

UNBOUNDED DEPENDENCIES AND
APPARENT VIOLATIONS OF STRICT SUBCATEGORIZATION RULES:
EVIDENCE FOR WH MOVEMENT*

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Certain otherwise very general strict subcategorization rules governing verb complement types appear to be violated when the complement is at an unbounded distance from the verb. This fact, which cannot be accounted for with traditional transformational analyses, is consistent with the WH Movement analysis of unbounded dependencies in Chomsky (1977). In addition, the WH Movement analysis is seen to predict exactly when these apparent violations occur. By appealing to the notion of abstract Case within the Government-Binding Theory, instances of the verb do which involve apparent violations of strict subcategorization rules are explained in a much more adequate manner than has previously been possible. The same facts which were discovered for English appear in Mandarin Chinese as well, suggesting that even though WH-words in Mandarin Chinese are not moved, unbounded dependencies in Mandarin must be accounted for by something very similar to English WH Movement.

0. Introduction

Unbounded syntactic dependencies have long been a source of controversy in generative grammar. Within the Standard Theory of transformational grammar, the debate often centered on whether to treat these dependencies as being derived through deletion over a variable or movement over a variable. Thus, to account for configurations such as (1),

(1) ...A X B...

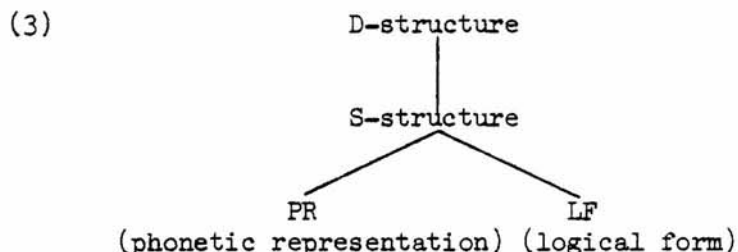
where X represents a variable of arbitrary length and B a gap dependent on A, one had to choose either a deletion analysis, where some item in B is deleted upon coreference with A, or a movement analysis where A occurs in the position of B in deep structure and then is moved into its surface position.

In this article I present new evidence for a third analysis, that proposed in Chomsky (1977), where unbounded dependencies are derived by successive application of WH Movement. Under this analysis, A in (1) is generated in place and a WH-word is moved from B to the COMP position

to the right of A, yielding the derived structure:

$$(2) \dots A \dots \begin{matrix} \text{[} \text{wh} \text{[} & \text{X B} \\ \text{S} & \text{S} \end{matrix}$$

I will be assuming for this analysis a model of grammar such as (3).



In this model, which forms the basis for current work in the Extended Standard Theory (EST), D-structure is generated by a set of phrase structure rules constrained by the X-system. D-structure is related to S-structure by a transformational component which is limited to moving phrases or categories. All instances of such movement are assumed to leave a "trace," that is, an empty element coindexed with the moved element. The resulting level of S-structure is operated on in PR, which contains deletion rules, filters, and stylistic rules, and LF, which contains rules of semantic interpretation. The crucial point for our purposes is that PR and LF operate independently of each other. Items available for semantic interpretation in LF may be deleted in PR.

Returning to (2), we will assume a rule in LF which relates WH to A, in addition to a rule relating the trace(s) of WH to WH itself. In certain constructions, this WH is deleted in PR, but as was mentioned above, this has no effect on the semantic interpretation. While this WH Movement analysis may at first seem like a needless complication, it has the advantage of providing, in addition to better empirical results, a unified account of unbounded dependencies, and it thus allows us to severely limit the class of transformational rules.

In section 1, I will present data involving apparent violations of strict subcategorization rules for verb complement types. It will be seen that out of the three possible analyses of unbounded dependencies outlined above, only the WH Movement analysis can account for the apparent violations.

In section 2, I will show how the WH Movement analysis predicts exactly when these apparent violations will occur. The striking correlation between WH-questions and unbounded dependencies which emerges constitutes additional evidence for a WH Movement account of these phenomena.

In section 3, the account of do presented in Ross (1972) will be compared with the data analyzed here. It will be seen that the WH Movement analysis, together with an independently motivated theory of abstract Case from Chomsky (1981), accounts for do in a more natural and empirically adequate manner.

In section 4, I will present data illustrating apparent violations of strict subcategorization rules in Mandarin Chinese. I will show that, despite the fact that the Mandarin equivalents of WH-words do not normally undergo movement, these data argue for something like a WH Movement analysis of unbounded dependencies in Mandarin.

1. Apparent violations of strict subcategorization rules

In this section, we will see how some strict subcategorization rules governing verb complement types are violated when the complement is separated from the verb by a variable. Let us first look at some examples of relativization. Compare (4) with (5).

(4)(i) To grade the exams, which I will ask them to do tomorrow,
is going to be a real chore.

(ii) To grade the exams, which John finally accomplished late
last night, was a real chore.

(iii) For the T.A.'s to grade the exams, which John brought
about last year, is a great help to the professors.

(5)(i)*I will ask them to do to grade the exams tomorrow.

(ii)*John finally accomplished to grade the exams late last
night.

(iii)*John brought about for the T.A.'s to grade the exams
last year.

As evidenced in (5), the verbs in question (do, accomplish, bring about) are not subcategorized for an infinitival complement. However, the infinitival subject of each sentence in (4) is clearly associated with the gap following the verb in the relative clause, hence the apparent violation of a strict subcategorization rule.

This strict subcategorization rule is not violated with bounded movement rules, such as Passive:

(6)(i)*To grade the exams will be done by John.

(ii)*To grade the exams was accomplished by John.

(iii)*For the T.A.'s to grade the exams was brought about
by John.

Thus, it is not the case that this strict subcategorization rule is relaxed whenever the complement is moved away from the verb.

Not quite as good as (4), but still, I think, grammatical, are the sentences in (7) with consider, condemn, and imagine.

(7)(i) To send in troops, which Congress has been considering for
a long time, will be very expensive.

(ii) To send in troops, which the Senator had repeatedly condemned, will be very expensive.

(iii) For John to go to Europe, which I imagined in my dreams, may finally come to pass.

These verbs as well do not accept infinitival complements.

(8)(i)*Congress has been considering to send in troops for a long time.

(ii)*The Senator had repeatedly condemned to send in troops.

(iii)*I imagined for John to go to Europe in my dreams.

(7) contrasts with the passive use of these verbs in (9).

(9)(i)*To send in troops has been considered by Congress for a long time.

(ii)*To send in troops had been repeatedly condemned by the Senator.

(iii)*For John to go to Europe was imagined by me in my dreams.

How can the apparent violation in (4) and (7) of a seemingly valid strict subcategorization rule be explained? Notice that any account of relative clauses which in deep structure has the head or a copy of the head in the position of the surface structure gap will only with great difficulty be able to generate sentences like those in (4) and (7). Analyses using deletion or movement over a variable are of this type. It is difficult to imagine how these analyses could be modified so as to generate (4) and (7) without at the same time generating (6) and (9). With the WH Movement analysis, on the other hand, these facts are accounted for quite naturally. (4)(i), for example, is derived from (10),

(10) To grade the exams [_S [_S I will ask them to do wh tomorrow
S S

which undergoes WH Movement, yielding (11).

(11) To grade the exams [_S which_i [_S I will ask them to do t_i tomorrow
S S

Which is interpreted as referring to the subject to grade the exams. There is no problem with strict subcategorization rules because the object of to do is which, not to grade the exams. The ungrammaticality of (6)(i) is preserved, however, because in this case to grade the exams really is the D-structure object of do, so the sentence is blocked by the strict subcategorization rule. The same can be said for all of the pairs of relativized vs. passive sentences given above. The verbs all allow WH as object, thus permitting (4) and (7), but do not take infinitival complements, which accounts for the ungrammaticality of (5)-(6) and (8)-(9).

Examples analogous to (4) and (7) can be constructed with tough-type predicates:

- (12)(i) To grade the exams was hard for John to ask them to do.
- (ii) To grade the exams was hard for John to accomplish in one night.
- (iii) For the T.A.'s to grade the exams wasn't easy for John to bring about.
- (iv) For the Army to send in troops was easy for Congress to consider.
- (v) For the Army to send in troops was hard for the Senator to condemn.
- (vi) For John to go to Europe next summer is easy to imagine.

None of the sentences in (12) are generable by Tough Deletion or Tough Movement, the two traditional analyses of this construction. Both of these analyses require the lower clause to look something like (13),

- (13) for John to ask them to do to grade the exams

which, as we have seen, is disallowed by a strict subcategorization rule. An analysis utilizing WH Movement, where instead of (13) we have (14),

- (14) for John to ask them to do wh

yielding the S-structure (15),

- (15) To grade the exams was hard [$\underset{S}{\text{wh}_i}$ for [$\underset{S}{\text{John to ask them to do } t_i}$]]

clearly does not suffer from this problem.

Our discussion of the other unbounded dependencies in English will be hampered by the fact that they do not permit infinitival clauses in the way we have seen with relative clauses and tough-predicates. Thus, we cannot look for apparent violations of the strict subcategorization rule exemplified in (5). However, these constructions do allow gerundive clauses and we can look for apparent subcategorization violations with this type of complement.

To simplify the discussion we will restrict our attention to the verb do, which yields somewhat clearer judgements than many other verbs. Do does not allow gerundive complements:

- (16)*I asked them to do grading the exams.

Thus we should look for sentences where a gerundive complement is separated from the verb by a variable.

Such examples can be found with clefted sentences:

- (17) It is grading the exams which I will ask them to do.

Because of the contrast in grammaticality between (17) and (16), the by now familiar argument for WH Movement can be advanced.

Similar examples can be constructed with topicalized sentences,

- (18) John will do many menial tasks this semester, but grading the exams he will never do.

where a normally unacceptable verb complement becomes acceptable when it appears in Topic position.

Finally, there exist relevant examples with comparatives:

- (19) That was more grading exams than I asked them to do.

(19) can be compared with the ungrammatical sentence in (16). The conclusion we can derive from this is the same as with Clefting and Topicalization. Any analysis which treats comparatives as deletion under identity or movement out of the than-clause will not be able to account for (19).¹

Note that Bresnan (1973) falls into this class of analyses. Bresnan's Comparative Deletion rule would derive (19) from (20),

- (20) That was more grading exams than I asked them to
do QP grading exams

where QP means "quantifier phrase." (20) is not a well-formed deep structure, however, because it violates a strict subcategorization rule which is independently needed to bar sentences such as:

- (21) I asked them to do more grading exams.

Thus Bresnan's analysis is unable to account for sentences like (21).

Similar arguments can be made with the following sentences:

- (22)(i) We saw more of John grading the exams than he had ever done before.
(ii) The committee saw more of John washing the car than Peter had ever done.

Again, only the WH Movement analysis can account for the contrast between (22) and (16).²

2. On the WH in WH-questions

So far, we have seen how the apparent violation of strict subcategorization rules governing verb complement types argues for a WH Movement account of unbounded dependencies in English. However, it is clear that not all verbs allow clauses to their left to be interpreted as comple-

ments. Thus, the sentences in (23) are ungrammatical,

(23)(i)*To grade the exams, which I began last night, was
a real chore.

(ii)*To grade the exams, which I tried several times, was
a real chore.

(iii)*To grade the exams, which John wishes, will be hard.

even though these verbs are subcategorized for infinitival complements,
as shown in (24).

(24)(i) I began to grade the exams last night.

(ii) I tried several times to grade the exams.

(iii) John wishes to grade the exams.

These facts obtain not just with relative clauses, as in (23), but
with all the unbounded dependencies we have examined. For example:³

(25)(i)*To grade the exams will be hard to begin.

(ii)*It was grading the exams which he began.

(iii)*John will begin doing many things today, but grading
the exams he will never begin.

(iv)*That was more grading exams than he could begin.

At first these facts appear very strange. If we assume the S-structure
of (23)(i) to be as in (26),

(26) To grade the exams [_S which_i [_S I began t_i

then we would expect that which would be interpreted as referring to
to grade the exams. This interpretation would be passed on to the trace
of which and everything should be fine.

Why, then, is this disallowed? The problem seems to lie in the refer-
ence of which to to grade the exams. It appears that for some verbs, the
WH-object may only have nominal, not clausal, reference. To see how
this is so, let us look at possible answers to WH-questions.

(27)(i) Q: What did John begin?

A:*To grade the exams.

*He graded the exams.

(ii) Q: What did John try?

A:*To grade the exams.

*He graded the exams.

- (iii) Q: What did John wish?
A: *To grade the exams.
*He graded the exams.

(27) contrasts with (28).

- (28)(i) Q: What did John ask them to do?
A: To grade the exams.
- (ii) Q: What did John finally accomplish?
A: He graded the exams.
- (iii) Q: What did John bring about?
A: For the T.A.'s to grade the exams.

The verbs in (27) are just those verbs which do not allow their complements to be separated to the left, while those in (28) are just those that do. The WH-objects of the verbs in (27) cannot refer to an entire clause, whereas those in (28) can. We would then expect that the other verbs discussed in section 1 would behave like (28), and in fact they do.

- (29)(i) Q: What did they consider at the meeting?
A: For John to give Mary the money.
- (ii) Q: What did Tom condemn?
A: For John to give Mary the money.
- (iii) Q: What did John imagine in his dreams?
A: For Mary to go to Europe.

The judgements in (29) seem less secure than those in (28), but this falls in line exactly with the similar difference between (4) and (7). Notice that the present analysis makes no prediction about the grammaticality of (7) and (29) other than that they will be the same. Indeed, all of the alleged instances of WH Movement with a particular verb should, *ceteris paribus*, receive the same grammaticality judgement. This in fact seems to be true.

Thus, S-structures such as (26) are uninterpretable because the WH-object of begin does not accept clausal reference. Notice that this explanation, while accounting for the seemingly peculiar facts of (23), at the same time constitutes a substantial argument for the WH Movement analysis. The correlation we have seen between WH-questions and other unbounded dependencies would go unexplained in any analysis which treats these as unrelated phenomena.

3. Do

Ross (1972) examines sentences such as:

- (30) Waxing the floors I've always hated to do.
- (31) Solving English crossword puzzles is impossible to do.

Ross claims that these are derived from (32) and (33) by movement of the bracketed NP:

(32) I've always hated to do [waxing the floor]
NP

(33) It is impossible to do [solving English crossword puzzles]
NP

If movement does not take place, a rule of Do Gobbling deletes do to give a grammatical sentence. If the NP's in (32) and (33) are moved, as in (30) and (31), do is left stranded and Do Gobbling cannot apply.

Although it works for a sizeable range of data, Ross's analysis is overly specific. As we have seen in the previous sections, the contrast between (30)-(31) and (32)-(33) is not a property of do alone, but is common to a broad class of verbs. In the WH Movement analysis presented earlier, no special mention needs to be made of do or of any other verb. Sentences like (30) and (31) can be given a very natural account if we assume they are generated through WH Movement.

Thus, Ross's analysis seems to be missing a significant generalization. In addition, it fails to account for all the relevant data. Although Ross refers to Passive as the "strongest argument" for his rule of Do Gobbling, it is in fact the strongest argument against it. His rule would predict the appearance of do in the Passive equivalent of (30)-(31), but this is not the case.⁴

(34)(i)*Waxing the floor was done by the maid.

(ii)*Solving English crossword puzzles was done by John.

Ross's Do Gobbling makes no distinction between unbounded movement rules, such as Topicalization and Tough Movement, and bounded movement rules, such as Passive. The facts of do indicate that just such a distinction must be made.

We are still left, however, with some "mysterious" appearances of do. Consider the following sentences:

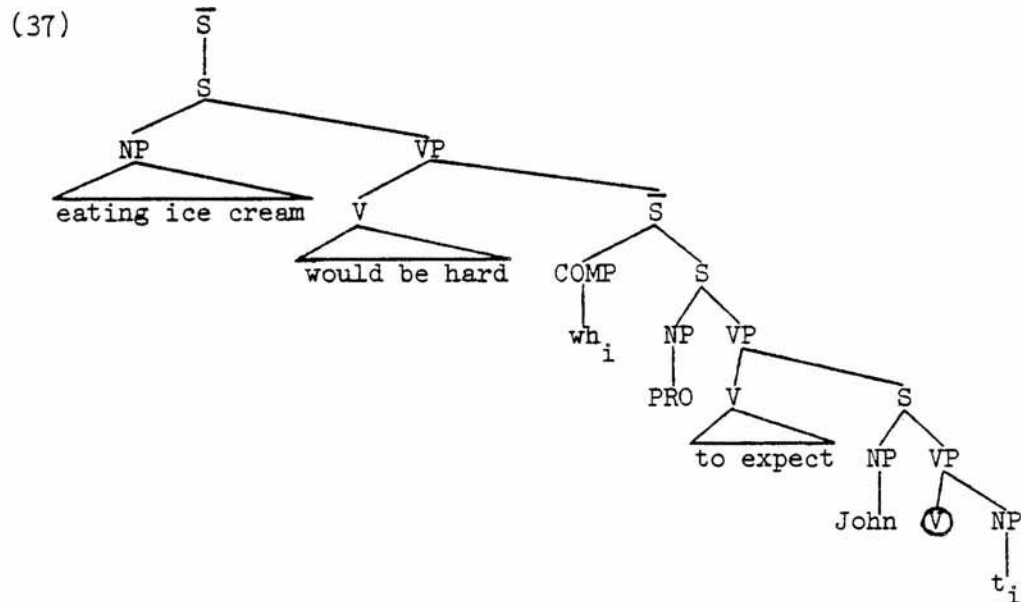
(35) Eating ice cream would be hard to expect John *(to do).

(36) It would be hard to expect John (*to do) to eat ice cream.

Why is do required in (35) but not in (36)? One initially plausible explanation involves defining do as an anaphoric pro-form of the preceding verb (under certain conditions which would have to be made precise). However this analysis is immediately faced with some serious difficulties. In spite of the anaphoric do, we are still left with the gap left by WH Movement, which will be interpreted as referring to the subject of the tough-predicate. This leads to an infelicitous semantic interpretation, where eating ice cream would appear twice in the interpretation of (35).

A more feasible solution is provided by the theory of abstract Case in Chomsky (1981). Under this theory, an NP is assigned Case when it is governed by V or P, where "governed" is defined as "minimally c-commanded." Crucially, for what we will see below, traces of WH Movement must be Case-marked.⁵

Let us examine the version of (35) without do. We might expect this to be grammatical, since the synonymous sentence (36) does not allow do. The structure of (35) would be something like:



Notice what happens when we leave \textcircled{V} unfilled,⁶ that is, when do is not present. t_i , which by virtue of its being a WH-trace must be Case-marked, is not Case-marked. When do fills \textcircled{V} , on the other hand, it assigns Case to t_i , and the sentence passes. Thus, by the independently motivated theory of abstract Case, we have an explanation for the otherwise unaccountable appearance of do.

4. Unbounded Dependencies in Mandarin Chinese

In the preceding sections we have seen evidence supporting the hypothesis that unbounded dependencies in English are instances of WH Movement. One might conclude on the basis of this that in languages where the equivalent of the WH morpheme does not appear to undergo movement, there will necessarily not be unbounded dependencies of the type we have seen in English. It is the purpose of the present section to show that this conclusion is erroneous.

Mandarin Chinese is a language where WH-words generally remain in their base-generated position. I will be assuming here an analysis by Huang(1980), where the following base rule is given:

$$(38) \bar{S} \rightarrow \text{TOP } S$$

Topics may either be base-generated in TOP or may move into TOP. As in English, S and \bar{S} appear to be bounding nodes for Subjacency and there

exist "bridge" verbs which have the property of deleting the following

Huang argues convincingly that relative clauses in Mandarin, which appear before the head noun, are formed through movement into TOP.

- (39) [_S TOP _i x_i] [_S _i mingtian hui lai de]] neige ren
tomorrow will come that man
'the man who will come tomorrow'

The basic motivation for this analysis stems from the fact that only those elements which may be topicalized may also be relativized. X is interpreted in LF as being coreferential to the head noun.⁷

It is tempting to apply the same kind of analysis to another construction in Mandarin, one which resembles tough in English.

- (40) Zheige gushi bu rongyi dong.
this story not easy understand
'This story isn't easy to understand.'

Unlike English, rongyi-predicates must have a lexical surface subject.

- (41)*Bu rongyi dong zheige gushi.
not easy understand this story

This construction has other interesting properties as well.⁸

- (42) Zheige haizi bu rongyi xiangxin — shi xuesheng.
this child not easy believe — be student
'This child isn't easy to believe to be a student.'

- (43)*Zheige haizi bu rongyi xiwang — shi xuesheng.
this child not easy hope be student
'This child is hard to hope to be a student.'

The difference between (42) and (43) is that (42) contains a bridge verb, which allows movement, while (43) does not. (42) also demonstrates that whatever mechanism generates this type of construction operates over a variable and leaves a gap.

These three properties of the rongyi construction -movement over a variable, leaving a gap, and sensitivity to bridge verbs- are also shared by Topicalization and Relativization, as well as by WH Movement in English. It would be conceptually very desirable to have all the constructions exhibiting these characteristics derived by the same operation.

What evidence exists that sentences with rongyi-predicates are gener-

ated in the same way as Topicalization and Relativization? Let us examine three possible analyses of this construction, involving NP movement, NP deletion, and movement into TOP:

(44)(i) [Zheige gushi]_i bu rongyi dong t_i

(ii) [Zheige gushi] bu rongyi dong [zheige gushi]
 \downarrow
 \emptyset

(iii) Zheige gushi bu rongyi [[X_i] [PRO dong t_i]]
 \uparrow \downarrow
 \bar{S} TOP \bar{S}

Each of these analyses seems initially quite plausible. However, it turns out that there are sentences with the same kind of apparent violations of strict subcategorization rules as we saw with English, which are only explainable under the movement into TOP analysis.

(45) Mingling Zhangsan juanqian bu rongyi zuodao.
 order donate-money not easy do

'To order Zhangsan to donate money isn't easy to do.'

(46)*Zuodao mingling Zhangsan juanqian
 do order donate-money

It would be difficult to maintain an analysis such as (44)(i) or (44)(ii) and still account for (45)-(46). With (44)(iii), however, the facts of (45)-(46) seem natural and expected. This analysis has the additional advantage of accounting for the obligatory subject (as shown in (41)) without any special provisions. This unified account of Topicalization, Relativization, and rongyi, then, is not only desirable but in fact necessary.

Thus it appears to be a mistake to assume that lack of movement with WH-words means lack of unbounded dependencies. Instead of looking for some semantic equivalent of WH-words in order to find unbounded movement in a language, one should look for the clustering of formal properties which characterize movement into COMP or its equivalent. The choice of which elements may be moved into COMP appears to be a parameter along which languages may vary.

5. Conclusion

In this article, I have shown that some apparent violations of strict subcategorization rules provide new evidence for a WH Movement analysis of unbounded dependencies. Of course, the possibility remains open that certain phenomena in natural language may not be accounted for in this way. Nevertheless, the fact that this analysis yields a unified account of unbounded dependencies both within and between the two languages examined here, gives added support to the general program of limiting the transformational component of core grammar to a single rule. Whether this position can be maintained in the face of rigorous treatments of

natural-language syntax is one of the central questions facing current linguistic theory.

Notes

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1. Some speakers find (19) questionable. The problem seems to lie in the use of more with a gerundive clause. If this use is in fact ungrammatical, then (19) simply becomes irrelevant to the issue at hand. (22) might be a better example for those speakers.

2. (22) has more than one reading. The relevant reading for our purposes is the one where the gap refers to grading the exams in (i) and to washing the car in (ii).

3. Begin of course is also subcategorized for gerundive complements, as in:

(i) John began grading the exams.

4. For an even clearer example, see (6)(i). Ross's one example of this is:

(i) Kissing gorillas just isn't done by debutantes.

Do in this sentence may be related to the inserted do in the corresponding active sentence.

5. I am of course omitting many important details of this theory which are not relevant here. For a more systematic explication of Case theory and the motivation behind it, see Chomsky (1979, 1981).

6. I am assuming that terminal nodes need not be filled, and that empty verb nodes do not assign Case. Apparent counterexamples to the second of these assumptions, such as Gapping, appear to all be stylistic rules, which in this theory apply after the level of S-structure.

7. X is my own notation, not Huang's. I leave open for now the question of what exactly X is.

8. "___" indicates a gap.

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