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QUANTIFICATION AND THE ENGLISH COMPARATIVE¹

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The work which led to this paper was provoked by the publication of two sharply divergent approaches to the English comparative construction, one by Robert B. Lees², the other by Carlota S. Smith³. Since each of these approaches represents the work of a competent linguist who heartily rejects the possibility that there might ultimately be more than one correct analysis of the English comparative, it appeared to be of some interest to review and evaluate these two rival views. It soon became apparent, however, that neither of these views was entirely adequate. This paper accordingly represents an attempt to point out certain shortcomings in each of these two analyses and to propose and motivate a third alternative.

The Comparative as Complex Adjective. Carlota Smith in the paper discussed here deals primarily with adjectival constructions in English. The comparative is viewed as a kind of

¹The writer wishes to thank Robert B. Lees, Noam Chomsky, Kenneth L. Hale, Charles J. Fillmore, Carlota S. Smith, William S-Y. Wang, and Paul M. Postal for numerous stimulating suggestions.

²Robert B. Lees, "Grammatical Analysis of the English Comparative Construction," Word 17.171-85 (1961).

³Carlota S. Smith, "A Class of Complex Modifiers in English," Language 37. 342-64 (1961).

complex adjectival, parallel in many respects to other complex adjectivals such as yellow with age, or hard to believe. On this view the comparative construction is formed by the conjunction of sentences of the form, Noun is Adjective. Complex adjectives which are formed in this way are embedded into certain other positions in which comparative constructions occur by means of relative clause embedding, relative clause reduction, and permutation. The rules which express this analysis are illustrated below in the derivation of the sentence, Jack built a larger house than Joe did.

1. Noun is Adjective Conjunction:

A house is large. }
 A house is large. } A house is larger than a house is large.

2. Deletion of Second Adjective:

⇒ A house is larger than a house is.

3. Relative Clause Embedding:⁴

A house is larger than a house + C is. }
 Joe built a WH-house. }

⇒ A house is larger than a house which Joe built is.

Jack built a house + C.

A WH-house is larger than a house which Joe built is. } ⇒

Jack built a house which is larger than a house which Joe built is.

⁴The order of embeddings is shifted slightly from that given by Smith in order to avoid having a rule apply to a nominal already embedded within a nominal. (Cf. Chomsky, "The Logical Structure of Linguistic Theory," Preprints of Papers for the Ninth International Congress of Linguists, Cambridge (1962) pp. 520-22.

4. Relative Clause Reduction:

*Jack built a house larger than a house Joe built is.

5. Order Change:

*Jack built a larger house than a house Joe built is.

6. Deletions:⁵

Jack built a larger house than Joe did.

This general approach has in its favor, among other things, the fact that it utilizes, in slightly generalized form, a rule for the embedding of comparative constructions which is already needed for the embedding of other complex adjectivals. This approach also leaves some things to be desired. Such desiderata constitute motivations for rejecting this analysis only if an equally plausible analysis can be shown to satisfy some or all of them without complicating the analysis in other ways.

One feature that might reasonably be desired of an analysis of the comparative is some simple characterization of the notion "comparative in English" comparable to the characterizations of the notion "interrogative in English" provided by Chomsky in his Yes-No question rule⁶ and by Katz and Postal in their expansion of "Q".⁷ One suspects rather intuitively that all English

⁵Note that the rule which reduces built to did is, in fact, a deletion rule since do is simply a tense carrier automatically inserted by the morphophonemic rules following verb deletion.

⁶Noam Chomsky, *Syntactic Structures*, 'S-Gravenhage, 1957, pp. 61-66.

⁷Jerrold J. Katz and Paul M. Postal, An Integrated Theory of Linguistic Descriptions, Cambridge (1964), pp. 84 ff.

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comparative constructions share certain features and that an analysis which introduces or accounts for all these shared and characteristic features with a single set of rules will be simpler and more revealing than one which requires separate sets of rules for variants of the comparative construction. Although it may be shown that this analysis fails to provide such a characterization, this is a reason for rejecting this analysis only if there is a simpler, more revealing analysis which furnishes the desired characterization.

Consider now the kinds of rules used in this analysis. It should be obvious that Noun is Adjective conjunction does not provide this kind of characterization for the comparative since the following sentences do not have Noun is Adjective sources of the kind required by this analysis:

1. John runs faster than Bill.
2. He assigned much more reading than Joe could do.

It is equally obvious that WH-relative clause embedding does not characterize the comparative. In addition to the fact that many WH-relative clauses do not contain comparatives, there are many comparatives which cannot be embedded by means of WH-relative clauses, as, for example, (1) and (3).

3. Bill washed the dishes cleaner than Joe did.

The derivation of (3) involves complement embedding of roughly the type already required for the embedding of simple adjectives:

4. Bill washed - C the dishes.
5. The dishes became clean.
6. Bill washed clean the dishes.



Bill washed the dishes clean.

the intended analysis as one centering around an adjunction rule. In this case a node Adj would have to be expanded in the phrase structure in order to give the complex adjectival a dominating node. With this kind of revision this analysis could provide its output strings with trees that mark comparative constructions as complex adjectivals.

This analysis is open to a second kind of criticism. The force of this criticism is to deny, on both semantic and syntactic grounds, the feasibility of introducing the comparative morphemes transformationally. Since this kind of argument applies also to Lees' analysis, it will be given following a brief presentation of Lees' approach to the comparative.

The Comparative as Complex Adverb. On Lees' view the comparative construction is a complex adverb formed by prefixing a comparative element to a sentence. Such complex adverbs are embedded into attributive adverb position before adjectives^s and manner adverbs by means of a special rule. The rules which express this analysis are illustrated below.

1. Adverbial Embedding:

Jack built a (Adv_a) large house. }
 Joe built a large house. }

⇒⇒ Jack built a (-er than Joe built a large house) large house.

2. Than-Complement Permutation:¹⁰

⇒⇒ Jack built a (-er) large house (than Joe built a large house.)

¹⁰Operations (1) and (2) are separated here for clarity. In his paper Lees performed them both by means of a single rule.

3. Deletions and Morphophonemics:

⇒ Jack built a larger house than Joe did.

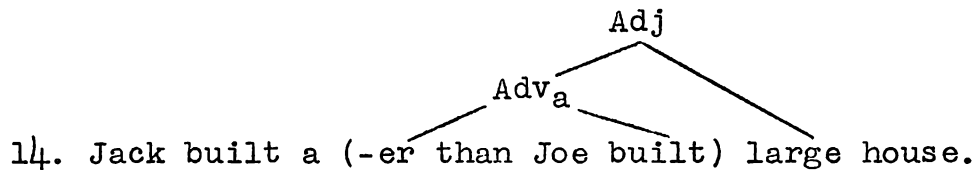
This analysis formalizes the idea that the adverbial that in

12. John is that intelligent.

is parallel to the complex adverbial more...than Bill in

13. John is more intelligent than Bill.

The problem of providing the appropriate structural descriptions for the sentences generated by this analysis is solved by embedding the comparative construction directly to a dominating node, Adv_a. This node is optionally expanded as a constituent of all adjectival and adverbial expressions which enter into the comparative construction. The trees generated are thus quite plausible.



The comparative is clearly labeled as a complex adverb, hence this view succeeds in formalizing its analysis in terms of the appropriate derived constituent structure. Sentences (1) and (2), which do not have obvious Noun is Adjective sources do have obvious sources under this kind of approach, hence this view also appears to succeed in providing a single embedding rule capable of giving a uniform and simple characterization of a wide variety of comparative constructions.

Certain other considerations, however, lead one to believe that both analyses leave things to be desired. If Katz and Postal are correct in their claim that the projection rules of the semantic component operate only upon the underlying P-markers

of sentences to which readings are assigned¹¹, then one requirement that should be met is the requirement that the readings of the comparative sentences of English be completely determined by the underlying P-markers upon which the comparative transformations operate. That is to say, any transformation which applies in the derivational history of a sentence must be without semantic effect, and consequently, lexical elements which are introduced by means of transformations must be meaningless, that is, they must not contribute to the semantic interpretation of the sentences involved. This, unfortunately, is not the case for either analysis. On both views the comparative morphemes, more than, less than, and the like are introduced transformationally, whether by conjunction, adjunction, or embedding. If one accepts the rather convincing arguments of Katz and Postal one is obliged to reject, at least in part, both of these views.

Even if one is not particularly impressed by the semantic motivations for rejecting these analyses given by Katz and Postal, there are strikingly parallel syntactic motivations which force the same rejection. Chomsky has noted¹² that there is a set of elements such as quite a lot, and a great deal which in some sense modify or are attributive to the comparative construction. This set of elements he calls Degree. He notes further that it occurs

¹¹This is one of the major conclusions of Jerrold J. Katz and Paul M. Postal, An Integrated Theory of Linguistic Descriptions.

¹²Personal letter, June 11, 1963.

in other contexts as well, e.g.,

15. I know (Degree) about it.

Since, as will be shown, Degree is a complex structure, it must either be expanded by phrase structure rules or derived from structures which are so expanded. Further, since Degree occurs optionally as a constituent of the comparative, it will not do to derive the comparative construction by prefixing -er than to a sentence embedded in attributive adverb (Adv_a) position. The solution suggested by Chomsky is to expand (Degree) -er than \bar{S} in positions where the comparative may occur, \bar{S} being a dummy symbol to be replaced by a sentence. On this view the comparative may still be characterized, perhaps even as Adv_a, but if it is so characterized it will be by virtue of certain phrase structure expansion rules rather than by virtue of any embedding or conjoining transformation. Only phrase structure expansion rules can expand nodes creating tree structure. Transformational rules tend only to increase the degree of ramiformity and decrease the degree of layered structure marked by dendridic structural descriptions. It is therefore obvious that if the structure (Degree) -er than \bar{S} were introduced either by a conjoining transformation as a conjunction or by an embedding transformation as a comparative element transformationally prefixed to a sentence, any complex layered structure that the transformationally introduced structures might have could not be represented in the derived constituent structure. As the constituent, (Degree), is shown to have a great deal of layered structure, this argument will

25. By which the extent exceeds the extent.




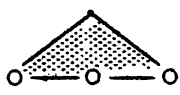
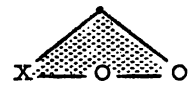


Assume also that the by-complement (BC hereafter) is optional:

26. The extent exceeds the extent.



27. Which exceeds the extent.

28. Which the extent exceeds.

Assume that any nominal in this sentence which does not undergo WH-prefixation and fronting may contain a complement dummy symbol to which relative clauses may be embedded.¹⁵ Let each possible configuration of this sentence be represented by its accompanying schematic:

29. The extent + C exceeds the extent + C. = 
30. Which exceeds the extent + C. = 
31. Which the extent + C exceeds. = 
32. The extent + C exceeds the extent + C by the extent + C. = 
33. Which exceeds the extent + C by the extent + C. = 
34. Which the extent + C exceeds by the extent + C. = 
35. By which the extent + C exceeds the extent + C. = 

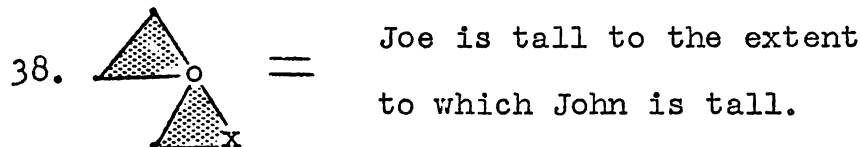
Consider now one class of sentences which may be embedded as relative clauses of the comparative sentence:

36. John is tall to $\left\{ \begin{array}{l} \text{an} \\ \text{the} \end{array} \right\}$ extent + C. = 
37. To which John is tall. = 

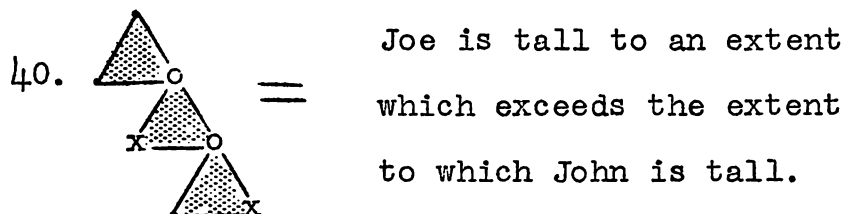
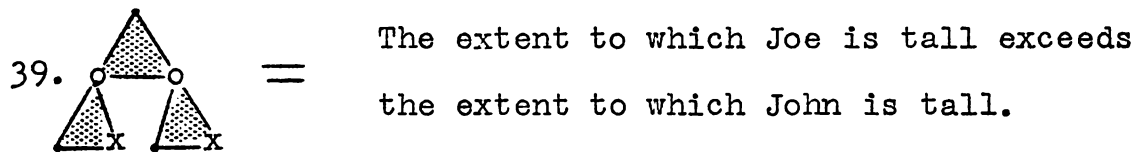
¹⁵ Embedding (or recursive expansion) is preferred to adjunction because only one relative clause may be embedded to a nominal.

With these kinds of building blocks we may examine more easily the limits which must be imposed upon embeddings involving the comparative construction and, at the same time, follow more easily the development of certain rather complex logical propositions which fall within the limits of grammaticality for English sentences.

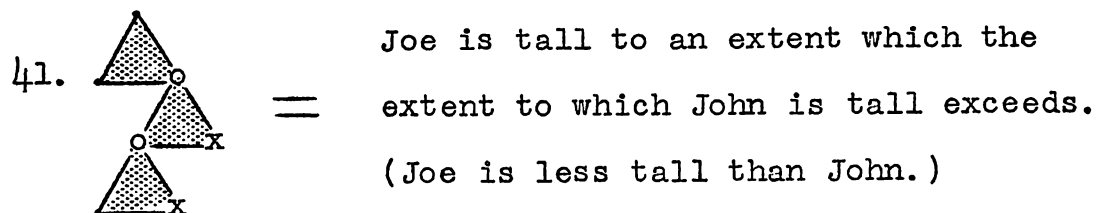
Starting from the simple cases and proceeding to the more complex, we immediately see that we must allow an embedding of the following kind:



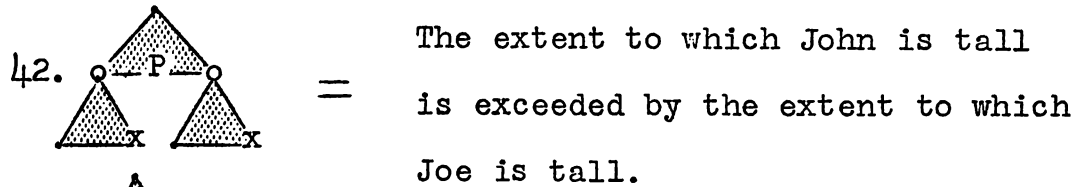
We may consider this to be one kind of equative comparison. At the next level of complexity we obviously must allow the following kinds of embedding:



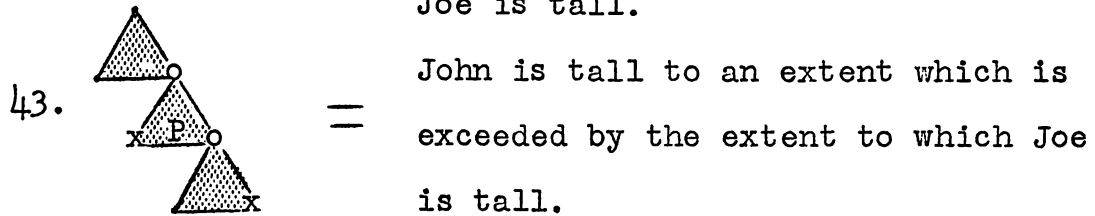
These are examples of what may be termed positive comparison. A different pattern of embedding produces what may be called negative comparison:



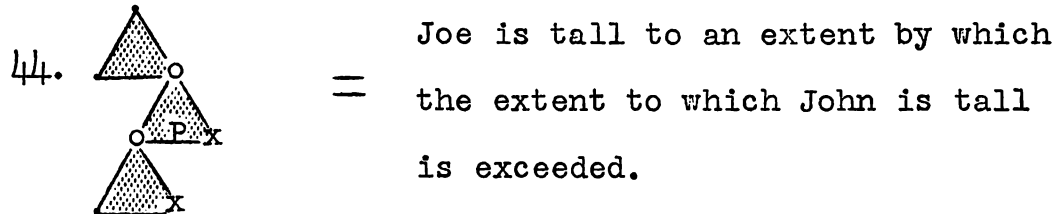
Each of the positive comparisons may be made negative (and the negative made positive) by applying the passive transformation to an appropriate expansion of the comparative sentence:



is exceeded by the extent to which Joe is tall.

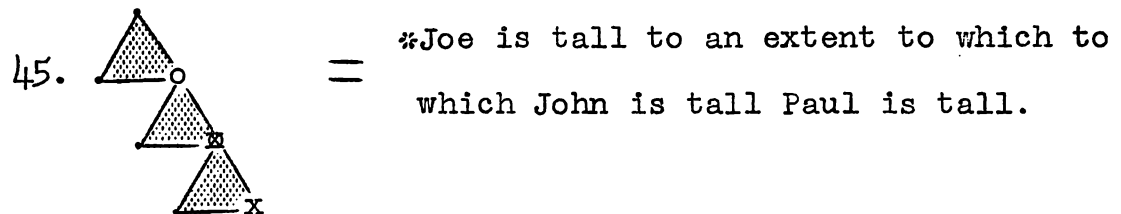


exceeded by the extent to which Joe is tall.

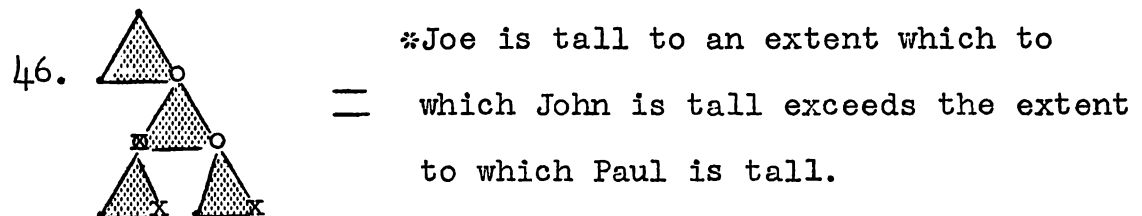


the extent to which John is tall is exceeded.

Consider now cases in which a given nominal is both prefixed with WH- and is expanded with a complement for relative clause embedding.

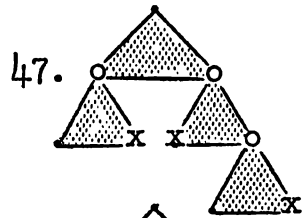


which John is tall Paul is tall.

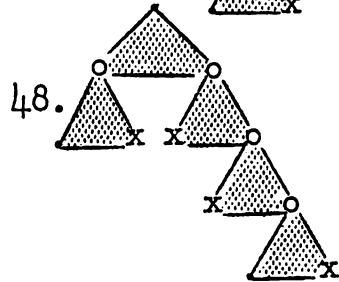


which John is tall exceeds the extent to which Paul is tall.

It seems that we are bound to disallow relative clause embedding to nominals prefixed with WH-. Slightly less clear is the case in which a comparative sentence is embedded to the complement of the subject or object nominal of a comparative sentence.



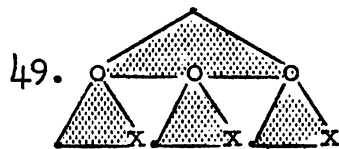
?The extent to which Joe is tall exceeds an extent which exceeds the extent to which John is tall.



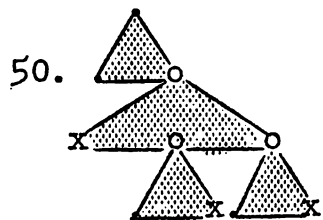
?The extent to which Joe is tall exceeds an extent which exceeds an extent which exceeds the extent to which John is tall.

Whether or not embeddings of this sort should be allowed does not seem to be a very important or interesting decision since this decision affects very little else that will be discussed in this paper. The inclusion of these sequences would remove certain embedding restrictions thus simplifying the grammar. Since these instances of recursion are not entirely convincing, and are in any event trivial, the writer chooses to exclude them.

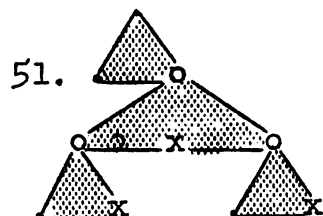
Much more interesting are the configurations of relative clause embeddings that are possible when the by-complement (BC) of the comparative sentence is expanded.



The extent to which Joe is tall exceeds the extent to which John is tall by the extent to which Bill is tall.

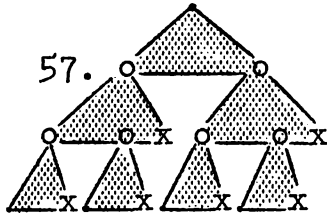


Joe is tall to an extent which exceeds the extent to which John is tall by the extent to which Bill is tall.

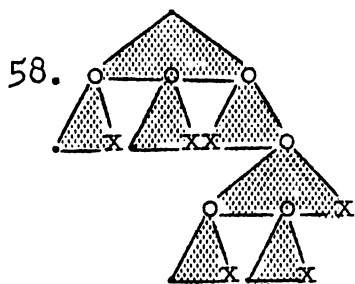


John is tall to an extent which the extent to which Joe is tall exceeds by the extent to which Bill is tall.

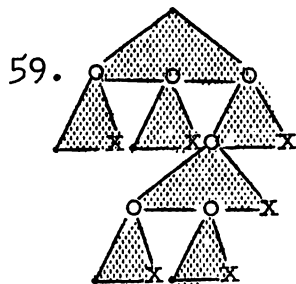
to suffice. Consider then the case in which by-complements are linked by means of a comparative sentence:



The extent (by which the extent to which Joe is tall exceeds the extent to which John is tall) exceeds the extent (by which the extent which Bill is tall exceeds the extent to which Pete is tall).



The extent to which Joe is tall exceeds the extent to which John is tall by an extent which exceeds the extent to which Bill is tall exceeds the extent to which Pete is tall.

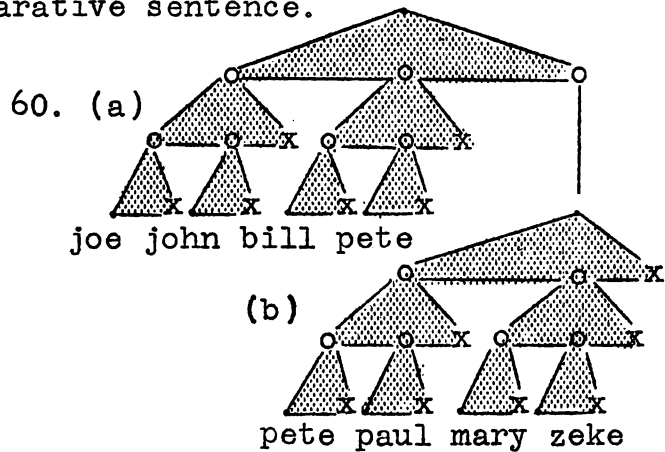


The extent to which Joe is tall exceeds the extent to which John is tall by an extent which the extent to which Bill is tall exceeds the extent to which Pete is tall exceeds.

The parallel described above appears complete. Sentences (57) and (58) are examples of positive comparison and sentence (59) is an example of negative comparison. The passive counterparts of these could obviously also be given.

Note now, however, that this is not the end. Just as sentence (56) may be considered to be an equative comparison of comparative sentences parallel to the equative comparison represented by (38), and just as (57), (58), and (59) may be considered cases of positive and negative comparison parallel to (39), (40), and (41) respectively, so also we get cases parallel to (49) through

(51) and (53) through (55). This is done simply by expanding the sentence which forms the comparative link in (57), (58) and (59) to include a by-complement. This by-complement may contain a nominal which may in turn be embedded to a nominal in another comparative sentence.



The extent (by which the extent to which Joe is tall exceeds the extent to which John is tall) exceeds the extent (by which the extent to which Pete is tall exceeds the extent to which Paul is tall) exceeds the extent (by which the extent to which Mary is tall exceeds the extent to which Zeke is tall).

Bill is tall exceeds the extent to which Pete is tall) by the extent (by which the extent to which Pete is tall exceeds the extent to which Paul is tall) exceeds the extent (by which the extent to which Mary is tall exceeds the extent to which Zeke is tall).

This sentence, though a bit more complex, is parallel in structure to sentence (55). How the parallels to the other sentences in this series are constructed should now be obvious. How the comparative is recursive should also be fairly clear. A more complex sentence could be formed, for example, by linking parts (a) and (b) of (60) by means of a comparative sentence containing a by-complement. Call this sentence Z. The nominal in BC-position of Z could then be embedded to a nominal in the BC-position of a sentence of the same complexity as Z. The resultant sentence will be more complex than (60).