PRO-SENTENTIAL FORMS AND THEIR IMPLICATIONS FOR ENGLISH SENTENCE STRUCTURE

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It represents a significant advance over G. Lakoff and Ross [1966 (paper 6 of this volume)]. Anderson is able to identify the do *and the* so *of* do so *with other uses of those words and to explain all peculiarities of* do so *on the basis of his rules of DO-deletion and Adverb-lowering. Much of the analysis overlaps with a later and better-known paper (Ross, 1972a). This paper is also noteworthy for the extent to which it raised the previously undistinguished craft of example construction to an art form.*

Anderson touches on (but does not contribute to) a controversy that raged then as it does now, the controversy as to the principles determining how grammatical rules interact. At the time this paper was written, Lakoff and Ross (and Anderson along with them) had rejected the notion of cycle, though they soon resurrected it; see Kimball (1972a),

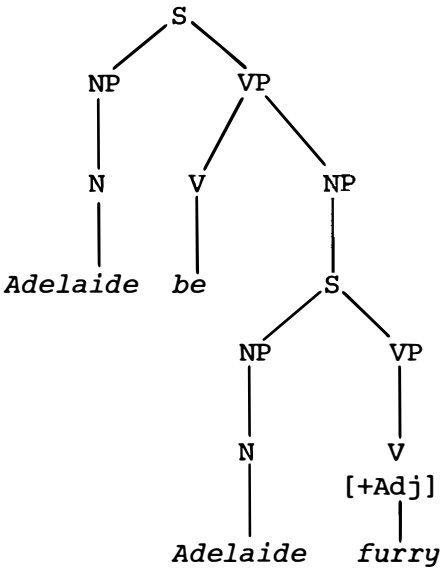
Grinder (1972), G. Lakoff (1972), G. Lakoff and Thompson (1975), Thompson (1975), and Jacobson and Neubauer (1975) for further discussion of the notion of "cycle" in syntax and of the notion of "linear cycle", which appears in its place in this paper. Footnote 1 contains a hint of the notion of "local ordering", which, in the context of generative phonology, figures prominently in Anderson's later work (Anderson, 1969, 1974).

Adverb-movement, which Anderson touches on briefly here, has since been treated more extensively in Keyser (1968) and Jackendoff (1972). It has become an area of major dispute in view of Jackendoff's arguments that the interpretation of adverbs is determined by their surface position and not by their deep-structure position.

Ross (1969c) has presented arguments in support of the position that adjectives are represented in the underlying structure of English sentences as embeddings, the complements of the verb *be**. Thus, Ross argues, that sentence (1) should have (2) as its deep structure:[1]

(1) *Adelaide is furry.*

(2)



After Equi-NP-deletion (and morphological rules irrelevant to the constituent structure) have applied, the desired surface structure is obtained.

There exist constructions that suggest by analogous arguments that a large class of other verb phrases should

be represented as embeddings, the complements of the verb *do*. For example, nonrestrictive relative clauses can be formed on verb phrases, giving sentences such as:

(3) a. *They said Lamb should come out with a new stratum this year, which he did.*

b. *You were told this course would presuppose fiber-bundle theory, which it does.*

In many languages, including English, there exist apparent proforms for verb phrases that, like those for adjectives, are identical with proforms for noun phrases. For example,

(4) a. *Sydney delights in breaking Radcliffe parietal rules, but I wouldn't do it for the world.*

b. *Les francais ont avoué qu'ils avaient tort en Indochine, mais les américains ne peuvent le faire.*

c. *Fido frisst oft meine Schuhe, weil er ein Hund ist, aber wenn er eine Katze wäre, würde er es nicht tun.*

Pseudocleft sentences of the sort used for giving added emphasis to noun phrases can occur also with verb phrases. For example,

(5) *What you can do with that turkey is stuff it.*

Similarly, just as equative clauses with colons can have an adjective phrase after the colon, they can also have a verb phrase in this position:

(6) *He did what he had always wanted to do: give up linguistics and become a professional motorcycle driver.*

These complements of *do* are noun phrases, and as such can be questioned or explicitly indicated as unknown, in which case they appear in the surface structure with the forms expected of noun phrases in these positions, although they represent verb phrases:

(7) a. *What could a nice girl like you be doing in a place like this?*

b. *Father, will you please do something about the unicorn in the garden?*

c. *Why can't we ever do anything I want to do?*

Apparently, when the object of *do* is not a fully realized complement sentence in (7), the sentence of which this is the main verb may itself be embedded as the complement of another sentence with main verb *do*; witness the grammatical, if somewhat inelegant:

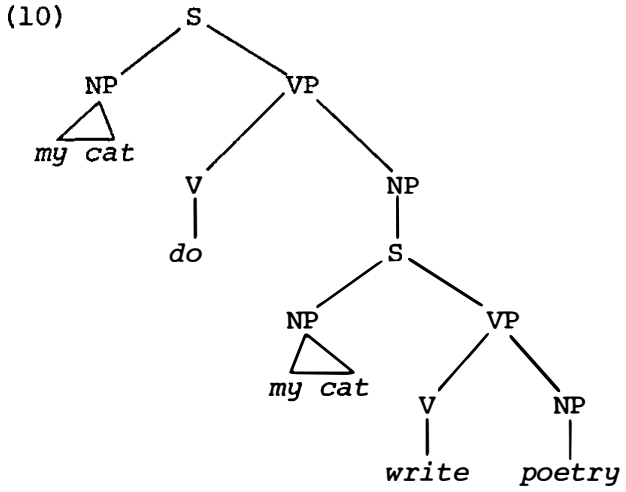
(8) *If he wanted to make his work more acceptable to the modern reader, what Hegel could do is do something about the chapters on phrenology.*

On the basis of these facts, it seems reasonable to posit a sentence with main verb *do* and noun phrase objects realized by complement sentences as the sources of at least a great many verb phrases in English, and perhaps in other languages as well. In this analysis, the structure underlying

(9) *My cat writes poetry.*

would be somewhat as given in (10):

(10)



The rule of complementizer introduction will apply to the structure in (10), inserting an abstract element $.[2] The rule of Equi-NP-deletion will delete the instance of *my cat* in the embedded sentence, and $ will be deleted by complementizer deletion. Since the element *do* does not normally appear in surface structures except in constructions such as those shown in sentences (3)-(7) above, it is necessary to posit a rule of *Do*-deletion that applies anywhere after the rules mentioned so far:

(11) *Do*-deletion

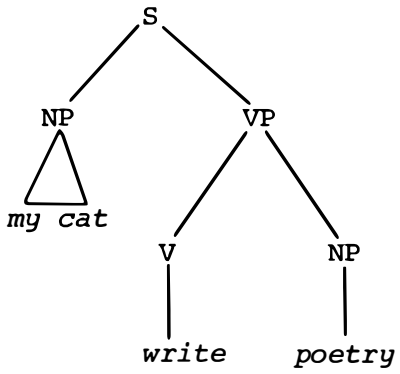
SD:	*X*	*do*	VP	*Y*
	1	2	3	4

SC: delete 2

This rule will remove the element *do* when it appears directly before a VP; i.e., in all those cases where the operation of some other rule has not removed the constituent containing the main VP as in the formation of constructions (3)-(7). It must somehow be stated that the VP that causes the deletion, term 3 of the SD, must be in the same sentence as the *do* that is term 2; the deletion does not occur in sentences such as 8, where the *do* is followed by the verb phrase of a higher sentence.

After the deletion of the embedded subject *my cat*, the inner node S will remain because of the complementizer $. When this element is deleted, however, the S will become a VP by universal principles of constituent labeling[3] and disappear (since it is now redundant). At this point, the same process will eliminate the node NP that formerly dominated the node S. After the operation of *Do*-deletion, the higher node VP will also disappear, yielding a derived structure such as:

(12)



Thus, with the addition of no apparatus to the grammar but the rule 11, we can provide correct derivations for sentences such as 9 starting from the deep structures it is apparently necessary to assume that they have in order to account for their relation to the constructions shown in (3)-(7).

It will be noted that not all verbs can occur in the constructions (4)-(7).[4] In particular, only those that have the feature [-stative] are possible.[5] Thus, all of the sentences in (13) are ungrammatical:

(13) a. **Atheistic communists do not believe in mother, although they ought to do it.*

b. **What this lemma does is imply the Gödel incompleteness theorem.*

c. **The machine did what no machine had ever done before: appreciate a sunset.*[6]

In addition, acceptable answers to (14a) and (15a) include (14b) and (15b), but not (14c) and (15c):

(14) a. *What are you planning to do in my bed?*

b. *Learn what sort of person you are.*

c. **Know what sort of person you are.*

(15) a. *Oscar, do something for your poor father.*

b. *I will, I'll listen to his labored breathing.*

c. **I will, I'll hear his labored breathing.*

In the corresponding constructions with adjectives, however, the sentences are grammatical regardless of the value of the feature of stativity. Thus, both (16a) and (16b) are acceptable:

(16) a. *What orgies are is noisy.* ([-Stative])

b. *What Franklin said older women are is grateful.* ([+Stative])

Interestingly enough, the sentences with [-Stative] adjectives can appear embedded as the complements of *do* (where the adjective itself is in a sentence immediately below a main verb *be*); thus one gets sentences such as

(17) a. *What everyone would like the president to do is be frank with the press.*

b. **What the United States apparently expects all smaller nations to do is be grateful for our intervention.*

These facts can be easily accounted for if we assume that *do* has the feature [//[-Stative]]; that is, it requires that the main verb of the next sentence down be [-Stative]. The verb *be* that appears with adjectives as suggested by Ross is transparent to this restriction, enabling the stativity of the adjective below it to determine the well-formedness of sentences such as (17), in which only the sentence with [-Stative] adjective (17a) is well formed for most speakers. Thus, only sentences with active verbs will contain the extra sentence with main verb *do* in their underlying structure. On the basis of the

suggestion that [+Stative] main verbs are to be treated as embedded in the NP subject of a sentence with main verb *be*,[7] Perlmutter has suggested that this provides an account of the fact that every verb that is exceptional in that it requires identity of its subject with that of its complement sentence in deep structure also requires that the main verb of this complement be [-Stative]. If every main verb is embedded either in the subject of a sentence with *be* or in the object of a sentence with *do*, the only cases in which deep structure identity of subjects can possibly hold is if the complement is of the latter type; in the former case, the subject of the embedded sentence will itself be a sentence, rather than simly the NP subject of the embedded (surface) main verb. Recalling that *do* itself is [//[-Stative]], it be seen that the requirement of deep-structural identity entails this added restriction as well.

It has been observed (Lakoff and Ross, 1966) that the class of verb phrases that can be replaced by *do so* under identity with a previously occurring verb phrase is also those with main verbs that are [-stative]. Since exactly these will always appear in embedded sentences that are complements of *do* in deep structure, it seems preferable to account for the formation of *do so* in terms of the replacement of these complements by *so*, rather than by replacing the verb phrases in question directly by *do so*. This latter formulation would require the introduction of an element (*do*), which would in every case cause the deletion of an identical element preceding it (by *Do*-deletion, rule 11). The element *so*, which thus substitutes for the complement sentence, cannot, apparently, be identified as a constituent of any particular type; thus, it cannot be a VP, or it would cause the deletion of the preceding *do*; there is no motivation for calling it an S, since in particular it does not extrapose;[8] neither does it behave in any way like an NP. It seems, then, that the rule should be formulated as replacing an S with an unlabeled *so* (a constituent directly dominated by the node formerly dominating the S in question, just as any grammatical formative that is transformationally introduced), leaving it to general conventions to eliminate the node NP.

The process that replaces sentential complements by *so* appears to be more general than this, however; not only *do*, but also a large class of "epistemic" verbs in English, such as *think, believe, understand, guess, wish, imagine,* which Kiparsky has called propositionals, can have their complements replaced by *so*. An additional class, which Kiparsky has called contentives and which includes verbs such

as *hope, pretend, complain,* is also subject to this replacement but behaves slightly differently with regard to other operations. Thus, we get all of the sentences in (18):

(18) a. *Phillip wants us to play Sputnik doubles and Roman Gerber, but I don't think we should do so until we learn to count high-card points.*

b. *The president of the republic thinks that he can get away with murder, and his military advisers evidently think so, too.*

c. *Your wife was under the impression that you would be away tonight, and as you can see, I imagined so, too.*

d. *You want to know if a mongoose can really outfight a cobra, and I can only say I guess so.*

e. *Thales was really very profound when he said that all is water, though he didn't pretend so at the time.*

Since the structures proposed for the complements of all these verbs contain sentences dominated by S, it seems reasonable to posit a process of Prosententialization that can replace a sentence by *so* under conditions of identity with an earlier sentence. Not all verbs can have their complements so replaced, however; the verbs that Kiparsky has called factives are not subject to the rule. Thus, the sentences (19) are ungrammatical.

(19) a. **Edwin was convicted of having exhibited himself in a public place, although he vehemently denied so.*

b. **Although we pointed out to Janet that her boat would inevitably be torpodoed by the Chinese, she persistently ignored so.*

One could capture this fact by claiming that the verb of the sentence in which the complement is embedded is mentioned in the rule of prosententialization itself and thus governs this rule. Then, the verbs in (18) would be marked with the feature of [+prosent], and those in (19) with [-prosent]. However, independent facts motivate the setting up of a structural distinction between these two sets of complements, such that the sentential complements in (19) are relative clauses on nouns such as *fact, contention,* (whatever the structure of these words may be) in deep structure, while

the complements in (18) are either directly dominated by VP or exhaust the NP of which they are a part.[9] It seems more reasonable to build this difference into the rule somehow, rather than to mention the verb itself and thus miss the generalization that whether or not the complement of a verb is subject to prosententialization is directly predictable in terms of the type of complements it takes.

This rule is subject to another constraint, which George Lakoff (personal communication) has pointed out is similar to that which Ross (1967b) proposed for Pronominalization. Specifically, Prosententialization can always apply to a complement sentence to the right of the sentence to which it is identical, but can only apply from right to left if the sentence replaced is dominated by another sentence that does not dominate the sentence on the right. Thus, the following paradigm is obtained:

(20) a. *People who want their cats to stay out of the garbage can usually get them to do so.*

b. *People who want their cats to do so can usually get them to stay out of the garbage.*

c. *Cats will stay out of the garbage if people want them to do so.*

d. **Cats will do so if people want them to stay out of the garbage.*

[Some discussion of the order of application of Prosententialization and other rules, and its relationship to the notion of cycle, is omitted here.]

The operation of Prosententialization, as has been pointed out above, is rather similar to Pronominalization. The latter rule can apply to complement structures which are dominated by an NP node, such as factives and propositionals, replacing them with *it*. In the case of propositionals, one can thus apply either rule, getting besides (18a-c) for example:

(23) a. *Philip wants us to play Sputnik doubles and Roman Gerber, but I don't think we should do it until we learn to count high-card points.*

b. *The president of the republic thinks that he can get away with murder, and his military advisors evidently think it too.*

c. *Your wife was under the impression that you would be away tonight, and as you can see, I imagined it too.*

In the case of factives such as (19), Prosententialization cannot apply, but pronominalization can.

(24) a. *Edwin was convicted of having exhibited himself in a public place, although he vehemently denied it.*

b. *Although we pointed out to Janet that her boat would inevitably be torpedoed by the Chinese, she persistently ignored it.*

Additionally, in contentives such as the use of *guess* in (18d), only Prosententialization can apply; there is no NP for Pronominalization to apply to.

(25) **You want to know if a mongoose can really outfight a cobra, and I can only say I guess it.*

Both of these rules that produce proforms for sentences apply in contexts other than complement constructions. The full range of cases of Prosententialization cannot be considered here; only two others will be considered briefly.

Let us consider the construction exemplified in (26):

(26) a. *We all said the Romans would destroy the Carthaginians in another Punic war, and so they did.*

b. *Each year Linus expects that the Great Pumpkin will rise up out of his pumpkin patch, and this year so he did.*

The superficial resemblance of these sentences to those containing *do so* is contradicted by several facts. In the first place, the element *do* that appears in these sentences cannot be the same as that which appears in *do so* sentences, as is shown by the appearance of both these elements together in sentences such as the grammatical (if somewhat inelegant).

(27) *Ermintrude has been asking her father for years to see a specialist about his receding hairline, and do so he did last week.*

In fact, the *do* that appears in these sentences is the element that is introduced transformationally by the rule of *Do*-support that is discussed in Chomsky (1957a, 1962).

In addition to the *do*s of *do so* and *Do*-support, there is another type, the main verbs of sentences such as

(28) a. *Primitive peoples do their dishes with cold water and clean sand.*

b. *We have only twenty minutes to do Chartres cathedral--you do the inside and I'll do the outside.*

It is unclear how many lexical items must be posited to account for the full range of semantic interpretations of these verbs; they seem to be essentially empty semantically, specifying only that the "most appropriate action" be performed with respect to the object. Whether it is possible to capture this notion in a principle of semantic interpretation is moot; since the "most appropriate action" for any given object will vary with culture and linguistic community, it is clearly a language-specific fact that, for example, we *wash* dishes when we *do* them rather than, say, smash them on the ground to prepare for a totemistic ceremony. Whether this constitutes an argument for a language-specific semantic interpretation rule or only for an enormously complex set of entries for the phonological form /dō/ remains to be considered in detail. Philosophers' discussion of the issue has been fragmentary and inconclusive.

In any event these instances of *do* are all main verbs, and are distinguished from the *do* of *Do*-support by not attracting *not (n't)*, not taking sentential complements of any sort, etc. There are instances in which all three types of *do* show up simultaneously:

(29) *What your friends didn't do yet is do it in a telephone booth.*

The construction illustrated in (26) can take verbs that are [+stative] in the sentences for which *so* substitutes, as in

(30) a. *Any thinking person generally hopes that the Emperor Ming will know what Flash Gordon is up to, and so he does.*

b. *Heidegger claims that lack of a point of view precludes understanding, and so it does.*

This fact, of course, follows from the fact that the *do* of *Do*-support does not restrict the stativity of its embedded verb.

There are other sentences of the same sort with auxiliary elements such as *be, have,* and modals:

(31) a. *Inspector French says the man is alive, and so he is for our purposes.*

b. *The British claim to have abandoned their pretentions to empire, and so they have.*

c. *Alonzo insisted that he would break his neck if we made him go skiing, and so he might if he did.*

The *do* of *Do*-support does not occur if any other auxiliary element does. Further, if more than one auxiliary does occur, the part of the sentence that is replaced by *so* cannot contain any of them:

(32) a. **They all say Bobby Fischer can beat anyone at mumblety-peg, and so he does* [where *do = can beat,* etc.].

b. **The whole class said Floyd would have been a fool to break the glass, and so he would* [where *so = have been a fool*].

There are also no sentences of this form in which the second clause has a subject other than that of the first, as might be expected if the process of forming the construction were parallel to that of Prosententialization that can occur after Equi-NP-deletion:

(33) a. **I have always claimed that Matisse was the most important painter of this century, and so most authorities did.*

b. **Naomi often lies down in fields to rest, and so her lover does.*[10]

It will be noted that exactly the same set of facts adduced in connection with the construction of (26) holds true for the closely related construction shown in (34).

(34) a. *The Regent told his men to collect taxes, and collect taxes they did.*

b. *The whole school hoped that Lunko Dullbrain, the all-star halfback, would pass the physics quiz, and pass it he might have if they had let him take his roommate's notes with him to the exam.*

These sentences appear to involve the permutation of an embedded sentence that is the complement of an auxiliary verb to the front of a higher sentence. The conditions under which this permutation can be applied are not completely understood, though they appear to include the following: (1) the sentence permuted must be identical to some earlier sentence; (2) the main verb of the next sentence up has the feature [+aux]; and (3) the main verb of the sentence permuted has the feature [-aux]. Conditions 2 and 3 exclude

sentences such as:

(35) a. **An anonymous caller threatened to put a fish in our medicine cabinet, and have put one in there he would if we hadn't been vigilant.*

b. **The postman claims that our mailbox falls down when he puts a magazine in it, and that it does I believe.*

The other conditions on this operation are accounted for by requirement 1 and the distributional constraints on auxiliary verbs, such as the requirement that the deep structure subject of the auxiliary be identical with that of its complement. The permutation rule must apply before Equi-NP-deletion in order to exclude sentences similar to those in (33). It should be mentioned that in this analysis the *do* of *Do*-support is simply another auxiliary verb, which occurs in exactly those structures that contain no other auxiliary verb and is subject to rule 11 (*Do*-deletion), just as is the *do* of *do so* when they appear before a VP in derived structure.

The sentences above with preposed *so*, (26, 30, 31), then are to be derived by way of the intermediate structures [which themselves underlie such sentences as (34)] produced by the rule of auxiliary-complement-preposing sketched above. Once these sentences have been preposed, they are subject to Prosententialization. The fact that they are not subject to this operation until then implies that the structure of auxiliaries, and particularly of their complements, is in need of further investigation. Presumably the fact that Prosententialization cannot apply directly to the complement structures should be reflected in some formal differentiating feature, as is the corresponding property of factives, but no candidates for this feature are immediately evident.

Once the sentence is preposed, however, whether it undergoes the Prosententialization rule or not appears to be dependent on its complexity. There appear to be no cases in which the rule cannot apply; however if the preposed sentence is at all complex, the rule apparently must apply. Thus (36) is vastly more awkward than (26a).

(36) *??We all said the Romans would destroy the Carthaginians in another Punic war, and destroy the Carthaginians in another Punic war they did.*

Complexity here is anything but well defined at present, though it clearly depends heavily on length. It would appear that the appropriate way to account for these data

is to make Prosententialization optional, and to relegate the rejection of infelicities such as (36) to a stylistic component, which deals with constraints on acceptable surface structures.

Another position in which *so* appears as a proform is as a proadjective in some constructions. Consider, for example,

(37) a. *The rain god is angry and will continue to be so until we placate him.*

b. *Our maid is pregnant, but she won't be so for long.*

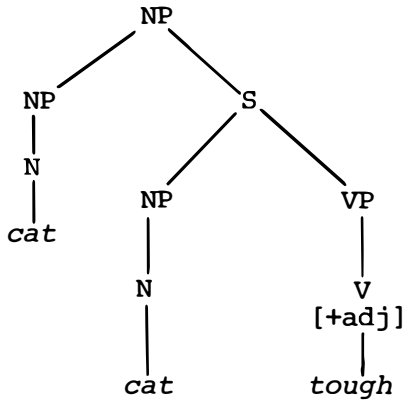
If we regard the adjectives in these sentences as derived from embedded sentences, these occurrences of *so* can be produced by the same rule as Prosententialization. *Be* clearly does not take factive complements, which would cause the rule to block. Note, incidentally, that adjectives modifying nouns are not subject to this rule:

(38) a. **My neighbor's cat is very tough, and only a* {*so cat* / *cat so*} *could survive on our block.*

b. **The hole I buried your radio in is very deep; a* {*so hole* / *hole so*} *that you can't dig into without an earth-mover.*

This is, however, exactly what would be expected if the relative clauses that are the source of these modifying adjectives do not include the layer of embedding with *be*. Thus, if the structure of the noun phrase underlying the subject of the second clause of (38a) is approximately

(39)



then the structure is formally the same as that of factive complements, which must already be excluded from the operation of the rule.

Consider now complements in subject position. As long as these are not extraposed, they cannot in general be subjected to Prosententialization:

(40) **The cookie jar was full when I left, and so remained until I got back* (where *so = the cookie jar is full*).

Since these subject complements also have the same structure (approximately) as factive object complements, they will also be protected by the same constraint. When the clauses are extraposed, however, they are no longer part of a complex NP and hence no longer protected. They would be expected to be Prosententializeable in this case, and indeed, we do get sentences such as

(41) a. *The cookie jar was full when I left, and it remained so until I got back.*

b. *Reese's bid means he holds four hearts, but it wouldn't seem so if you couldn't see his finger signals.*

This explanation only holds for intransitive true verbs such as *seem, appear, remain*. Some other explanation must be found for the fact that sentences extraposed from the subjects of adjectives, such as *be obvious, be unpleasant,* and transitive true verbs, such as *annoys me, causes trouble, arouses the masses,* are not subject to Prosententialization. The restriction can apparently be stated as follows: if a sentence is dominated by VP (without another sentence node intervening) it must be the only constituent other than the verb which this VP dominates if Prosententialization is to apply. This does not pretend to be a solution, but only a fairly precise statement of what the problem of characterizing these structures is.

To return to the parallels between pronominal and prosentential replacement of complement clauses, it will be seen that only the latter can apply to the extraposed complements of intransitives discussed above, because these are not NP and hence not pronominalizable. Thus, we do not get:

(42) a. **That Percy would fail to pass his generals was actually a foregone conclusion, but it didn't seem it to the rest of us.*

b. **Alonzo has never realized that he could swim across Lake Michigan if he were really to try, but it appears it to me.*

Pronominal replacement of sentences applies in a much wider class of environments than prosentential replacement, however, including a number of positions apparently unrelated to verbal complements. Thus, we get the a sentences but not the b ones in (43)-(45).

(43) a. *Throneberry would never have thought of catching the ball if you hadn't given him the idea of it.*

b. **Throneberry would never have thought of catching the ball if you hadn't given him the idea of so.*

(44) a. *Arnold is embarrassed about having pushed his mother overboard, and I'm a bit upset about it, too.*

b. **Arnold is embarrassed about having pushed his mother overboard, and I'm a bit upset about so, too.*

(45) a. *Mandeville is really quite facile at distorting the facts to prove a point, but I can never bring myself to it.*

b. **Mandeville is really quite facile at distorting the facts to prove a point, but I can never bring myself to so.*

Thus, we see that though these rules share many features, neither can be regarded as a special case of the other. Some languages, such as French, appear to have no equivalent of Prosententialization, and the only constructions that are possible are those that can be formed by Pronominalization, such as

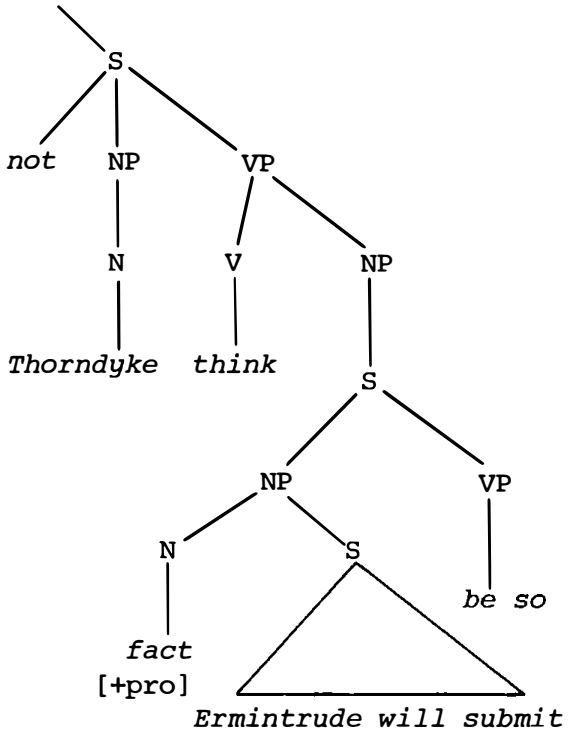
(46) a. *Jean a donné un coup de pied au chien de berger, et je l'ai fait aussi.*

b. *Notre domestique pense qu'elle est enceinte, et nous le pensons aussi.*

It might be suggested that the source of the element *so* in sentences such as (18b-e) is not a rule such as Prosententialization at all, but rather a very late rule that deletes *it is* from a sentence *it is so*[11] formed by Pronominalization. This suggests that underlying the second clause of (47) is a structure like (48):

(47) *I still believe that Ermintrude will submit, though Thorndyke doesn't think so.*

(48)



Even though such a rule is needed in the grammar of English anyway, it does not remove the need for a rule of prosententialization that can apply to produce sentences (18b-e). These two possible sources of *so* are stressed differently, with the one derived from a structure like (48) given stronger stress in most cases than a *so* arising from Prosententialization. In some cases, in fact, ambiguity is possible depending on which source has provided the *so*; for example, (49) has at least two main interpretations.

(49) *Lord Russell said that two and two make eleven, though it didn't seem so at the time.*

In one of these interpretations (when the *so* is the product of Prosententialization), the speaker asserts that at the time, Lord Russell didn't seem to be making this foolish assertion, which in fact he did make; in the other (where the *so* represents a reduction of *it is so*), he merely asserts that at the time it did not seem correct to claim that two and two make eleven. It appears that the rule that reduces *it is so* also applies to *it is not so*, where a

subsequent rule reduces *not so* to *not* in such positions, giving such sentences as

(50) a. *Two and two do not make eleven, and it seemed not when Lord Russell said it.*

b. *That undergraduate claims he has proven Fermat's last conjecture, but I think not.*

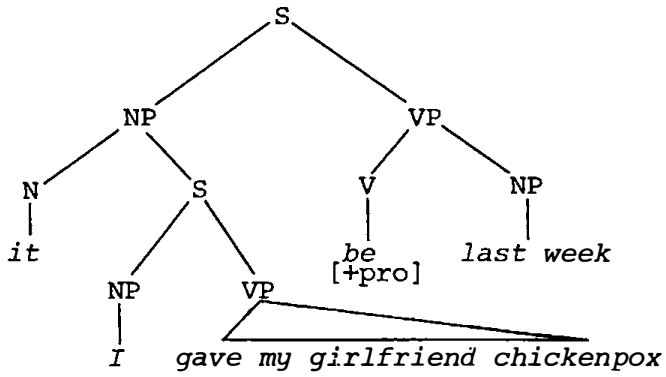
In the event that the rule of *Not*-transportation (which gives *I don't think I will go* from *I think I won't go*) has applied to a sentence such as (50b) to yield *I don't think so* (*I think not so), the *so* will no longer reduce, since it no longer follows *not* when the rule applies.

In G. Lakoff and Ross's (1966) analysis, the rule that replaces verb phrases by *do so* was put forward as a test to determine the constituency of verb phrases; in particular it was intended to differentiate between those adverbs that can be said to be inside the VP and those that are outside it. Before the conclusions reached there can be evaluated in terms of the analysis proposed in this study, however, and the tenability of their position examined, it is necessary to consider the question of the structure of sentences containing adverbs and the transformational mechanism that accounts for their placement in derived structures.

In Appendix F of G. Lakoff (1965), a number of arguments are adduced for considering that many classes of adverbs are to be derived from the main verbs of higher sentences. It is proposed there that sentences such as (51) have underlying structures such as (52):

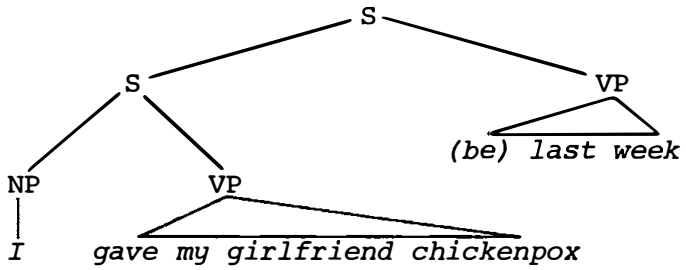
(51) *I gave my girlfriend chickenpox last week.*

(52)



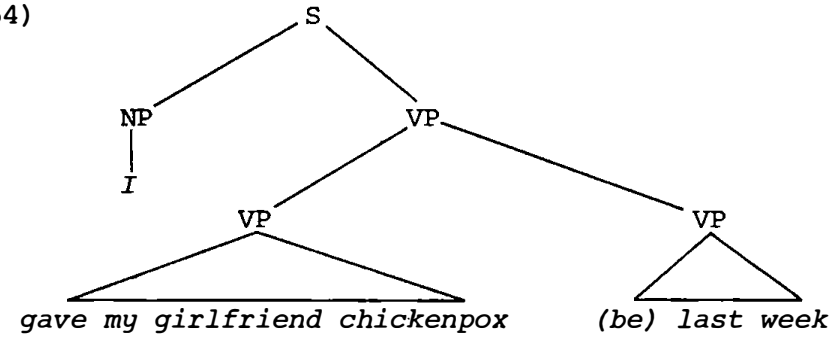
This analysis explains a number of otherwise puzzling facts concerning the relations between various sentences with adverbial elements, and it will be accepted here. However, the mechanism by which such structures are to be related to surface structures is not as incontrovertible as the deep structures themselves. Lakoff suggests that the derived structure of such a sentence should be

(53)



Whether a node NP remains in the subject dominating the sentence that contains the main verb or not, this structure is still highly counterintuitive. There are, further, a number of syntactic facts that support the contention that the structure should rather be like that given in (54).

(54)



This structure contains only one S node and a more complex verb phrase than that in (53). Supporting the conclusion that there should be only one S node are the following:

If the adverbial and the main verb phrase are never in the same simplex sentence the structural description for the rule of Reflexivization will not be met in a number of cases, producing the ungrammatical (55b) instead of (55a):

(55) a. *Felicity goes on deceiving her father in spite of herself.*

b. **Felicity goes on deceiving her father in spite of her.* (where *her = Felicity*)

In addition, the extra S node in (53) will permit the structural description for right to left pronominalization (Ross, 1967b) to be met, producing the incorrect (56b) sentences rather than only (56a):

(56) a. *Lucina called her mother a fool on her birthday.*

b. i. **She$_i$ called her$_i$ mother a fool on Lucina$_i$'s birthday.*

ii. **Lucina$_j$ called her$_i$ a fool on her$_j$ mother$_i$'s birthday.*

Similarly, this node would permit right to left Prosententialization as discussed above, yielding the ungrammatical (57b):

(57) a. *I expect you to take out the garbage when I tell you to do so.*

b. **I expect you to do so when I tell you to take out the garbage.*

His analysis also forces Lakoff to a completely ad hoc modification of the notion of "main verb" (G. Lakoff, 1970a, pp. 170-171); this difficulty is completely avoided if the adverbials associated with the main verb in surface structure do not constitute separate sentences. While syntactic facts force one to the conclusion that the main verb of a sentence is generally deeply embedded at the level of underlying structure at which grammatical relations are defined, cooccurrence relations expressed, etc.,[12] to make the counterintuitive claim that this is also true of surface structure is simply to propose a new use for the term and does not alter the facts concerning the level that has traditionally been called surface structure.

It would also be very difficult to express the late optional minor rule that permutes certain adverbials around the VP structure below them. Thus, (58b) is synonymous with (58a) and is derived from it:

(58) a. *Ethelyn speaks in an inaudible murmur often.*

b. *Ethelyn often speaks in an inaudible murmur.*

In the analysis typified by the structure in (53), these have radically different surface structures, and it is not even clear that such a rule could be stated. If the analysis

in (54) is chosen, however, they differ only in the order of constituents, being related by a rule such as

(59) *Adverb permutation*

SD: X $[_{VP}$ VP $[_{VP}$ V (NP)]] Y
1 2 3 4 5

SC: exchange 2 and 3 + 4

This rule should be governed by the verb in the (ad)verb phrase being permuted (i.e., constituent 3), since it is the case that some adverbs, such as *often,* can permute, and not that some verb phrases can have their adverbs permuted around them. It will be noted that this rule can apply more than once to the same structure if several layers of permutable adverbs are present in it. Thus, (60a-d) are synonymous, but (60e) is not a possible variation:

(60) a. *The prisoner protests his innocence loudly often.*

b. *The prisoner loudly protests his innocence often.*

c. *The prisoner often protests his innocence loudly.*

d. *The prisoner often loudly protests his innocence.*

e. **The prisoner loudly often protests his innocence.*

In Lakoff and Ross's analysis of sentences with *do so,* further problems are created by this extra S node. If *do so* replaces a VP, it is impossible to account for the sentences in (16), since the deleted elements do not even form a constituent:

(61) a. *Alonzo pores over the dictionary in search of dirty words, and his brother did so before him.*

b. *Matisse made collages with cut paper up until the time of his death, and rising young artists think it will increase their sales if they do so, too.*

Notice that the adverbial itself cannot be analyzed as a VP for the purpose of applying their rule unless the entire included structure also forms part of the VP. Thus, only (62a,b) are grammatical, and not (62c).

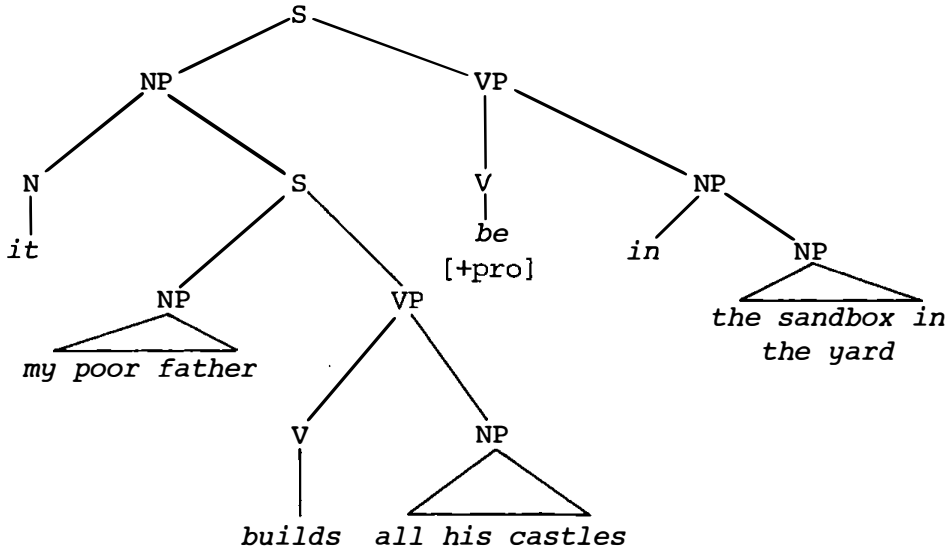
(62) a. *Maurice tried out for the hammer throw team yesterday, and even though he didn't make it, Ottokar did so, too.*

b. *Maurice tried out for the hammer throw team yesterday, and even though he didn't make it, Ottokar did so today.*

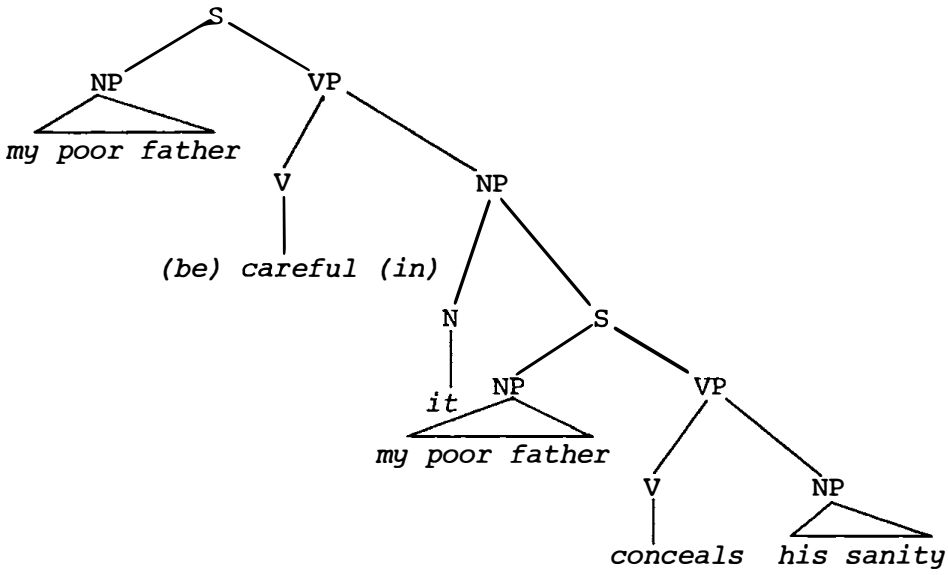
c. **Maurice tried out for the hammer throw team yesterday, and even though he didn't make it, Ottokar tried out for it did so.*

In view of the above facts, it seems necessary to state a rule that incorporates adverbs into the VP containing the main verb, giving structures like (54) from underlying (52). Before stating such a rule, however, it should be noted that the adverbs to be lowered can come from two different types of underlying structures, shown in (63) and (64).

(63)



(64)



Structures such as (64) are motivated by the necessity of imposing selectional restrictions on the kinds of subjects that can appear in sentences with modifying manner adverbials like *carefully, wilfully*. Adverbs derived from structures like (63), on the other hand, have restrictions that apply to the verbs of the embedded sentence rather than to their subjects. Such adverbs as *carefully* require deep structural identity of subject with the embedded sentence and hence that the embedded verb be [-stative] as discussed above, but do not generally restrict this verb further (Lakoff, 1968a). It is therefore proposed that the facts of adverb incorporation be expressed in the following rule, in which the same structural change may be wrought upon either of two types of structures:

(65) *Adverb-lowering*

SD: (i) $[_S[_{NP}\ \underset{1}{N\ [+pro]}\ [_S\ \underset{2}{NP}\ \underset{3}{VP}]][_{VP}\ \underset{4}{V}\ \underset{5}{(NP)}]]$

or

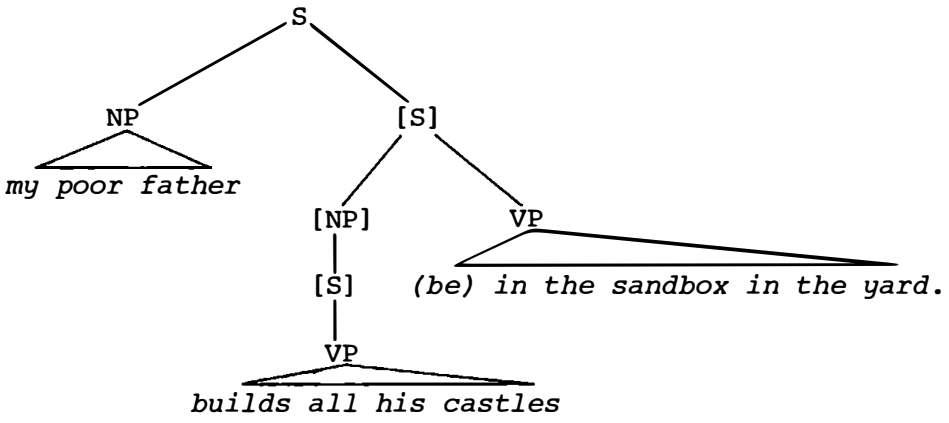
(ii) $[_S\ \underset{6}{NP}[_{VP}\ \underset{4}{V}\ [_{NP}\ \underset{1}{N\ [+pro]}\ [_S\ \underset{2}{NP}\ \underset{3}{VP}]]]]$

SC: a. delete 1

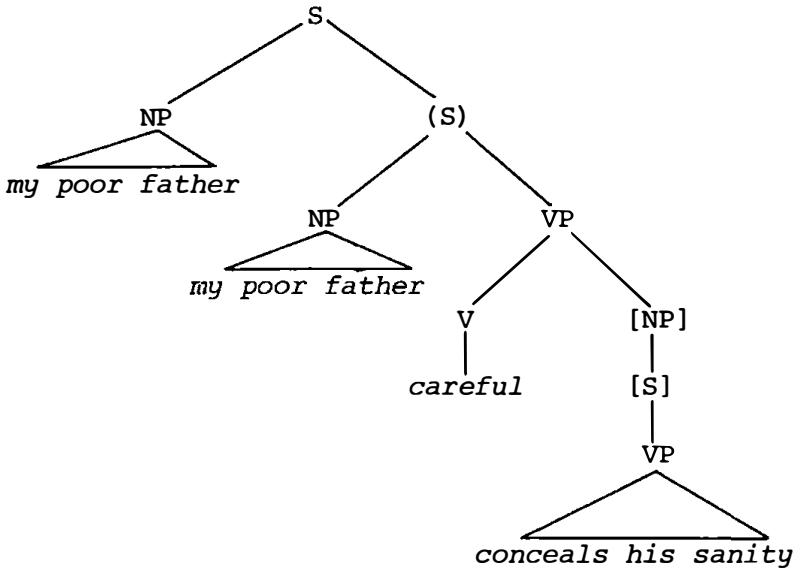
b. Chomsky-adjoin 2 to the higher S

Structures such as (63) can be analyzed as meeting (65i), while those like (64) meet (65ii). When the rule is applied to these structures, (66) and (67) result.

(66)

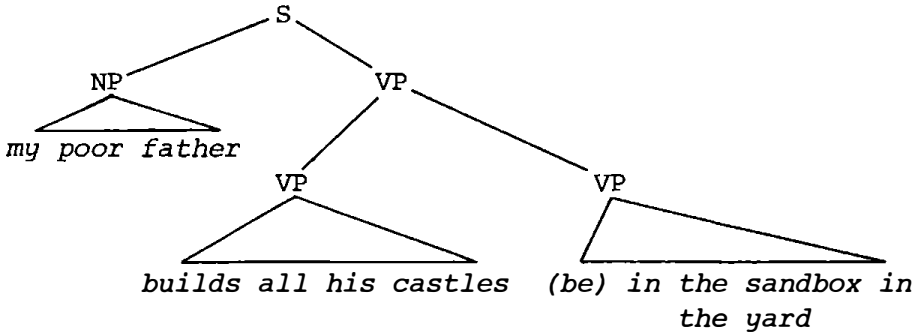


(67)

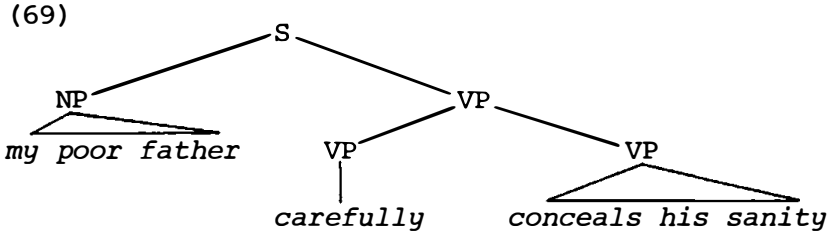


At this point in the derivation, universal conventions will progressively change the nodes enclosed in [ ] to VP and delete redundant ones. The second instance of the subject in (67) can be eliminated either by Equi-NP-deletion, at the cost of enclosing the V in the SD of that rule in ( ), or by addition of another line to the SC of (65): "c. delete 6". After this operation, the S in parentheses will become a VP and be deleted as redundant, giving the correct surface structures (68), (69) (after *careful* ⇒ *carefully*):

(68)



(69)



The process of deletion of the pro-N must be stated as a part of this rule, rather than as normal *It*-deletion, since after the rule applies the SD for *It*-deletion (which clearly applies much later) will no longer be met. As suggested above, the deletion of the inner subject may similarly be part of this rule. The justification for stating the rule in this way, rather than as a rule that takes the VP of the higher sentence and incorporates it directly in the lower one comes from adverbials of the second type (*carefully*, etc.). Such a treatment for adverbials of this sort would require a much more radical alteration of constituent structure, and it is far from clear how such a rule could be stated. In addition, it seems semantically more plausible that the occurence of the subject NP in surface structure be derived from the NP that was subject of the (surface) main verb in deep structure, rather than from one that is simply referentially identical with it (the subject of the manner adverbial). If the mutual relationship between these two NP is not reversed by a process such as that given here, it is the former occurrence of *my poor father* (the subject of *builds* + NP in deep structure) which will somehow be deleted by Equi-NP deletion. If some such device as that used here is allowed for the statement of these two processes in one rule schema, the obvious similarities of the two can be expressed. The subject of abbreviatory notations in syntax and the general question of evaluation metrics defined over syntactic systems has been little investigated to date; any such notational system should allow the capturing of such similarities of operation as that discussed here.

In considering the structures of sentences containing adverbials such as those discussed here, it is apparent that at least part of the facts concerning their behavior under *do so* formation (by Prosententialization of the complement of underlying *do*) can be explained by assuming that they constitute layers of embedding above that with main verb *do*. Thus, the adverbs in the second clauses of (70a,b) remain after this rule applies, because they are not part of the sentential complement of *do*, which is the structure which is replaced by *so*.

(70) a. *My poor father builds all his castles in the sandbox in the yard, while my mother does so in the air.*

b. *Arthur made his way through the enchanted forest while the wizard was asleep, and if I'm lucky I'll do so then, too.*

Thus we see that the notion that an adverbial of a certain type is outside the VP is adequately captured by the claim that such adverbials constitute the main verbs of sentences higher than that containing the *do* associated with the VP in question. As one would expect, such elements as the NP direct object are inside the VP by this criterion, since they occur only at the level of the main verb, which is below the *do*. This analysis also permits an account of the fact that auxiliary elements seem to be "outside the VP" in sentences such as (71).

(71) a. **Lloyd can blow bubbles through his right ear, and Benjy does so, too.* (where *do so = can blow bubbles* etc.).

b. **If God had made the world for metaphysicians, the absolute would have vibrated in the ether, and perhaps even the contingent does so.* (where *do so = would have vibrated* etc.).

This analysis shows auxiliaries to be outside the VP; it is thus quite consistent with Ross's claim (1969b) that they constitute the main verbs of higher sentences. These sentences are above the *do*, as is also indicated by their appearance with it when the sentence below is dislocated, as in the formation of the pseudocleft construction:

(72) *What Renoir should have done was quit while he was ahead.*

The above considerations raise the question of the treatment to be accorded those adverbials that Lakoff and Ross's criterion designates as inside the VP.[13] It seems reasonable to treat them as layers of embedding between that of the element *do* and that of the sentence containing the (surface) main verb. If they are thus part of the embedded sentence that is the complement of *do*, they will, of course, always be deleted when Prosententialization replaces this complement by *so*, thus explaining the nonoccurrence of sentences like (73).

(73) a. **Vincent felt he had to remain in France during the war, though he could have done so in America.*

b. **Wittgenstein threw metaphysics out the window, and all his followers then did so into the fire.*

c. **The captain of the Queen Maude swam to shore when it went down, though the first mate did so to the lifeboat.*

Lakoff (personal communication) has suggested that all these adverbials can be analyzed as the product of more complicated structure. Thus, he would analyze (74a,b) as derived from the structures that underlie (75a,b).

(74) a. *I remained in the jungle.*

b. *I swam to shore.*

(75) a. **For me to be in the jungle remained.*

b. *My swimming enabled me to* {*succeed in coming to be at* / *get to*} *shore.*

Aside from the queasy feeling produced in one's stomach by such an analysis, there seem to be good syntactic reasons why neither of these can be maintained. First, the occurrence of (76) implies that the subject of *remain* in underlying structure must be *I* rather than a sentence, since sentences cannot be the subjects of adverbials such as *intentionally*.

(76) *I remained in the jungle intentionally.*

Similarly, if the same structure underlies both (74b) and (75b), we would expect to get such nonsentences as

(77) **Last year I could only float to shore, but this year my swimming did so.*[14]

The only argument in favor of analyzing sentences like (74b) as having the same deep structures as those like (75b) is the existence of sentences such as

(78) *The captain swam to shore, but the first mate got there by rowing.*

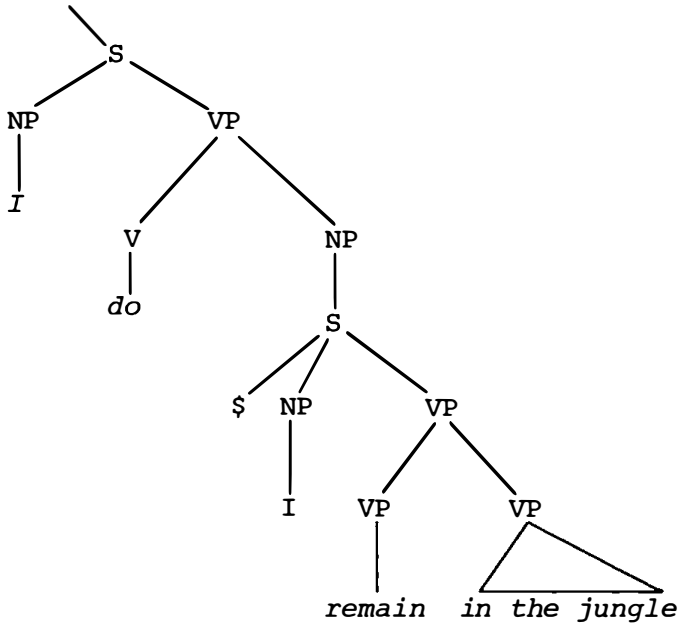
If one assumes that there is some sort of constraint that requires that conjuncts have "parallel structure", one might interpret this constraint as sufficiently strong to require the first clause of (78) to be derived from a structure like (75b). But in fact this constraint is very little understood; the existence of sentences such as (79) implies that it cannot be so strong as to require identity of structure.

(79) *The captain of the Queen Maude swam to shore, but the first mate drowned.*

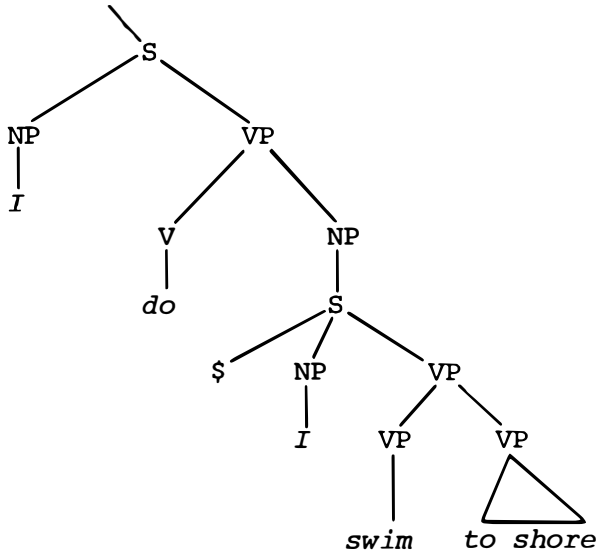
Surely *drown* is not to be derived from *fail to come to be at the shore by swimming (by drowning)*.

In any event, whatever may turn out to be the deepest structure underlying inside the VP adverbials, their only known peculiarity (compulsory deletion under *do so* formation) is adequately accounted for by positing them as layers of embedding between *do* and the main verb of the embedded sentence. The rules that incorporate adverbs into VP must apply before Equi-NP-deletion, or the latter rule will delete the embedded subjects of structures such as (64) before adverb-lowering can apply to them. If we constrain Pro-sententialization to apply after at least adverb-lowering (probably it can be constrained to apply after Equi-NP-deletion though neither of these "after rule n" constraints affect the point at issue) and before *Do*-deletion the structures of (74a,b) will be as shown in (80a,b) throughout the time when Prosententialization can apply (assuming they are present in some more complex structure in which Prosententialization can apply at all).

(80) a.



(80) b.



If Prosententialization applies to either of these structures, it can only yield the phrase *I do so (too)*, and cannot leave the adverbial element out of account.

The analysis suggested above, in which *do so* is created by the very general rule of Prosententialization, appears to account for the facts with very little extra apparatus. Lakoff has proposed a different analysis (Lakoff and Ross, 1966; Lakoff, personal communication) on which the element introduced replaces a VP rather than a sentence. He proposes to account for the optional deletability of adverbs that are "outside the VP" by allowing this rule to affect any level of VP so long as it also affects all those embedded under it [a similar condition on NP is called pied-piping in Ross (1967a)]. This analysis, however, has several serious defects. In the first place, the condition referred to above (hereafter called VP-piping) still does not prevent the rule from applying to only part of the embedded structure in sentences such as (80a,b) if the analysis of adverbs given in this paper is substantially correct. Only the right or the left branching VP (of the two dominated by the VP under S) might be chosen without violating VP-piping, producing such nonsentences as

(81) a. **Arnold remained in the jungle while I did so in the city.*

b. **Arnold remained in the jungle and I remained (do) so too.*

c. **The captain swam to shore and the first mate did so to the lifeboat.*

d. **The captain swam to shore and the first mate swam (do) so too.*

Somehow, it is necessary to state that the whole of the largest possible single VP immediately below but not dominating *do* is the minimal unit that can be replaced with *so*. The statement of such a constraint is not possible within the present theory of grammar.

Even if this is somehow avoided, however, at the points at which *do so* formation can occur, outside the VP adverbials are dominated all by the same VP that dominates the element *do* itself. Thus, if *so* replaces the embedded VP and some of the external adverbials, the material deleted will not, in general, form a constituent unless all the external adverbials associated with this VP are deleted and the element *do* as well. Since this would not produce *do so* anyway, but only *so* (unless a subsequent rule or another part of this rule inserted another *do,* which would destroy much of the reason for assuming its presence in deep structure to begin with), it is clear that the VP-piping solution will not avail here.

In addition, such a solution fails to account for the fact that exactly the same phenomena of adverb deletion occur when a sentence is Pronominalized, replaced by *it*. Thus, we get the sentences in (82).

(82) a. i. *Arnold remained in the city until Thursday, but I only did so until Wednesday.*

ii. *Arnold remained in the city until Thursday, but I only did it until Wednesday.*

b. i. *Arnold remained in the city until Thursday, and I did so, too.*

ii. *Arnold remained in the city until Thursday, and I did it, too.*

c. i. **Arnold remained in the city until Thursday, and I did so in the country.*

ii. **Arnold remained in the city until Thursday, and I did it in the country.*

Any analysis that accounts for the adverbial ellipses in (82a, b.i) in terms of the rule that forms *so* is forced to posit an additional rule to account for exactly the same deletions of external adverbs after *it* as are provided for after *so* by the rule introducing it. This additional rule, of course, totally misses the fact that it is the same thing that is going on in both cases. Apparently, the deletion

rule cannot be stated as part of either Pronominalization or Prosententialization (since to do so would be to state the same process twice), and must be accounted for by another rule that is independent of either but explains the facts of both. The facts concerning internal adverbials are already adequately accounted for, since both rules must delete the entire complement of *do* in order to form either *do so* or *do it;* the complement will, of course, contain the internal adverbials as outlined above in either case.

A clue as to the possible fate of these deleted external adverbials is provided in part by the observation that there must exist in the grammar a rule that creates proforms for adverbials when they are identical with ones occurring earlier:

(83) a. *I write my papers with a typewriter, and Suzie writes hers that way, too.*

b. *I write my papers with a typewriter, and Suzie does so that way, too.*

c. *I write my papers in the office, and Suzie writes hers there, too.*

d. *I write my papers in the office, and Suzie does so there, too.*

The range of adverbials for which proforms exist includes all those that can occur as external to VP. Some adverbials however, do not have proforms, such as negatives. These also cannot be deleted under *do so/it* formation. Thus, one does not get

(84) a. **Ottokar never beats his mistress, and I do so (too).* (where *do so = never beat* etc.)

b. **Ottokar never beats his mistress, and I do so then, too.* (where *then = never*)

A much similar situation prevails in German; Kiparsky has proposed (class lectures at M.I.T., Spring 1967) a rule called discourse deletion, which deletes adverbials from left to right under identity with others. This rule is subject to very much the same constraints.

Since any adverbial that could be deleted in *do so/it* formation is also subject to Proadverbialization, it would seem reasonable to posit these proadverbs as intermediate steps on the road to oblivion for these adverbials. If we then assume a rule that deletes a string of these adverbials if they follow a proform that represents an underlying sentence (the feature bundle [+pro, + sent] will express this, though some other characterization of the feature common to these forms alone should be found), the facts of (82) will be

explained. Such a rule can be stated iteratively, deleting them one at a time if they are immediately after the proform.

(85) *Adverb-ellipsis*

$$\text{SD:}\quad X \;\; V \;\; \begin{bmatrix} +\text{pro} \\ +\text{sent} \end{bmatrix} \;\; [_{VP} \;\; \begin{bmatrix} V \\ +\text{adv} \\ +\text{pro} \end{bmatrix} \;\; (NP)] \;\; Y$$

$$\qquad\quad 1 \quad 2 \quad\;\; 3 \qquad\qquad\;\; 4 \qquad\;\; 5 \quad\;\; 6$$

SC: delete 4 + 5

This rule is optional, as shown by the existence of sentences such as (83b,d), and minor, being governed by the verb that is constituent 2. That the rule is governed is shown by the failure of proadverbs to delete after *think so, hope so,* etc.

(86) a. *Alonzo thought Goldwater would win before the election, and Felicity thought so then, too.*

b. **Alonzo thought Goldwater would win before the election, and Felicity thought so, too.* (meaning *Felicity thought so before the election.)*

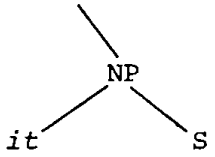
This rule appears to account for the facts of external adverbial deletion with the addition of minimal apparatus to the grammar. While another account might well be given, this appears to suffice in view of the data known at present; it provides, apparently, the relevant mechanism to allow the Prosententialization rule discussed in this study to do its work in peace.

NOTES:

*I have benefitted much from discussions with George Lakoff and John R. Ross, who have reached many conclusions similar to those reached in this paper independently. I am indebted to them and to Susumu Kuno for discussion of these problems and comments on an earlier version of this study. None of these people are responsible for errors in this work, of course.

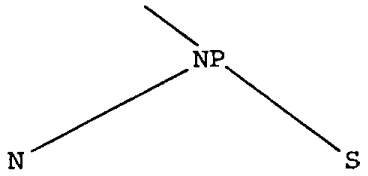
[1]The general grammatical framework assumed in this paper includes the main points of the analysis of English syntax

presented by Ross and Lakoff in class lectures during 1966-1967. In particular, I assume a noncyclic theory of grammar, with iterative rules whose order of application is specified in terms of statements of applicability such as "anywhere before rule i" and "anywhere after rule j". In many cases, these restrictions will be sufficiently confining to give the impression of a strict linear sequence of rules. For more background on questions of rule ordering, see my forthcoming study of the subject. I depart from Ross and Lakoff primarily in assuming the analysis of complements suggested in class lectures at M.I.T., in the Spring of 1967, by Paul Kiparsky. Kiparsky classifies complements into three types on the basis of several criteria of syntactic behavior. While the analysis given originally by Rosenbaum and maintained by Ross and Lakoff assumes that all complements have the structure



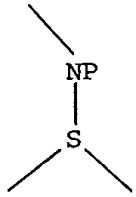
Kiparsky's three structures are:

Factive type:



Fact, Idea, Contention
etc.
[+PRO]

Propositional type:



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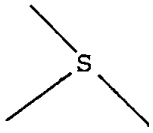

I will occasionally use *it* in this paper for the head noun of a factive construction; this is not to be taken to imply an undifferentiated structure.

[2]The symbol $ represents the abstract complementizer element that is inserted in the complements of certain verbs and prevents their S node from being subject to node deletion conditions but it is always deleted by Comp-deletion and hence can be given no concrete phonetic shape. This is, of course, only a notational expression of the fact that the nodes in question remain until a late stage of the derivation. If a more general account of this phenomenon can be given, the element $ would, of course, be superfluous; until then it remains an essentially ad hoc statement of an apparently independent fact.

[3]These principles, which we hope can be stated universally, determine the conditions under which a node may bear a given label. A preliminary approach to these problems was made in Anderson (1967a). Much more work remains to be done on the problem, and the conclusions reached there can by no means be accepted in their entirety.

[4]This is not true of the construction illustrated in (3), since the *do* here is a different item (the *do* of *do*-support, which will be discussed briefly below).

[5]The importance of the feature [+Stative] in the classification of verbs (including adjectives) is discussed at length in G. Lakoff (1966).

[6]Many apparently [+Stative] verbs appear in constructions that normally require [-Stative] verbs. Perceptual statives are especially prone to this behavior. Further analysis shows in these cases that an abstract proverb, such as the inchoative and causative discussed in G. Lakoff (1965), is present in the deep structure and is subsequently deleted or reduced to a feature on the main verb. S. Fischer (1967) has studied these phenomena, among other proverb deletions, in some detail.

[7]D. Perlmutter (1969) discusses in detail the motivations for this construction, as well as many others related to deep-structural constraints that may constitute exception features of individual lexical items.

[8]For discussion of the extraposition rule and other aspects of the transformational component of a grammar of English incorporating Kiparsky's suggestions concerning the structure of complements, see Fodor (1967).

[9][See now Kiparsky and Kiparsky (1971), ed.]

[10]These sentences are, of course, all right if the *so* is the element that means, roughly, 'also'. This element is quite different from the *so* of Prosententialization, however. For one thing, it causes Auxiliary attraction to apply, although apparently no question element is involved. Thus, with this *so,* (33a) would be *I have always claimed that Matisse was the most important painter of this century, and so did most authorities*. This element appears to be totally unrelated to Prosententialization *so* and will not be further considered in this study.

[11]This, of course, begs the question of the source of the *so* in *it is so*. This element does not seem to be prosentential, and the behavior of the construction seems to indicate that it is an adjective; but if so, it is a most bizarre one. This *so* cannot be compared (**soer, *soest*), reduced (*thing which is so → *so thing*), etc. I have no idea where it comes from. These facts were pointed out to me by John Robert Ross.

[12]For a discussion of the criteria for the definition of the level of deep structure and their interaction with each other and with other aspects of grammar, see G. Lakoff (1968a).

[13]Many of the same adverbials that are called "internal to the VP" in English share transformational peculiarities in other languages. Thus, in Samoan, certain adverbials (including directionals) can, by their presence in the VP, inhibit the operation of the rule of particle-deletion (which removes a subject or object particle from an NP directly after the VP). For details, see my unpublished paper "Some Syntactic Rules in Samoan"; further discussion will be forthcoming in my "Why You Can't *Do So* into the Lagoon Either".

[14]Sentence (77) might be excluded in any case by not allowing the rule of *do so* formation (or Prosententialization)

to apply until after these structures had been simplified to approximately their surface forms; however, in this case, the correct sentences could only be generated if the "inside" and "outside" adverbials were differentiated approximately as I suggest in this paper. Whatever the deepest possible structure of adverbs may be, I claim that the level of structure assumed in this study must be reached at some point, and this is the point at which the rules proposed here apply.