A Structure-Preserving Constraint
on NP Movement Transformations

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In this paper I wish to describe a certain hypothesis about transformations which move major constituents like NP (noun phrase), S (sentence), AP (adjective phrase), VP (verb phrase), and PP (prepositional phrase). Because of considerations of length, I will limit discussion to NP movement transformations, and in particular to the transformation of <u>there</u> insertion. This rule can replace an indefinite subject NP of <u>be</u> (and of a few other verbs) with <u>there</u>, while moving the subject NP itself to a position after this <u>be.</u>

(1) A few unmarried men are on welfare.
    There are a few unmarried men on welfare.

    Three girls were standing on the corner.
    There were three girls standing on the corner..

    There has been very little money given to this fund.
    Very little money has been given to this fund.

    A child was in the other room.
    There was a child in the other room.

    How many officials were at the airport?
    How many officials were there at the airport?

There are several poorly understood conditions on this transformation. Three of them can be explained quite adequately on the basis of the structure-preserving hypothesis.

The structure-preserving hypothesis is that movement transformations (NP movement transformations, in this paper) are constrained, if they can apply freely in embedded sentences, to substituting a constituent with label X for another such constituent with label X, where this second X is empty (i.e., it dominates nothing). This means that non-terminal nodes, at any level other than that of surface structure, are not required to dominate terminal elements. The empirical content of the hypothesis is that, given the phrase-structure rules for a given language, transformations can only move constituents with label X to positions where these phrase structure rules can generate such constituents. (Constituents immediately dominated by highest S's are excepted.) This assumes, of course, that certain absolute constraints on phrase-structure rules exist (e.g. a preposition could never be immediately dominated by an S, an adjective could never dominate an S, etc.) and that symbols in phrase structure rules and in conditions on their use contribute to the cost of a grammar. (Many non-structure-preserving transformations could be reformulated as structure-preserving, given more phrase structure rules and conditions on their use, but these reformulations add to the cost of the grammar.)

A stronger form of the hypothesis, which I will argue for here also, is that empty deep structure nodes are also subject to subcategorization conditions.

The verb be is sub-categorized to take either a predicate attribute (either an AP or an NP) or a PP, or a combination of both:

(2) John was a doctor in Denver.
    The soloists were charming during the concert.
    Three of the students were out of cash.
    My uncle is very old.
    The mayor is also the party leader.

But in normal usage, the absence of a complement is ungrammatical:

(3)*Some people who don't like beer are.
    *A huge fire was.
    *Lately, a lot of unrest has been.

Without the structure-preserving hypothesis, we must both state that just in case of indefinite subjects, be can appear without deep structure complements, and that just in case be has no deep structure complement, there insertion is obligatory rather than optional. But with the structure-preserving hypothesis, the empty NP in deep structure, onto which there insertion moves deep structure subjects, satisfies sub-categorization automatically; no special condition is needed. (If this NP is generated in deep structure, the rule must apply, since we have stipulated that empty nodes are not allowed in surface structure.) Thus, the structure-preservinghypothesis allows us to dispense with a doubly ad hoc set of conditions otherwise needed to exclude (3) and to include (4).

(4) There are some people who don't like beer.
    There was a huge fire.
    Lately, there has been a lot of unrest.

A second argument for the structure-preserving hypothesis concerns the uses of be as a modal: be (to) (necessity) and be going (to) are like other modals (must, can, ought, etc.) in that they never occur in infinitives, gerunds, etc., nor do they succeed each other. In the ordinary case, there insertion places the subject NP after the first occurrence of be:

(5) There is a house being built next door.
    *There is being a house built next door.
    There were only a few students being obnoxious.
    *There were being only a few students obnoxious.

Yet, if the first use of be is a modal usage, this is not the case:

(6) Some participants are going to be in the sound-proof booth.
    There are going to be some participants in the sound-proof booth.
    *There are some participants going to be in the sound-proof booth.

Three movie stars are to be here by six o'clock.
There are to be three movie stars here by six o'clock.
*There are three movie stars to be here by six o'clock.

The structure-preserving hypothesis explains this perfectly, since
there is no NP node generable after M by the phrase structure rules.**
     A third argument for the structure-preserving hypothesis is that
it predicts that if be has a (non-empty) deep structure predicate
attribute (NP or AP), there is no possibility of generating an empty
NP node for there insertion to move an NP onto. Hence, we should
expect to find in a non-structure-preserving framework, that there
insertion must be blocked by another ad hoc condition if be is fol-
lowed by a predicate attribute (NP or AP). And in fact, this is the
case.

     (7) Many teen-agers are licensed drivers.
        *There are many teen-agers licensed drivers.
         Certain areas were very dry.
        *There were certain areas very dry.
         One man was a very good pharmacist.
        *There was one man a very good pharmacist.

But these judgments of grammaticality are just what the structure-
preserving hypothesis would predict, since the sub-categorization
features of be only allow one AP or NP (empty or not) in its com-
plement.
     One might at first think that an example like "there are few
doctors available" would be an instance of there insertion apply-
ing even when be has a deep structure AP complement. However,
available can be analyzed here as resulting from the locative PP
node, just as it must be in sentences like (8).

     (8) At this late date, any seat available is all right with us.
         All the doctors available are on this list here.
         The seats inside are the best ones available.

In these examples, available acts like other post-nominal adverbs
here, inside, etc.
     Once we accept the structure-preserving analysis of there in-
sertion, we are led to interesting conclusions about the constitu-
ency of sentences with auxiliaries. Prior to there insertion, the
                                                   structure of

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**More precisely, if we define as VP that which occurs in infin-
itives, gerunds, and participles, then the phrase structure rule for
S is S --> NP - M - VP, where the finite tense endings and the aux-
iliary do originate at the node M. If we then move verbs to the
left onto affixes, rather than vice-versa, as in Syntactic Struc-
tures, we can analyze the deletion in comparative than clauses and
in question tags as the deletion of the single constituent VP, as
long as this deletion is ordered after the movement of be and the
auxiliary have onto M. (When formulated carefully, this movement
of have and be is sufficient to characterize the notion "auxiliary"
in English, since a rule like subject-auxiliary inversion can then
be formulated in terms of the subject NP and M.)

"there were three girls standing on the corner" must be "($_{NP}$ three girls) - ($_{VP}$($_V$ be) - ($_{NP}$____) - ($_{VP}$standing on the corner) "). (In deep structure, the embedded VP may be an S which is later reduced; I take no stand on this issue.)

The implication of such a structure is that auxiliaries like be must be the heads of separate VP's in surface structure; they cannot be sister constituents to the main verb. An apparent disadvantage of this is that the order of auxiliaries cannot be given by a phrase structure rule, as it was in Chomsky's Syntactic Structures (1957). However, independent justification can be given for not indicating the order of auxiliaries (perfect - progressive - passive) by a phrase structure rule.

Consider the class of verbs which contains begin, start, continue, commence, go on, keep, keep on, recommence, finish, stop, etc. We can call these verbs the verbs of temporal aspect. They share with the progressive be the characteristic that they can be followed by verb phrases whose first verb has the affix ing. In fact, these are the only uses of verb phrase complements introduced by ing which were not analyzed as NP's (because of their behavior in passive and pseudo-cleft constructions) by Rosenbaum (1966). The constituent analysis of auxiliaries given above, in which be is the head of a separate verb phrase, suggests as a possible hypothesis that the progressive be is also a verb of temporal aspect. This would explain why the complement to this use of be is introduced by the affix ing. Furthermore, it would explain why the perfect auxiliary cannot follow the progressive, since no complement to a verb of temporal aspect can begin with the perfect auxiliary:

(9)*John was having eaten.
  *John started having eaten.
  *John went on having eaten.
  *John finished having eaten.

Also, verbs of temporal aspect with ing complements cannot follow one another, and if the progressive be is included in this class, this condition has still wider applicability:

(10)*They began finishing doing their homework.
  *Mary went on starting taking piano lessons.
  *The boys were continuing painting the house.
  *The sink was finishing draining.
  *My friends kept being entertaining my sister.
  *The speaker commenced being reading his lecture.

Since the passive auxiliary can appear only before verbs which are followed, at the point the passive transformation applies, by a noun phrase object (with perhaps a particle or preposition intervening), it follows that neither a verb of temporal aspect nor the perfect auxiliary have can be preceded by the passive auxiliary, since they are followed by a verb phrase (VP) at the point of application of the passive rule. This fact, and the general prohibition on the perfect auxiliary after verbs of temporal aspect, completely determines the order of the perfect, progressive, and passive auxiliaries. Therefore, indicating this order by a phrase structure rule in the grammar is redundant and hence incorrect. (The generalizations

which hold for the entire class of verbs of temporal aspect do not
exclude the possibility of the perfect auxiliary (have) following it-
self; I will assume that this defect can be remedied without jeapord-
izing this analysis.)

Another possible objection to analyzing the complement of the
progressive be as a separate constituent (as the structure-preserving
analysis of there insertion demands) is the claim that the "passives"
(12) and (13), should not be similarly derived.

(12) John was sweeping her room.
Her room was being swept by John.

(13) John began sweeping her room.
Her room began being swept by John.

The basis of the objection is that the sentences of (13) are not
synon mous, at least when the most usual reading of the active sen-
tence in (13) is understood. (i.e., that John is an agent of the
action of beginning, and is the deep structure subject of begin, as
well as the deep structure subject of sweep.) This is supposedly
accounted for by analyzing only non-auxiliary verbs (i.e., verbs
which do not prepose in questions and which can appear before n't)
as heads of separate VP's.

However, this explanation is deficient in a way that makes the
objection to analyzing the progressive be as a head of a VP collapse.
Almost every modal (will, may, must, shall, etc.) has a sense, as
do begin and other verbs of temporal aspect, in which the subject
which precedes it in both active and passive sentences is interpreted
as the subject of that modal. Thus, the use of will not, meaning
refuse to, and the use of shall in questions, which asks for advice,
do not appear in synonymous active and passive pairs:

(14) John will not shovel the snow!(ambiguous)
The snow will not be shoveled by John!(non-ambiguous)

Shall I be examined by you?
*Shall you examine me?

Thus, the kind of ambiguity exhibited by begin is also exhibited by
auxiliaries like will, shall, etc. If an interpretive rule marks the
surface subjects of all the examples of (14) as subjects of the mod-
als will, shall, etc. in certain of their meanings, the same rule
can apply to the surface subjects of begin in (13), in the meaning
where the surface subject of begin is an agent. If, on the other
hand, in the deep structure of complements to begin, the subject
of begin is also the subject of its complement, then the same anal-
ysis should be made of the deep structure of complements to will,
shall, etc. In either case, we cannot account for the difference
between begin and the progressive be, exemplified in (12) and (13),
by appealing to the notion of auxiliary vs. non-auxiliary; so there
is no reason, in view of these examples, to object to analyzing them
both as heads of separate verb phrases.

In conclusion, we see that a consequence of a structure-preserving
formulation of there insertion is that the progressive and passive

auxiliaries must be analyzed as heads of separate verb phrases. We
have seen that two possible objections to this, concerning the order
of auxiliaries and the preservation of meaning by the passive trans-
formations, are in fact not relevant. We have accounted for the or-
der of auxiliaries by appealing to independent characteristics of
the verbs of temporal aspect, and we have pointed out that the dif-
ferences in meaning in (13) are no different from differences in
meaning in (14). Thus, there are no serious reasons to reject the
structure-preserving formulation of there insertion, and we gave
several arguments for accepting it. Of course, the validity of the
structure-preserving hypothesis as a constraint on a larger class of
transformations depends on independent investigation of its effects
on the formulation of each member of this class.