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Item Type	article;article
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Download date	2024-10-21 20:26:44
Link to Item	https://hdl.handle.net/20.500.14394/50199

COORDINATION AND THE SYNTAX OF THAT-CLAUSES

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The claim that the coordination of two nodes is possible only if their translations (or interpretations) are of the same logical type is inescapable for those who adopt a standard model-theoretic approach to semantics. If we attempt to coordinate two syntactic categories α_1 and α_2 whose translations α_1' and α_2' are of different types, the result will be an ill-formed formula. Thus, within such a framework, identity in semantic types is a necessary condition for coordination. We might also ask whether syntactic categorial identity must obtain as a necessary condition for coordination. If so, we might propose a coordination schema to impose the relevant restriction; viz., that only like categories can coordinate.

1) $\alpha \rightarrow \alpha$ and α

(1) would abbreviate all the rules in, say, English, which introduce coordinate structures (cf. Gazdar (1981) and the references cited there for recent discussion).

The desirability of imposing the requirement of syntactic identity for coordination has been questioned by McCloskey (1979). He avers that cases of unlike constituent coordination exist which involve that-clauses and NPs, and his argument depends on the assumption that that-clauses are not NPs.

In Wasow and Weisler (in preparation) we consider several types of examples involving unlike category coordination and we suggest a way to analyze these examples while retaining a syntactic coordination schema. We deal with McCloskey's examples of NP and that-clause

coordination by analyzing that-clauses as a type of NP. In Part One of this paper I consider many of the traditional arguments against analyzing that-clauses as NPs presented in Emonds (1972, 1976), Koster (1978), and McCloskey (1979) and discussed in Higgins (1973). I argue that none of them are compelling. In Part Two I argue that one additional argument concerning the (alleged) non-occurrence of that-clauses as prepositional objects can be turned around and counted in support of an NP analysis of that-clauses. I conclude that an analysis of coordination such as that in Wasow and Weisler (in preparation), which employs a coordination schema, is not challenged by McCloskey's data.

McCloskey's argument is based in part on an example due to L. Karttunen, given in (2).

2) John knew Mr. Colson but not that he worked at the White House. He suggests that this example involves the coordination of an NP with an \bar{S} , but is nevertheless grammatical.¹ In the case of (2) we might assume that the that-clause, although syntactically an \bar{S} , is assigned an NP-type interpretation by the semantics--perhaps something like 'the fact that he worked at the White House', for example. An NP-type analysis of the semantics of that-clauses has been independently proposed by Thomason (1972), and is adopted in Gazdar (ms.). Of course, the NP Mr. Colson will also receive an interpretation of this type. If one adopts a PTQ style analysis of NPs, it may be possible to interpret both the that-clause and the NP Mr. Colson as denoting a set of properties: the that-clause will denote the set of properties that are properties of the fact that he worked at the White House, and Mr. Colson will denote the set of Mr. Colson's properties.

Although this semantic analysis of that-clauses would explain the coordination in (2), one can nevertheless challenge the claim that McCloskey makes about the syntactic category of that-clauses. If, for example, we were to argue that that-clauses were \bar{S} s dominated exhaustively by NP, the fact that they receive an NP-type semantics would follow from the syntactic analysis (given Montague's assumption that all NPs must receive the same type of interpretation). Furthermore, it is well known that that-clauses share many distributional properties with NPs which would be explained directly if we assume that that-clauses are NPs. For example, that-clauses can passivize, tough-move, cleft, pseudo-cleft and appear in subject position in active sentences, as can simple NPs.

- 3) a. That birds eat was doubted by no one.
 b. That your proposal fails is easy to prove.
 c. It's only that the solution seems so complicated that continues to worry us.
 d. What I believe is that you are lying.
 e. Apparently, that birds eat is obvious.

Does this pattern of distribution constitute an argument for assigning that-clauses to the category NP? In this regard McCloskey (1979) maintains²

The fact that NP, \bar{S} and Q [questions-S.W.] all occur in essentially the same phrase structure positions means only that these are the categories that typically occur as arguments to a predicate, and that languages have systematic ways of coding argument positions syntactically. So the fact that NP, \bar{S} , and Q can all occur, for instance, in subject position means only that all these categories can fill the first argument position of some predicate.

Now whatever account of these facts is to be given, it clearly will not do simply to demand that every kind of phrase that can appear at a particular set of phrase structure positions be regarded as belonging to the same syntactic category. To do this, we would have to give up the distinction between NP and \bar{S} .³ (McCloskey (1979:83))

Although McCloskey allows that languages have "systematic ways of coding argument positions," in the absence of a detailed and independently justified system for cross-classifying syntactic categories which allows us to generalize over NP and \bar{S} (on the assumption that that-clauses are not dominated by NP) with which to express the observed overlap in their distributions, it is difficult to evaluate his suggestion.⁴ At any rate, there is quite a bit of argumentation directed to proving that \bar{S} s are not NPs, despite the overlap in distribution. The debate on this topic has spanned over a decade of research and has not admitted of an uncontroversial conclusion. Next I consider the discussion of the [_{NP} \bar{S}] analysis in Emonds (1972, 1976) which is repeated in part and amplified in McCloskey (1979) and Koster (1978), and discussed in some detail in Higgins (1973).

Part One

Argument One: The Position of Object Complements

On the basis of the examples in (4), Emonds claims that that-clauses do not occur in NP object position (that is deleted in (4a)).

- 4) a. *You promised you would do the wash to Mary.
 b. *The man taught that books were important to his sons.
 c. *They expect that you cooperate of you.

Emonds contrasts these examples with the extraposed versions in (5), concluding that only the clause final position, and not the internal NP dominated object position is possible for \bar{S} s.

- 5) a. You promised Mary you would do the wash.
 b. The man taught his sons that books were important.
 c. They expect it of you that you cooperate.

It is difficult to accept Emonds' conclusion on the basis of (5),

as there seem to be largely irrelevant factors which lower the examples in acceptability. Thus, parallel to (4a) (which can itself be improved by introducing the subordinate clause with that rather than the "null complementizer"), consider (6).

- 6) You {^{indicated}_{explained}} that you would do the wash to Mary.

(4b) can be improved by substituting verbs also.

- 7) The man {^{announced}_{suggested}} that books were important to his sons.

Before considering (4c), note that (4b) is grammatical with a simple NP substituted for its that-clause, as Emonds would predict.

- 8) The man taught the importance of books to his sons.

With regard to (4c), however, the substitution of your cooperation for the that-complement does not lead to improvement.

- 9) *They expect your cooperation of you.

Surely we cannot conclude from (9) that your cooperation is not an NP. Instead, it seems correct to conclude that many factors possibly including control, definiteness, and redundancy can affect the acceptability of NPs in object position, explaining the data considered above. Furthermore, the examples in (6) and (7) provide distributional evidence (the existence of which Emonds' denies) in favor of counting that-clauses as NPs (see also the discussion in Higgins (1973) for further distributional evidence).

Argument Two: Genitive Marking

Emonds' next argument concerns the English "Saxon" genitive construction. He argues that that-clauses cannot take the genitive "'s" and that this fact cannot be explained on the basis of the

complexity of the that-clause, but can be explained if we do not treat that-clauses as NPs. (10) is an example.

10) I understand that John left's importance.

This argument hinges on the assumption that all NPs take the genitive 's. This is a false assumption, as (11) shows.

11) a. The number of people in the room surprised us.

b.*The people's number in the room surprised us.

Clearly the failure of the people to take genitive 's does not prove that it is not an NP, and equally clearly, nothing follows with regard to the NP status of that-clauses simply on the basis of facts such as (10). Incidentally, many speakers reject (12b), which is perhaps bad for the same reason (10) is.

12) a. The proof of the fact that a whale is a mammal was simple.

b. *_{NP}[The fact that a whale is a mammal] 's proof was simple.

If this conjecture is correct, it may be that the factivity (or abstractness) of that-clauses and the fact that clauses precludes their appearance in prenominal genitive position.

Argument Three: Embedded Subject Sentences

Emonds' next argument against a [_{NP} \bar{S}] analysis is that that-clauses cannot appear in embedded subject position, which they should if they are NPs. Although some of the relevant examples are unacceptable, others sound fine to my ear. Emonds includes the following (his judgements are shown).

13) a. *That for Bill to smoke bothers the teacher is quite possible.

b. ?It is quite possible that for Bill to smoke bothers the teacher.

c. *He protested the decision that for the bill to be paid meant nothing.

- d) *For that you pay the tax to be necessary would be an inconvenience.
- e) *It would be an inconvenience for that you pay the tax to be necessary.

(13b) is perfectly acceptable. (13c) can be markedly improved by altering the lexical material:

- 14) He disagreed with your assumption that for the bill to be paid would mean nothing.

As for the examples in (13a) and (13b), it is possible that their oddity can be connected to difficulties in parsing this type of embedded structure, although I cannot provide an account of the relevant constraint (see Footnote 9, below). It seems clear, however, that the example in (13e) is worse than the apparently parallel (13b). Below I suggest that this may be related to a general restriction on for that-clauses sequences. Be that as it may, the high acceptability of examples such as (14) undermines Emonds' argument (see Koster (1978) for an analysis of embedded subject sentences and Baltin and Nanni (ms.) for criticism).

Argument Four: Internal Subject Sentences

Citing Ross, Emonds notes that \bar{S} s cannot appear in subject position if they are preceded by any preposed material. He offers the following examples.

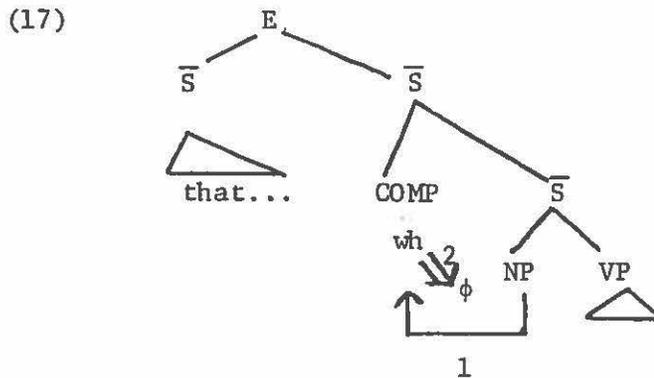
- 15) a. Why did { *that Mary liked old records } irritate him?
 Mary's liking old records
- b. Is { *that this stock is sold } certain?
 ?this stocks being sold

Koster (1978) adds the following topicalized examples.

- 16) a. That he reads so much doesn't prove such things.
- b. *Such things, that he reads so much doesn't prove.

Koster suggests that all these facts can be explained by assuming, as he does, 1) that subject sentences do not exist, 2) apparent subject sentences are actually in a "satellite" position (cf. (17) below),

and 3) Wh-movement applies out of subject position (into COMP) in apparent subject sentence constructions followed by deletion of the moved wh-word. (17) illustrates a typical derivation.



What is important from the point of view of this paper is Koster's claim that that-clauses are prevented from appearing in subject position because they are not NPs (and hence can only appear in a VP or in satellite position). The facts in (15)-(16) are claimed to follow because each rule in question involved preposing material over subject position, but not over satellite position.⁶ In the case of (16a), for example, if topicalization fronted [_{NP} such things], the output would be (18) rather than (16b).⁷

18) *That he reads so much [_S [_{NP₂} such things] t₁ [_S t₁ doesn't prove t₂]]

(18) can presumably be ruled out by a doubly filled COMP prohibition which prevents Wh-movement and topicalization from involving a single COMP.

In evaluation Koster's proposal it is useful to discuss the topicalized examples and the questions in (15) separately. There is at least one serious problem with the explanation for the ungrammaticality of (16b).⁸ That is, although it is true that topicalization does

not prepose NPs over that-clauses (cf. (16b)), neither does it prepose NPs over that fact that NPs, for some unknown reason.

19) The fact that you speak fluent German upset Bill.

20) *Bill, the fact that you speak fluent German upset.

Thus, the topicalization test may not be a foolproof diagnostic for the position (or categorial status) of that-clauses.

With regard to the questions in (15), many people find these sentences (or others like them, see below) moderately acceptable. Consider, for example the slightly improved sentences in (21).

21) a. Does that I can't play mean that the game is cancelled?

b. How does that I vote conservatively bear on the issue at hand?

As I discussed above, it may be that parsing considerations condition the acceptability of these kinds of constructions, but it seems to be a mistake, in view of the reasonably acceptable examples in (21), to accept Koster's analysis (or his claim that that-clauses are not NPs). In order to account for the degree of acceptability these examples carry it seems reasonable to generate them in the syntax and to provide an independent explanation for their oddity.⁹ However, Koster's approach develops the opposite and, to my mind, less attractive position. The sentences of (15) are ruled ungrammatical and he must somehow account for their degree of acceptability.

Argument Five: Coordination

Building on observations reported in Gleitman (1965) Emonds claims (pace McCloskey!) that NPs do not coordinate with that-clauses, and hence are not NPs. He cites (22) as an example.

22) He proposed a 20% reduction for the elderly and that the office be moved to the suburbs.

There are two points to make by way of a rejoinder. First, even if NPs did not coordinate with that-clauses, it would not follow that that-clauses are not NPs, as Higgins (1973) points out. In many cases NPs fail to coordinate with other NPs for a variety of reasons having to do with poorly understood matters such as abstractness, zeugma, and thematic role:

- 23) a. *I enjoyed buying a new hat and ice cream.
 b. *I pointed out Bill and the importance of being earnest.
 c. *I hit the ball and the wall.

Additional sylleptic examples are discussed in Higgins (1973), who concludes correctly that categorial identity is not a sufficient condition for conjunction.

In addition, Emonds' claim that that-clauses do not coordinate with NPs directly contradicts McCloskey's position (although both agree that that-clauses are not NPs), but the facts, when clear, seem to bear McCloskey out.

- 24) a. I understand the immediacy of the situation and that solutions to your type of problem are hard to come by.
 b. I anticipated your position on Vitamin E but not that you would be so pig-headed about it.
 c. Both the complexity of the problem and that its solution required an expert were among the matters discussed by the committee.
 d. Only at the last minute did he remember your tendency to cook Chinese food and that for him, peanut oil is poison.

Argument Six: Clefts

Emonds claims that only NPs and PPs can appear in focus position of clefts, and that that-clauses cannot. He concludes that that-clauses are not NPs, offering the following examples.

- 25) a. *Its that John has come too late that Bill realizes.
 b. *It was that you explain your motives that Bill realizes.
 c. *Was it that Mary had cashed the check that Bill regretted?

Again, similar sentences seem quite acceptable, which granting Emonds' contention that the cleft test picks out only NPs and PPs suggests that at least some that-clauses are NPs (or, implausibly, PPs).

- 26) a. It was simply that mail orders tend to take so long that convinced her to pay retail.
 b. It's not only that you are too short that makes you unsuitable for the job but also that you are too fat for it.

Argument Seven: By-Phrases

Emonds points out that the transformation of agent postposing does not apply to that-clauses:

- 27) *The situation was helped by that you spoke out of turn.

If we analyze passive agent phrases like other PPs, but with a special interpretation rule that analyzes the object of by as the logical subject of the sentence, (27) can be viewed as a special case of the quite general requirement that prohibits P that-clauses sequences, discussed and analyzed in Part Two, below.

Argument Eight: The $NP \rightarrow \bar{S}$ Rule

The penultimate argument I consider is presented in Emonds (1976) and emphasized in Koster (1978). The rule $NP \rightarrow S$ (or $NP \rightarrow \bar{S}$), Koster claims following Emonds, "is at variance with reasonable restrictions on the base component, since we never need rules...where phrase nodes are rewritten as other single phrase nodes of a different type." (Koster (1978)). If we grant all of the other arguments against a rule $NP \rightarrow \bar{S}$ presented in Emonds (1972, 1976) and Koster (1978),

and even their grammaticality judgements, this last claim is dubious. Questions, which are dominated by \bar{S} in the grammars Emonds and Koster promote, clearly pass most every test they mention as providing a diagnostic for NPs.¹⁰ For example, questions appear as simple objects of prepositions, they cleft, and they coordinate with NPs:

- 28) a. We worried about why you left.
 b. It's why you left that we continue to wonder about.
 c. I remembered why you left and the reason that you caused such a stir.

Notice, by the way, that if we accept McCloskey's (1979) arguments to the effect that questions are dominated by a clausal node distinct from \bar{S} , e.g. Q, the evidence suggests the need for a rule expanding NP as a Q (NP \rightarrow Q), which obviously has the same properties as the rule NP \rightarrow \bar{S} , whose existence Koster doubts.

Part Two - The P [^] that-clause Argument

The final argument turns on the well-known fact that that-clauses cannot be objects of prepositions (cf. Ross (1973), McCloskey (1978) for discussion). Below I will argue that the facts are best analyzed if we adopt a version of the [_{NP} \bar{S}] analysis. Among the facts at issue are (29).

- 29) a. We agreed on the solution to the problem.
 b. *We agreed on that the solution to the problem was simple.
 c. We agreed that the solution to the problem was simple.

I will argue that this limitation on the distribution of that-clauses should not be taken as an argument against treating that-clauses as NPs.

In fact, objects of prepositions can be (or include) that-clauses:

- 30) a. We decided on an appropriate format for our new products and that we would have to move quickly.
- b. We were aware of the seriousness of the problem and that its solution would require an expert.

The examples in (30) show that that-clauses can be conjuncts in coordinated prepositional objects, although reversing the order of the conjuncts produces unacceptability:

- 31) a. *We decided on that we would have to move quickly and an appropriate format for our new product.
- b. *We agreed upon that it (the problem) clearly required an expert and the seriousness of the problem.

That-clauses can also appear in the following constructions in which they "control" P-object gaps.

- 32) a. That I will be on time, you may depend on. (topicalization)
- b. It is only that I won't be happy in a wheelchair that I continue to worry about. (cleft)
- c. That you will be fluent in German by Thursday isn't easy to convince the boss of. (tough movement)
- d. That you will be fluent in French one week later is too unlikely for me to worry about. (too-enough deletion)

Although others have analyzed the examples in (32) without committing themselves to an [_{NP} \bar{S}] analysis by letting \bar{S} s control an empty NP position (the P-object) (cf. Kaplan and Bresnan (1981), Koster (1978)), it seems unlikely that these approaches can be extended to account for in examples in (30). There is, furthermore, another complication surrounding the P-object argument which can be seen by considering $\bar{P} \bar{S}$ sequences in Italian. Italian is like English in the regard that most $\bar{P} \bar{S}$ sequences are not permitted. (33) illustrates the typical pattern.

- 33) a. Non ci preoccupavamo (*circa)[_{\bar{S}} che Maria lasciasse
Not-I worry about that Maria left (subj)
la scuola].
the school

- b. Non ci preoccupavamo *(circa) [_{NP} la decisione di Maria
 Not I worry about the decision of Maria
 di darsi alla danza]
 of getting into dancing.

There is at least one preposition, however, fra (between), which does take che-clause objects:

- 24) dobbiamo scegliere fra [_S [_S che Mario venga] o
 We have to choose between that Mario comes or
 [_S che Gianni parta]]
 that Gianni leaves.

Of further interest is the fact that examples such as (35) are acceptable (parallel to (30) in English) even though circa does not freely accept a che-clause.

- 35) Non ci preoccupavamo circa la decisione di Maria di darsi
 Not-I worry about the decision of Maria of getting
 alla danza o che lasciasse la scuola
 into dancing or that leave (3rd p subj) the school
 "I don't worry about Maria's decision to get into dancing
 or that she would leave the school."

As in the corresponding English example, the order of the conjuncts cannot be reversed, or an ungrammatical sentence results (cf. (31)).

How are we to account for these differences between English and Italian? We could try to account for the acceptable $P \overline{S}$ sequences in Italian by claiming that there is a rule "NP $\rightarrow \overline{S}$ " in Italian. However, such an approach fails to distinguish fra from the rest of the Italian prepositions, and it fails to account for examples such as (30) in English and (35) in Italian. We might also consider allowing two PP expansions -- PP $\rightarrow P$ NP and PP $\rightarrow P \overline{S}$ (in addition to a NP $\rightarrow \overline{S}$ rule)

for Italian. By allowing only fra to subcategorize for NP we can distinguish it from the other prepositions which do not take che-clauses. However, such an approach still leaves unexplained example (30) in English and (35) in Italian, predicting both to be ungrammatical.

Suppose we reject Emonds' conclusion and analyze that-clauses as NPs, adding (36) to the grammars of English and Italian.

36) $NP \rightarrow \bar{S}$

By itself, such a rule allows that-clauses to be generated in the full range of NP positions. Clearly something must be done to block the ungrammatical (b) examples in (37) - (38).

37) a. I ate the poi.

b. *I ate that raw fish is good.

38) a. I wanted an apple.

b. *I wanted that you leave.

We must be able to distinguish these verbs which take that-clause complements and simple NP complements from those which take only simple NPs. To make this distinction, let us amend (36) as follows.¹¹

39) $NP \rightarrow \bar{S}$
[+SENT]

The feature [+SENT] (for "sentential") allows us to bifurcate NPs into two groups. Thus, verbs such as eat and want subcategorize for NP [-SENT] and verbs such as remember and understand subcategorize for NP [+SENT] (which allows either an NP [+SENT] or an NP [-SENT] complement). The third possibility, verbs that accept that-clauses but not simple NPs as complements, include hope and hint. These will be subcategorized for NP [+SENT], or possibly for \bar{S} . I leave the matter open.

Turning now to prepositional objects, we might consider a rule such as (40) for PPs.

which behave like English prepositions. In the case of fra, which does take that-clause complements, we can provide a second PP rule, $PP \rightarrow P \bar{S}$, which allows the following structures, and subcategorize fra for \bar{S} (as well as NP).



Note that the filter (41), which we propose for Italian as well as for English, will not apply to the structures in (43), even though we find a P che-clause sequence because the che-clause will not be dominated by NP
[+SENT].

To sum up, I have disputed the arguments presented and discussed in Emonds (1972, 1976), Koster (1978), McCloskey (1978) and Higgins (1973) against analyzing that-clauses as NPs. In some cases, the data were judged not to support the arguments, and in others, the arguments themselves were claimed to be invalid. I also argued that the failure of that-clauses to appear as (simple) objects of prepositions can be best accounted for by analyzing that-clauses as NPs. The general conclusion is that the syntax of that-clauses, and, in particular, their distribution in coordinate structures, does not undermine the principle lying behind the coordination schema which requires syntactic identity for the purposes of coordination.¹³

Footnotes

*This paper, which provides support for the analysis of coordination in Wasow and Weisler (in preparation), owes much to Tom Wasow. I would also like to thank Ivan Sag, Tom Roeper, Emmon Bach, Alan Prince, Lyn Frazier, Jane Grimshaw, and Edwin Williams, as well as the majority of the graduate student population at the University of Massachusetts to whom I presented an earlier version of some of the material in this paper in a departmental colloquium.

¹The example is a poor one. The two senses of know (i.e. to know a person and to know a proposition) involved in (2) induce zeugma. Note, for example, that (2) cannot be rendered into French since that language has two distinct verbs to render the two senses of knowledge in question: connaître (for people) and savoir (for propositions). There are, however, non-zeugmatic examples of NP-that-clause coordination such as (f)

- (f) (i) I recognize the appeal of your proposal and that it will be difficult to improve upon.

Other examples are discussed below.

²McCloskey makes this point in the context of a slightly different, but related discussion.

³McCloskey here ignores the possibility of [_{NP} Q] and [_{NP} \bar{S}] analyses, which avoid this undesirable result. See below for discussion.

⁴McCloskey (1978) does offer a rich and slightly non-standard syntactic feature system, but it does not provide a natural characterization of (just) NPs and that-clauses.

⁵Tom Roeper called (11) to my attention. The example is attributed to Mona Anderson and was discussed in her 1981 LSA paper.

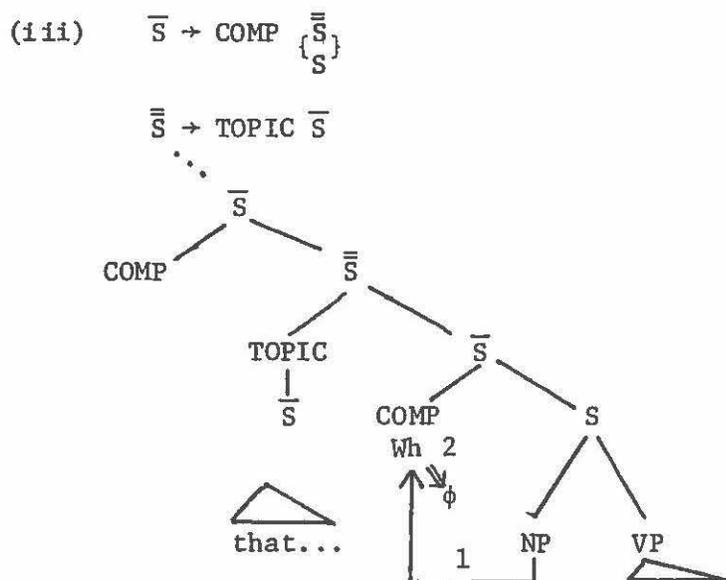
⁶See Emonds (1972) for a different proposal and Higgins (1973) for discussion.

⁷I assume that topicalization moves an NP into COMP. Other assumptions are possible.

⁸Baltin and Nanni (ms.) point out another serious problem: Koster's analysis over-generates (i) and fails to generate (ii).

- (i) *John would never realize for him to arrive late that would be rude.
- (ii) John would never realize that for him to arrive would be rude.

They suggest, as an alternative to (17), the analysis in (iii), which seems to solve the problem.



⁹Of course various "internal NP-over- \bar{S} " filters come to mind (cf. Ross (1967), Kuno (1973), Koster (1978) for discussion), but the details are notoriously difficult to work out, as Koster notes.

¹⁰Bresnan and Grimshaw (1978) record this observation in a criticism of Koster's proposal. Note, by the way, that questions do not easily accept genitive "'s":

- (i) *Why I left's importance was disputed.

¹¹This follows a suggestions due to I. Sag.

¹²Thus, if we assume that the "complementizer" for is a preposition (as, I believe, Emonds has suggested), examples such as (13e) can be explained on the basis of (41).

13) e. *It would be an inconvenience [_{PP} for [_S[_{NP} that you
[+SENT]
pay the tax] to be necessary]]

¹³The careful reader will have noticed that the coordination of NPs and that-clauses has been reduced, in this paper, to the coordination of NP and NP -- an apparent case of unlike category coordination, [+SENT]
it might be thought. In Wasow and Weisler (in preparation) we propose that features such as [+SENT] do not block the like-category requirement on coordination, and we further propose a criterion for predicting this effect.

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