points on a single scale of measurement to compare. The \( \lambda \)-expression in (7) denotes a point on a scale of numbers. Copyings into the position of what (in what we expect t) which make the object argument of than an expression denoting something other than a number are filtered out as leading to semantic incoherence. The copying rule (therefore) copies the obvious proximate expression which denotes a number, namely the \( \lambda \)-expression. This gives us (9). (I have enclosed the object argument of than, and the expression copied into the position of what, within square brackets, for perspicuity.)

(9) \( \lambda x \) [John shoot x-many elephants] (more than [[ \( \lambda x \) [John shoot x-many elephants]] i we expect t])

In the object argument of than (in (9)), we now have a \( \lambda \)-expression which is coindexed to a trace. Chomsky (1977) has a rule for the interpretation of wh-phrases in the COMP, which
we can make use of here. Chomsky's rule is formulated as (38)
\((=38)\) of Chomsky (1977):

\[\text{(10) Given an } S \text{ of the form:} \]
\[\text{[COMP } \neg [\text{wh} - \tilde{N}] - [+WH]] [S \ldots t \ldots] \]
\[\text{where } t \text{ is the trace of } [\text{wh} - \tilde{N}], \text{rewrite it as:} \]
\[\text{[COMP for which } x, x \text{ an } \tilde{N}], [S \ldots [\neg x \neg] \ldots] \]

This rule maps "surface structures" like (11a) and (12a) onto

\text{logical representations like (11b) and (12b)(respectively):}

\[\text{(11)} \]
\[\text{a. [whose book] }_i \text{ did Mary read } t_i \]
\[\text{b. for which } x, x \text{ a person, Mary read } [x' \text{'s book}] \]

\[\text{(12)} \]
\[\text{a. [pictures of whom] }_i \text{ did Mary see } t_i \]
\[\text{b. for which } x, x \text{ a person, Mary saw [pictures of } x] \]

What this rule does can be thought of as a two-stage operation.

In the first stage, it analyzes a \text{wh}-phrase into an operator and

a phrase containing a variable bound by the operator, as shown

in (13). (It also deletes [+WH].)

\[\text{(13)} \]
\[\text{[COMP [whose book] }_i [+WH]] [S \text{ Mary read } t_i] \]
\[\text{[COMP [for which } x, x \text{ a person } [x' \text{'s book}]]_i [S \text{ Mary}
\text{ read } t_i] \]

In the second stage, it 'restores' the phrase containing the

variable to the position of the trace (while retaining the
operator in the COMP); this is shown in (14):

\[
\text{(14) \quad [COMP \text{ for which } x, \ x \ a \ person] [S Mary read [x's book]]}
\]

The object argument of than in (9) is (15):

\[
\text{(15) \quad \ldots \ \ \left[\lambda x [\text{John shoot } x\text{-many elephants}]\right] \text{ we expect } t_1}
\]

This has an operator (namely, \(\lambda x\)), and a phrase containing a variable which is bound by the operator; the whole thing is coindexed with a trace. By applying the second-stage operation of Chomsky's rule, which 'restores' the phrase to the position of the trace, we get (16):

\[
\text{(16) \quad \ldots \ \left[\lambda x [\text{we expect [John shoot } x\text{-many elephants]]}\right]}
\]

We have now mapped (9) onto (17):

\[
\text{(17) \quad \lambda x [\text{John shoot } x\text{-many elephants}] (more than [\lambda x [\text{we expect [John shoot } x\text{-many elephants]]]])}
\]

Observe that (17) is the same as (4), except for one (important) difference. We do not treat MORE THAN as a two-place predicate which takes the \(\lambda\)-expressions as arguments. The second \(\lambda\)-expression is in fact the object argument of than; and it is the entire expression more than \([\lambda x [\ldots x \ldots]]\) which 'binds' (is the argument of) the first \(\lambda\)-expression. I believe (17) is
the correct logical form of (3), not (4).

2. Extending the Rules to Comparative Deletion

2.1. A Problem

A straightforward extension of these rules to Comparative Deletion is made impossible by the following problem. Given a sentence derived by CD like (18), the application of our rules outputs the representations given in (19):

(18) Henry is more wealthy than what Richard is.

(19) a. \(\lambda x [S \text{ Henry is } x\text{-much wealthy}] \) (more than what Richard is \(t_1\)) (by Reverse \(\lambda\) Conversion)

b. \(\lambda x [S \text{ Henry is } x\text{-much wealthy}] \) (more than
\(\lambda x [S \text{ Henry is } x\text{-much wealthy}]\) \(t_1\) Richard is \(t_1\))
(by Copying)

c. \(\lambda x [S \text{ Henry is } x\text{-much wealthy}] \) (more than
\(\lambda x [S \text{ Richard is } [\text{Henry is } x\text{-much wealthy}]]\)\)
(by "Wh-Interpretation")

The final output, (19c), is a nonsensical expression. The expression we want is more like:

(20) \(\lambda x [S \text{ Henry is } x\text{-much wealthy}] \) (more than \(\lambda x [S \text{ Richard is } x\text{-much wealthy}]\))
We can get (20) if our Copying rule copies -- instead of the entire antecedent $\lambda$-expression -- just the underlined part of (19a'):

\[(19a') \quad \lambda x [S \text{ Henry is } x\text{-much wealthy}] (\text{more than } \text{what}_i \text{ Richard is } t_i)\]

The derivation will now proceed as follows:

\[(19b') \quad \lambda x [S \text{ Henry is } x\text{-much wealthy}] (\text{more than } [\lambda x [x\text{-much wealthy}]_i \text{ Richard is } t_i) \text{ (by Copying)}\]

\[(19c') \quad \lambda x [S \text{ Henry is } x\text{-much wealthy}] (\text{more than } [\lambda x [\text{Richard is } [x\text{-much wealthy}]])] \text{ (by "Wh-Interpretation")}\]

(19c') is the same as (20). The difficulty is how to get the Copying rule to copy just a subpart of the antecedent $\lambda$-expression; since $\lambda x$ and $x$-much wealthy do not form a constituent.

Suppose we were to say that the copying rule copies the "appropriate parts" of the $\lambda$-expression. We can formalize this by letting the copying rule copy any arbitrary part of the $\lambda$-expression; if the copied elements do not make sense when "restored" to the CD gap, the reading can be filtered out. However this device fails to express the fact that the CD gap is always the gap of a constituent. Thus (21) is ungrammatical because more toys and to the baby do not together form a
constituent:

(21) * I handed more toys to the baby than you handed.

We must (then) minimally be able to say that the rule copies \( \lambda x \) and a single constituent of the antecedent \( \lambda \)-expression. This is however a strange thing to say.

2.2. A Revision of "Reverse \( \lambda \) Conversion"

The solution, it seems to me, is not to modify the Copying rule, but rather the earlier rule of Reverse \( \lambda \) Conversion. We can revise the latter rule in such a way that, in its output (which the Copying rule takes as its input), \( \lambda x \) and \( x \)-much wealthy do form a constituent.

The Reverse \( \lambda \) Conversion rule has at present the form (22); suppose we modify it to (23):

(22) \[
[ S \quad : \quad C \quad : \quad ] \quad \rightarrow \quad \lambda x \; [ S \quad \{ \quad x \quad \} \quad ] \quad (C)
\]

(23) \[
[ C \quad : \quad : \quad C \quad : \quad ] \quad \rightarrow \quad \lambda x \; [ C \quad \{ \quad x \quad \} \quad ] \quad (C)
\]

The way (23) is different from (22) is that it allows the rule to analyze as its context predicate not only an S, but any C, where C is a phrasal category. 7

Given the sentence (18), which has the S-structure (18'):

(18') \[
[ S \quad Henry \, \text{is} \quad [ \quad \text{AP more wealthy than what} \quad ] \quad \text{Richard is} \quad \text{ti} ]
\]
our rule can now apply to the domain of AP, and extract the QP
more than what Richard is $t_1$, exactly as we described in the
case of CE3 sentences. The resulting expression is (24):

$$\lambda x [\text{AP} x\text{-much wealthy}] (\text{more than what}_1 \text{Richard is } t_1)]$$

The copying rule now copies the entire $\lambda$-expression into the
position of what$_1$ -- again, exactly as we described earlier -- ,
giving (25):

$$\lambda x [\text{AP} x\text{-much wealthy}] (\text{more than } [\lambda x \text{AP} x\text{-much wealthy}]_1 \text{Richard is } t_1)]$$

The "Wh-Interpretation" rule yields (26):

$$\lambda x [\text{AP} x\text{-much wealthy}] (\text{more than } [\lambda x [\text{AP} x\text{-much wealthy}]_1 \text{Richard is } t_1)]$$

While (26) is not the same as (20), it seems (on the face of it)
to be an adequate logical representation of the meaning of (18).
The semantic requirement that there be (at the interpreted
level) two 'terms of comparison' which denote two points on the
same scale is satisfied here: there are two $\lambda$-expressions in
(26) that denote points on the scale of 'wealthiness'.

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2.3. Two Further Problems

However there are two reasons to be dissatisfied with (26) (as it stands) as the logical form of a comparative sentence. Firstly, quantifiers have (universally) S-expressions -- proposition-denoting expressions -- as their scope at the level of LF. But in (26), the first \( \lambda \)-operator has an Adjective Phrase as its scope. In a different example, this \( \lambda \)-operator can also have an Adverb Phrase or a Noun Phrase as its scope, cf. (27) and (28):

    b. \([\text{Henry runs } [\lambda x [\text{AP } x\text{-much fast} ] ] \text{ (more than } [\lambda x [\text{Richard runs } [\text{AP } x\text{-much fast} ] ] ]]])

(28) c. Henry has more marbles than what Richard has.
    d. \([\text{Henry has } [\lambda x [\text{NP } x\text{-many marbles} ] ] \text{ (more than } [\lambda x [\text{Richard has } [\text{NP } x\text{-many marbles} ] ] ]]])

A second (perhaps more compelling) reason will appear when we discuss scope phenomena in comparatives in Chapter Five. As a preview, look at the well-known fact that a sentence like (29),

(29) John thinks that he is taller than he is

has two readings: a 'contradictory' reading, in which John thinks the contradictory thought "I am taller than I am"; and a 'sensible' reading, paraphrasable as "The height which John
thinks he has is greater than the height he has". We want to be able to represent the two readings in terms of the scope differences of our \( \lambda \)-operator, as shown in (30): (30a) represents the 'contradictory' reading, and (30b) the 'sensible' reading.)

\[
\begin{align*}
(30) & \quad a. \ [S \text{ John thinks that } [\lambda x [S \text{ he is } x\text{-much tall}]] \text{ (more than } [\lambda x [S \text{ he is } x\text{-much tall}]]))] \\
& \quad b. \ [\lambda x [S \text{ John thinks that } [S \text{ he is } x\text{-much tall}]] \text{ (more than } [\lambda x [S \text{ he is } x\text{-much tall}]]])
\end{align*}
\]

But there is no way we can derive either of these logical representations, depending on our present set of rules. Thus look at the \( S \)-structure of (29), namely (29'):

\[
(29') \quad [S \text{ John thinks that } [S \text{ he is } [\text{AP taller than what}_1 \text{ he is } t_1]]]
\]

If we analyze the AP as the context predicate of our rule (23), we get the following derivation:

\[
\begin{align*}
(31) & \quad a. \ [S \text{ John thinks that } [S \text{ he is } [\lambda x [\text{AP x\text{-much tall}}]] \text{ (more than } \text{what}_1 \text{ he is } t_1]))) \text{ (by Reverse } \lambda \text{ Conversion)} \\
& \quad b. \ [S \text{ John thinks that } [S \text{ he is } [\lambda x [\text{AP x\text{-much tall}}]] \text{ (more than } [\lambda x [\text{AP x\text{-much tall}}]]_1 \text{ he is } t_1)))) \text{ (by Copying)}
\end{align*}
\]
The output, (31c), does not express the scope differences of (29). It expresses only one reading, namely the contradictory reading.

The choice of either of the S's in (29') as the context predicate of our rule (23) leads to the derivation of semantically incoherent (nonsensical) expressions, of a type we noticed earlier. We shall work out only one of these cases. If we take the outer S of (29'), we get the following derivation:

\[
\lambda x \left[ S \text{ John thinks that } S \text{ he is } \left[ \text{AP } x \text{-much tall} \right]\right] \text{(more than } \lambda x \left[ S \text{ John thinks that } S \text{ he is } \left[ \text{AP } x \text{-much tall} \right]\right]\text{)} \text{ (by Reverse } \lambda \text{ Conversion)}
\]

b. \[
\lambda x \left[ S \text{ John thinks that } S \text{ he is } \left[ \text{AP } x \text{-much tall} \right]\right] \text{(more than } \lambda x \left[ S \text{ John thinks that } S \text{ he is } \left[ \text{AP } x \text{-much tall} \right]\right]\text{)} \text{ (by Copying)}
\]

c. \[
\lambda x \left[ S \text{ John thinks that } S \text{ he is } \left[ \text{AP } x \text{-much tall} \right]\right] \text{(more than } \lambda x \left[ S \text{ John thinks that } S \text{ he is } \left[ \text{AP } x \text{-much tall} \right]\right]\text{)} \text{ (by "Wh-Interpretation")}
\]

Here the underlined expression is incoherent.
2.4. A "Scope Expansion" Rule

Our Reverse $\lambda$ Conversion rule now does two things: it generates a $\lambda$-expression for the Copying rule to copy; it also fixes the scope of the $\lambda$-operator. Our dilemma is that if we choose the context predicate of the rule in such a way as to get the right $\lambda$-expression to copy, we don't get the scope we want for the $\lambda$-operator. If we choose the context predicate so as to get the scope right, we don't get the right $\lambda$-expression to copy. Suppose we split these two functions, and give Reverse $\lambda$ Conversion only the first function. We can have a separate rule which gives the $\lambda$-operator its scope. What this new rule will do is the following: when it finds a $\lambda$-operator which does not have an S-expression as its scope, it moves it to a position where it does have an S-expression as its scope. We can refer to our rule as "Scope-Expansion Rule", and formalize it as (33):

\begin{equation}
(33) \quad [S \ldots [\lambda x_i [\ldots x_i \ldots]] (C_2) \ldots]
\end{equation}

\[\lambda x_i [S \ldots [\ldots x_i \ldots] \ldots] (C_2)\]

Condition: $C_1 \neq S$

(Observe that as $\lambda x$ is 'raised' to a position outside an $S$, $C_2$ (the argument of $\lambda x$) is also 'raised' to a position outside the same $S$. This is necessary, since otherwise we shall end up with an expression in which the $\lambda$-operator is bound by an expression.
within its own scope, which is ill-formed.)

Now, before we show how the new set of rules can deal with the problems we noted, let us pause for a moment to point out that the modifications proposed in 2.2 and immediately above are intuitively in the right direction. Take (first) our revision of Reverse $\lambda$ Conversion. The change from (22) to (23) is a simplification: whereas (22) applied only to an $S$, (23) applies to any phrasal category. Considering that in $\lambda$-calculus the operation of "$\lambda$ Abstraction" is not restricted to sentential formulae, the earlier restriction of the Reverse $\lambda$ Conversion rule (which involves $\lambda$ Abstraction) to $S$ was somewhat arbitrary. Therefore it is a good thing that we have eliminated this restriction.

As for rule (33), it does two things: it moves the $\lambda$-operator (which is a quantifier), and it also moves the $\lambda$-operator's argument along with the $\lambda$-operator. The first operation is simply the universal rule of Quantifier Movement, which says (in essence) that a quantifier which does not have an $S$ as its scope, must be moved to a position where it does have an $S$ as its scope. Assuming some type of a 'landing site' theory as part of Universal Grammar, all that we may need to say for Quantifier Movement (and for this part of our rule) is

(34) "Move Q, if it does not minimally c-command an $S".10 11
The second thing that our rule does is also very natural if we can think of the $\lambda$-operator as being 'bonded' to its argument, and so "pied-piping" the latter with it. This would be analogous to the way in which, when the Specifier of a phrase is moved by a movement rule, it takes with it the rest of the phrase. In the case of the rule of Wh-Movement, it has been shown that by stating the "pied-piping" facts as a general "condition on analyzability" rather than as a part of the rule itself, the rule can be stated in a maximally simple fashion, namely as "Move wh" (see May (1977, chapter one)). If the fact that a $\lambda$-operator "pied-pipes" its argument is part of some general "conditions on analyzability", it need not be mentioned in our rule at all. Now all that we will need in the place of our rule (33) is the maximally simple statement contained in (34), which is already part of the grammar.

2.5. The Solutions

Returning now to our example (18), which we left at the stage of interpretation represented by (26) (repeated below):

\[(26) \quad [S \text{ Henry is } [\lambda x [AP x\text{-much wealthy}]] \text{ (more than } [\lambda x [S \text{ Richard is } [AP x\text{-much wealthy}]]]])] \]

our "Scope Expansion Rule" applies to (26), moving the first $\lambda x$ and its argument in the manner indicated in (26'): 

\[\lambda x \text{ and its argument in the manner indicated in (26')}: \]
The resulting expression (35) is the same as (20), which was the "logical form" of (18) that we were looking for:

\[ (35) \lambda x [S \text{ Henry is } [AP \text{ x-much wealthy}]] \text{ (more than } \lambda x [S \text{ Richard is } [AP \text{ x-much wealthy}]]]) \]

In the case of sentence (29), recall that we were earlier unable to give a satisfactory (formal) account of its two readings. But with our new rule, we can do this. The first three steps of the interpretation will proceed exactly as shown in (31). But at the stage represented by (31c) (repeated below):

\[ (31c) [S \text{ John thinks that } [S \text{ he is } [\lambda x [AP \text{ x-much tall}]] \text{ (more than } [\lambda x [S \text{ he is } [AP \text{ x-much tall}]]])]] \]

the Scope Expansion Rule applies, moving the first \( \lambda x \) and its argument either outside the smaller S (the embedded S), or the larger S (the matrix S). In the first case we obtain (36a), and in the second case, (36b):

\[ (36) \text{a. } [S \text{ John thinks that } [\lambda x [S \text{ he is } [AP \text{ x-much tall}]] \text{ (more than } [\lambda x [S \text{ he is } [AP \text{ x-much tall}]]])] \]

\[ \text{b. } \lambda x [S \text{ John thinks that } [S \text{ he is } [AP \text{ x-much tall}]] \text{ (more than } [\lambda x [S \text{ he is } [AP \text{ x-much tall}]]])] \]
(36a) and (36b) are the same as (30a) and (30b), the logical representations we wanted.

This completes our task of showing how a CD-type comparative is interpreted. In the rest of this chapter we shall show how this account unifies a very wide range of data. We shall also discuss why this account should be preferred over some earlier accounts of comparatives.

3. Two Merits of the Present Account

3.1. Unification of CE3 and CD

The reader may have noticed that we have been treating CE3 and CD as the same rule. Both involve the optional deletion of a proform, what, by a deletion-triggering preposition. Also, identical interpretation rules map their structures onto "logical forms" (principally by the interpretation of the what). Thus consider the following sentences, the first of which is a CE3-type comparative, the second a CD-type comparative:

(37) [S John shot [NP more elephants than what Bill expected]]

(38) [S John shot [NP more elephants than what Bill shot]]

These sentences have (in our analysis) identical structures at the deep and surface levels. Their interpretation differs only
in that in (37), Reverse $\lambda$-Conversion analyzes as its context predicate the S, and not the NP; whereas in (38), the rule analyzes the NP, and not the S. This difference is not brought about by a difference in the rule, which is free to apply in either case to the NP or the S (or to any other phrasal category, for that matter). But the 'wrong' choice results in an incoherent (nonsensical) reading, which is filtered out. This type of filter is a device that we must assume in all interpretation of proforms, as is illustrated by the case of it in the following sentences:

(39)  
  a. John ate pork, but Bill didn't realize it.
  b. John ate pork, but Bill didn't eat it.

Here, it must be interpreted as (that) John ate pork in (39a), and as pork in (39b); but there is no a priori way of stipulating what the relevant copying rule must copy into the position of it. The claim implicit in our analysis is that the difference between CE3 and CD is only the 'difference' between (39a) and (39b): it is a difference in the "semantic context" in which the proform occurs.

The unification of CE3 and CD I consider to be one of the nice things about the new analysis. Bresnan's deletion analysis of comparatives treated the 'Comparative Ellipsis' group of rules as separate rules from CD and Subdeletion. The main reason for doing this was that the Ellipsis rules were known to be
optional; whereas Comparative Deletion-Subdeletion was considered by Bresnan to be a single, obligatory rule, which — relying on the "Relativized A-over-A Principle" (RAOAP) — always deleted the maximal "recoverable" \( \bar{X} \) (\( \bar{X} = \text{QP}, \text{AP}, \text{or NP} \)) that dominated the Q of the compared constituent in the comparative clause. Observe the restriction of the deletion target to the set \{QP, AP, NP\}. Bresnan could not allow the inclusion of VP and S in this set (to obtain CE1 and CE3); because the RAOAP would then have made CE1 and CE3 obligatory whenever the "recoverability" condition was met.

It should be possible for the Deletion Analysis of Bresnan to unify CE3 (and CE1) with Comparative Deletion-Subdeletion, if (i) the A-over-A Principle is abandoned (I briefly argue in Chapter Four that there is no A-over-A Principle); and (ii) the grammaticality of a Subdeletion sentence with a "repeated element" (as illustrated in (40)) under the appropriate conditions of focus, is granted (see Sag (1976), Chomsky (1977)):

\[(40) \quad \text{John is taller than Bill is TALL.}\]

If (as (40) shows) the maximal recoverable QP, AP or NP need not always be deleted, it becomes possible to maintain that all deletions in comparatives are optional. The fact that minimally a QP — the never-surfacing QP of the comparative — must be deleted, can be captured by generating this QP as a \( \Delta \). If the \( \Delta \)
is not deleted, a general convention which filters out a surface \( \Delta \) will filter out the sentence. Bresnan (however) does not explore such a solution. (This solution would of course still be inadequate for several other reasons that we have discussed.)

3.2. Explaining Some Noncomparative Data

We have already noted in several places (see section 3.1 of Chapter One and section 4 of Chapter Two) that the types of phenomena that we have labelled "Comparative Ellipsis" and "Comparative Deletion" are also exhibited by a variety of noncomparative sentences. These sentences presented a problem for a "deletion-under-identity" analysis of comparatives. A good test of our proposed interpretation rules will be to see if they can be successfully extrapolated from comparatives to these other kinds of sentences.

3.2.2. Noncomparative "Comparative Ellipsis" Sentences. Let us repeat a type of data that we noted in connection with the analysis of CE3, in Chapter Two ((41)= (67) of Chapter Two).

(41) a. The situation was \{different than\ what we expected \}
    \{different from\ the same as \}
    \{like \}
b. The situation was \{different than\} what we expected
\{different from\}
\{the same as\}
\{like\}
that it would be 

These sentences are parallel to the 'regular' comparatives of (42):

(42) a. The situation was better than what we expected ___.
b. The situation was better than what we expected ___.

The sentences of (41) (except the ones involving from) have variants without the what -- a fact which we can now routinely explain by saying that than, as, and like have the property of triggering an optional deletion of what. Also, the gap in the sentences of (41) have all the properties of "wh-movement gaps". As we observed in Chapter Two, whatever device relates (42a) and (42b) must also relate the sentences of (41a) and (41b).

Now, observe how our interpretation rules can deal with the sentences of (41a) exactly as they dealt with Comparative Ellipsis sentences. Consider (43):

(43) \[ S \text{ the situation was } [NP \text{ the same as what}_i \text{ we expected } t_i] \]
This will be interpreted as shown in (44):

\[ (44) \]

a. \[ \lambda x [S \text{ the situation be } x](\text{the same as what }_1 \text{ we expect } _1) \] (by Reverse \[ \lambda \text{ Conversion, which extracts the indicated NP from the S})

b. \[ \lambda x [S \text{ the situation be } x] \text{ (the same as } [\lambda x [S \text{ the situation be } x]]_1 \text{ we expect } _1) \] (by Copying)

c. \[ \lambda x [S \text{ the situation be } x] \text{ (the same as } [\lambda x [S \text{ we expect } [S \text{ the situation be } x]]]]) \] (by "Wh-Interpretation")\[ ^{14}\]

3.2.3. Noncomparative "Comparative Deletion" Sentences. We repeat below the data which Chomsky (1977) noted as a problem for a deletion-under-identity analysis of Comparative Deletion. (We discussed this data in 3.1 of Chapter One.)

\[ (45) \]

a. Mary isn't the same as she was ___ five years ago.

b. Mary isn't different than she was ___ five years ago.

c. Mary is (more or less) as she was ___ five years ago.

The problem with these sentences (it will be recalled) is that "there is no overt matrix phrase that can trigger and control the deletion" (Chomsky (1977,88)).

However our interpretation rules can deal with these
sentences precisely in the same way as they dealt with the analogous comparatives. Thus, (45c), which has the S-structure (45c') (we ignore the more or less):

(45c') \[ S \text{ Mary is } \lambda x [\text{AP } x] \text{ (as what}_i \text{ she was } t_i \text{ five years ago)} \]

will be interpreted as follows:

(46)

a. \[ S \text{ Mary is } [\lambda x [\text{AP } x] \text{ (as what}_i \text{ she was } t_i \text{ five years ago)}] \text{ (by Reverse } \lambda \text{ Conversion)} \]

b. \[ S \text{ Mary is } [\lambda x [\text{AP } x] \text{ (as } [\lambda x [\text{AP } x]]_i \text{ she was } t_i \text{ five years ago)}] \text{ (by Copying)} \]

c. \[ S \text{ Mary is } [\lambda x [\text{AP } x] \text{ (as } [\lambda x [S \text{ she was } [\text{AP } x] \text{ five years ago)}]] \text{ (by "Wh-Interpretation"\} \]

d. \[ \lambda x [S \text{ Mary is } [\text{AP } x]] \text{ (as } [\lambda x [S \text{ she was } [\text{AP } x] \text{ five years ago}]] \text{ (by "Scope Expansion") \}

(46d) is a satisfactory logical representation of (45c).

The reader can easily see how the other sentences of (45) can be interpreted.

There is a type of comparative sentence which might seem even more remote from the 'regular' comparative than the sentences of (45). This type of sentence has neither the standard "comparative morpheme" more (or as), nor the "comparative preposition" than (or as). Consider (47):
(47)  a. All things measure twice what they seem to measure 
     b. The prices are up from what they were ___ last week.  
     c. My present income is just half what it was ___ last year.

The semantic and formal similarities of these sentences with 'regular' comparatives should be intuitively obvious. Besides, a sentence of this type can show scope ambiguity of precisely the same nature as we saw in the case of sentence (29). Cf.

(48)  John thinks that the prize is twice what it (actually) is.

(48) has two readings, a 'sensible' reading and a 'stupid' reading, parallel to the two readings of (29). This is further evidence that these sentences should be interpreted (if possible) in the same way as 'regular' comparatives.

Happily, our analysis finds no particular difference between 'regular' comparatives and these sentences. Thus the interpretation of (47a) will go as follows:

(49)  a. [S All things measure \[NP twice what \_ they seem to measure \_]] (S-structure)

     b. [S All things measure \[\lambda x [NP x] (twice what \_ they seem to measure \_)]]) (by Reverse \_ Conversion)
c. \[ S \text{ All things measure } [\lambda x [\text{NP } x]] \text{(twice } [\lambda x [\text{NP } x]]_i \text{ they seem to measure } t_i)] \] (by Copying)

d. \[ S \text{ All things measure } [\lambda x [\text{NP } x]] \text{(twice } [\lambda x [S \text{ they seem to measure } [\text{NP } x]]]] \] (by "Wh-Interpretation")

e. \[ \lambda x [S \text{ All things measure } [\text{NP } x]] \text{(twice } [\lambda x [S \text{ they seem to measure } [\text{NP } x]]]) \] (by Scope Expansion)

Since the reader can easily see how an analysis along these lines can account for the scope ambiguities of (48), I will not labor the point here.

4. Preferring the Present Analysis Over Some Earlier Analyses

The reader may recall that at the beginning of my interpretive account of CE3 in this chapter, I said that many linguists and logicians have proposed a structure like (50) (= (2)) as the "logical form" of comparatives:

\[
(50) \quad (\lambda x [\ldots x \ldots ]) \text{ MORE THAN } (\lambda x [\ldots x \ldots ])
\]

(50) was meant only to be a rough representation. Not all the linguists and logicians I have in mind used a \(\lambda\)-operator (for example). Their choice of the "comparative predicate" also might have been different. But there is an important area of agreement among them, which is that the "logical form" of comparatives is
that of a proposition consisting of a two-place predicate and its two arguments, a structure which is (most schematically) representable as: \( P(x, y) \). I have however adopted a logical form which is representable as (51):

\[
(51) \quad \lambda x \ [ \ldots x \ldots ] \text{ (more than } [\lambda x \ [ \ldots x \ldots ]].) \]

Here there is no two-place predicate. And although the two "terms of comparison" can be discerned in the two \( \lambda \)-expressions, the second \( \lambda \)-expression is simply the object of than. Moreover, the more inclusive expression more than \( [\lambda x \ [ \ldots x \ldots ]] \) is the argument of the first \( \lambda \)-operator. I concluded my account of CE3 by saying that (51) is the "correct logical form" of comparatives, not (50). The reader may think that this statement requires some justification.

May (1977) has suggested that there may be two levels of Logical Form, LF and LF'. A sentence containing a quantifier, (say) (52),

\[
(52) \quad \text{Mary loves every boy} \]

is represented as (53) in LF:

\[
(53) \quad [\text{every boy}]_x [S \text{ Mary loves } x] \]

(53) is obtained by a simple process of Chomsky-adjunction of the quantifier expression to the S. May suggests that the sentence may well be represented as (54) at a more abstract
level that we may call LF':

\[ \forall x \ [\text{boy}(x) \rightarrow \text{love}(m', x)] \]

(54) is the standard predicate calculus representation of (52). The difference between LF and LF' is that in LF, the syntactic bracketing of the sentence is preserved. Also (importantly) the rules mapping from S-structure to LF may employ only the highly limited set of operations that are allowed to transformations.Obviously (however) (54) cannot be obtained by such a constrained set of rules.

Now, regarding comparatives, I do not deny that a comparative sentence may be represented in a form akin to (50) at a level LF'. My contention is only that its representation at LF is (51). Let me make my reasons clear. The first reason is that (51) can be generated by a constrained set of rules, some of which are already there in the grammar. Reverse \( \lambda \) Conversion is the only truly new rule; but it has already proved its usefulness in our discussion of the fairly wide range of comparative and "semi-comparative" sentences that we have just considered. Moreover, this rule is probably even more general than I have yet given reason to believe. Consider the ambiguity of the following sentence (example from Postal (1974); I discuss this type of sentence again in Chapter Five):

\[(55) \quad \text{John believes that Mary didn't kiss the boy she} \]

(55), although it is not a comparative sentence, has two readings which are exactly parallel to those of (29): a 'stupid' reading, according to which John believes the contradiction: "Mary didn't kiss the boy whom she kissed"; and a 'sensible' reading paraphrasable as "there is a boy, x, whom Mary kissed, but John believes that Mary didn't kiss x". The ambiguity here --- as in the case of (29) --- is a scope ambiguity (see Postal (1974), or Chapter Five, for evidence). Now Reverse λ Conversion gives the neatest account yet (considering the alternatives proposed so far) of the facts here. By having the rule extract the NP the boy she kissed from the embedded S (the sentential object of believes), we generate (56a); by letting the rule extract the NP from the matrix S, we generate (56b).

\[(56)\]
\[\text{a. John believes that } [\lambda x [\text{Mary didn't kiss } x] \text{ (the boy she kissed)}] \]
\[\text{b. } \lambda x [\text{John believes that Mary didn't kiss } x] \text{ (the boy she kissed)}\]

(56a) represents the 'stupid' reading, and (56b) the 'sensible' reading. (Postal's proposal regarding this sentence, which involves "quantifier lowering" and a "disappearing" predicate, SAME, will be discussed in Chapter Five.)

Similarly, in philosophers' discussions of "referential
opacity", it is customary to give the sentence, (57), the two logical representations, (58), in order to capture the 'opaque/transparent' readings of the phrase, the prime minister of Canada.

(57) John believes that the prime minister of Canada is bald.

(58) a. Believe (j, Ǝx [Prime-Minister-of-Canada (x) ∧ Bald (x)])

b. Ǝx [Prime-Minister-of-Canada (x) ∧ Believe (j, [Bald (x)])]

Montague (1973), trying to generate these two logical representations, resorts to the device of "quantifying in" the relevant term phrase at different stages of the ('bottom-up') derivation of the sentence. (In the framework of Generative Semantics, the distinction calls for "lowering rules", cf. McCawley (1970).) But Reverse λ Conversion gives a perfectly satisfactory account of the philosophers' distinction, reading it off the S-structure, cf.

(59) a. John believes that [λx [s x is bald] (the prime minister of Canada)]

b. λx [John believes that x is bald] (the prime minister of Canada)
Thus we see that Reverse Conversion may be a very general rule of interpretation (of natural language).

Our second reason for preferring the structure (51) to the structure (50) is that a satisfactory way of relating (50) to a level of syntactic structure (whether deep structure or S-structure) is yet to be proposed. I shall show this by briefly outlining the proposals (in this regard) of Postal (1974), Williams (1977), and Cresswell (1976).

4.1. Postal (1974)

Postal gives the sentence (60) the underlying structure (61). (The diagrams (61), (62), and (63) are Postal's examples (96), (97), and (98).)

(60) Jack ate more apples than Bob ate.

(61)

```
 Verb
   /
  NP
 /  \
 NP
 /   \ 
 MORE x Jack ate x many apples y Bob ate y many apples
```

The leftmost NP (i.e., NP₁) is the subject NP; its head is NP₀. The subject NP is "the overall target of lowering". In the first step of the derivation, the predicate MORE and NP₂ are daughter-adjointed to the head of the subject NP (i.e., to NP₀);
this destroys the $S_0$ node. The resulting structure is (62):

(62)

In the second step of the derivation, "NP$_0$ will be substituted in toto for the index in $S_1$ which is coreferential with the index directly dominated by NP$_0$". This operation destroys NP$_1$ and leaves $S_1$ as the root. The structure we get is (63):

(63)

Postal does not take the derivation of the sentence beyond this
stage, although he admits that "this is still a long way from the correct surface form" (p.401).

It will be readily appreciated that the task of arriving at a reasonable set of rules on the basis of this account is very difficult.

4.2. Williams (1977)

Williams's account of the interpretation of Comparative Deletion sentences employs only two minimal operations, both of which are (moreover) very plausible. He takes CD to be a copying rule (which copies a string into base-generated empty nodes). Given the S-structure (64a), the copying rule outputs (64b) (cf. Williams's (109)):

\[\begin{align*}
\text{(64)} & \quad \begin{align*}
\text{a. John has more horses than Bill has } & \left[\text{NP}_1 \Delta \Delta \right] \\
\text{b. John has more horses than Bill has } & \left[\text{NP more horses}\right]
\end{align*} \\
\text{CD}
\end{align*}\]

Williams assumes that more is a quantifier. So now, the normal rule of Quantifier Interpretation, formulated by the author as (65) (=Williams's (78)):

\[\begin{align*}
\text{(65)} & \quad \left[\ldots \text{Q} \ldots \right]_S \rightarrow \left[\text{Q}_i \left(\ldots \, x_i \ldots \right)\right]_S
\end{align*}\]

applies to both more's in (64b), moving them to the leftmost position of their respective clauses, and at the same time
inserting a bound variable in the positions they were moved from. The movements are shown in (64b'):

(64b') \[ \text{John has more horses than Bill has more horses} \]

The result of Quantifier Interpretation (Williams claims) is (66) (cf. Williams's (109c)):

(66) \[ \text{MORE}_i \text{ (John has } x_i \text{ horses) than MORE}_j \text{ (Bill has } x_j \text{ horses)} \]

This is the "logical form" of the sentence; here, than is a two-place relation, and its two arguments denote amounts or extents.

However, if the comparative clause is a subordinate clause, and therefore a comparative sentence has the bracketing shown below:

(67) \[ [s \ldots \text{ than } [s \ldots ]] \]

Quantifier Interpretation will not yield a structure in which the first MORE has scope only over \textbf{John has } x_i \textbf{ horses}; it will have scope over the entire sentence. Therefore, instead of (66), the rule will yield (68):

(68) \[ \text{MORE}_i \text{ (John has } x_i \text{ horses than MORE}_j \text{ (Bill has } x_j \text{ horses)} \]

In order to get (66), Williams must at least postulate an
extraposition rule (possibly a transformational rule, or perhaps an interpretation rule) which yields a structure more or less like (69):

(69)

(Another alternative would be a 'conjunctive' structure, like that shown in fn.16 of Chapter Two.)

Even if the analysis can be repaired in this way, the types of comparative sentences it can apply to are very limited. One cannot readily see how it will deal with the sentences of (45) (repeated below):

(70)

a. Mary isn't the same as she was ___ five years ago.

b. Mary isn't different than she was ___ five years ago.

c. Mary is (more or less) as she was ___ five years ago.

4.3. **Cresswell (1976)**

In Cresswell's analysis, the sentence (71) has the semantic representation (72):
(71) * My father is a taller man than my mother is a tall woman

(72) `<< λ, x, <my father, <tall, man>, x>, er than, <λ, x, <my mother, <tall, woman>, x>>`

Here, er than is the comparative predicate; its two arguments, the λ-expressions, denote "degrees". The mapping of (72) onto a syntactically-motivated structure would involve many operations which are not allowed in any constrained version of transformational theory. A few of the operations that Cresswell suggests would be needed to achieve this mapping, are:

(i) the raising of my father and my mother to the position of the subjects of their respective clauses;
(ii) the raising of my father to become the subject of the whole sentence;
(iii) the replacement of [tall man x] and [tall woman x] by [is x much tall a man] and [is x much tall a woman];
(iv) the moving of er to replace the x in the leftmost x much.
FOOTNOTES TO CHAPTER THREE

1 See Akmajan (1973) for a discussion of the copying rule which
terprets such pronominal anaphora.

2 We ignore Tense and Aspect here. We shall often adopt this
practice in our logical representations, in order to avoid some
irrelevant complexity.

3 This is not implausible; in Bresnan (1973), more and the
than-phrase are generated under a QP modifier of a
head-of-phrase N or A. (The than-phrase is later extraposed by a
transformation.) Thus (i) has the deep structure (ii):

(i) John ate more apples than Bill ate.
(ii) John ate [NP [QP more than Bill ate x-many apples]
apples]

This analysis apparently meets with some difficulties (see, for
a discussion, Andrews (1974)). My claim is (of course) only that
a semantic rule treats more and the than-phrase as a single
unit.

4 I shall adopt Montague's practice (see Montague (1973)) of
using parentheses to enclose the argument of the λ-operator
(and of placing the argument to the right of the $\lambda$-expression). All other bracketing will be indicated by square brackets; the latter I shall omit or introduce as seems necessary for perspicuity.

5 We have already drawn attention to this problem in connexion with the rule of Comparative Ellipsis (cf. (90) of the last chapter, and the discussion there; also see a possible way of avoiding this problem, in fn.16 of the same chapter.)

Observe (at this point) that the "Reverse $\lambda$ Conversion" rule which we postulated in deriving (7) is justified on three counts: (i) it yields a level of representation where what has a definable antecedent; (ii) it explains scope ambiguities in comparatives (which we discuss directly); (iii) it is necessary elsewhere in the grammar (see discussion below). A restructuring rule is (similarly) postulated by Sag (1976) in order to explain "antecedent contained" VP Deletion, which we discussed in fn.15 of the last chapter. The sentence cited there, namely (i), is given the logical form (ii), wherein (note) the Deletion Trigger has become a definable unit:

(i) Sandy hit everyone that Bill did.

(ii) $(\forall y:\text{Bill}, \lambda x (x \text{ hit } y)) [\text{Sandy}, \lambda w (w \text{ hit } y)]$

Del. Target Del. Trigger

6 If our copying rule is a rule of sentence grammar, it will
have access only to elements within the sentence; unlike the copying rules for VP Deletion and pronominal anaphora, which have access to the discourse.

The fact that the what of comparatives always copies elements from the matrix clause, should not be taken as strong evidence that the copying rule involved is a rule of sentence grammar. As we pointed out (in the course of our discussion of CE1) in the last chapter, "proximity" appears to be a controlling factor for copying rules; and the most proximate part of the discourse, for the what of a comparative, is the matrix clause.

My main reason for wanting to treat the copying rule in comparatives as a rule of sentence grammar is that, if we adopt my account of the interpretation of CD-type comparatives, the antecedent we want to copy (from the matrix clause) will no longer be a constituent at the level of LF. Since rules of discourse grammar have access only to LF-level representations (Williams (1977)), this poses the problem of how to copy a nonconstituent. Also (although this is not a strong reason), we make convenient use of Chomsky's "Wh-Interpretation" rule (Chomsky (1977)) at a certain stage of the interpretation (see discussion below); and the latter is clearly a rule of sentence grammar. On the other hand, if the copying rule is a discourse rule, the analogy between this rule and the other two copying rules will be strengthened; and we may be able to maintain that al
copying rules belong to discourse grammar. I wish to leave the question open at this point.

7 To avoid possible confusion, it may be pointed out that the C of the labelled bracket (the context predicate) and the C which is 'extrapoled' by the rule (the target predicate) need not be the same category; though of course they can be.

8 In λ-calculus, a λ-operator can have scope over an expression of any 'type' (of the 'type' theory); cf. Carnap (1958). But of course, we are talking about natural language quantification, which must be psychologically real.

(I am using the term 'quantifier' loosely, to denote any logical operator which has scope, and which binds a position in the expression within its scope. In the strict sense, a λ-operator is not a quantifier, since it does not quantify.)

9 See fn. 8. I think a distinction can (and ought to) be made between how a quantifier is generated, and how it is interpreted. Consider that the quantifier words every and some are generated within an S, but are interpreted as having scope over an S. Similarly, the λ-operator can be generated (by the "λ Abstraction" rule of natural language) with scope narrower than an S, but be interpreted so as to give it scope over an S.

10 The notion "minimally c-command" is defined as follows (see Chomsky (1979b)): 
A minimally $C$-commands $B \overset{\text{def}}{=} A$ $C$-commands $B$ and there is no $C$ such that $A$ $C$-commands $C$ and $C$ $C$-commands $B$ and not $C$ $C$-commands $A$.

Suppose we state (34) simply as:

(i) Move $Q$

and have a filter that applies at LF, of the form:

(ii) $* \ldots Q [ \ldots$

where $C \neq S$

This solution gives somewhat different results. It now becomes possible -- by repeatedly applying "Move $Q" -- to move a quantifier which already minimally $C$-commands an $S$ to a higher $S$ (cyclically, as it were), as shown in (iii):

(iii) $A[S \ldots [S \ldots Q [S \ldots ]]]$

In our solution, on the other hand, the scope of the quantifier must be achieved 'in one swoop'.

A crucial example that may help us to decide in favor of (34) (and against the filter solution) is a sentence like (iv), which has the two readings paraphrasable as (va) and (vb):

(iv) $[S \text{ John claimed that } [S \text{ he had shot more elephants than what we expected }]]$

(v) a. The number of elephants that John claimed that he
had shot is more than the number of elephants that
we expected that John would claim that he had
shot.

b. John claimed that the number of elephants that he
had shot is more than the number of elephants that
we expected that he would shoot.

We can generate these readings by letting Réversible λ Conversion
analyze as its context predicate either the larger $S$ or the
smaller $S$ in (iv). If the rule applies to the larger $S$, we get
the derivation (vi); if it applies to the smaller $S$, we get the
derivation (vii):

(vi)  

a. $\lambda x [S \text{ John claim that } [S \text{ he shoot } x\text{-many}
elephants]]$ (more than what we expect $t_i$) (by
Reverse λ Conversion)

b. $\lambda x [S \text{ John claim that } [S \text{ he shoot } x\text{-many}
elephants]]$ (more than $[\lambda x [S \text{ John claim that } [S$
he shoot $x\text{-many elephants]]]\_i$ we expect $t_i$) (by
Copying)

c. $\lambda x [S \text{ John claim that } [S \text{ he shoot } x\text{-many}
elephants]]$ (more than $[\lambda x [S \text{ we expect } [S \text{ John}$
claim that $[S \text{ he shoot } x\text{-many elephants]}]]])$ (by
"Wh-Interpretation")

(vii)  

a. $[S \text{ John claim that } [\lambda x [S \text{ he shoot } x\text{-many}
elephants]]$ (more than what we expect $t_i$) (by
Reverse λ Conversion)
elephants] (more than what we expect $t_1$)] (by Reverse $\\lambda$ Conversion)

b. $[S \text{ John claim that } [\lambda x [S \text{ he shoot } x\text{-many elephants}] \text{ (more than } [\lambda x [S \text{ he shoot } x\text{-many elephants}]]_i \text{ we expect } t_1])]$ (by Copying)

c. $[S \text{ John claim that } [\lambda x [S \text{ he shoot } x\text{-many elephants}] \text{ (more than } [\lambda x [S \text{ we expect } [S \text{ he shoot } x\text{-many elephants}]]])]$ (by "Wh-Interpretation")

(vic) and (viic) are the logical representations of (va) and (vb) (respectively)

However, if "Move Q" allows a quantifier which already minimally c-commands an S to be moved to a higher S, this rule could now apply to (viic) in the manner shown below:

(viic) $[S \text{ John claim that } [\lambda x [S \ldots]]$

The resulting expression, (viii), -- we assume, in (viii), that the rule simultaneously 'raises' the argument of the $\lambda$-operator also; otherwise an incoherent expression would result -- represents the reading (ix):

(viii) $[\lambda x [S \text{ John claim that } [S \text{ he shoot } x\text{-many elephants}]] \text{ (more than } [\lambda x [S \text{ we expect } [S \text{ he shoot } x\text{-many elephants}]]])$

(ix) The number of elephants that John claimed that he
had shot is more than the number of elephants that we expected that he would shoot.

However (ix), although it is a perfectly coherent reading, is not a reading that we get for (iv).

(If "Move Q" were to move the second \( \lambda x \) in (viic), as shown below:

\[
\text{(viic) } \quad \left[ S \right. \quad \text{John claims that } \left[ \lambda x \left[ S \right. \quad \text{he shoot } x\text{-many elephants} \right] \right] \quad \text{more than } \left[ \lambda x \left[ S \right. \quad \ldots \right. \]
\]

the resulting expression is simply uninterpretable.)

\[12\] In our representation of the output of Reverse \( \lambda \)-Conversion, we have been showing the \( \lambda \)-operator to the left of the expression which comprises its scope, and the argument of the \( \lambda \)-operator to the right of this expression. Our motive for doing this was partly to imitate as closely as possible the word order of English in comparatives. We could as well have written the argument and the \( \lambda \)-operator on the same side of this expression, and (even) indicated the bond between the argument and the \( \lambda \)-operator by " \( \wedge \)":

\[
\left( C_2 \right) \wedge \lambda x_i \left[ \ldots \quad \cdot \quad \ldots \quad x_i \quad \ldots \right]
\]

It may now be easier to conceive how the \( \lambda \)-operator may "pied-pipe" its argument with it.
See Bresnan (1976a, fn.10) for an account of this device. (The reader may recall that we mentioned this device in fn.16 of Chapter Two.) Note that this device is necessary for Bresnan even apart from the possible changes in her theory that we are discussing.

There is another type of sentence that I am not aware has ever been brought into the discussion of Comparative Ellipsis:

(i)  a. As I expected __, we ran out of gas.
     b. As __ was only too obvious, Bill was in deep financial trouble.
     c. The doctor had gone on a vacation, like I feared __.
     d. Like you predicted __, the mountain erupted.

Like comparatives (and the sentences of (41)), the gap in these sentences have the properties of wh-movement gaps; and they have variants with a what adjacent to as or like. It would appear (at least on the face of it) that our copying rule should deal with these sentences, in the manner shown below:

(ii) a. like what_1 you predict t_1, the mountain erupted
     b. like [the mountain erupt]_1 you predict t_1, the
        mountain erupt (by Copying)
     c. like you predict [the mountain erupt], the
        mountain erupt (by "Wh-Interpretation")
(iic) may appear to be a more or less satisfactory semantic representation of (ic). The trouble is with sentences like (iii):

(iii)  a. Unlike what you predicted, the mountain erupted.
    b. Differently from what I expected, we ran out of gas.

In the case of (iii) a, our copying rule (if it applies in a 'simple-minded' manner) will ultimately output the wrong reading, (iv):

(iv) unlike you predict [(that) the mountain erupt],
    the mountain erupt.

Apparently, the interpretation rule here must 'construct' the referent of the proform what more "actively" than our copying rule can do. How such a rule can be formalized, and whether it is this latter rule which is also operative in comparatives, are questions which must await further research.

15 May maintains that the rules mapping onto LF are "transformational" rules, and therefore are subject to the same constraints as transformations.
CHAPTER FOUR

SUBDELETION

PART I: "INTERPOLATION" INTO GAPS AND PRONOUN REFERENTS

In Part I of this chapter I shall investigate a certain property of copying rules -- a property I shall appeal to in my analysis of Subdeletion in Part II.

1. Interpolation into VP Gaps

I shall begin by looking at VP Deletion. I outlined in Chapter Two the two current analyses of this rule, namely the deletion analysis of Sag (Sag (1976)), and the copying analysis of Williams (Williams (1977)). I decided to adopt the copying analysis in this thesis, and promised some additional reasons for this, besides the ones given in Williams (1977). These reasons will appear in the discussion below.

The investigations of Sag and Williams have greatly enhanced our understanding of this rule. However both authors ignore an important property of VP Deletion, namely the possibility (in VP Deletion) of what I shall call "interpolation into the VP gap". VP Deletion does not always delete a whole VP. Consider the following instances of the application of the rule ((a)-(c) from Sag (1976); (d)-(e) from Halliday and Hasan
(1)  

a. John could pull you out of a plane, like he did Ø his brother Ø.

b. Mary hasn't dated Bill, but she has Ø Harry.

c. It doesn't bother Harry that Bill left, but it does Ø me Ø.

d. Speaker A: Is she suing the hospital?
   Speaker B: She is Ø the doctor.

e. Speaker A: Has he sold his collection yet?
   Speaker B: He has Ø some of his paintings; I am not sure about the rest.

It is easy to show that Williams's copying rule is oversimple. If (1b) (for example) has the deep structure (2a), and the LF-representation (2b), the application of the copying rule will yield the incoherent expression (2c):

(2)  

a. Mary has not [\textit{VP dated Bill}], but she has [\textit{VP} \textit{Δ} \textit{Harry}]

b. Mary has not [\textit{VP} \textit{λ}x [x date Bill]], but she has [\textit{VP} \textit{Δ} \textit{Harry}]

c. Mary has not [\textit{VP} \textit{λ}x [x date Bill]], but she has [\textit{VP} \textit{λ}x [x date Bill] \textit{Harry}]

Obviously we need a more 'flexible' copying rule, which copies only the "appropriate" parts of the antecedent VP. Or
alternatively, we need a mechanism which, given a copy of the antecedent VP, can "replace" an element of that copy by some other element. Thus in (1a), such a mechanism will substitute his brother for you in (the copy of) the antecedent VP, pull you out of a plane; in (1b), it will substitute Harry for Bill in date Bill; etc. We shall call such 'replacements' in copies of antecedents, "interpolations". Before we consider how we can formalize such a mechanism, we shall examine certain properties of interpolation into gaps, and also compare the latter to similar interpolation phenomena in the interpretation of pronouns.

2. Properties of Interpolation into Gaps

2.1. Interpolation and Embedding

Contrast the sentences of (3), which are cases of plain VP Deletion, with those of (4), which are cases of VP Deletion with Interpolation. In both (3) and (4), VP Deletion is shown applying in clauses at different depths of embedding (with respect to the antecedent VP).

(3)  
   a. She hasn't sued the hospital yet; but she will.  
   b. She hasn't sued the hospital yet; but her lawyer says that she will.  
   c. She hasn't sued the hospital yet; but the newspaper reports that her lawyer says that she
will.

(4)  

a. She isn't suing the hospital; but she is the doctor.

b. ? She isn't suing the hospital; but her lawyer says that she is the doctor.

c. ?? She isn't suing the hospital; but the newspaper reports that her lawyer says that she is the doctor.

Clearly, Interpolation makes VP Deletion degenerate fast with increasing depth of embedding.

Depth of embedding is only one of the factors which can cause decay of acceptability in cases of Interpolation. Interpolation seems to be subject to a parallelism constraint, as the following examples show:

(5)  

a. She hasn't sued the hospital; but she has the doctor.

b. ? She hasn't sued the hospital; but she may the doctor.

c. She hasn't sued the hospital; but she may.

(6)  

a. John can't drive a truck; but he can a tractor.

b. ? John can't drive a truck; and he can't seem to a tractor.

c. John can't drive a truck; and Bill can't seem to.
The (a) sentences are fine, because the antecedent clause and the anaphoric clause are fully parallel. The (b) sentences are marginal, because the parallelism constraint is not met. By contrast, the (c) sentences -- although they do not meet the parallelism constraint -- are fine, because there is no interpolation in them.

2.2. **Multiple Interpolations**

Sentences like (7) and (8) (below) seem to show that more than one element can be interpolated. (These sentences should be read with a heavy accent on both the interpolated elements and the 'paired' elements in the antecedent VP, as indicated.)

(7) I didn't give a pen to you yesterday; but I did a pencil today.

(8) I didn't give a pen to Mary; but I did a pencil to Jane.

Apparently, the interpolated elements need not form a continuous string of the interpreted VP; thus in (7), the second conjunct has the reading:

(9) ... but I did \[ VP \text{ (give) a pencil (to you) today} \]

where the interpolated elements are separated by a copied in element. 

1
2.3. Interpolation and Stress

It seems to be obligatory that the interpolated element(s) bear some degree of contrastive stress, cf. (10) and (11):

(10)  
\begin{itemize}
  \item a. John didn't steal the apples; but he did the peaches.
  \item b. You will eat the apples; and I will the peaches.
\end{itemize}

(11)  
\begin{itemize}
  \item a. * John didn't steal the apples; but Bill did the apples.
  \item b. * John hasn't eaten the apples yet; but he will the apples.
  \item c. * You will eat the apples; and I will the apples.
\end{itemize}

2.4. Interpolation and Left-Branch Constituents

Consider (12):

(12)   I can't eat that many apples; but I can peaches.  

Here the second conjunct has the reading:

(13)   \ldots but I can [VP (eat that many) peaches].

(Sentence (12) should be contrasted with a sentence like (14), in which no VP Deletion has taken place -- and therefore no copying rule applies:
(14) I can't eat that many apples; but I can eat peaches.

In (14), the second conjunct does not have the reading "(but) I can eat that many peaches").

For a straight deletion analysis, the derivation of (12) involves the deletion of a verb and the specifier of an NP, leaving the head of the NP intact. Such a deletion will have two odd properties: firstly, it deletes a nonconstituent; secondly, it deletes a left-branch constituent of a phrase without taking the head. The only other deletion operation (that I am aware of) that does the second thing (and possibly the first thing) is Comparative Subdeletion.

If my analysis is correct, however, what is happening here is simply the interpolation of a bare head-of-phrase, giving the apparent effect of a left-branch deletion.

2.5. Interpolation and the Behavior of Anaphors

Research on constraining grammars has come up with the analysis that construal rules (i.e., rules which relate anaphors to their antecedents) are subject to two opacity conditions. One of these conditions says that an anaphoric element which is in the predicate of an S must be construed as being coreferential with some other element within the S. It is owing to this condition that the coreference relations (indicated by coindexing) in the sentences of (16) are judged to be
ill-formed, while those in the sentences of (15) are well-formed:

(15)  a. they promised \([_S \text{PRO}_i \text{to see [NP}_i \text{each other}]]\)°
       b. I promised \([_S \text{that they}_i \text{will see [NP}_i \text{each other}]]\)
       c. they promised \([_S \text{PRO}_i \text{to show [NP}_j \text{the men} to [NP}_i \text{each other}]]\)

(16)  a. * they \(_i \text{expect [}_S \text{me to see [NP}_i \text{each other}]]\)
       b. * I seemed to them \(_i \text{to like [}_S \text{NP}_i \text{each other}]]\)°
       c. * they begged me \([_S \text{PRO to love [NP}_i \text{each other}]]\)

We get the same results if we put any other anaphor (say, themselves) in the place of each other. Chomsky (1980b) argues that PRO and NP-movement traces are also anaphors (these latter are "non-lexical" anaphors). Thus the ungrammaticality of the sentences of (17) is claimed to be partly due to the ill-formed coindexing:

(17)  a. * John\(_i \text{wants [}_S \text{Bill to like PRO}_i \text{]}\)
       b. * John\(_i \text{seems [}_S \text{Bill to like t}_i \text{]}\)

This condition was formulated as the "Specified Subject Condition" (SSC) in Chomsky (1973, 1977); in Chomsky's more recent work (Chomsky (1979b, 1980b)), it is reformulated in terms of a theory of "government". Williams (1980) states it as a "Predicate Opacity Condition", I shall refer to this condition
A second condition on anaphors says that if an anaphoric element is within a tensed S, the same consequence as in the first condition follows — i.e., the anaphor must be construed as being coreferential with some other element within the S. This condition — variously called the "Tensed-S Condition" (Chomsky (1973)), the "Propositional Island Condition" (Chomsky (1977)), and the "Nominative Island Condition" (Chomsky (1980a)) — accounts for the ungrammaticality of the sentences of (18):

(18) a. *they_i expect [S_i (that) each other] will win
b. *they_i expect [S_i (that) themselves] will win
c. *they_i expect [S_i (that) PRO_i to win]
d. *they_i seemed [S_i (that) t_i liked Vancouver]

The two conditions (taken together) predict that the only "transparent" position (in an S structure) is the subject position of a non-tensed S. The sentences of (19) (as contrasted with those of (18)) seem to bear out this prediction:

(19) a. they_i expect [S_i [NP_i each other] to win]
b. they_i expect [S_i themselves to win]
c. they_i expect [S_i PRO_i to win]
d. they_i seemed [S_i t_i to like Vancouver].
Now a very interesting fact about Interpolation is that it observes the opacity conditions. Consider (20):

(20)  

a. I didn't expect your mother to like the picture; but I did ø you ø. (= ... but I expected you to like the picture)
b. * I didn't expect your mother to like the picture; but I did ø the dinner. (= ... but I expected your mother to like the dinner)
c. * I didn't expect that your mother would like the picture; but I did ø you ø. (= ... but I expected that you would like the picture)

The intended readings of these sentences are indicated within parentheses. In (20a), the interpolated element (you) is interpolated into a transparent position, namely the subject position of an infinitival S. In (20b) and (20c), the interpolations are (respectively) into a predicate and into a tensed S, both of which are opaque domains. The distribution of *'s seems to show that the opaque/transparent distinction, which is known to play a role in the construal of anaphors, also plays a role in Interpolation. How Interpolation can be assimilated to the case of anaphors, we shall consider later.
3. Interpolation into Pronoun Referents

Hitherto we have been considering only cases of interpolation into a gap (in fact, only a single type of gap, namely a VP gap). Now we shall look at interpolation into the referents of pronouns. The first serious attempt to give a formal interpretive treatment of this phenomenon was made in Akhavan (1973). (See Ross (1969) for a syntactic treatment involving deletion, within the framework of Generative Semantics.) Akhavan considers sentences like the following (= Akhavan's (1)):

\[(21) \quad \begin{align*}
\text{a. Pratt & roasted a pig in the fireplace last year,} \\
& \quad \text{but none of his friends realize it.} \\
\text{b. Pratt & roasted a pig in the fireplace last year,} \\
& \quad \text{and Whitney did it too.} \\
\text{c. Pratt & roasted a pig in the fireplace last year,} \\
& \quad \text{and Whitney tried it with a game hen.}
\end{align*} \]

The second conjuncts of these sentences have the following readings:

\[(22) \quad \begin{align*}
\text{a. \ldots but none of his friends realize [(that)} \\
& \quad \text{Pratt roasted a pig in the fireplace last year]} \\
\text{b. \ldots and Whitney did [roast a pig in the} \\
& \quad \text{fireplace last year] too} \\
\text{c. \ldots and Whitney tried [(to) roast a game hen in}
\end{align*} \]
In the most straightforward case, the interpretation of (21a), the entire antecedent clause replaces *it* in the "anaphoric clause". In the interpretation of (21b), only the VP of the antecedent clause replaces *it*; apparently, the copying rule should have the ability to copy only the "appropriate" constituent from the antecedent clause. In the most complicated case, the interpretation of (21c) -- which is also the case we are interested in --, the VP of the antecedent clause is copied into the position of *it*, but with a difference: an NP of the antecedent VP (namely, *a pig*) is replaced by an NP which is specified as a prepositional object in the anaphoric clause (namely, *a game hen*). This "replacement" is analogous to the "replacement" that we observed in the interpretation of VP gaps.

If we can think of the copying rule as producing a variable in the place of *a pig, and of this variable being bound by the prepositional object *a game hen*, we can represent the stages of the mapping as follows:

(23) a. . . . and [*Whitney [\(\text{VP tried} \) [\(\text{pp with } [\text{NP a game hen}]\)]]]

*Replacement (by Copying)*

b. . . . and [*Whitney [\(\text{VP tried } [\text{roast x in the fireplace last year}] \) [\(\text{pp with } [\text{NP a game hen}]\)]]]
Variable Binding

c. * * * and \[ S \text{Whitney} [_{VP\text{tried}} [\text{roast} \ x_i \text{in the fireplace last year}]]_{PP\text{with}} [\text{NP}_i \text{a game hen}]]]$

This is (essentially) Akmajian's solution to the problem of interpreting pronouns. Akmajian makes use of the notions of "focus" and "presupposition" as defined in Chomsky (1971): a "focus" constituent of a sentence is a constituent containing an intonation center; the "presupposition" of a sentence is an expression derived by replacing the focus (or foci) of a sentence with appropriate variable(s). Thus, given that the antecedent clause of (21c) has the stress pattern shown in (24):

(24) Pratt roasted a pig in the fireplace last year

the presupposition-focus relation in the clause can be represented as in (25):

(25) \[[x \text{roasted} \ y \text{in the fireplace last year}], \[[x=\text{Pratt}], \[y=\text{a pig}]\]

(25) is a bipartite expression, of which the first part is the presupposition (containing variables), and the second part contains the foci (which bind the variables). In the anaphoric clause of (21c), the stress pattern is as in (26), and therefore the presupposition-focus relation is as in (27):

(26) (and) Whitney tried \textit{it} with a game hen.
(27)  \[ x \text{ tried } it \text{ with } y], [[x=Whitney], [y=a \text{ game hen}]]

Akmajian's suggestion (now) is that the copying rule which interprets \textit{it} copies just the presupposition of the antecedent clause into the position of \textit{it}. This gives us (28) as the interpretation of the anaphoric clause:

(28)  \[ x \text{ tried } [x \text{ roasted } y \text{ in the fireplace last year}] \text{ with } y], [[x=Whitney], [y=a \text{ game hen}]]

This account (I believe) is very valuable for its description of a plausible way in which we can generate copies of antecedents wherein certain argument positions are replaced by variables. It has (as it stands) two shortcomings, to my mind. Firstly, it pays inadequate attention to the nature of the mechanism which links variables to new foci in the anaphoric clause. Note that its explanation of (21c) assigns no function to the preposition \textit{with} which governs a \textit{game hen}. Obviously (however), \textit{with} has a function, since we cannot use any arbitrary preposition in its place, cf.

(29)  * . . . and Whitney tried it\{in \underbrace{\text{under}}_{\text{with respect to}} \text{a game hen}\}

The only possibilities in this context seem to be:

(30)  . . . and Whitney tried it\{with \underbrace{\text{using}}_{\text{on}} \text{a game hen}\}  \quad (a)  \quad (b)  \quad (c)
Here, (a) and (b) seem to give 'a game hen' an instrumental role; (c) seems to give it an objective role. It is important to note that in general, in the case of all interpretation of pronouns, interpolation of an element into the pronoun referent requires a preposition (or a verb like *using*) which specifies a role (thematic function) for the interpolated element; "direct interpolation", as into VP Deletion gaps, is not possible, cf. (31) *

and Whitney tried it a game hen.

It would seem therefore that Akmajian's "linking" of variables to new foci in the anaphoric clause is effected through the mediation of thematic functions. We shall call this type of interpolation "Oblique Interpolation" (OI), in contrast to the type of "Direct Interpolation" (DI) which is possible in VP Deletion gaps.

A second shortcoming of Akmajian's analysis is that it overextends its explanation. In his account of the anaphoric clause of (21c), Akmajian treats *Whitney* and *a game hen* in similar fashion: both are interpreted by being associated with variables; or, speaking in our terms, both are "interpolated". This is (however) incorrect. *Whitney* is directly generated in the position which it occupies in the final reading of the sentence, namely the subject position of *tried*; while *a game hen* is generated as an oblique object. It is not at all obvious that the former must be interpreted with the aid of any "variable
This overextension of the explanation is forced on Akmajian by his insistence that the copying rule always copy (the presupposition of) the entire antecedent S. Note (in this connection) that Akmajian's proposal (as it stands) runs into difficulties with sentences like (32) (=Akmajian's (22a)):

(32) Pratt believes that there are unicorns, but Whitney doesn't believe it.

Here, we assign the focus-presupposition relations (33a) and (33b) to the antecedent clause and the anaphoric clause (respectively):

(33) a. [x believes that there are unicorns] [x=Platt]
b. [x doesn't believe it] [x=Whitney]

Copying the presupposition of the antecedent clause into the position of it gives us (34), which is an incorrect reading:

(34) [x doesn't believe [x believes that there are unicorns]] [x=Whitney]

Realizing this difficulty, Akmajian suggests (p. 223, fn. 9) that "only the nonidentical portion of the presupposition of the antecedent clause is assigned to the reading of the anaphoric clause". In (33a) and (33b), x believes is common; therefore the copying rule (somehow) omits this string in copying the
presupposition of the antecedent. This gives us the correct reading:

(35) \[ x \text{ doesn't believe } [\text{that there are unicorns}] \]
     \[ x=\text{Whitney} \]

This ad hoc modification (however) can be easily shown to be inadequate. Consider (36):

(36) a. Prátt succeeded in splitting firewood with a hammer; now Whitney wants to try it.
    b. Prátt wouldn't touch the new cereal; so Whitney ate it.

In (36a), we assign the focus-presupposition relations (37a) and (37b) to the antecedent clause and the anaphoric clause (respectively):

(37) a. \[ x \text{ succeeded in splitting firewood with a hammer} \]
     \[ x=\text{Pratt} \]
     b. \[ \text{now } x \text{ wants to try } \underline{\text{it}} \] \[ x=\text{Whitney} \]

Here the two presuppositions have no substring in common. The copying rule therefore gives us (38):

(38) \[ \text{now } x \text{ wants to try } [x \text{ succeeded in splitting firewood with a hammer}] \]
     \[ x=\text{Whitney} \]

(38) represents the reading (39) (we ignore an incorrect Tense
in the embedded S of (38)):

(39) ... now Whitney wants to try to succeed in splitting firewood with a hammer.

But this is an incorrect reading. The reading we want is:

(40) ... now Whitney wants to try splitting firewood with a hammer.

We obtain this reading straightway if we let the copying rule copy, not the presupposition of the entire antecedent S, but just the presupposition of the gerundial phrase splitting firewood with a hammer. (Since this phrase contains no focus element, its presupposition will be identical to the phrase itself.)

Similarly, in the case of (36b), there is (again) no shared substring in the presuppositions of the antecedent and anaphoric clauses, cf.

(41) a. [\(x\) wouldn't touch the new cereal] \([x=Pratt]\)  
b. [so \(x\) ate \(it\)] \([x=Whitney]\)

The copying rule now gives us the nonsensical expression:

(42) [so \(x\) ate [\(x\) wouldn't touch the new cereal]] \([x=Whitney]\)

We get the correct reading if we let the copying rule copy just
the presupposition of the NP the new cereal into the position of it

(43) \[ \text{so x ate [the new cereal]} \] [x=Whitney]

All this seems to show that the copying rule must have the latitude to copy the presupposition of a subconstituent of the antecedent S. In the case of (21c) (now), we can say that only the presupposition of the antecedent VP, namely roast y in the fireplace last year, is copied into the position of it. This enables us to maintain a distinction between the ways in which Whitney and a game hen are interpreted: only a game hen is "interpolated" into the referent of a pronoun. (Whitney is interpreted like any normal subject of a sentence.)

4. Properties of Interpolation into Pronoun Referents

4.1. Interpolation and Obliqueness

We have already pointed out the most striking characteristic of interpolation into pronoun referents, namely that the interpolated element must be governed by a preposition (or a verb) which assigns it an (appropriate) thematic function. Owing to this property, we called this type of interpolation "Oblique Interpolation", and contrasted it with "Direct Interpolation" -- the type we observed in the case of interpolation into gaps.
4.2. Oblique Interpolation and Embedding

Unlike Direct Interpolation, Oblique Interpolation does not degenerate with increasing depth of embedding, cf.

(44) a. Pratt roasted a pig in the fireplace; and Whitney tried it with a game hen.

b. Pratt roasted a pig in the fireplace; and Mary says that Whitney tried it with a game hen.

c. Pratt roasted a pig in the fireplace; and Mary says that she can prove that Whitney tried it with a game hen.

4.3. Multiple Oblique Interpolations

More than one element can be obliquely interpolated, just as in the case of Direct Interpolation. In the following sentence (borrowed from Bach et al. (1974)), three elements (Bill, the couch, apple butter) are interpolated into the referent of it:

(45) Jack put Mabel on the bed and poured honey on her, and I want to do it to Bill using the couch and apple butter. (and I want to put Bill on the couch and pour apple butter on him)

The relative order of the interpolated elements doesn’t seem to be important; in particular, they don’t have to match the
relative order of the elements of the antecedent $S$ which they "replace". Thus (45) seems to be acceptable with the following alternative orders:

(46) a. . . . and I want to do it, using the couch and apple butter, to Bill.
     b. . . . and I want to do it to Bill, using apple butter and the couch.

This is in contrast to interpolations into gaps, where the order is important; cf. (47)((47a)=(8)):

(47) a. I didn't give a pen to Mary; but I did a pencil to Jane.
     b. * I didn't give a pen to Mary; but I did to Jane a pencil.

4.4. Oblique Interpolation and the Behavior of Anaphors

Consider the following sentences:

(48) c. They require the girls to kiss their parents; but they don't require the same thing, of the boys.
     d. They require that the girls should kiss their parents; but they don't require the same thing, of the boys.

(49) a. They believe girls to be clever; they also believe
the same thing about boys.

b. They believe that girls are clever; they also believe the same thing about boys.

It is not clear whether Oblique Interpolation interacts with the Tensed-S Condition; since one cannot detect a marked difference in grammaticality between the (a) and (b) sentences above.

The Predicate Opacity Condition gives some clearer results, cf.

(50) * They require the girls to kiss their fathers; but they don't require it to their mothers. (Cf. The girls kiss their fathers; but they don't do it to their mothers.)

The sentence within parentheses shows that to is the correct preposition to use in this case (or, equivalently, that Goal is the right "role" for the interpolated NP). Therefore the ungrammaticality of (50) can only be attributed to the fact that the position which is the interpolation "target" is within an embedded VP.
5. The Syntax of Interpolation

Now we shall very briefly discuss the question of the syntactic position of the interpolated elements in the deep structure.

Oblique Interpolation presents no special problem: a PP (or VP) introducing an interpolated element is generated like any other PP (or VP). Thus in the case of (51), the anaphoric clause has the deep structure (and also the surface structure) shown in (52):

(51) The girls kiss their fathers; but they don't do it to their mothers.

(52)

```
S
   /\   
  NP   AUX
     \ /
      \NP
       \  
        V
       / \PP
      /   /
     /   /
   do    to
   it    their mothers
```

The copying rule replaces \[ NP \text{ it} \] with the presupposition of the antecedent VP; the resulting structure can be represented as (53): ⁹
An indexing mechanism (which makes crucial use of thematic information) coindexes PRO and their mothers. This indexing is not blocked by the Predicate Opacity Condition, since the "antecedent" (namely, their mothers) is within the minimal S which contains the anaphor. 10

In the case of (50), the anaphoric clause has the structure (54):

Here, [NP it] is replaced by the presupposition of an embedded S of the antecedent clause:
In this case, the coindexing of PRO with their mothers is blocked by the Predicate Opacity Condition, because the minimal S which contains the anaphor does not contain the antecedent.

Turning now to Direct Interpolation, a question arises here as to whether the interpolated element should be generated within the gap ("in place"), or outside the gap. I.e., in the case of a sentence like (56)(= (1b)), we must choose whether to represent the structure of the anaphoric clause as (57), or as (58):

(56) Mary hasn't dated Bill, but she has Ø Harry.

(57)
(57) has an intuitive appeal. If we adopt this solution, we must now have a copying rule which copies only those elements of the antecedent VP which correspond to empty positions in the anaphoric VP. It may be possible to formalize such a rule. However, we saw that Direct Interpolation is subject to the conditions on anaphora. This should lead us to think that the interpretation of Direct Interpolation involves (at some stage) an anaphor-antecedent relationship between two elements. Given a structure on the model of (57), and a copying rule like the one we described, it is difficult to see what element would be the anaphor in such a relationship.

We shall therefore choose a structure on the model of (58) for the anaphoric clause; and our copying rule will be the same rule as in Oblique Interpolation. In the case of a sentence like (20a) (repeated here), the structure of the anaphoric clause will now be (59):
(20a) I didn't expect your mother to like the picture; but I did you.

The copying rule copies into the empty VP-node the presupposition of the antecedent VP:

(59)

Since PRO is in a transparent position, it can now be coindexed with you.

In the case of (20b) (repeated below), the structure of the anaphoric clause is (61); we get (62) as a result of the copying
(20b) * I didn't expect your mother to like the picture; but I did the dinner.

Here the coindexing of PRO with the dinner is blocked, since PRO is in an opaque position, and the minimal S which contains the anaphor does not contain the antecedent.

In (20c) (repeated below) the structure of the anaphoric clause is (63), and the structure output by the copying rule is
(64):

(20c)  *I didn't expect that your mother would like the picture; but I did you.

(63)

(64)

The coindexing of PRO and you is blocked in this case by the Tensed-S Condition.
We have developed the theory of Interpolation sufficiently (at this point) to be able to suggest a new solution to a question which has very often been at the centre of the debate about English comparatives. For completeness' sake, let us recapitulate a little. The issue is about the correct account of the rule of "Comparative Subdeletion" (Subdeletion), illustrated in (66); this rule is most often discussed in relation to the rule of Comparative Deletion (CD), illustrated in (65):

(65) a. John is cleverer than Bill is ___.
    b. John ate more apples than Bill ate ___.

(66) c. John is cleverer than Bill is ___ brave.
    d. John ate more apples than Bill ate ___ peaches.

In (65a), the comparative clause can be taken to mean (something like) "than Bill is x-much clever". Referring to "x-much clever" as a 'term of comparison', we can say that in sentences in which CD has applied, we find a gap representing the entire term of comparison (in the comparative clause). In (66a), the term of comparison in the comparative clause is "x-much brave". The gap (in this case) represents just the QP (Quantifier Phrase) "x-much". In sentences in which Subdeletion has applied (then), the gap represents less than the entire term of comparison.
Using "deletion" merely as a metaphor (for the moment), we can say that Subdeletion deletes a part of the term of comparison, and CD deletes the entire term of comparison.

1. The Three Analyses of Subdeletion

1.1. The "Deletion-Under-Identity" Analysis

Bresnan (1973, 1975, 1976a, 1976b) has maintained that CD and Subdeletion are the same rule; and that this rule is a "deletion-under-identity" operation, which deletes an $X$ ($X=QP, AP, or NP$) dominating the QP $x$-much in the comparative clause. The $X$ which is deleted is always the maximal $X$ which is identical to a constituent of the 'head' of the comparative clause. Sentences like (65a) and (66a) have (in Bresnan's analysis) deep structures like (67) and (68) (respectively):
John is much cleverer than Bill is much clever.
The constituents we have "boxed in" are the "compared constituents" of the sentence. (The one to the left is the 'head' of the comparative clause.) In the comparative clause of (67), the maximal $\bar{x}$ which is "identical" to a constituent of the head is the $\bar{AP}$ dominating $x$-much clever -- i.e. the entire compared constituent. It is therefore deleted, giving us (65a).
In (68), the largest "identical" $\bar{X}$ is the QP $x$-much; the deletion of this gives us (66a).

In Bresnan (1976a), Bresnan develops a relativized version of the A-over-A Principle, which ensures that it is always the maximal $\bar{X}$ which is deleted by CD. We shall return to a discussion of this principle presently.

1.2. The Wh-Movement Analysis

The reader will recall Chomsky's analysis of CD (Chomsky (1973, 1977)), which maintains that the element which CD deletes is a wh-phrase (a proform), what. The deep structure of (65a) (according to this analysis) is (69):

\[(69)\]

[Diagram showing a tree representation of the sentence structure]
Wh-Movement moves what into the COMP adjacent to than (as indicated in (69)); in this position it is deleted by a minor rule, which is obligatory in some dialects and optional in other dialects. In the dialects in which the deletion is optional, the sentences of (65) have variants like (70):

(70) a. John is cleverer than what Bill is.

b. John ate more apples than what Bill ate.

CD is not (under this analysis) a deletion-under-identity operation but simply the deletion of a designated element; also, the deletion is 'local'. This analysis enables Chomsky to maintain that "there do not exist rules of 'deletion over a variable'" (Chomsky (1977,88)); more importantly, it enables him to assimilate CD to a more general theory which claims that all long-distance rules (in English) that are subject to the island constraints are (simply) instances of a single rule -- the rule of Wh-Movement (Chomsky(1977)).

Now, Chomsky's analysis (or analyses) of Subdeletion was influenced by a misunderstanding about data that plagued all earlier discussions of this rule. It was thought (for some time) that the dialects which allow variants with a surface what in cases of CD (as illustrated in (70)) do not have similar variants in cases of Subdeletion. I.e., it was thought that sentences like (71) are not acceptable in these dialects (nor in
any dialect of English):

(71)   a. John is cleverer than what Bill is brave.
       b. John ate more apples than what Bill ate peaches.

Given this (supposed) state of affairs, a challenge faced by any account of Subdeletion in terms of wh-movement was to explain why the wh-phrase never surfaced. Chomsky (accordingly) suggested that in cases of Subdeletion, the wh-phrase which is moved may be a "bare" wh-, which has no phonetic content (Chomsky (1977,123)).

Apparently (however), sentences like (71) are acceptable in the dialects in question. Therefore the device of the "ghost wh-phrase" can be given up. Subdeletion is now fully parallel to CD. The analysis predicts (correctly, I think) that Subdeletion is a long-distance rule, and that it observes the island constraints.

1.2.1. An Objection to the Wh-Movement Analysis

The "wh-movement analysis" (however) is still open to some serious objections, pointed out in Bresnan (1975,1976b). The wh-phrase is generated as a specifier (a left-branch modifier) of a head-of-phrase Adjective, Noun, or Adverb. The rule of comparative formation moves this specifier away from the head-of-phrase. This is shown in (72), using the comparative clause of (71a) as an example:
But it is well-known that (in English) this type of movement is not possible: a QP, or other left-branch modifier, must take the head-of-phrase with it when it is moved. This is shown by the following examples (the (a) examples are the deep structures corresponding to the (b) and (c) sentences):

(73) a. Bill is \([\text{AP [how]} \text{ brave}]\)
    b. How brave is Bill? / How brave Bill is!
    c. *How is Bill brave? / *How Bill is brave!

(74) d. he ate \([\text{NP [how many]} \text{ apples}]\)
    e. How many apples did he eat? / How many apples he ate!
f. * How many did he eat apples? / * How many he ate apples!

(75)  a. he ate \[NP \{so many\} apples\] that ...

b. So many apples did he eat that ...

c. * So many did he eat apples that ...

If Subdeletion involves the type of deep structure (and movement) illustrated in (72), it would violate the obligatory "pied-piping" condition on left-branch wh-phrases that we see operative here. 13

Not only must we allow Subdeletion to move a normally immovable left-branch phrase; we must somehow prevent this phrase from ever taking the head-of-phrase with it. I.e., we must impose on this particular case of wh-movement an obligatory "non-pied-piping" condition, thereby making it very unlike all other (well-attested) cases of wh-movement in the language. Otherwise we should generate the ungrammatical sentences of (77) by way of the stages indicated in (76):

(76)  a. \ldots \text{ than } [S \{COMP \triangle} \text{ Bill is } [AP \{what\} brave]\] 

\[\Rightarrow \] (by Wh-Movement)

b. \ldots \text{ than } [S \{COMP [AP \{what\} brave]\} \text{ Bill is}]

\[\Rightarrow \] (by optional deletion of wh-phrase)

c. \ldots \text{ than } [S \{COMP [AP, \emptyset brave] \text{ Bill is}]\]

(77)  a. * John is cleverer than what brave Bill is.

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b. * John is cleverer than brave Bill is.

1.3. The "Deletion of a Designated Element" Analysis

Perhaps bearing in mind these objections, Chomsky (1977) also suggests an alternative analysis of Subdeletion: the delendum, a QP, is perhaps simply deleted "in place" by a rule which deletes a designated element. (This would be analogous to a "pronoun drop" rule.) Since a rule of this type is not subject to the island constraints, the plausibility of this analysis depends on whether (or not) Subdeletion observes these constraints.

Evidence in this regard is complicated by a property of Subdeletion which we discuss immediately below. Subdeletion is apparently subject to a requirement of parallelism between the comparative clause and the matrix clause, and tends to degenerate with repeated embedding. Chomsky focuses the issue by discussing the following examples (= (232) of Chomsky (1977)):

(78)  
c. The desk is as high as it is wide.

d. * The desk is as high as they believe the claim that it is wide.

e. ? The desk is as high as they believe that Bill claims that it is wide.

f. The desk is as high as they believe that Bill claims that it is.
Here, (78a), which is a Subdeletion construction that meets the requirement of parallelism, is fully acceptable. (78d) is fully acceptable too, because it is a case of CD (which is not subject to any parallelism constraint). There is a complex NP in (78b), but not in (78c); neither of these sentences meets the parallelism requirement, and neither of them is (fully) acceptable. The crucial question is: is there a significant difference in their degree of grammaticality? If there is not, one can simply say that Subdeletion is subject to a "complex phrase constraint" (but not the Complex NP Constraint). If we decide that (78b) is significantly worse than (78c), then (of course) we must give up the "proform drop" analysis. We can now fall back on the wh-movement analysis, and postulate "some extragrammatical factors that account for the rapid decline in acceptability with complexity and for the focus and parallelism requirements" (Chomsky (1977,124)).

2. Some Unexplained Properties of Subdeletion

There are things about Subdeletion that none of the analyses offered in the literature so far explains.
2.1. Subdeletion and the Parallelism Constraint

It has been noted by Bresnan that "the acceptability of sentences involving Subdeletion seems to decay more rapidly as length and complexity increase than with CD" (Bresnan (1975, fn. 10; see also Bresnan (1976b, 387)). Bresnan (ibid.) gives the following examples to illustrate this difference:

(79)  a. Rockefeller managed to sell more banks than Hughes thought that he could buy.

b. Rockefeller managed to sell more banks than Hughes thought that he could buy airlines.

(79a), which is derived by CD, is a fine sentence, but (79b), which involves Subdeletion, is only marginal. The decay in acceptability is apparently "progressive", increasing as the depth of embedding increases; cf.

(80)  a. The desk is as high as it is wide.

b. The desk is as high as Bill claims that it is wide.

c. The desk is as high as they believe that Bill claims that it is wide.

((80c) should be contrasted with 'The desk is as high as they believe that Bill claims that it is ', which involves CD and is perfectly acceptable.)
Chomsky (1977) notes that "very slight modifications suffice to cause decay of acceptability of [Subdeletion]." He cites the following examples (= (233)-(235) of Chomsky (1977)):

(81) a. The desk is wider than it is high.
b. ? The desk is wider than it used to be high.
c. ? The desk was wider than it seems to me to be high now.

(82) a. She seems as happy now as she seemed sad before.
b. ? She seems as happy now as she
   \[
   \text{was sad before.}
   \begin{cases}
   \text{has ever been sad.} \\
   \text{will ever be sad.}
   \end{cases}
   \]

c. ? John looks more satisfied than he is happy.
d. ? John is more healthy now than he has been happy for many years.

Chomsky remarks that "[ (81b,c)], [ (82b)], and [(83)] are very low in acceptability, ... although the comparatives formed by removing the italicized word in these examples are perfectly acceptable and the modification that gives the unacceptable [Subdeletion] forms is rather slight" (Chomsky (1977,120)),

.187
The evidence of (81)-(83) suggests that a parallelism constraint is at work here. Since Wh-Movement (or a "proform drop" rule) is not known to be subject to a requirement of parallelism (or to decay with repeated embedding), these properties of Subdeletion must wait for some other explanation. (Chomsky suggests "extragrammatical factors" (Chomsky (1977,124)).)

Bresnan's analysis, which rests on the claim that Subdeletion and Comparative Deletion are the same rule, is very vulnerable to evidence like (79)-(83): it is not readily conceivable how two applications of the same rule can be subject to different constraints.14

2.2. Subdeletion and the "Focus Constraint"

In a Subdeletion construction, the undeleted element of the compared constituent must bear heavy stress. This fact was noted as early as 1963 by Chomsky, who gave the following informal account of the rule:

Thus in the comparative construction we can have such sentences as That one is wider than this one is DEEP (with heavy stress on deep), but not * That one is wider than this one is WIDE -- the latter is replaced obligatorily by That one is wider than this one is. Thus in these constructions, characteristically, a repeated element is deleted and a nonrepeated element receives heavy stress. (Chomsky (1963,378))
In more recent work (specifically, Chomsky (1977)), Chomsky makes a modification in the above analysis. He now suggests that a sentence like That one is wider than this one is *WIDE* is not ungrammatical; in fact, it is acceptable if "context supplies an adequate reason for placement of the required stress on the compared form" (Chomsky (1977, 122)). He cites as evidence contexts like the following (= (246) and (247) of Chomsky (1977)):

(84) Speaker A: John is more courageous than Bill is *intelligent.*

Speaker B: No, you have got it all wrong; John is more courageous than Bill is *courageous.*

(85) Speaker A: This desk is higher than that one is *wide.*

Speaker B: What is more, this desk is higher than that one is *high.*

If Chomsky's later conclusion is correct -- see Sag (1976, 3.3) for some similar arguments in support of this conclusion -- we can say that a Subdeletion construction is fine if the compared form (whether a repeated element or not) bears contrastive stress. Of course, what we do not yet explain is why this stress is required. It is not a property of *wh*-movement, or of a rule of deletion of a designated element, or of a rule of deletion under identity, that an element to the right of the
moved or deleted element be in contrast with a paired element in an antecedent clause (and so be heavily stressed). Thus assuming (with Chomsky) that a repeated element is permissible in Subdeletion constructions, none of the three competing analyses can account for the ungrammaticality of (86) ('-' here indicates lack of stress):

(86) * This desk is higher than that one is ___ high.

2.3. Subdeletion and the A-over-A Principle

Suppose we grant that a Subdeletion construction with a repeated element in the compared constituent is grammatical (as Chomsky's later account claims). Bresnan (1976b) has shown that by a small modification of her Comparative Deletion rule, her "Relativized A-over-A Principle" (RAOAP) will still generate all the correct data. What she does not indicate (however) is that in this case, while the data will be consistent with that principle, it does not require that principle. On the other hand, if the aforesaid type of construction is ungrammatical, then Bresnan's account of Comparative Deletion will crucially depend on RAOAP to delete the maximal "recoverable" element of the compared constituent. However, in the light of recent research (much of it Bresnan's own research), it is doubtful if there is an A-over-A Principle.

The original motivation for the A-over-A Principle came
largely from the study of rules like the Passive, which -- given alternative proper analyses of a string that fitted their structural descriptions -- seemed to choose the one in which the target predicates were maximal (most inclusive). (87) is an example discussed by Bresnan (Bresnan (1976a, 5-6)):

\[ (87) \]
\[ a. \triangle \text{ isn't approved of } [\text{NP } [\text{NP children('s)}] \text{ smoking}] \text{ by doctors} \]
\[ b. \text{Children('s) smoking isn't approved of by doctors.} \]
\[ c. \star \text{Children('s) aren't approved of smoking by doctors.} \]

The argument from this example is the following: the Object Preposing rule (of the Passive), which must analyze an NP to the right of V (there can be an optional intervening P), can ambiguously analyze either the smaller NP children('s), or the larger NP children('s) smoking; but in fact it must analyze the larger NP to get a grammatical output, as shown by (87b) and (87c).

Obviously, arguments of this type must be disregarded if we hold that the so-called "structure-preserving transformations" are lexical rules that operate on grammatical relations.

The remaining arguments discussed in Bresnan (1976a) seem to me to be of doubtful status. The facts about VP Deletion can (at best) be shown to be consistent with the A-over-A Principle; they do not require that principle. Bresnan argues (pp.33-34)
that a constraint on Complex NP Shift illustrated by (88) can be explained by the A-over-A Principle:

(88) a. He considers \([\text{NP many of [NP my best friends]}]\)

stupid.

b. He considers stupid many of my best friends.

c. * He considers many of stupid my best friends.

However, given that the VP of (88a) has the following structure:

(89) 

```
  VP
   \(V\)
      \(\text{considers}\)
       \(\text{many of } \text{NP}\)
           \(\text{stupid}\)
               \(\text{my best friends}\)
```

the facts about Complex NP Shift are best handled by saying that "Stylistic Rearrangement" is possible only among sister nodes.

If we disregard the argument from Comparative Deletion, which is the point at issue, there are two remaining arguments in Bresnan(1976a): one from Question Movement (QM) and one from Relativization. The argument from Question Movement deals with the type of data which (earlier) motivated the formulation of a "Left-Branch Condition" (see (73)-(75) above, and fn. 13). Bresnan (1976a) discusses the following examples:
(90)  a. How difficult a problem do you want to solve?
    b. * How difficult do you want to solve ___ a
       problem?
    c. * How (much) do you want to solve ____ difficult a
       problem?

(91)  a. How many feet tall does the girl stand?
    b. * How many feet does the girl stand ____ tall?
    c. * How many does the girl stand ____ feet tall?

(92)  a. How much more skillfully can you phrase this?
    b. * How much more can you phrase this ___
       skillfully?
    c. * How much can you phrase this ___ more
       skillfully?

Bresnan formulates QM as in (93). ("Q" here is the interrogative
complementizer; "X" stands for a "supercategory" which includes
N, A, and Q.)

(93)

\[
[S \ Q \ -- \ W_1 \ -- \ [\ X \ wh \ -- \ W_2 ] \ -- \ W_3 ]
\]

\[
\begin{array}{cccccc}
\downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\
1 & 2 & 3 & 4 & 5 & 5 \\
3 & 4 & 2 & 9 & 5 & 5
\end{array}
\]

In (93), the target predicate is \([\ X \ wh \ -- \ W_2 ]\); i.e., an \[X\]
category which has a \textit{wh}-word as its leftmost element. Given that
(90a) has the deep structure (94):

\[ \text{(94)} \]

\[ \text{COMP} + \text{Wh} \]

\[ \text{S} \]

\[ \text{S} \]

\[ \text{NP} \]

\[ \text{VP} \]

\[ \Delta \]

\[ \text{you} \]

\[ \text{V} \]

\[ \text{S} \]

\[ \text{want} \]

\[ \text{AUX} \]

\[ \text{VP} \]

\[ \text{to} \]

\[ \text{V} \]

\[ \overline{\text{N}} \]

\[ \text{solve} \]

\[ \overline{\text{A}} \]

\[ \text{A} \]

\[ \text{N} \]

\[ \text{a problem} \]

\[ \overline{\text{Q}} \]

\[ \text{difficult} \]

\[ \text{D} + \text{Wh} \]

\[ \text{Q} \]

\[ \text{how} \]

\[ \text{(much)} \]

RA0AP forces us to choose the maximal value of the $\overline{x}$ category, which in this case is the $\overline{N}$, how (much) difficult a problem. The choice of nonmaximal values $\xi$ such as the $\overline{A}$, how (much) difficult, or the $\overline{Q}$, how (much) -- gives us ungrammatical outputs, as (90b) and (90c) show.

Bresnan's formulation of QM predicts that all phrases moved
by this rule will have a *-word as its leftmost element.

However this prediction is false, cf.

(95)  a. From which drawer did you take this document?

b. Shoes of what size do you usually buy?

If, in order to accommodate these facts, we provide an additional variable to the left of the *-word in the target predicate, as shown below:

\[
\begin{array}{c}
\begin{array}{c}
\text{If, in order to accommodate these facts, we provide an additional variable to the left of the *-word in the target predicate, as shown below:}
\end{array}
\end{array}
\]

we come up against another difficulty. In a structure like (97) (adapted from (14) of Bresnan (1976a)),

\[
\begin{array}{c}
\begin{array}{c}
\text{we come up against another difficulty. In a structure like (97) (adapted from (14) of Bresnan (1976a)),}
\end{array}
\end{array}
\]
both the circled NP's meet the structural description of the target predicate. The A-over-A Principle now forces us to choose the higher (larger) NP; therefore we can generate only (98a), not (98b):

(98)  

a. My seeing who would you approve of?  
b. Who would you approve of my seeing?

If we give up the A-over-A Principle, we can generate both these sentences. In order to account for the facts of (90)–(92) (which have to do with the obligatory "pied piping" of the head by the specifier), we can fall back on a version of the
Left-Branch Condition. Note that in the area of Question Movement, the Left-Branch Condition and the A-over-A Principle cover the same ground; the latter however makes some additional predictions, which are false.

Bresnan's remaining argument has to do with "Pied Piping" in Relativization. Bresnan sets out to explain the following data, which is recorded by Ross (1967) (Ross's (2.3), (4.163), and (4.167)):

(99) The government prescribes the height of the lettering on the covers of the reports.

(100) a. Reports which the government prescribes the height of the lettering on the covers of are invariably boring.

b. Reports the covers of which the government prescribes the height of the lettering on always put me to sleep.

c. Reports the lettering on the covers of which the government prescribes the height of are a shocking waste of public funds.

d. Reports the height of the lettering on the covers of which the government prescribes should be abolished.

(101) a. * Reports of which the government prescribes the
height of the lettering on the covers are invariably boring.

b. *Reports on the covers of which the government prescribes the height of the lettering almost always put me to sleep.

c. *Reports of the lettering on the covers of which the government prescribes the height are a shocking waste of public funds.

Given the underlying structure (102),
Bresnan's formulation of the rule of Relativization, namely (103), predicts all the facts of (100)–(101) (if taken in conjunction with RAOAP).

(103) \[ NP \rightarrow [S\ COMP \cdot W1 \cdot (P) \cdot [\overline{x} W2 \cdot \text{rel} \cdot W3] \cdot W] \]
\( \overline{\mathcal{V}} \) designates the set of categories \{NP, PP\}; \( \text{rel} \) is the class of relative pronouns. Note that term 4 of the rule, \((\text{P})\), can be satisfied either by a P or by a null element. If we take it to be satisfied by a P, for each of the three prepositions in (102), the sister NP to its right is maximal (and can be moved); this generates (100a-c). If we take term 4 to be satisfied by the null element, the maximal NP or PP which dominates the relative pronoun -- which in this case is \( \text{NP}_1 \) -- will be moved; this generates (100d). There is no way in which the sentences of (101) will be generated.

Now, suppose we had no A-over-A Principle, and had a simple rule of Relativization which said, "Move an NP or PP dominating the relative pronoun". This rule would generate all of the sentences of (100); but it would also generate the sentences of (101). The choice between such an analysis and Bresnan's analysis (therefore) depends on the grammaticality status of (101). Bresnan admits that there is "much variation among speakers" in judgments of "Eied Piping" cases (p.34). It seems to me that, although the sentences of (101) are marginal, the analogous sentences of (104) are fully acceptable:

(104) a. Reports of which the government chooses the format, are invariably boring.

b. A picture, of which I like only the frame, is being auctioned at the gallery.
A house, of which only the roof was still intact, was slowly floating along the current.

Note that, given a structure like (105):

(105)

Bresnan's rule can either analyze the preposition of as term 4, and so move NP₂; or analyze the null element as term 4, and move the maximal [-v] category dominating the relative pronoun, namely NP₁. But it cannot move the PP of which. Therefore a sentence like (104b) cannot be generated. Thus, if the sentences of (104) are grammatical, the RAOAP makes false predictions in the case of Relativization also.
What seems to be happening is that "structure-dependent" rules (such as Question Movement, Relativization, and VP Deletion) are not subject to any A-over-A Principle; while "non-structure-dependent" rules (the "structure-preserving" rules) superficially obey the principle but for reasons which have nothing to do with that principle.16

I shall presently show that an account of Subdeletion is possible, which does not involve the A-over-A Principle.

2.4. Subdeletion and the Deletion of Nonconstituents

It has been noted that Subdeletion appears to delete a nonconstituent sequence in some cases of its application. Bresnan (1976b) discusses the following sentences (Bresnan's (77)):

(106)  a. There aren't as many nuggets of gold in the jar as there appear to be ___ of pyrite.

b. He's as good a singer of lieder as he was ___ of pop songs.

c. Isn't he as proud of his son as he is ___ of his daughter?

d. Are there as many degrees of grammaticality as there are ___ of ungrammaticality?

Assuming Bresnan's analysis of comparatives, the lower compared constituents in these examples are: \[x \text{ many [nuggets of}\]
proud of his daughter], [x many [degrees of ungrammaticality]]. The point of interest is the bracketing; there is good reason to believe that the phrases are bracketed as indicated. Now note that the sequence which Subdeletion seems to remove in each case (the underlined words) do not form a constituent.

If this fact cannot be explained away, it is a difficulty for all three competing analyses of Subdeletion. No movement rule ever moves a nonconstituent (cf. Chomsky's wh-movement analysis); and a rule deleting a designated element cannot very well "designate" a nonconstituent (cf. Chomsky's "proform-drop" analysis); and finally, it is not possible to formulate a deletion rule which establishes a binding relation between the "controller" and the "target", if the latter is not a constituent (cf. Bresnan's "controlled PRO deletion" analysis).

Bresnan (accordingly) attempts to provide alternative explanations for this seeming fact. In (106a) (she argues), Subdeletion deletes only the QP x many; nuggets is deleted by a different rule which optionally deletes an N between a QP and a PP. This rule is independent of comparatives, cf. (107)(=Bresnan's (78),(79));

(107) a. Are there many nuggets of gold in the jar? There certainly don't appear to be many... of pyrite.
b. For each degree of grammaticality, there had to be two of ungrammaticality, in his theory.

Andrews (1974) -- who was the first to discuss this rule -- calls it "One(s) Deletion". The deletions in (106a) are (according to this explanation) as diagrammed in (108):

(108)

\[ \text{NP} \rightarrow \text{QP} \rightarrow \text{Q} \rightarrow \text{NP} \quad \text{QP} \rightarrow \text{N} \rightarrow \text{PP} \]

(Subdeletion) (One(s) Deletion)

This explanation (however) does not apply to (106b), since (in this case) an adjective intervenes between the deletion-triggering QP and the N. As the following example shows (and as discussed by Andrews (1974)), "One(s) Deletion" is blocked if the QP is not immediately to the left of N:

(109) a. *Are there many large nuggets of gold in the jar?

There certainly don't appear to be many small
of pyrite.

b. * For each well-defined degree of grammaticality, there had to be two ill-defined ___ of ungrammaticality, in his theory.

However Bresnan has an alternative explanation for (106b); she suggests that an NP-cyclic PF-Extrposition rule (discussed in Akmaijian (1975)) could very well have applied to a case like this. This rule would apply to the underlying structure (110a) prior to CD, yielding (110b). In this new structure, x (much) good a singer is a constituent.

(110)a. 

```
NP
  AP
    QP
      x much
    AP
      good
  D
    N
      a singer
    PP
      of pop songs
```
For the case of (106c) Bresnan offers a third explanation, namely that the degree modifier (the "x (much)") is perhaps "incorporated with the Adjective"; cf. "John had too much, and Bill had much too much, pastrami" with "* John was too, and Bill was much too, hungry". (These sentences are meant to show that an adjectival head cannot be 'split' from its degree modifier and "right-node-raised", while a nominal head can be; which argues that the degree modifier is incorporated with the Adjective head, but not with the Noun head.) The suggestion is that an 'incorporation rule' transforms a structure like (111a) to (something like) (111b), wherein x much proud is a constituent:
Without wishing to challenge any of the individual explanations -- at least the "One(s) Deletion" rule seems to be very well motivated --, let us note the lack of a unified explanation here. We have three different accounts -- perhaps reducible to two different accounts if we extend the "PP-Extrapolation" explanation to (106a) also -- of a set of data which exhibit what looks remarkably like the same phenomenon.

In the new analysis of Subdeletion which I present below, the problem of nonconstituent deletion does not arise at all.
3. A New Proposal

In Part I of this chapter we examined the phenomenon of "interpolation into gaps". Suppose we say that Subdeletion -- the essential property of which is that it "leaves behind" a part of the compared constituent, -- is not a deletion rule at all, but a case of interpolation into the gap in the comparative clause; we then explain several puzzling properties of Subdeletion.

We saw that Subdeletion is subject to a parallelism constraint, and degenerates fast with depth of embedding (Section 2.1). We remarked that this is not characteristic of wh-movement, or of deletion of designated elements, or of a rule like Comparative Deletion. But this is a property of interpolation into gaps, see Section 2.1 of Part I.

Again, we saw that Subdeletion sentences are fine if they have a heavy stress on the undeleted part of the compared constituent, but they are unacceptable without this stress (Section 2.2). None of the competing analyses of Subdeletion have an explanation for this fact. But we know that heavy stress is obligatory on the interpolated element, in cases of all types of interpolation; see Section 2.3 of Part I.

We saw that any proposed derivation of a comparative clause like (112a) which involved a movement of a wh-phrase like that shown in (112b) was untenable, since the rule would be moving a
left-branch modifier away from its head.

(112)  a. . . than what Bill ate peaches

b. . . . [PP than [S [COMP what] Bill ate [NP [QP }

peaches]

This problem does not arise under the new analysis, since what is happening in (112a) is (simply) the interpolation of a Noun into the position of the head of the NP, as shown informally in (113):

(113)  . . . [PP than[S [COMP what] Bill ate [NP [QP }

peaches]

We showed that interpolation into the position of the head is possible in the case of indefinite NP's, cf. (12) of Part I. The point to note is that the what in (112a) is not generated as a left-branch modifier at all, but is the same what that appears in the analogous Comparative Deletion construction, "... than what Bill ate". (The issue of whether the what is generated in place, or moved from the gap, is a separate question that concerns both CD and Subdeletion; it will be discussed later.)

The problem of "nonconstituent deletion", which took such ingenuity to explain away, also does not arise under the proposed analysis. We can easily see why, if we consider the following case of interpolation into a VP Deletion gap:
(114) I didn't send a parcel to Mary, but I did to Jane.

Under a deletion analysis of VP Deletion, this sentence would involve the deletion of a nonconstituent, as shown in diagram (115):

(115)

We would face even a worse problem in the case of a sentence like (116):

(116) I didn't send a letter to you; but I did a Christmas card

where the delendum is not only a nonconstituent but discontinuous, as shown in (117):
But this problem (we saw) is only an artifact of the deletion analysis. From the point of view of the interpolation analysis, the question of whether the non-interpolated elements of the VP (the elements which are simply copied in) together form a constituent is a matter of no consequence, or interest. The same obviously applies to interpolation into the comparative clause gap.

Finally, note that in the proposed analysis, we do not rely on the A-over-A Principle, which I have argued does not exist.17

4. The Deep Structure of Subdeletion Comparatives

In Part I of this chapter, we distinguished between two types of interpolation, Direct Interpolation and Oblique Interpolation. It was suggested that Direct Interpolation is always into (base-generated) gaps, and Oblique Interpolation is always into pronoun referents. Now since the interpolation into comparative clause gaps is obviously of the type of Direct
Interpolation, this would seem to argue that the comparative clause gap is a gap also in the deep structure.

This consequence touches on a problem which we have hitherto put off facing, namely the question of the deep structure position of the what which introduces the comparative clause. Assuming -- as we have been doing all along -- that the comparative clause is a free relative, we must choose between two competing analyses of free relatives. The traditional analysis of free relatives, recently defended in Groos and Riemsdijk (1979), generates an empty head for the relative clause; the wh-phrase is generated in an argument position within the clause, and is moved (by wh-movement) into a COMP adjacent to the head. An alternative analysis, proposed and defended in Bresnan and Grimshaw (1978), generates the wh-phrase as the head of the relative clause; a lexically empty category is generated in an argument position within the clause, which the head (the wh-phrase) is made to bind by a transformational rule. The deep structure of a comparative clause like (118) will be (119) under the 'empty head' analysis, and (120) under the 'wh-phrase head' analysis.

(118) ... than what Bill ate
In the case of comparative clauses involving interpolation, we shall -- following our practice in the representation of interpolation into VP Deletion gaps, cf. (64) above -- represent the interpolated element as a sister of the node into which the
copying rule copies in a string. Thus the deep structure of a clause like (121) will be (122) and (123), under the two alternative analyses:

(121) ... than what Bill ate ___ peaches.

(122)

```
  PP
  NP
    than
    NP
      △ COMP
      S
      △
      VP
      Bill V NP
        ate NP N
          what peaches
```
In (122), *peaches* is being interpolated into the referent of *what*, which is a lexical proform. If our observation that Direct Interpolation is possible only into gaps is correct, this would be a reason for not preferring the type of deep structure represented by (122) (and (119)) as the deep structure of comparatives (or of free relatives). In (123), the node to which *peaches* is sister-adjointed is empty (a gap). (However the argument for either choice would remain weak, until we have a better understanding of the properties of Interpolation.)

The interpretation of Subdeletion will proceed exactly along the lines of the interpretation of interpolation into VP gaps. Recall that in the latter case, the relevant interpretation rule introduced into the null VP a copy of an antecedent VP in which the foci had been replaced by PRO's. The
The coindexing of PRO and *peaches* gives us the interpretation we want.
FOOTNOTES TO CHAPTER FOUR

1 There are several unclear facts (and grammaticality judgments) about multiple interpolations. Thus compare (i) with (8):

(i) ?? Bill didn't give a pen to Mary; but Péter did a pencil to Jane.

I haven't investigated such facts in any detail.

2 It may help to place (12) in the following context:

Speaker A: Can you eat thirty apples?
Speaker B: I can't eat that many apples; but I can peaches.

3 It must be noted that interpolation of a head-of-phrase is not possible into definite NPs, cf.

(i) He didn't steal those apples, but he did peaches.

If the above sentence is grammatical at all, its second conjunct does not have the reading "but he did (steal those) peaches"

A real quirk of interpolation into VP gaps (for which I have no explanation) is that an AP -- and as a subcase, the head
of an AP -- cannot be interpolated, cf.

(ii) * It won't be very strong; but it will very durable.

(iii) * I can't be that tall; but I can strong.

This is in contrast to NP (and head-of-NP), PP, and S, all of which can be interpolated. I give examples of PP- and S-interpolation below:

(iv) I didn't give a pencil to Mary, but I did to Jane.

(v) I don't believe that the earth is flat, but I do that it is very stable.

I haven't been able to find fully acceptable examples of VP-interpolation either, cf.

(vi) ?? The baby hadn't learned to walk; but it had to swim.

4 In (15a) and (15c), the PRO subject is in turn coindexed with the subject of the matrix S, they, by another construal rule; we do not indicate this here. Note that in (15c), each other can be construed as being coreferential with not only the PRO-subject, but the direct object the men.

5 In (16b) and (16c), each other can be coindexed with the PRO-subject without violating the condition. But the PRO is in
turn coindexed with I in (16b), and with me in (16c) by the
other construal rule that we mentioned. Now, since each other
needs a plural antecedent, this situation leads to semantic
incoherence; and therefore these readings are blocked.

6 Actually, there is also a second transparent position, namely
COMP. But we can ignore this position for our purposes.

7 "Anaphoric clause" is Akmajian's term for the clause
containing the pronoun to be interpreted.

8 As Akmajian notes (Akmajian (1973, fn.3)), anaphoric
expressions like the same (thing) and that function in a similar
manner as it:

Pratt roasted a pig in the fireplace last year,
and Whitney tried it with a game hen.

9 We have preferred to represent the variable in the "copied-in"
VP as a PRO (rather than, say, an x), since we are dealing with
an anaphoric variable (which is subject to the conditions on
anaphora).

Note that if we adopt the assumption that Case Assignment
and the "Case Filter" apply prior to interpretation (and
therefore do not apply to the output of a copying rule), the PRO
in (53) in a position governed by V should not pose a problem
for Case Theory (or for our analysis).

10 Note (however) that the anaphor is neither preceded nor c-commanded by the antecedent. It is difficult to say (at this stage) whether this fact calls for a modification of our analysis of Interpolation, or for a modification (or extension) of the theory of anaphora.

11 In (59), the single $\Delta$ that the VP is expanded into may be thought of as an expository convenience. Wasow (1972) has argued that a "missing VP" has all the structure that its antecedent has; and that $\Delta$'s occupy only lexical nodes, never major category nodes. Williams (1977) also adopts Wasow's "empty structures" hypothesis.

12 Actually, Bresnan employs the notion "nondistinct", which is a looser relation than "identical" (Bresnan (1973,1975)); this enables her to treat er-much and x-much as nondistinct. This notion is made sharper in Andrews (1974), who proposes to generate a "null" QP instead of x-much in the deep structure of comparatives. Andrews then develops a theory in which a lexically unfilled category is treated as nondistinct from any instance of the same category. This theory clearly allows the deletion of [QP $\Delta$] under identity with [QP er much]. (Bresnan adopts this "null QP" analysis in Bresnan (1976a).)

13 Ross (1967) first formulated the condition we see here as the
"Left Branch Condition". This formulation of the condition is almost certainly in need of modification, see Grosu (1974). Bresnan (1975, 1976a, 1976b) suggests that her "Relativized A-over-A Principle" (RAOAP) will take care of the data of (73)-(75), as well as of Subdeletion, without any special "left-branch condition". We shall return to this question presently.

14 Bresnan (1975, fn. 10) notes -- crediting the observation to Akmajian, originally -- that "examples of Subdeletion involve more 'natural contrasts' or 'foci' than similar examples of CD". She goes on to suggest that "(i)t is possible that the reduced acceptability of some cases of Subdeletion is caused by the proliferation of foci or resultant stacking up of stresses."

Giving the examples (i) and (ii)= (79a, b) above):

(i) Rockefeller managed to sell more banks than Hughes thought that he could buy ___ . (CD)

(ii) ? Rockefeller managed to sell more banks than Hughes thought that he could buy ___ airlines. (Subdeletion)

She notes that in (i), the foci include Rockefeller and Hughes, sell and buy; while in (ii), they include these as well as banks and airlines. She then demonstrates (by citing (iii)) that by increasing parallelism, which eliminates contrasts and reduces the number of foci, Subdeletion can be improved.
(iii) Rocky thought that he could sell more banks than Hughes thought that he could sell airlines.

It is entirely correct that parallelism improves the acceptability of Subdeletion; however, the argument above does not touch on the point at issue. If Subdeletion and Comparative Deletion are the same rule, the "proliferation of foci" and non-parallelism should affect both in the same way. But this is not true, cf.

(iv) Rockefeller managed to sell more banks in a day than Hughes thought that he could buy in a year.

(v) Jack loses more money on truck rentals than his wife is ever likely to earn on car rentals.

Sentences (iv) and (v) have (each) three sets of foci, the same as (ii); they also exhibit similar non-parallelisms as (ii) (cf. managed to sell and thought that he could buy in (iv), and loses and is ever likely to earn in (v)). But unlike (ii), they are fully acceptable.

Bresnan's observation (Bresnan (1976b, 388)) that "Subdeletion constructions are intuitively more complex in meaning than corresponding Comparative Deletion constructions" is not at all obvious when we consider cases like (ii) and (iv). Rather, what seems to be happening is that in interpreting Subdeletion, a different type of mechanism is at play which is
easily "thrown off" by non-parallelism. This is only another way of saying that a different rule is involved here.

May (1977) has the following version of the Left-Branch Condition (May (1977, 14)), which expresses the required generalization very well and also avoids the pitfalls of the A-over-A Principle:

**Condition on Analyzability**

If a rule $\Phi$ mentions SPEC, then $\Phi$ applies to the minimal $[+\text{N}]$-phrase dominating SPEC, which is not immediately dominated by another $[+\text{N}]$-phrase.

(SPEC is a specifier element. A $[+\text{N}]$-phrase is either an NP or an AP.) The reader can easily see how this condition works, taking (say) (90a) as an example.

Incidentally, the "structure-preserving" rules obey even a non-"relativized" version of the A-over-A Principle. The "relativized" version seems to have been made necessary only by the "structure-dependent" rules.

A difference between Subdeletion and interpolation into VP Deletion gaps is that in Subdeletion, the head of an AP is an 'accessible' position for interpolation (cf. 'It's longer than it is wide'); while this is not so in the case of VP Deletion gaps. (We noted this latter fact in fn. 3.) I see no particular
reason (at this moment) to take the behaviour of VP Deletion gaps as the 'norm' for Interpolation, and to treat Subdeletion as the exception that ought to be explained. The difference between the two rules (however) deserves the attention of future research.
CHAPTER FIVE

ISLAND CONSTRAINTS, SUCCESSIVE CYCLICITY, AND LOGICAL FORM

The comparative construction has been used as evidence in recent discussions of the nature of island constraints (and of Subjacency). A point at issue is whether the island constraints are conditions on movement rules (as they were originally thought to be by Ross (Ross (1967))); or whether they should be so interpreted as to be applicable to a broader class of rules, a class definable as rules involving 'trace binding' (in a theory where 'trace binding' can be established by some other specified types of rules besides movement). This question has a bearing on a larger theoretical issue, namely whether unbounded dependencies should be described by an unbounded rule (applying over a variable), or by iterative application of a bounded rule. The issues are complex, and we shall attempt only the barest sketch of them below.

In this chapter I shall argue (on the evidence of scope phenomena in comparatives, and also some other evidence) that the island constraints cannot be conditions on movement rules (as maintained in Chomsky (1973;1977; and subsequent work)), nor conditions on trace binding (as suggested in Bresnan (1976b); Bresnan and Grimshaw (1978)), but must be conditions on
quantifier binding at the level of Logical Form. I shall also show that they cannot be conditions on both trace binding and quantifier binding, as maintained in May (1977).

1. Preliminaries

1.1. Subjacency and the Island Constraints

Chomsky (1973) proposed a condition -- the "Subjacency Condition" -- on movement rules, which says (essentially) that an element may not be moved "across" more than one bounding node (by a single transformational operation). In proposing this condition, Chomsky was trying to replace the "catalogue of island conditions" by an explanatory theory, a theory which would "yield the island conditions as theorems" (Chomsky (1980b)). We shall briefly show how he hoped to do this, using the Complex NP Constraint (CNPC) and the Wh-Island Constraint as illustrations. Consider (1):

(1) the hat which Mary believes that Bill claims that John was wearing

This phrase has the structure (1'). Assuming NP and S to be bounding nodes, i and given the reasonable assumption that a wh-phrase may move only into a COMP-node, we can explain the surface position of which (in (1)) with respect to its deep structure position, by repeated "COMP-to-COMP" movement of the wh-phrase on each successive cycle, as indicated in (1'). (The
domains of the three relevant bounding nodes are marked off by broken lines.)

\((1')\)

\[\begin{array}{c}
\text{NP} \\
\downarrow \\
\text{NP} \\
\downarrow \\
\text{the hat} \\
\downarrow \\
\text{COMP} \\
\downarrow \\
\text{which} \\
\downarrow \\
\text{Mary believes} \\
\downarrow \\
\text{COMP} \\
\downarrow \\
\text{Bill claims} \\
\downarrow \\
\text{S} \\
\end{array}\]

Note that the three movements of the wh-phrase (on the three cycles) each "cross" only one bounding node. Now consider \((2)\), and its structure \((2')\):

\((2)\) 
* the hat which Mary believes the claim that John was wearing
Here, on the lowest cycle, which moves into the COMP of $S_2$. On the next cycle (that of $NP_2$) it cannot move anywhere, since NP has no COMP-node. Now on the third cycle, it cannot move into the COMP of $S_1$, since it would have to cross two bounding nodes. Thus, from the fact that NP has no COMP-node, the Subjacency Condition 'explains' why complex NP's block extraction.

Given the assumption that a wh-phrase cannot be moved into a COMP which has already been "filled", the Subjacency Condition also blocks extraction from wh-islands. Consider (3), and its structure (3'):
Here, *who* cannot be moved into the COMP of $\overline{S}_2$ on the lower cycle (by movement (i)), because the COMP is already "filled"; it cannot be moved into the COMP of $\overline{S}_1$ on the next cycle (by movement (ii)), since it would have to cross two bounding nodes.

There have been several attempts to revise Subjacency, in the light of problems turned up by later research. However, the above simple (and orthodox) version of it will do for us. For it may be worth pointing out that there are two distinct questions in this area (that we can profitably keep apart). One is the question of the correct formulation of Subjacency (of the larger principle(s) which will subsume the island constraints).

Discussions bearing on this question may be found in Rizzi (1978), Maling (1978), Engdahl (1979; 1980a; 1980b), Marantz (1979). The second question is: to what type of rules do the
island constraints apply? For discussing this, we can still speak (if we wish) in terms of our old 'catalogue' of conditions. However, in fact we shall speak of 'Subjacency', meaning (by this term) whatever principle underlies the "conditions on variables" first observed in Ross (1967).

Now, one way in which Chomsky's explanation of the CNPC and the Wh-Island Constraint in terms of Subjacency does not differ from the earlier formulations is that it still treats these conditions as properties of movement rules. In fact, Chomsky (1977) proposes to analyze any process of sentence grammar which is "non-local" (in the sense that it apparently moves, or deletes, an element over an "essential" variable) and is subject to these two constraints, as involving "successive-cyclic" wh-movement.

1.2. A Different Version of Subjacency

The comparative construction comes into the picture in Bresnan's rejection (Bresnan (1975;1976b)) of this view of the island constraints, as also of the Subjacency Condition as formulated by Chomsky. Bresnan's arguments are mainly based on her analysis of two rules of grammar, Comparative Deletion and Relativization-by-Deletion. The comparative clause and the relative clause are both 'headed' structures that invariably contain a gap. The gap may be arbitrarily far from the 'head'; but the gap may not be separated from the head by the boundary
of a complex NP, nor by a "filled" COMP. Bresnan advances arguments (which we have seen) which purport to show that no movement (in particular, no wh-movement) has taken place in these constructions; that what has taken place is simply the deletion of an element in the clause, "under identity" with the head of the clause. Since deletion (obviously) cannot be successive-cyclic, it follows that the explanation of the island constraints in terms of Subjacency (as formulated by Chomsky) is inadequate.

Bresnan's answer to the problem of providing an alternative explanation for the two constraints is to reinterpret the Subjacency Condition "as a condition on syntactic binding" (Bresnan and Grimshaw (1978, 380)). Importantly, in her theory, a "trace" can be left not only by movement but by "controlled PRO deletion". The latter rule deletes a pro category in a 'headed' structure under identity with the head of the structure. A 'trace' is an empty node bearing a category label, coindexed with the moved element or the "controller" of the deletion. (In the case of a comparative clause, or a relative clause, the "controller" will be the 'head' of the clause.) By "syntactic binding" is meant this coindexing between a trace and its antecedent. This coindexing must be determined to be well-formed or ill-formed by a further indexing procedure.

Suppose that we are given the structure (4), which is derived by wh-movement:
(4) \[ S \left[ \text{COMP} \left[ \text{NP}_{i} \text{ who} \right] \right] \left[ S \text{ does she think } \left[ S \left[ \text{COMP} \text{ that} \right] \right. \right. \left. \left. \left[ S \text{ she likes } \left[ \text{NP}_{i} \text{ e } \right] \right] \right] \right] \]

Starting with the antecedent \( \text{NP}_{i} \text{ who} \), we look among the elements which are subjacent to \( \text{who} \) for one which is coindexed with it. (The notion "subjacent" is defined as in Chomsky (1973): nodes A and B are subjacent if they are separated by no more than one bounding node.) In (4), there is no such element. In this case, if there is a subjacent empty COMP, we coindex it with \( \text{who} \), as shown in (5):

(5) \[ S \left[ \text{COMP} \left[ \text{NP}_{i} \text{ who} \right] \right] \left[ S \text{ does she think } \left[ S \left[ \text{COMP} \right. \right. \left. \left. \left. \text{ that} \right] \right. \right. \left. \left. \left. \text{ she likes } \left[ \text{NP}_{i} \text{ e } \right] \right] \right] \right] \]

Now the procedure reapplys to the substructure (6), taking COMP\(_{i}\) as the antecedent.

(6) \[ S \left[ \text{COMP} \left[ \text{NP}_{i} \text{ that} \right] \right] \left[ S \text{ she likes } \left[ \text{NP}_{i} \text{ e } \right] \right] \]

This time we find a subjacent coindexed element, namely \( \text{NP}_{i} \text{ e } \). Now the syntactic binding is "connected", and is therefore well-formed.

If a complex NP intervenes between the antecedent and the trace, the syntactic binding will not be connected. Thus, in (7):

(7) \[ S \left[ \text{COMP} \left[ \text{NP}_{i} \text{ who} \right] \right] \left[ S \text{ does she know } \left[ \text{NP} \left[ \text{NP} \text{ a man} \right] \left[ S \left[ \text{COMP} \left[ \text{NP}_{j} \text{ who} \right] \right] \left[ S \left[ \text{NP}_{j} \text{ e } \right] \text{ likes } \left[ \text{NP}_{i} \text{ e } \right] \right] \right] \right] \right] \]
the antecedent NP₁ who has neither a subjacent coindexed element, nor a subjacent empty COMP; so the indexing cannot proceed. We get a similar result if a "filled" COMP intervenes between the antecedent and the trace, as in (8):

\[
(8) \quad [S [\text{COMP} [\text{NP}_1 \text{what}]] \quad [S \text{ does she know } [S [\text{COMP} [\text{NP}_j \text{who}]] \quad [S [\text{NP}_j \text{e}] \text{ likes } [\text{NP}_1 \text{e}]]]]]
\]

Here, the antecedent NP₁ what has no subjacent coindexed element; it has a subjacent COMP, but it is not empty. So again, the indexing is blocked.

The indexing procedure applies indifferently to the syntactic binding resulting from a movement rule or a deletion rule. Therefore Bresnan's interpretation of the Subjacency Condition can explain -- as Chomsky's version of it could not -- why a certain type of deletion rule obeys the island constraints. There are also some other differences in empirical consequences between the two interpretations of Subjacency (see, for details, Bresnan (1976), Bresnan and Grimshaw (1978)). But both interpretations agree in treating the island constraints as conditions on rules relating two syntactic positions. Observe that 'trace' is an element which is present at the syntactic level. I shall now try to show that this view of the island constraints is incorrect.
2. A Strange Case of the CNPC

Consider the sentence:

(9) John claimed that he had shot more elephants than what we expected.

Sentence (9) has two readings, which can be represented as (10a) and (10b):

(10)  
   a. John claimed that he had shot more elephants than we expected that he would shoot \( x \)-many elephants.
   b. John claimed that he had shot more elephants than we expected that he would claim that he had shot \( x \)-many elephants.

Consider also the similar ambiguity of (11) and (13), which have the readings shown in (12) and (14) (respectively):

(11) You are willing to be a more forgiving mother than what I am.

(12)  
   a. You are willing to be a more forgiving mother than I am an \( x \)-much forgiving mother.
   b. You are willing to be a more forgiving mother than I am willing to be an \( x \)-much forgiving mother.

(13) She confessed that she was a richer woman than what was prudent.
a. She confessed that she was a richer woman than
[for her to be an x-much rich woman] was prudent.
b. She confessed that she was a richer woman than
[for her to confess that she was an x-much rich
woman] was prudent.

As we showed in Chapter Three, we can account for these
ambiguities by letting Reverse Conversion apply alternatively
to the embedded S or the matrix S. Thus, in (9), which has the
bracketing indicated in (15),

(15) [S₂ John claimed that [S₁ he had shot more elephants
than what we expected]]

if we apply Reverse Conversion to S₂, we get (16a); if we
apply it to S₁, we get (16b).

(16) a. [John claim [\(\lambda x [he shoot x\text{-many elephants}]
(more than what we expect)]]
b. \(\lambda x [John claim that he shoot x\text{-many elephants}]
(more than what we expect)

Applying the copying and other rules that we discussed to (16a)
and (16b), we get (17a) and (17b) (respectively):

(17) a. [John claim [\(\lambda x [he shoot x\text{-many elephants}] (more
than \(\lambda x [we expect [he shoot x\text{-many
elephants}])))]]}]]}
b. $\lambda x \, [\text{John claimed that he shot } x\text{-many elephants}]$
   (more than $[\lambda x \, [\text{we expect [John claimed that he shot } x\text{-many elephants]}}])$

These logical representations correspond to the two readings, (10a) and (10b).

An explanation along the same lines can be given for the ambiguity of (11) and (13).

2.1. A Problem

But now consider (18), (20), and (22); these sentences have the (a) reading, but not the other reading(s), of (19), (21), and (23) (respectively):

(18) John made the claim that he had shot more elephants than what we expected.

(19) a. John made the claim that he had shot more elephants than we expected that he would shoot $x$-many elephants.
   b. John made the claim that he had shot more elephants than we expected that he would make the claim that he had shot $x$-many elephants.

(20) You are willing to be a mother who is more forgiving than what I am.

(21) a. You are willing to be a mother who is more
forgiving than I am x-much forgiving.

b. You are willing to be a mother who is more forgiving than I am a mother who is x-much forgiving.

c. You are willing to be a mother who is more forgiving than I am willing to be a mother who is x-much forgiving.

(22) She confessed that she was a woman who was richer than what was prudent.

(23) a. She confessed that she was a woman who was richer than [for her to be x-much rich] was prudent.

b. She confessed that she was a woman who was richer than [for her to be a woman who was x-much rich] was prudent.

c. She confessed that she was a woman who was richer than [for her to confess that she was a woman who was x-much rich] was prudent.

A way in which these sentences are different from the earlier set of sentences (i.e., (9), (11), and (13)) is that, in these sentences, the comparative clause is within a complex NP.

Consider again (18), which has the bracketing indicated in (24):

(24) $S_1$ John made [NP the claim that $S_2$ he had shot more}
elephants than what we expected]]

By applying Reverse $\lambda$ Conversion to $S_2$ and $S_1$, we should be able to get (25a) and (25b) (respectively):

(25) a. [John make [the claim [\(\lambda x [\text{he shoot } x\text{-many elephants}]] (more than what we expect)]]

b. \(\lambda x [\text{John make [the claim [he shoot } x\text{-many elephants]]}]) (more than what we expect)

The copying and other operations that we discussed should further give us (26a) and (26b) (respectively):

(26) a. [John make [the claim [\(\lambda x [\text{he shoot } x\text{-many elephants}]] (more than [\(\lambda x [\text{we expect [he shoot } x\text{-many elephants]]}]])]]

b. \(\lambda x [\text{John make [the claim [he shoot } x\text{-many elephants]]}]) (more than [\(\lambda x [\text{we expect [John make [the claim [he shoot } x\text{-many elephants]]]}]]])

These two logical representations correspond to the two readings, (19a) and (19b). The question is: why don't we get the reading, (19b)?

The same problem arises in the case of a sentence like (27), in which the comparative clause is within a wh-island:

(27) John wondered whether he had shot more elephants than what we expected.
This sentence has only the reading (28a), not (28b):

(28)  
a. John wondered whether he had shot more elephants than we expected that he would shoot x-many elephants.

b. John wondered whether he had shot more elephants than we expected that he would wonder whether he had shot x-many elephants.

Sentence (27) has the bracketing indicated in (27'):

(27') \[ S_1 \text{John wondered} [S [\text{COMP whether} [S_2 \text{he had shot more elephants than what we expected}]]] \]

By applying Reverse $\lambda$ Conversion to $S_2$ and $S_1$, we should get (29a) and (29b) (respectively):

(29)  

a. \[ S_1 \text{John wonder} [S [\text{COMP whether} [\lambda x [S_2 \text{he shoot x-many elephants}] (more than what we expect)]]] \]

b. \[ \lambda x [S_1 \text{John wonder} [S [\text{COMP whether} [S_2 \text{he shoot x-many elephants}]]) (more than what we expect) \]

Copying and other rules should give us:

(30)  

a. \[ S_1 \text{John wonder} [S [\text{COMP whether} [\lambda x [S_2 \text{he shoot x-many elephants}] (more than [\lambda x [\text{we expect [he shoot x-many elephants]}}]])]] \]

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The formulae (30a) and (30b) correspond to the two readings, (28a) and (28b) (respectively). Again, the question is: why don't we get the reading, (28b)?

2.2. The Inadequacy of Current Proposals about Island Constraints

The usual examples (in the literature) of the CNPC blocking a comparative sentence are cases like (31):

(31) *John has more marbles than Mary believes the claim that Peter has ___.

Both Chomsky's, and Bresnan's, versions of Subjacency can account for the ungrammaticality of this sentence. In Chomsky's (1977) account of comparatives, a wh-phrase (what) in the position of the 'gap' is moved successive-cyclically to a COMP-node adjacent to than, where it is optionally deleted. This movement is blocked by an intervening complex NP. This is shown in (32):
In Bresnan's analysis of comparatives involving CD, the 'head' of the comparative construction deletes (under identity) a PRO in the comparative clause, leaving a trace. The controller and the trace must be "syntactically connected" by a reverse-cyclic indexing procedure; but this indexing is blocked by an intervening complex NP. This is shown in (33):
Now if one could claim that there is a rule of Comparative Ellipsis in the grammar, and that the inadmissible reading of (18) (namely, (19b)) is derived from the deep structure (34) by applying wh-movement and Comparative Ellipsis,

(34)  "John made the claim that he had shot more elephants than we expected that he would make [NP the claim [S that he had shot what]]

one could give a routine explanation of the inadmissibility of the (19b) reading. One could say that the movement of the what (in (34)) to a position adjacent to than is blocked by an intervening complex NP.
But I have shown that there is no rule of Comparative Ellipsis. The deep structure of (18) is (35):

(35)

Only a movement of a *wh*-phrase (indicated in (35)) has taken place in the derivation of (18); this movement does not cross any complex NP boundary. And in fact, (18) is a grammatical sentence of English; what we have to explain is why we don't get
one of the two readings of the sentence that we think we ought to get.

No explanation is possible in terms of constraining the copying rule which interprets what. It is not at all obvious how we will state a complex NP constraint on a copying rule. Moreover, whatever precise shape such a constraint takes, it will be a constraint on the structure of a string; this will not be generalizable with the CNPC as it affects movement rules (or movement and controlled PRO deletion rules). Also, these latter rules are syntactic rules, while the copying rule is a rule of interpretation. Therefore, we shall now end up with two formally distinct constraints, each applying in a different component of the grammar. Thus we shall be giving up a unified treatment of the phenomena associated with complex NP's.

On the other hand, Chomsky's and Bresnan's accounts of Subjacency (of the CNPC) do not explain the absence of one of the two possible readings of (18) (and the similar absent readings of (20) and (22)). We pointed out that both these accounts treat the CNPC as a condition which blocks rules relating two syntactic positions -- a trace contained in a complex NP and its antecedent outside the complex NP. In the derivation of (18), (20), or (22), we do not find a trace contained in a complex NP which does not contain its antecedent. If we postulate a new rule to account for these cases, we again end up with a non-unified treatment of the phenomena associated
with complex NP's.

The same type of argument can be constructed around the problem noted in the case of (27), showing the inadequacy of the current view about the Wh-Island Constraint.

2.3. A New Proposal About Island Constraints

If we say that the CNPC and the Wh-Island Constraint are conditions on quantifier binding at the level of LF, we immediately account for the absent readings. The formula (26b), which represents the absent reading of (18), is ill-formed because it exhibits instances of a variable contained within a complex NP, bound by a quantifier outside the complex NP. The same explanation applies to the absent readings of (20) and (22). The same explanation (again) covers the case of (27); the reading represented by (30b) is blocked because it contains instances of a variable within a wh-island, bound by a quantifier which is outside the wh-island.

The reformulated conditions are also sufficient to account for all the data which their earlier formulations were designed to account for. Recall that a wh-phrase is represented in LF as a quantifier; and that this quantifier binds a variable in the position of the trace. Therefore all extractions of wh-phrases from within complex NPs, or wh-islands, will yield ungrammatical sentences, since the logical representations of these sentences will contain an inadmissible type of quantifier binding.
2.4. Formalizing the New Proposal

There are several (more or less equivalent) ways of formalizing the constraint on quantifier binding. I shall propose here one which the reader will recognize as Bresnan’s version of Subjacency, transposed to the level of LF. We shall say that an instance of quantifier binding is well-formed only if the quantifier and the variable it binds are "connected." We shall establish "connectedness" by the following indexing algorithm. Given a formula like (36):

(36) \( \lambda x_1 \ [S \text{ John claim } [S [\text{COMP}\Delta] [S \text{ he shoot } x_1 \text{-many' elephants}]]] \)

we take the quantifier \( x_1 \) as the antecedent, and look among the elements which are subjacent to it for a coindexed variable. (The notion, "subjacent," is defined as in Chomsky (1973); and NP and S are taken to be the bounding nodes.) If there is no such variable (as there isn’t in (36)), we try to find a subjacent empty COMP, which we then coindex with the quantifier. The result is shown in (37):

(37) \( \lambda x_1 \ [S \text{ John claim } [S [\text{COMP}_i \Delta]] \ldots \)

We now reapply the procedure to the substructure (38), taking COMP\(_i\) as the antecedent.
This time we find a subjacent coindexed variable; therefore the quantifier binding is "connected."

If a complex NP, or a "filled" COMP, intervenes between the quantifier and the variable it binds, the quantifier binding will not be connected. This is shown in (39) and (40):

\[
\lambda x_1 \left[ S \text{ John make } [N_{\text{P}} \text{ the claim } [S [\text{COMP} \Delta] \text{ he shoot } x_1\text{-many elephants}]] \right]
\]

\[
\lambda x_1 \left[ S \text{ John wonder } [S [\text{COMP whether} \ [S \text{ he shoot } x_1\text{-many elephants}]]] \right]
\]

In these formulae, the indexing is blocked because we cannot find either a coindexed variable, or an empty COMP, among the elements which are subjacent to the quantifier.

3. Certain Ambiguities

Given the revised theory of island constraints, we are in a position to explain certain ambiguities which have been noted for a long time in the literature. Consider (41) and (42). ((41) is due to Ross and Perlmutter (1970), (42) to Bresnan (1971).)

(41) Bill thinks that he is taller than he is.

(42) Bill thinks that he is someone that he isn't.
These sentences are ambiguous. In one interpretation of (41), Bill entertains the contradictory thought, "I am taller than I am". The other (non-contradictory, or 'sensible') reading can be paraphrased as (43):

(43) The height Bill thinks he has exceeds the height he (actually) has.

Similarly, (42) has an obvious contradictory reading, and also a sensible reading paraphrasable by (44):

(44) The person that Bill thinks he is is not the person that he (actually) is.

3.1. Two Proposals Regarding the Ambiguities

Regarding how to account for the ambiguities, there are two main proposals in the literature. One proposal (advocated by Ross and Perlmutter (1970), McCawley (1973), and Postal (1974)) would derive a sentence like (41) from two different underlying structures. In the derivation of the sensible reading, "the than-clause of [(41)], superficially a part of the object of think, [will] appear outside the object of think in underlying structure" (Ross and Perlmutter (1970:128)). The contradictory reading will be derived from an underlying structure in which the than-clause is a part of the object of think. The 'abstract'
underlying structures will be mapped onto the surface forms by a set of rules which include (crucially) "predicate lowering" rules.

The second proposal (backed by Bresnan (1971), Hasegawa (1972)) would account for the ambiguities by means of interpretation rules. Different portions of the S-complements of verbs like think, believe, claim, say, etc., will be marked (in the interpretive component) as representing "the 'assertions' or 'judgments' of different persons" (Hasegawa 1972:147). For example, in (41), if Bill is responsible for the statement "he is taller than he is," we get the contradictory reading; but if Bill is the assertor (only) of "he is ___tall," and the comparative clause, "(more) than he is," represents the speaker's judgment, we get the non-contradictory reading.

The first proposal has been rejected by many linguists on the ground that its abstract underlying structures and "lowering" rules lack truly syntactic motivation. But the second proposal is also inadequate. Postal (1974) pointed out that there are sentences like (45) and (46) (=Postal's (15) and (16)), which are ambiguous essentially the way that (41) and (42) are:

(45)  The storm prevented it from being hotter than it was.

(46)  His arrival prevented us from leaving earlier than we did (leave).
Sentence (45) has a reading on which it means that the storm prevented the contradictory state of affairs represented by (47):

(47) It was hotter than it was.

It also has a sensible reading on which it means that the level that the temperature would have reached if there had been no storm, is higher than the level that the temperature actually reached. Sentence (46) exhibits a similar type of ambiguity. However, in these sentences we do not have two "assertors" whose differing 'judgments' we can appeal to, to explain the ambiguity.

A second (more serious) inadequacy of the proposal is its inability to explain a certain configuration of facts -- a configuration which is the topic of our next subsection.

3.2. The Ambiguities and Island Constraints

Postal noted (as "one of the most striking properties" of the ambiguities under discussion) that "the actual distribution of such ambiguities is controlled by syntactic islands in the sense of Ross (1967) and later work" (Postal (1974:383)). Postal's observation is based on facts like the following.
3.2.1. The Ambiguities and Complex NPs

Consider the pairs of sentences (48) and (49):

(48)  
   a. He believes that she is older than she is.
   b. He believes the claim that she is older than she is.

(49)  
   a. She believes that her husband is someone that he isn't.
   b. She believes her husband's claim that he is someone that he isn't.

Sentence (48a) and (49a) are ambiguous in the way in which the analogous sentences (41) and (42) are ambiguous. But (48b) and (49b) have only the contradictory readings. This lack of an expected reading seems to have to do with the fact that in the (b) sentences (but not in the (a) sentences) the parts of the sentences which could give rise to ambiguity (namely, that she is older than she is and that he is someone that he isn't) are within complex NPs.

3.2.2. The Ambiguities and Wh-Islands

Consider the following sentences:

(50) They asked me if I earned more money than I (in fact) earned.
Sentence (50) cannot be used to describe a situation in which they asked me if I earned a thousand dollars -- and a thousand dollars is more than I (in fact) earned. It can only mean that they asked me the contradictory question: "Do you earn more money than you (in fact) earn?" Similar observations apply to (51), which has only the contradictory reading. The lack of a sensible reading for these sentences seems to correlate with the fact that the phrases, I earned more money than I (in fact) earned and he was someone that he wasn't, are within wh-islands.

3.2.3. The Ambiguities and "Manner-of-Speaking" Verbs

It is well-known that there are some verbs which are not "bridges," in the sense that they do not allow extraction of an element across them. This fact is illustrated in (52) and (53). The contrast in grammaticality between (52a) and (53a) is due to the properties of the matrix-clause verbs; say and claim are "bridges" which allow movement of a wh-phrase across them (as indicated in (52b)), but state, shriek, whisper, and moan are non-"bridges" which block such movements (as indicated in (53b)).
(52) a. Who did she {say } that she loved? 
   \{claim\} 

b. who did she {say } that she loved —
   \{claim\} 

Now (interestingly), the bridge property of the matrix verb affects the type of ambiguity that we are discussing. Consider (54) and (55):

(54) a. Bill {said } that he was taller than he was. 
   \{claimed\} 

b. Bill {said } that he was someone he wasn't. 
   \{claimed\}

(55) a. Bill {stated } that he was taller than he was. 
   \{shrieked \} 
   \{whispered \} 
   \{moaned \} 

b. Bill {stated } that he was someone that he wasn't. 
   \{shrieked \} 
   \{whispered \} 
   \{moaned \} 

The sentences of (54) are readily amenable to the expected two readings. But in the case of (55), it is difficult to give these sentences anything but the contradictory reading.
3.2.4. The Ambiguities and Subject Phrases

We have discussed the fact that subject phrases are islands that block extraction of an element from within them (see section 4.1 of Chapter Two). Now, if the comparative (or relative) that could give rise to ambiguity is within a subject phrase, this fact affects the readings we get, cf.

(56) a. That she was older than she was was assumed by several people.
   b. That she was older than she was was easy for people to believe.
   c. That he was someone that he wasn't was assumed by Bill.
   d. That he was someone that he wasn't was easy for Bill to believe.

It seems to be difficult to give a non-contradictory reading to these sentences. At least, it is more difficult to give such a reading to these sentences, than to their non-passivized, or non-Tough-moved, counterparts; thus, contrast (56d) and (56d̂):

(56d̂) It was easy for Bill to believe that he was someone that he wasn't.
There are also other islands which control the ambiguities in question; I must refer the reader to Postal's article for a full discussion. 6 Note (at this point) that the "speaker's interpolation" explanation does not explain the above-discussed property of the ambiguities.

3.3. Postal's Explanation

Postal gives the ambiguous comparative (57) (=Postal's (37)), the two distinct underlying structures shown in (58) (=Postal's (38)):

(57) Jim believes that Mary is older than she is.

(58) a. MORE x [Jim believes (Mary is old to x)] y [Mary is old to y]  
    b. Jim believes (MORE x [Mary is old to x] y [Mary is old to y])

Here, (58a) represents the sensible reading, and (58b) the contradictory reading. Similarly, the sentence (59) (=Postal's (42)) is given the two underlying structures shown in (60) (=Postal's (43)), where (60a) is the sensible reading, and (60b) the contradictory reading.

(59) John believes that Mary didn't kiss the boy she kissed.
(60)  
a. \text{SAME } x \text{ [John believes (NOT (Mary kiss x))]} y 
   \text{[Mary kiss y]}

b. John believes (NOT (SAME x [Mary kiss x] y [Mary kiss y]))

The underlying structures are transformed into near-surface forms by "lowering" rules, which (for the framework Postal assumes) are movement rules. Postal now proposes to explain the correlation between the ambiguities under discussion and syntactic islands by a small revision of the theory of syntactic islands:

(I)sland boundaries have usually\textsuperscript{41} been interpreted as blocking extractions of elements; that is, as blocking (to some degree)\textsuperscript{42} movement of an element from inside an island to outside of it. A straightforward generalization of this would also block (to some degree) movement in the opposite direction, from outside of the island to within it. (Postal (1974, 386-387; footnotes 41 and 42 omitted))

To illustrate: sentence (61), which has only the contradictory reading, is derivable only from (62b) (representing the contradictory reading), and not from (62a) (representing the sensible reading), because the "lowering" movement of MORE (indicated by the arrow) in (62a) is blocked by an intervening island boundary.

(61)  John believes the claim that Mary is older than she is.
Linguists who reject the above explanation (and Postal's framework) are left with the task of finding an alternative explanation for the facts Postal noted. Such an explanation (I believe) has not been offered.

3.4. A New Explanation

Given the new theory of island constraints, an explanation can be given for Postal's facts within the framework of the Extended Standard Theory. Consider (61) again, which has the bracketing indicated in (63):

\[(63) \quad [S_1 \text{John believes } NP \text{ the claim that } S_2 \text{ Mary is older than she is}]\]

By applying our rule of interpretation to the domain of $S_1$, we get (64a); by applying the rule to $S_2$, we get (64b). (We assume the presence of an underlying what at the head of the comparative clause.)

\[(64) \quad a. \lambda x [S \text{ John believes } NP \text{ the claim that } S_1 \text{ Mary is } x\text{-much old}] \text{ (more than what she is)}\]
b. [{S John believes [NP the claim that [λx [S Mary is x-much old]] (more than what she is)]]}

The application of further rules to these structures will give us (65):

(65) a. λx [S John believes [NP the claim that [S Mary is x-much old]] (more than [λx [she is x-much old]])

b. [{S John believes [NP the claim that [λx [S Mary is x-much old]] (more than [λx [she is x-much old]])}]

Here, (65a) represents the sensible reading, and (65b) the contradictory reading, of (61). But (65a) (as well as the earlier (64a)) contains the following instance of an "unconnected" quantifier binding:

(66) λx [S John believes [NP the claim that [S Mary is x-much old]]]

Therefore the sensible reading of (61) is blocked, and the sentence has only a contradictory reading.

The same explanation will cover the fact that (51), which we repeat here with some relevant bracketing as (67), has only a contradictory reading:

(67) [S_1 they wondered [S [COMP whether] [S_2 he was someone
Recall that Postal's account of a sentence like this will involve an 'abstract' predicate SAME (which must 'disappear'), and much distortion on the way from the underlying level to the surface. Our (interpretive) account of (67) is very simple. By letting Reverse Conversion extract the NP someone that he wasn't (variably) from S1 and S2, we obtain (respectively) (68a) and (68b).

\[
(68) \quad \lambda x \left[ S_1 \text{they wondered} \left[ S_2 \left[ \text{COMP whether} \left[ S_2 \text{he was} \right] \left( \text{someone that he wasn't} \right) \right] \right] \right]
\]

The formula (68a), which represents a (conceivable) sensible reading of (67), contains the subformula (69):

\[
(69) \quad \lambda x \left[ S_1 \text{they wondered} \left[ S_2 \left[ \text{COMP whether} \left[ S_2 \text{he was} \right] \left( \text{someone that he wasn't} \right) \right] \right] \right]
\]

This is a case of "unconnected" binding. Therefore the reading represented by (68a) is blocked, and what we get is only the contradictory reading, expressed by (68b).

The same type of explanation suffices for all the data discussed by Ross and Perlmutter (1970), Bresnan (1971), Hasegawa (1972), McCawley (1973), and Postal (1974). Observe that the new explanation accommodates the Generative
Semantics' intuition that the ambiguities under discussion involve scope phenomena, and the Interpretivist view that they should be explained in the interpretive component (rather than in syntax). Also observe that our explanation depends on, and (if correct) supports, our revision of the theory of island constraints.

4. Further Predictions of the New Theory

In this section I very briefly discuss two further (correct) predictions of the new theory.

4.1 Long Distance Rules without Wh-Movement

The "long distance" rules of English exhibit a certain configuration of properties which Chomsky (1977) has summarized as in (70) (essentially Chomsky's (49)):

(70)  
   a. the rules leave a gap
   b. where there is a bridge, there is an apparent violation of subjacency, the Propositional-Island Condition (PIC), and the Specified Subject Condition (SSC)
   c. the rules observe CNPC
   d. they observe wh-island constraints.

There is obviously a generalization to be expressed here. Given Chomsky's view of Subjacency (and the island constraints), and
also given the fact that only a wh-phrase can move into a COMP, and move from COMP to COMP on successive cycles, the problem we face defines itself — we must show that all the long distance rules involve wh-movement. Chomsky (1977) contains an attempt to show this.

The new theory of island constraints (and Subjacency) defines the problem in a different way. What we have to show is that the interpretation of (the surface structures generated by) all long distance rules involves quantifier binding. Quantifier binding in LF can be generated also by other means than as a reflex of a syntactic rule which moves a wh-phrase. In the next two subsections I shall give some arguments which suggest that the task defined by the first set of assumptions is (probably) not feasible; while the task defined by the second set of assumptions can (perhaps) be handled.

4.1.1. Chomsky's Proposals and Counterevidence

I shall examine only one long distance rule, namely Clefting, as representative of Chomsky's (1977) proposals. Chomsky suggests that in a cleft sentence, the S following the 'focus constituent' is a "kind of free relative" (Chomsky (1977, 91)). The sentence (71) is given the deep structure — (72a); after the application of wh-movement we get (72b).

(71) It is this book that I really like.

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a. It is \[ \mathbf{\bar{\bar{S}}} \] [TOP this book] \[ \mathbf{\bar{\bar{S}}} \] [COMP \( \triangle \)] [I really like which]]

b. It is \[ \mathbf{\bar{\bar{S}}} \] [TOP this book] \[ \mathbf{\bar{\bar{S}}} \] [COMP which] [I really like t]]

In (72b), which may be optionally deleted; in this case, that is inserted into the empty COMP, giving us (71). If which is not deleted, we get the variant (71'):

(71') It is this book which I really like.

We may note (at this point) that 'regular' free relatives are never introduced by that or which; therefore the ones in clefts must be a new class of free relatives -- a possibility which Chomsky is obviously prepared to countenance. This new class must have a restriction which ensures that their COMP may not be empty (cf. *It is this book I really like). That this property is shared also by extraposed sentences (cf. *It is clear John likes Mary) is made quite accidental by this analysis.

When we apply the analysis to a slightly extended body of data, it apparently breaks down completely. Consider (73)-(75):

(73) It is for Mary that I bought the piano.

(74) It is to Mary that I spoke.
(75) It is in the kitchen sink that he left the hairbrush.

Sentence (73) must have the deep structure (76):

(76) It is [\[S [TOP for Mary] [\[S [\[COMP whom] [I bought the piano for whom]]]]

Application of \textit{wh}-movement yields either (77a) (if only the \textit{wh}-word is moved), or (77b) (if the PP dominating the \textit{wh}-word is moved):

(77) a. It is [\[S [TOP for Mary] [\[S [\[COMP whom] [I bought the piano for whom]]]]

b. It is [\[S [TOP for Mary] [\[S [\[COMP whom] [I bought the piano for whom]]]]

(77a) should yield (depending on the optional deletion of \textit{whom}) either (78a) or (78b), both ungrammatical:

(78) a. *It is for Mary whom I bought the piano for.

b. *It is for Mary that I bought the piano for.

In (77b), for \textit{whom} cannot be deleted (since such a deletion would not be recoverable); therefore we end up with the ungrammatical sentence (79):

(79) *It is for Mary for whom I bought the piano.

There is no obvious way to block these ungrammatical sentences.
Also, there is no way to generate the grammatical sentence (73); unless we are prepared to admit an 'abstract' (phonetically unrealized) lexical item which (say) is marked for the feature [+WH], and is case-marked to convey the meaning of for. 9

4.1.2. A Counterproposal

I suggest that situations which seem to call for an abstract wh-word are best handled by interpretation rules which yield variable binding. Thus, let us posit the following interpretation rule for clefts:

\[
(80) \quad [s \ldots \frac{x}{\lambda} e \ldots] \rightarrow \lambda x [s \ldots x \ldots]
\]

(80) is simply the rule of "\(\lambda\) Abstraction". This rule, when it finds a sentence containing an empty \(\lambda\) (where \(\lambda\) is an informal notation for 'phrasal category'), substitutes a variable for the empty category and binds it with a \(\lambda\)-operator; the resulting \(\lambda\)-expression is of the category \(S/\lambda\).

Sentence (73) will have the surface structure (and, in all essential respects, the deep structure) (81):

\[
(81)
\]

```
S_1
  COMP
    S_1
      S_2
        COMP
          S_2
            it is for Mary that
              I bought the piano [PF e]
```

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The application of the rule of interpretation to $S_2$ gives us the $\lambda$-expression (82),

\[(82) \quad \lambda x [I \text{ bought the piano } x],\]

which is of the category $S/PP$. We shall assume a mechanism which coindexes $it$ and $S_2$. At this stage (then), the sentence can be represented as (83) (omitting some details):

\[(83) \quad [S_1 [S_1 \text{ it } is \text{ for Mary}] \quad [S_2 \lambda x [S_2 \text{ I bought the piano } x]]].\]

Since $S_2$ contains only the $\lambda$-expression, the latter is (effectively) coindexed with $it$. Note (now) that the main clause of the cleft sentence is an "equational" sentence, which equates $it$ with for Mary. The intersubstitutivity of equivalents allows us now to substitute for Mary for $it$, giving us (roughly) an interpretation like (84):

\[(84) \quad [ PP_1 \text{ for Mary}] \quad [S/PP_1 \lambda x [I \text{ bought the piano } x]]].\]

Assuming a derivational step which allows us (at this stage) to treat for Mary as binding the $\lambda$-expression, "$\lambda$ Conversion" should now yield the sentence $I$ bought the piano for Mary, which is the correct semantic result.

The point of the above (admittedly sketchy) account of clefting is to show that for at least one long distance rule, an
analysis involving \textit{wh}-movement is not possible, but one involving quantifier binding is easily possible. The new theory of island constraints now explains why this rule observes the constraints; while the old theory is left without any ready explanation of this fact.

4.2. NP Islands

Consider the familiar contrast in grammaticality exhibited by sentence pairs like the following:

(85)  
a. Who did you see pictures of?
b. *Who did you see John's (yesterday's) pictures of?

(86)  
a. This is the girl who all the newspapers have published pictures of.
b. *This is the girl who all the newspapers have published John's (yesterday's) pictures of.

In the framework of Chomsky (1973), wherein NP and \textit{\textgreek{g}} (not \textit{S}) were taken to be the bounding nodes, the \textit{wh}-movement in neither member of the pairs violated Subjacency, cf.

\begin{align*}
(85a') & \quad [5' \text{COMP} \text{who} [5 \text{S \text{did you see [NP pictures of t]]}}] \\
(85b') & \quad [5' \text{COMP} \text{who} [5 \text{S \text{did you see [NP John's pictures of t]]}}]
\end{align*}

The contrast in grammaticality was then attributed to a
violation of the Specified Subject Condition; in the (b) sentences, but not in the (a) sentences, who is moved across John’s, which is the subject of the NP John’s pictures of who.

(This now forces one to say that yesterday’s is the subject of yesterday’s pictures of who; but a purely positional definition of subject should perhaps find no difficulty in this.) Chomsky’s later work assumed NP and S to be the bounding nodes. Given this assumption, the wh-movement in both members of the pairs violates Subjacency; now, we cannot explain why the (a) sentences are grammatical.

Some recent research (Rizzi (1978)) has tended to the conclusion that wh-movement is not constrained by the Specified Subject Condition or the Propositional Island Condition; the latter are constraints affecting only construal. Accordingly, Chomsky (1979a) suggests that the contrast in grammaticality in sentence pairs like (85) is the result of a definiteness restriction.

Following this tack, we can assume that a markedness convention marks non-definite NP’s as [-Bounding Node]. The standard view of Subjacency now can explain why the movement indicated in (85a′′) is permissible, while that in (85b′′) is not permissible.

(85a′′) \[ S \ni \text{COMP} \ni \text{is you see [NP pictures of who]} \]

(85b′′) \[ S \ni \text{COMP} \ni \text{is you see [NP John's pictures of who]} \]
But there is a type of sentence which does not seem to have entered the discussions of Subjacency so far:

(87) *John's (yesterday's) pictures of whom did you see?

(88) *This is the girl John's (yesterday's) pictures of whom all the newspapers have published.

Contrast these sentences with the following, which, though awkward, are not (I think) ungrammatical:

(89) Pictures of whom did you see?

(90) This is the girl pictures of whom all the newspapers have published.

Observe also that analogous sentences in which the wh-word is in the determiner position of the moved NP are grammatical:

(91) Whose pictures of the war did the newspapers publish?

(92) This is the girl whose pictures of the war the newspapers published.

Now, (87) is derived by the wh-movement indicated in (87'):

\[
(87') \quad [\exists\text{ Comp } S \text{ you saw } [\text{ NP John's pictures of whom }]]
\]
The movement here does not violate the Subjacency Condition. Therefore the standard view of islands predicts that (87) should be grammatical. But observe that the logical form of (87) is the same as that of (85b), namely (93):

\[(93) \quad [S \text{COMP for which } x] [S \text{ you see } [NP \text{ John's pictures of } x)]\]

Our revised theory correctly predicts that (85b) and (87) should have the same grammaticality status.

5. A Note on May's Proposal

In our last remark, we assumed a theory in which

"wh-interpretation" applies prior to LF. This rule (described in Chomsky (1977)) maps a surface structure like (94a) onto a logical form like (94b):

\[(94) \quad \begin{align*}
\text{a. } & [S [\text{whose book}] i \ldots t_i \ldots] \\
\text{b. } & [S [\text{for which } x] \ldots [x's \text{ book}] \ldots]
\end{align*}\]

We assumed that there are no traces in LF; these have been replaced by bound variables. May (1977) (however) proposes a slightly different picture of LF. In May's LF, a wh-phrase still binds a trace. Subjacency is (as in our theory) "a convention on well-formedness at the level of Logical Form" (p.169), not a condition on movement rules. But the condition applies to "trace
binding," where "trace binding" is understood as including both a \( \text{wh} \)-phrase binding its trace and a quantifier expression binding a variable. (The latter are 'traces,' for May.) May sums up his position as follows:

(T)he Subjacency Condition is a general condition on the output of the rules of core grammar. Hence, not only must the trace of a \( \text{wh} \)-phrase be subjacent to (and immediately c-commanded by) the \( \text{wh} \)-phrase which binds it, but so must the trace of a quantified noun phrase which has been affected by QR.

It is not easy to find cases where the two theories make different predictions. All instances of a \( \text{wh} \)-phrase binding a trace in an opaque domain will be marked ungrammatical by both theories. Happily, however, we do have a crucial case, namely the sentences (87) and (88) that we have just examined. In May's theory, (87) will be represented as (95) at the level of LF:

\[
(95) \quad [S \left[ \text{COMP} \left[ \text{NP John's pictures of whom} \right] \right] [S \text{ you see } t_1]\]\

In our theory, (87) will be represented as (93) (repeated below):

\[
(93) \quad [S \left[ \text{COMP for which } x \right] [S \text{ you see } \left[ \text{NP John's pictures of } x \right]]\]\

In (95), the "trace binding" crosses only one bounding node; in fact (87) should be no different from the simplest cases of
wh-movement (such as 'Who did you see?'), if we adopt May's theory. In (93), the quantifier binds across two bounding nodes, and (in doing so) crosses a definite determiner of an NP. Now May cannot account for the ungrammaticality of (87), while we can.

6. Conclusion

The theory of island constraints defended in this chapter can bring to a conclusion the long-standing debate about bounded vs. unbounded transformations. Wh-movement can now be free, subject only to some form of a "landing site" theory. The main motivation for successive-cyclic wh-movement is now removed, since the island constraints are accounted for in the interpretation component. However, "successive cyclicity" (or Subjacency, or whatever it is that accounts for the island constraints) survives now at a different level of the grammar; it is exhibited (depending on our choice of explanation) either by the movement of quantifiers in LF, or by the indexing mechanism which connects quantifiers and variables.

Our theory also throws some light on "Logical Form," enabling us to give this level of interpretation a somewhat narrower (richer) characterization. We can now say that Subjacency (and the island constraints) apply at this level, also that all long distance rules have reflexes at this level which involve quantifier binding. Also, Logical Form is

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"surfacey"; the distinction between active and passive, or between a topicalized and a non-topicalized version of a sentence, is not neutralized in it. We saw in the course of our discussion in section 3 that it is the "surface structure" position of a constituent that is relevant to scope relations, and to island constraints.

The picture of sentence grammar which emerges (from all this) is also fairly well-articulated. We now have three distinct types of rules in sentence grammar. There are "structure-preserving" transformations, which are 'local,' and do not involve quantifier binding in the interpretation of their output. Most, or all, of them are probably lexical rules (Bresnan (1978), Wasow (1977;1980), Brame (1978;1979)). Long distance rules involve quantifier binding, and (therefore) are controlled by island constraints, but are not subject to SSC (Specified Subject Condition) or PIC (Propositional Island Condition); see discussion in Chomsky (1979a). Finally, construal rules (involving syntactic binding) are subject to SSC and PIC.
1 In Chomsky (1973), NP and S (not S) are taken to be bounding nodes. In Chomsky (1977) and subsequent work, NP and S are taken to be the bounding nodes for English. For purposes of our exposition, we shall adopt the later position here. The choice of S or S makes no difference for Chomsky's explanation of the CNPC; although it does make a difference for his explanation of the Wh-Island Constraint. (We shall not go into the details here.)

2 There are (in fact) an earlier and a later version of the alternative, presented in Bresnan (1976b) and Bresnan and Grimshaw (1978), respectively. However, since the two accounts agree on all essentials, I shall outline only the later version here.

3 Chomsky analyzes than as a preposition (Chomsky (1977, 88)), and its sentential object as a free relative (Chomsky (1980b)). It is not entirely clear to me what structure Chomsky assigns to free relatives. I have therefore shown the object of than simply as an S; since (anyway) the structure of the head of the free relative does not affect the point being made.
Or -- alternatively, following Bresnan and Grimshaw's (1978) analysis of free relatives -- a deletion of PRO, under identity with what, has taken place in the following structure:

\[ [NP \text{what} [ _s \text{we expected PRO}]] \]

Here again, there is no intervening complex NP.

Many of these verbs fall within the class of "manner-of-speaking" verbs, studied by Zwicky (1971). See also Erteschik (1973) for a discussion of "bridge" properties of verbs.

Liddell (1975) calls into question (some of) Postal's claims. He cites sentences like (i)-(iv), which he says have both readings (i.e. a sensible and a contradictory reading). In (i) and (ii) (=Liddell's (19),(20)), the "ambiguity-inducing" comparative is in a subject phrase; in (iii) and (iv) (=Liddell's (22),(23)), it is in a complex NP.

(i) That lead weighs more than it does was assumed by our class in order to simplify calculations.

(ii) That Mary was richer than she was was easy for Melvin to conclude, since she often wore her friend's mink tennis shoes.

(iii) For ease of calculation we will accept the assumption that lead weighs more than it does.
(iv) My belief that Mary was smarter than she was was mistaken.

I find the sensible reading (indeed) possible in these sentences (also in some of Liddell's other example sentences). However, in this connexion, the following observations are in order:

(a) It is not enough to show that there are sentences which (contrary to Postal's claim) allow both a contradictory and a sensible reading. If, in such cases, one of the readings is more preferred than the other, and the preference is always in the same direction, this is a fact that must be accounted for. In many of Liddell's sentences, the contradictory reading is the preferred reading; in none of his sentences does the opposite situation obtain. (This is in spite of the fact that a native speaker tends to "see" only the sensible readings.)

(b) There are counterexamples also to the claimed correlation between syntactic islands and extraction rules (see Kuno (1975) for some examples). Apparently there is an overlay of (probably functional) factors which obscures the operation of the island constraints. Postal has data showing a correlation between the ambiguities he is discussing and the whole range of what are traditionally recognized as extraction islands. It is this range which is his most impressive argument. This argument cannot be dismissed simply by showing that there are sentences
in which his predictions are not clearly borne out.

At least one set of Liddell's putative counterexamples is defective. Postal has a claim that if the "ambiguity-inducing" comparative is in a pseudocleft construction (which is a known island for extraction), the sensible reading is blocked. Against this, Liddell cites (v) and (vi) (=Liddell's (34), (35)), which he says have both readings:

(v) What Melvin believes is that for us to make more money than we make we will have to work six days a week.

(vi) What Ed believes happened last year is that he made more money than he did.

Here the evidence of (v) is vitiated by the fact that the two 'terms' of the comparison (for us to make more money and (more) than we make) clearly refer to different points of time. The construction for NP to VP (e.g. for John to leave) is always interpreted as referring to a point of time in the future. Therefore (v) is being interpreted (essentially) as (v'):

(v') What Melvin believes is that for us to make more money (in the future) than we make (at present) we will have to work six days a week.

Observe that if we make the second term of the comparison also refer to the future (by changing we make to we will make), we
get only the contradictory reading:

\[(v^\prime)\] What Melvin believes is that for us to make more money than we will make we will have to work six days a week.

Sentence (vi), wherein both terms of the comparison refer to the past, has only the contradictory reading, contrary to Liddell's claim.

Liddell offers no counterevidence to the claim regarding the effect (on the ambiguities) of manner-of-speaking verbs (see section 3.2.3 above), or of wh-islands (see section 3.2.2 above) --- the latter, perhaps because Postal himself (strangely) omits to make a claim regarding this.

7 I am greatly simplifying Postal's account of lowering, since we are not interested in the details of the operation. Actually, \textit{MORE} x and y \textit{(Mary is old to y)} are first 'brought together'; and it is this new constituent which is lowered into \(S_2\). See our outline of Postal's account of comparatives in Chapter Three.

8 Chomsky assumes the phrase structure rules:

\[S \rightarrow \text{TOP} \quad S\]
\[S \rightarrow \text{COMP} \{S\} \quad S\]

9 We should need three different lexical items for the three
Different PP's in the focus position of (73)-(75). Further questions arise -- in this ingenious solution -- whether the case-marking can be recoverably deleted.

10. The proposed structure is identical to the structure proposed for extraposed sentences in Jayaseelan (1979); it is also very similar to the structure which Brame (1978) has proposed for clefts, namely:

```
        S
       /\S
      /  \ S
     /    /
    NP    VP
    |  it  |
     V    NP
```

11. The nature of this mechanism, in the case of extraposed sentences, is discussed at some length in Jayaseelan (1979).

12. The only evidence (that I am aware of) for "successive-cyclic" wh-movement -- apart from the evidence of the island constraints, to which we have given an alternative explanation --, is Kayne and Pollock's (1978) formulation of the rule of "Stylistic Inversion" in French. See Marantz (1979) for a suggestion regarding how this evidence can be otherwise explained.
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