

THE PROBLEM OF GRAMMATICAL RELATIONS
IN SURFACE STRUCTURE¹

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It is normally assumed that grammatical relations are defined at each level of linguistic representation. In a theory that posits the three levels of surface syntactic structure, deep syntactic structure, and semantic structure, we may speak therefore of there being surface syntactic relations, deep syntactic relations, and semantic relations. The vocabulary for syntactic relations, both deep and surface, include such elements as subject-of, predicate-of, direct object-of, head-of, modifier-of, etc. The vocabulary for semantic relations is different, at least in part, and includes such elements as agent-of, patient-of, argument-of, etc. In English, this tripartite assignment of relations to constituents can be seen most clearly in passive sentences such as (1) The guard was watched by the prisoner. In (1), the noun phrase the guard is the surface subject, the deep direct object, and the semantic patient; while the noun phrase the prisoner is the surface oblique (prepositional) object, the deep subject, and the semantic agent.

Syntactic relations, both deep and surface, are generally thought to be definable in terms of the configurations of constituents in phrase markers (Chomsky 1965). For example, the subject, deep or surface, of a sentence S is that NP which is immediately dominated by S and which cooccurs exclusively with VP; the direct object of a sentence S is that NP which is immediately dominated by VP which is immediately dominated by S, etc. Semantic relations, in turn, are assigned to constituents on the basis of projection rules of various sorts. Thus, if the subject of the sentence (2) Open spaces frighten him has the same semantic relation to (2) as the direct object of the

sentence (3) He fears open spaces has to (3), then that fact can be accounted for by a projection rule that assigns the same semantic relation (say, experience-of) to the subject of (2) as to the direct object of (3).²

Let us now examine more closely the basis for our being able to identify surface syntactic relations, and more particularly how it is that the configurational definitions for deep syntactic relations also work for surface relations. That basis would appear to be the fact that many transformations preserve the configurational characteristics of sentences, even while drastically rearranging their parts. Thus the passive transformation in English applies in such a way that the configuration of its output is identical to the configuration of elements in independently generated deep syntactic structures. Compare, for example, the configuration of the elements in the passive sentence (4) The guard was watched by the prisoner with the configuration of the elements in the independently generated active sentence (5) The guard was angry at the prisoner. It would appear, then, that to the extent that transformations preserve the configurations on which syntactic relations are defined, we can identify syntactic relations in surface structures.

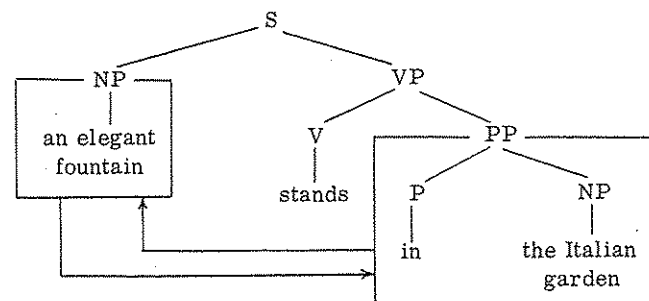
On the basis of observations such as those in the foregoing paragraph, Emonds (1970, 1972a, 1972b) has proposed the hypothesis that all syntactic transformations, save those that apply exclusively to nonembedded sentences (what he calls 'root transformations'), create configurations which are matched by configurations that appear independently in deep structures. He calls this 'the structure-preserving hypothesis'. It is an attractive hypothesis for the reason that it imposes a substantial limitation on the strong generative capacity of transformational grammars.

Unfortunately, the structure-preserving hypothesis cannot be maintained. In turn, the falsity of this hypothesis leads us to question that necessity for assigning relations to constituents in surface structures generally, and to speculate about the perceptual mechanisms by which listeners are able to recover the deep syntactic relations in the sentences they hear. I proceed now to a demonstration that the structure-preserving hypothesis is false.

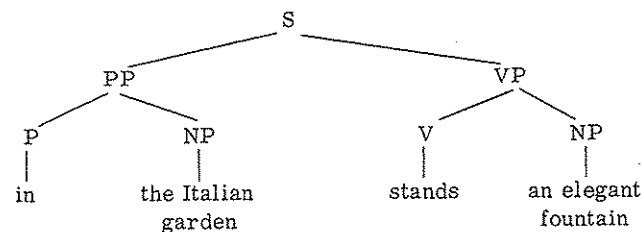
Consider the process in English that converts the structures underlying sentences such as (6) An elegant fountain stands in the Italian garden and (7) The outside world is over that fence into the structures manifest in (8) In the Italian garden stands an elegant fountain and (9) Over that fence is the outside world. Let us call the process Locative Inversion. Emonds views Locative Inversion (what he calls PP Substitution (1970:chapter 1; 1972:39)), to be a root, rather than structure-preserving transformation. This view, however, cannot be correct, since Locative Inversion is applicable to embedded (nonroot) sentences,

as illustrated in (10) Are you aware that John believes that over that fence is the outside world? and (11) It surprised everyone to learn that in the Italian garden stood an elegant fountain. Of course, Emonds could deny that (10) and (11) are grammatical, but there is no basis for such a denial outside of the desire to view Locative Inversion as a root transformation.³

If Locative Inversion is not a root transformation, how is it to be formulated as a structure-preserving one (note that it cannot be what Emonds calls a minor movement rule, since the categories involved are phrase categories)? The best that I can come up with within Emonds' framework is a formulation which is analogous to his treatment of Dative Movement (1972a), namely as a simultaneous interchange of the two constituents which are moved, as schematized in (12)



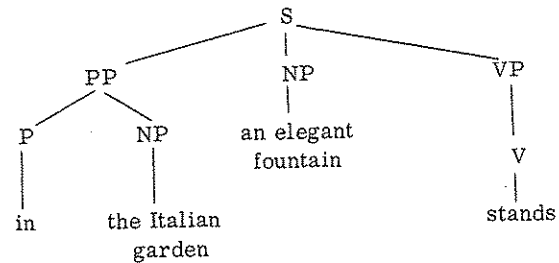
The surface configuration of (8) would therefore be (13)



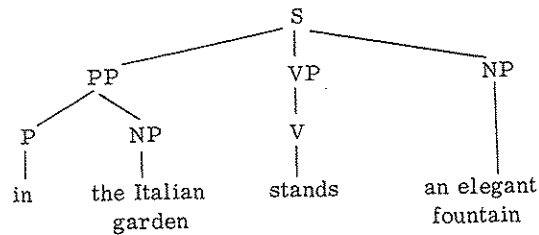
The formulation of Locative Inversion given in (12) is technically in violation of one of the corollaries of the structure-preserving hypothesis, namely 'that the only movement rules which can interchange constituents in embedded sentences must interchange constituents of the same category' (Emonds 1972b:24-25). In defense of (12), however, we may note first that while NP and PP are different categories, they are not so different (as compared to the difference, say, between NP and S) that perhaps the hypothesis can be relaxed slightly so as to

enable (12) not to be in violation of a principle of universal grammar. And second, there are independently generated deep structures in English that have the configuration of (13). An example of a sentence with such a deep-structure configuration is (14) Over that fence is a home run (all such sentences, however, have as their main verb *be*).

If we were not constrained by our theory to view Locative Inversion as a structure-preserving transformation, we could describe it as a result of the successive application of two nonstructure-preserving transformations needed independently in the grammar of English, as follows. First would apply a fronting rule, perhaps Topicalization, that would apply to (15) An elegant fountain stands in the Italian garden to yield (16) In the Italian garden stands an elegant fountain. The derived constituent structure of (16) is (17)



Second, to this structure would apply, optionally, a rule we may call Verb Second, that places a verb phrase consisting simply of a verb immediately after the preposed constituent to yield (18) In the Italian garden stands an elegant fountain, whose derived structure would be (19)⁴



Thus, the view that Locative Inversion is a structure-preserving transformation leads us to conclude that the surface configuration of sentences like (8) = (18) is that of (13), whereas the view that it is the result of two independently motivated nonstructure-preserving transformations leads us to conclude that the surface configuration of such sentences is that of (19). Which is correct?

The difference between (13) and (19) comes down to this. In (13), the noun phrase that corresponds to the deep subject of the sentence becomes either a surface direct object (as in sentence (8) = (18)), or a surface predicate noun phrase (if the main verb is *be*, as in sentence (9)). In (19), on the other hand, that noun phrase stands in no surface grammatical relation whatever to the sentence as a whole. Thus, the structure-preserving hypothesis predicts that the deep subject of a sentence that undergoes Locative Inversion will behave like a surface direct object or like a surface predicate nominal, depending on the main verb of the sentence. Without that hypothesis, we are free to conclude that the deep subject will behave like any noun phrase that bears no surface relation to the sentence as a whole.

According to recent research conducted by Keenan and his colleagues at King's College, Cambridge (see in particular Keenan and Comrie (1972)) on a wide variety of the world's languages, it appears that noun phrases are or are not relativizable (deletable under identity inside relative clauses) depending on their surface syntactic relations if not relativized. The various surface grammatical relations, furthermore, may be placed on a hierarchical scale, so that for a given language, any noun phrase in a surface relation above a given cut-off on the hierarchy may be relativized, but not any noun phrase below that cut-off. English happens to have a relatively low cut-off; for our purposes it is sufficient to note that in English surface direct objects may be relativized as in (20) The boy that Mark knows is tall. However, noun phrases postposed by Locative Inversion, and which on the structure-preserving hypothesis should be surface direct objects, cannot be relativized, as we see from the ungrammaticality of (21) *The elegant fountain that in the Italian garden stands is my favorite. Thus, on Keenan's theory of accessibility to relativization, such noun phrases must be below the cut-off for relativizability in English, and hence cannot be surface direct objects, in contradiction to the structure-preserving hypothesis.⁵

We cannot use Keenan's theory to show that noun phrases postposed by Locative Inversion cannot be predicate noun phrases, since in general predicate noun phrases cannot be relativized, as we see from the ungrammaticality of (22) *The boy that Mark is is tall.⁶ But we can find another difference between the behavior of true surface predicate noun phrases and of noun phrases postposed by Locative Inversion: the former may be questioned, the latter may not.⁷ Thus, questions of the type (23) Who are the people in your neighborhood? in which the predicate noun phrase has been questioned, are fully grammatical. But noun phrases postposed by Locative Inversion can no more be questioned than they can be relativized, as we see from the ungrammaticality of (24) *What kind of world must over that fence be? and (25) *What does in the Italian garden stand? Moreover, recall

that there are sentences in which a surface predicate noun phrase co-occurs with an oblique subject, for example (26) Over that fence is a home run, and indeed the predicate noun phrases of such sentences can be questioned, as illustrated in (27) What kind of hit should over that fence be?⁸ Thus, the ungrammaticality of sentences like (24) cannot be due to the presence of a preposition phrase around which the auxiliary verb has to be moved, but rather to the fact that the interrogated constituent is not a predicate noun phrase (or in any other relation that permits the fronting of interrogative constituents to apply). We conclude once again that the derived structure of sentences that have undergone Locative Inversion cannot be (13), the structure required by the structure-preserving hypothesis, but must be (19), thus disconfirming that hypothesis.

In defense of the claim that Locative Inversion is a structure-preserving transformation (and thus that the hypothesis is not disconfirmed by the nature of that process), we may argue as follows. In Emonds (1972b:39) it is pointed out that no more than one fronting root transformation may apply in the derivation of a given sentence. In addition, the nonroot (and according to Emonds structure-preserving) transformation of WH-Fronting (for both questions and relative clauses, see note 7) belongs in the list of those fronting transformations no more than one of which may apply in a given sentence. All we need do, then, to account for the fact that one cannot question or relativize noun phrases postposed by Locative Inversion, is to add Locative Inversion (even though it is structure preserving) to that list. While this solution is ad hoc, it does appear to save the phenomena. But does it?

So far we have not considered what happens when we try to question or to relativize the noun phrase inside the locative preposition phrase that is fronted by Locative Inversion. If we do so, we obtain stylized, but fully grammatical sentences such as (28) In which garden stands an elegant fountain? and (29) I want to visit a garden in which stands an elegant fountain. However, given the restriction that not both WH-Fronting and Locative Inversion (in particular) can apply in the derivation of a given sentence, it would not be possible to generate (28) and (29).⁹ Therefore the restriction cannot be correct, and both WH-Fronting and Locative Inversion must be allowed to apply to the same sentence, and the defense collapses.

The problem remains, however, to account for the derivation of (28) and (29) on the view that Locative Inversion consists of the two nonstructure-preserving operations of Locative Fronting and Verb Second. The solution is to say that prior application of WH-Fronting to phrases like in which garden in (28) and in which in (29) renders the rule of Locative Inversion inapplicable (its structural conditions are not met). Verb Second, however, may be applied, since its

structural conditions are satisfied, in particular since the verb phrase consists solely of a verb. Thus the derivation of (28) is roughly (30) An elegant fountain stands in which garden?

=== (WH-Fronting) ==> In which garden an elegant fountain stands?
 === (Verb Second) ==> In which garden stands an elegant fountain?

Note further, that if by WH-Fronting we choose to strand the preposition in, which we may do, Verb Second is inapplicable (its structural conditions are not satisfied) and ordinary Subject-Auxiliary Inversion obligatorily applies, yielding (31) Which garden does an elegant fountain stand in? but not the ungrammatical (32) *Which garden stands an elegant fountain in?¹⁰

Having shown that the structure-preserving hypothesis is not correct, and in so doing having shown that there are constituents in the surface structure of a potentially embedded sentence that stand in no grammatical relation to the rest of the sentence (at least in no relation that we currently recognize), we may well ask why are there grammatical relations in surface structure at all, and more precisely, why do constituents stand in recognizable relations in some kinds of sentences but not in others? Since (as we have seen) there is no structural answer to this question, we may look for a functional one. The functional answer that immediately comes to mind is that the surface relations that do obtain can be used by a listener as an aid in determining what the deep syntactic relations are, and ultimately what the semantic relations are in the sentences that he hears. One could imagine a heuristic, for example, by which listeners recover the information that the surface subject of a passive sentence is its deep object from the fact that it is a surface subject and the fact that the verb is marked as passive.

The problem of recovering deep relations from surface structures is compounded by the fact that ambiguities concerning what deep relations noun phrases have occasionally arise. Consider the sentence (33) What has your dog in its jaws? This sentence is ambiguous, depending on whether one construes what as the deep object and your dog as the deep subject or vice versa. It is instructive to observe that this ambiguity arises precisely because what, when starting out as object, takes on the surface appearance of a subject, a phenomenon that does not arise when the auxiliary verb do is introduced, as in (34) What does your dog have in its jaws?¹¹

Interrogative sentences, in fact, are a good testing-ground for hypotheses concerning how deep syntactic relations are arrived at in the absence of configurational cues, for in such sentences structure is often not at all preserved. One such hypothesis is that the listener is making guesses about deep grammatical relations as he listens to

the sentence. How else, for example, could a listener spontaneously interpret (33) as (34), as in fact most people do, if he did not guess that what is the object of the sentence as soon as he had processed just the piece what has your dog (note the plausible continuations: . . . done; . . . found in the closet; etc.). Perhaps even more convincing is the following 'experiment'. Listen to the following two sentences. (35) Of what countries have the boundaries been in dispute? (36) Of what person did the brother visit everyone? Probably most of you found (35) intelligible, though perhaps clumsy. But (36) was most probably judged by you to have been total hash. In fact, the structures of (35) and (36) are exactly parallel; only the lexical items are different, and the choice of lexical items has no bearing on the grammatical status of either sentence. Both are fully grammatical. They are stylistic variants, respectively, of (37) The boundaries of what countries have been in dispute? and (38) The brother of what person visited everyone?

How is it that (36) strikes the ear as word salad, even after many repetitions and after having had its structure explained? The answer is that the first two noun phrases that one hears in (36) very plausibly stand in the relation object-of and subject-of (as in (39) Of what person did the brother think?), and that is such a powerful gestalt that when one hears the conclusion . . . visited everyone, one is simply thrown into confusion. Thus (36) is analogous to the grammatical but perceptually confusing sentences discussed by Bever (1970); only this time the perceptual gestalt has to do with the grammatical relations within a simple clause, rather than with the clause itself as a unit.

I conclude with a brief summary. The structure-preserving hypothesis is false. As a result many constituents in surface structure bear no recognizable grammatical relation to the whole. To recover the deep structure and semantic relations such constituents bear, the listener makes use of direct perceptual mapping rules of constituents onto deep relations, but what these rules are, in detail, remains a mystery, on which, as usual, more research is required for their proper elucidation.

NOTES

¹This version differs somewhat from the orally presented version thanks to intelligent and persistent questioning by Peg Griffin, and to some very helpful suggestions by Haj Ross.

²This view is essentially that of Katz (1972:104-13), who repudiates the claims that have been made by Fillmore and others that deep grammatical relations are unnecessary in complete account of the syntax and semantics of sentences (see also Chomsky 1972b:98-105). Katz makes the additional point, correctly I believe, that the surface

grammatical relations provide the basis for determining the rhetorical relations of sentences in the same way that the deep grammatical relations provide the basis for determining the semantic relations. Thus the surface subject is rhetorically interpreted as the topic of the sentence, etc.

³Ross (1973) observes that most, if not all, the so-called root transformations proposed for English can appear in at least some embedded contexts. Thus, one is led to wonder how trustworthy the grammaticality judgments are that Emonds uses to set up his typology of transformations. I, for one, am totally baffled by the grammaticality judgments used in Emonds (1972b) to establish the claim that the rule of Subject Replacement (the inverse of Extraposition) is a root transformation. For further discussion of the problem of arriving at 'true' grammaticality judgments, see Langendoen and Bever (in press).

⁴Note that Verb Second is inapplicable in case the noun phrase immediately preceding the verb in its structural condition is a personal pronoun; accordingly, sentences like (a) *In the Italian garden stands it are ungrammatical. The condition that the verb phrase consist solely of a verb is motivated by the fact that sentences like (b) *In the corner put John the mop are ungrammatical.

⁵If on the other hand, noun phrases postposed by Locative Inversion bear no grammatical relation to their sentences at all, Keenan's theory predicts that they would not be relativizable in English. This is so because the relation of having no relation is at the very bottom of the hierarchy; if there is any surface relation above it in English that does not permit relativization of the noun phrases bearing that relation, then necessarily noun phrases having no surface relation to the sentence cannot be relativized either. But as the next paragraph reveals, there is such a surface relation, namely that of being a predicate noun phrase.

⁶There are, however, some marginal cases in which predicate noun phrases may be relativized (I thank Haj Ross for revealing most of these cases to me; they are mysterious on anyone's theory, as Ross himself would be the first to point out). For example, if the modifier noun is itself a predicate noun, one may relativize a predicate noun phrase as in (a) You are not the woman I am. Also, predicate noun phrases like the kind of N may be relativized under somewhat broader, but still restricted circumstances, as in (b) The kind of person that Max is gets along well with paranoids. The existence of such cases can be used to reveal a difference with respect to relativization between true surface predicate noun phrases and noun phrases postposed by Locative Inversion; the latter cannot be relativized even if the conditions noted above for true surface predicate noun phrases are satisfied, as illustrated in (d) *This is not the world that

over that fence is and (e) *The kind of fountain that in the Italian garden stands is very rare.

⁷Thus one difference between Relative-Clause Formation and Question Formation in English is that the latter but not the former applies generally to predicate noun phrases. Thus, contrary to widespread belief, there may not be a single unitary rule of WH-Fronting in English, which handles the fronting of both relative and interrogative constituents. However, in subsequent paragraphs we shall, for convenience's sake, speak of WH-Fronting as if it single-handedly could take care of both kinds of fronting.

⁸In case (27) strikes the reader as strange, consider the following setting. A bunch of children are about to play baseball on a field with a very short left-field fence. They are not sure that a ball hit over that fence should be a home run. A discussion ensues, and one of the children asks (27).

⁹As a last-ditch effort to save the structure-preserving hypothesis, we might suggest the possibility that upon application of Locative Inversion, WH-Fronting (assuming it applies later on in the derivation) would be vacuous in cases like (28) and (29). Hence it would not have to apply, the principle could be saved and the sentences generated. But then, what about (a) In which garden did Sam say stood an elegant fountain? Certainly, the rule of Locative Inversion cannot be responsible for moving the Locative Phrase outside the clause in which it originates; only WH-Fronting can do that. So even this last-ditch effort fails.

Example (a), however, is problematic also for the solution proposed in the next paragraph. In order for the structural conditions on Verb Second to be satisfied, it would seem that the interrogated constituent would still have to be in the original clause at the point at which Verb Second applies. The only way to accomplish this, as far as I can tell, is to make WH-Fronting a successive-cyclic transformation, in the sense of Chomsky (1972a).

¹⁰The foregoing account reveals a weakness, easily correctable I think, in Keenan's accessibility theory. That theory is presented as if relativization is the last rule in the grammar. Clearly, as this discussion reveals, it is not. What one needs to add to Keenan's theory is a stipulation that a noun phrase, once relativized, cannot be made to appear, by further transformational operations, to bear an unrelativizable relation in its clause. Note that the relation of oblique subject is a relativizable relation in English (otherwise (29) would be ungrammatical by the stipulation just mentioned).

¹¹Ambiguities of this sort, having to do solely with grammatical relations are rare in English (and in the languages of the world). Another case is discussed in Langendoen, Kalish-Landon and Dore (1972).

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