

WHAT ARE TRANSFORMATIONS?

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This paper, dated December 1960, is one of three papers by R.B. Lees that were published in Russian translation in "Voprosy Jazykoznanija" but whose English originals have not as yet been published. The details of the three papers are:

*'Čto tak^ˇoje transformatsija?' (What are transformations?)
Vol. 10, No. 3, pp. 69-77 (1961).*

*'O pereformulirovanii transformatsionnykh grammatik'
(On the reformulation of transformational grammars).
Vol. 10, No. 6, pp. 41-50 (1961).*

*'O vozmožnostjakh proverki lingvističeskikh položenij'
(On the testability of linguistic propositions).
Vol. 11, No. 4, pp. 45-55 (1962).*

There are now numerous references in the literature of scientific linguistics to certain research on language and grammatical theory done at the Massachusetts Institute of Technology and elsewhere and very often called "the transformational approach" or "transform grammar". These terms have been coined by not-so-innocent bystanders and certainly demand some clarification. In particular, it is not at all clear to many, even to some of those who use these

terms, just what the words "transformational" or "transform" are supposed to mean.¹

Within the immediate history of linguistics in America, the notion of grammatical transformation arose, as far as I know, in the course of Zellig Harris' work on discourse analysis, (Harris, 1952a, b, 1957). This study by Harris and his students consisted roughly of the following. Given some particular text, and employing various linguistic techniques, e.g., those outlined in Harris (1951), one could presumably assign to each sentence of that text its correct grammatical analysis. By this Harris meant briefly that one could segment these sentences into significant parts, label these parts as to grammatical category, bracket them with an immediate-constituent analysis, etc. But it happens that certain morphemically different constituents in two or more sentences share the same intrasentence context, and these sentences of the text could then be "reduced", as it were, to the same sentence-type of that text. Such a reduction, or collapse, of similar sentences under context equivalence serves to diminish the variety of semantically similar expressions and thus to condense the text to its essential minimum.

Such condensation, however, was often not very extensive, and one could easily see that there remained a great many constituents in the text that were still semantically equivalent but uncollapsed because they did not share exactly the same constituent contexts. But if, for example, an active sentence and its corresponding passive, or an assertion and its corresponding interrogative, could also be considered equivalent in some, perhaps new, sense, then the text could be collapsed further to a very few protosentences that comprise a compact summary of the whole.

Thus, Harris was led to consider intersentence relations, a notion that to that time had not been treated in contemporary linguistics, even though it had been quite commonplace in traditional grammatical literature.² In exact accord with his usual view of linguistics, Harris formulated this notion in terms of a set of operations that the analyst can perform on sentences of a text in order to convert certain sentence types into others. Thus, there was an operation that could convert an active into its corresponding passive, and vice versa; one that could turn a sentence into one of its nominalizations, and vice versa; etc. These operations, in line with his fondness for mathematical terminology, Harris called "transformations". Later, he and his students went on to formulate and study scores of such relations among sentence types based upon the idea of cooccurrence of certain

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constituents within certain contexts. Harris himself viewed the entire study as an extension of descriptive linguistics, not as a part of it.

Let us see in a little more detail what these studies were like. The new methods of relating sentences were developed into techniques for finding, or setting up, new transformations by relating sentence types that, although they differed among themselves in immediate-constituent (IC) analysis, contained constituents restricted identically as to which particular morphemes could appear in them. For example, if we should note that simple assertion sentences of the following form are so restricted as to include only the unstarred ones:

- (1) *Ivan izumljajet Petra.*
'John astonishes Peter'
- (2) *Kniga izumljajet Petra.*
'The book astonishes Peter'
- (3) **Ivan izumljajet knigu.*
'John astonishes the book'

and at the same time that simple passive assertions of the following form are subject to exactly these same restrictions:

- (4) *Pjotr izumljon Ivanom.*
'Peter is astonished by John'
- (5) *Pjotr izumljon knigoj.*
'Peter is astonished by the book'
- (6) **Kniga izumljena Petrom.*
'The book is astonished by Peter'

then we might be led to set up a transformation connecting the two sentence types, converting the one into the other in either direction.³ Thus, sentences were said to have grammatical structures and also, over and beyond this, to be connected with other sentences by transformations. Most of these transformations, furthermore, were found to be reversible.

Now this is all historical background. And it does not at all account for the use of the term "transformation" in the work of MIT linguists, where it clearly has a very different meaning.

Among the students of Harris working on discourse analysis and other problems was N.A. Chomsky. Later, at the Society of Fellows at Harvard University, Chomsky attempted to formulate a theory for grammatical description that would

correctly account for all, or most, of what we know of linguistic structure, and he chose to think of this theory in the form that is often employed in the study of logic and the foundations of mathematics, namely as a set of abstract rules or an algorithm to enumerate from a finite vocabulary of symbols the infinite set of representations for all the grammatical sentences, assigning automatically to each generated string its correct grammatical analysis.⁴

A minimal requirement for the syntactic structure that is to be assigned to each sentence by its mode of derivation from these rules is surely the familiar immediate-constituent analysis, or bracketing, or branching diagram (IC tree). It is not difficult to formulate the conditions the rules of a grammar would have to satisfy in order for the derivations to assign IC structure to the generated sentences. In brief, it is simply that no more than one abstract grammatical symbol of a string be expanded by a given rule at a time. If this requirement is satisfied by the simple rewrite rules one is able to formulate for the generation of morpheme sequences, then to each generated string there will correspond uniquely a particular tree of derivation that expresses the required structural properties of an IC-analysis bracketing, or parsing.

It was natural for Chomsky to inquire how many different sentence types of English could be successfully generated by means of a reasonably simple set of such rewrite rules satisfying the requirement just mentioned. If, in principle, simple rules of this type could be given in the form of a reasonably simple algorithm to generate all English sentences, or at least all maximally grammatical English sentences, then there was a very good chance that a complete theory of syntactic structure for language could easily be formulated, for the properties of such a grammar would be relatively perspicuous. However, several apparently insuperable difficulties immediately arose.

In fact, difficulties arose precisely where other authors had already noted unsatisfactory aspects of IC analysis, though no solutions had ever been offered. I shall discuss only a few of these difficulties, but they will be sufficient for my purpose, which is to indicate the origin, nature, and need for grammatical transformations.

The major difficulty, and the most compelling by far, is just that to give IC expansion rules for all simple, maximally grammatical sentences proves to be impossible without completely counterintuitive complications in the grammar. In particular, whole large sets of lower-level rules would simply have to be repeated en masse in the grammar, and precisely at

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those places where Harris and his students had been studying co-occurring constituents in identical contexts. To take a specific example, there would have to be some set of rules in the grammar to ensure that among the active sentences, (1) and (2) above are generated but (3) is not. Similarly, however, there would have to be some rules somewhere in the grammar to ensure that among passive assertions, only (4) and (5) are derived but not (6). However, the first-mentioned set of rules and the latter set, it turns out, are then entirely identical in content. There is no way, in general, to combine these two sets of lower-level selection-rules, they must simply be repeated. In other words, there does not seem to be a simple, straightforward set of IC expansion rules to generate all ordinary sentences properly. Perhaps this simply reflects the complicated nature of language. But in view of the other difficulties I shall now mention, it would not seem so; that is, there must be some other mechanisms at work in the derivation of sentences than simply IC expansion.

A second difficulty that arose was that while many grammatical ambiguities could be explained in an IC grammar as the existence of two or more bona fide paths of derivation through the rules that happen to result in identical morpheme sequences, as would be quite appropriate, there always remained a number of residual ambiguities of the same kind, apparently, that could not be so construed as differences in IC bracketing. For example, one distinct path through a grammar of Russian would yield sentences of the form (7) and a second distinct path through the rules would yield sentences like (8):

(7) *My našli sodejstvujuščie okisleniju kisloty sposoby.*
'We found means that assist the oxidation of the acid'

(8) *My našli sodejstvujuščie osaždeniju okislenija kisloty.*
'We found oxidations of the acid that assist the precipitation'

But among the first set of sentences there would also be the sentence (9), the same sentence would also occur in the second set:⁵

(9) *My našli sodejstvujuščie reaktsii okislenija kisloty.*

The ambiguity in (9) is then easily explained as a difference in IC structure, for when it is derived by path number 1 it is bracketed as in (10), but if a product of path number 2, it is bracketed as in (11):

- (10) *(My) (našli) (sodejstvujuščie (reaktsii okislenija) kisloty)).*
'We found acids that assist the reaction of oxidation'
- (11) *(My) (našli) (sodejstvujuščie reaktsii) (okislenija kisloty)).*
'We found oxidations of the acid that assist the reaction'

The difficulty arises, however, when we consider the ambiguity in sentences like (12):⁶

- (12) *Poseščenja rodstvennikov moguť byť neprijatny.*
'Visits by/to relatives can be unpleasant'

for there is no motivation for bracketing the string in two different ways, since the bracketing is the same in the syntactically contrasting but unambiguous

- (13) *Padenie mostov možet byť neprijatno.*
'The falling of bridges can be unpleasant'
- (14) *Učenje jazykov možet byť neprijatno.*
'The study of languages can be unpleasant'

The question is not whether the two versions of (12) are grammatically alike or different; any speaker of Russian knows that they differ radically in their syntactic structure. The point is that there is no motivation in constructing an IC grammar for employing two different paths of derivation to yield these two sentence types.

Notice, incidentally, that it is no solution to adjoin to general linguistic theory a provision that ambiguous strings shall always have two derivation paths, for this is simply tantamount to surrendering the use of ambiguities as empirical verifications for particular grammars.

A third difficulty which arises is the inability of IC structure correctly to classify certain sentence types. For example, every speaker knows that: (15) is an assertion sentence while (16) and (17) are both question sentences:

- (15) *Ivan ljubit Petra.*
'John loves Peter'
- (16) *Ljubit-li Ivan Petra.*
'Does John love Peter?'
- (17) *Kto ljubit Petra.*
'Who loves Peter?'

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But there is no particular motivation on the basis of IC structure for this classification; (16) has inverted word order, but (17) does not; (16) may have a special intonation pattern, but (17) does not. Again, the problem is not that we cannot find some complicated set of criteria to pick out just the question sentence types; rather it is that, as far as the syntactic structure of these bracketed morpheme sequences is concerned, there is no particular formal motivation for doing so. In other words, the theory underlying the IC derivation of all other sentences does not automatically force us to classify (16) and (17) together as questions as contrasted with (15).

Finally, let me mention one more convincing argument against the formulation of grammatical structure exclusively as an IC bracketing, that is, as a labeled tree of constituents. No one would disagree, I am sure, with the analysis of coordinate constructions as multiple branches of some such tree; in fact, that seems to be the very content of the term coordinate. Unlike subordinate constructions, the elements of a coordinate construction are all on the same level of branching, not parenthesized within one another, but strung out one after another. Consider as a concrete example some conjunction like (18):

- (18) *mužčiny, ženščiny i deti*
 'men, women, and children'

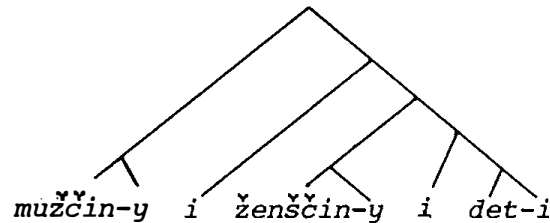
Such constructions may, of course, be indefinitely long. Therefore, the rules that enumerate them must necessarily be iterative, or recursive; that is, they must somehow bend back upon themselves and repeat their function indefinitely many times, each time adding a new conjunct, or coordinate element, to the generated string. Suppose, then, that for conjoined nouns we employ three rules like the following in our postulated grammar of IC expansion:

- A. Nom \longrightarrow NP (Conj)
- B. Conj \longrightarrow *i* + Nom
- C. NP \longrightarrow N + Ending

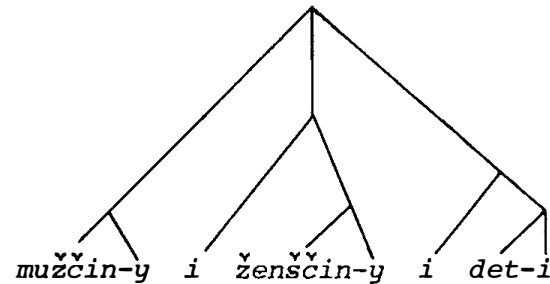
Rule A derives from a nominal a noun phrase with or without a following conjunct. Rule B expands this conjunct, if chosen in applying Rule A, to the sequence *i* 'and' plus another nominal. Finally, Rule C expands each noun phrase into a noun and its ending. If, when Rule A is applied, a conjunct is chosen, then the nominal will contain another nominal (from Rule B) within itself that also can

again be expanded so as to contain a third internal nominal. In this way, by looping back and forth between Rules A and B, any finite number of included nominals may be obtained, and the resulting conjunction may be indefinitely long, as was desired. Thus, three simple IC rules yield an infinite set of conjunctions.

But now notice that the bracketing imposed on these conjunctions automatically must have far too much internal IC structure, for each reapplication of Rules A and B produces a new echelon of included subordinate structure. That is, a string like (18) would have a tree of derivation like:



This, we agreed, was not the correct IC structure for coordinate expressions; it should have been a tree like:⁷



What kind of IC expansion rules would be required to yield this structure for conjunctions? Well, we could have a rule

D. $\text{Nom} \longrightarrow \text{NP}(\text{Conj})(\text{Conj})$

between A and B. It yields the correct coordinate structure, but it unfortunately will permit the derivation of only binary conjunctions. So we add another rule:

E. $\text{Nom} \longrightarrow \text{NP}(\text{Conj})(\text{Conj})(\text{Conj})$

It should be clear now that the only way to generate all conjunctions of whatever length and at the same time to impose on each one its typical coordinate structure is to have an infinite number of rules in the grammar!

There is no a priori, formal reason why a grammar should not be constructed to contain an infinite number of rules. But there are the following severe empirical objections.

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First, if the grammar can contain an infinite number of rules, the study of grammar is rendered vacuous, for there is then nothing to prevent us from entering into the grammar one rule for each sentence to be enumerated, and the grammar thus loses its explanatory power. Second, if the grammar is presumed to be available to speakers for use in producing sentences, we must then suppose that speakers have stored in their brains infinitely many items of memory. And third, it turns out to be unnecessary in any case to use infinite grammars, for there is obviously a formulation of conjunctive constructions that will employ only a finite number of rules and yet yield coordinated strings of any length. The only difficulty is that such a formulation must violate the constraints that were placed on constituent-structure expansion rules. This is simply to say, the grammatical structure of Russian sentences is not expressible by means of IC structure alone.

Chomsky soon found that all these difficulties with IC analysis, and others as well, could easily be avoided by incorporating within a grammar a set of rules of a new type, going beyond the power of the IC expansion rules and expressing formally the idea of relationships among sentences of different types with which he had already become familiar in his work with Harris. In other words, he had to extend grammars to include Harris' transformations in some way.

These new rules were to take fully developed sentences derived in the usual way from an IC grammar and convert them into new, derived sentences. To do this properly, the new rules would have to be able to recognize not only the constituency of a particular string, but because of the ambiguous strings we spoke of before, yielded by the IC grammar, would also have to recognize the derivational history of the string to be converted. For example, (19) and (20) are bracketed alike:

- (19) *My postroili mašinu dlja opyta.*
'We constructed the machine as an experiment'
(20) *My postroili mašinu dlja školy.*
'We constructed the machine for school'

But we should like to convert only (19) into a nominalization like (21), for there is no (22):⁸

- (21) *Naš opyt v postrojke mašiny ...*
'Our experiment of constructing the machine'
(22) **Naša škola v postrojke mašiny ...*
'Our school of constructing the machine'

The difference between sentences (19) and (20), since they are bracketed alike, must be in their previous transformational history, and therefore the nominalization rule that produces (21) but not (22) must be able to recognize and take into account this difference. Thus, Chomsky presumed that transformational rules serve not to derive strings from individual strings, but rather they must serve in general to derive whole trees from trees.

Clearly, transformational rules cannot be constrained to convert only a single symbol at a time, and therefore the derived trees are not automatically reconstructible from the application of the rule itself without the addition of further conventions about derived IC structure. For example, it is probably correct to formulate grammatical theory so that the IC structure of an expression is that of a constituent that is replaced under the transformation that generated it.

It is absolutely indispensable to understanding that the reader comprehend the differences between Harris' early notion of transformation and the present concept of transformational rule as used in the work of Chomsky, Halle, Lees *et. al.* Harris' transformation was simply a relation between two sentence types that shared certain co-occurrences, and it was very often reversible. That which is often called a "transformation" in connection with Chomsky's work is, however, an entirely different concept. It is, roughly speaking, any one of a certain type of grammatical rule in a sentence-generating grammar, a rule that serves to permit the derivation of certain types of trees from others by means of permutations, additions, or ellipses of elements. Like any grammatical rule, it is not in general reversible; in fact, the notion of reversal of grammatical rules does not make too much sense. A transformational rule may be thought of as an ordered triplet $[T, B, E]$ consisting of an IC-derivation tree T , a particular analysis or bracketing B of the last line of T , and an elementary transformation E indicating how the elements of B are to be converted so as to yield a new, derived tree T' . Sometimes we speak of the derived string as a "transform" (of the last line of T). Thus:

(Rule) $[T, B, E] \longrightarrow T'$

A great many of the optional grammatical transformation rules in a grammar serve to embed a transformed version of one sentence inside another by replacement of some constituent of the latter. Thus, the underlying source expression for the rule consists really of two source sentences. This need not complicate the basic formalism for

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expressing transformational rules, for we need only consider the top line of the input tree T to be $\#S\#S\#$ instead of only $\#S\#$ (where $\#$ means sentence boundary and S stands for "sentence"), and the bottom line (the sentence to be transformed) to be simply the concatenation of the two input source sentences.

As an example of such an optional (so-called "generalized") grammatical transformation rule, I submit the following as a suggestion of how certain sentence types in Russian may be nominalized to yield nominal constituents in other sentences. Since I do not know many of the formal syntactic details of a Russian IC-expansion-rule grammar, clearly the particularities of this example may very well be incorrect. It is nevertheless very likely that the process of nominalization expressed by the rule is correctly formalized in general outline. Furthermore, in the abbreviated formalism we shall use here, only the last line of each relevant tree is given overtly; but it must not be forgotten that, strictly speaking, the rule given operates on the entire IC tree for the source expression.

$$\left. \begin{array}{l} X + N_a + \text{num} + Y \\ C_{\text{nom}} + N_1 + \text{pers} + \text{tense} + V_t (C_{\text{acc}} + N_2) \end{array} \right\} \longrightarrow X + V_t + \text{suff}_{\text{nom}} (C_{\text{nom}} + N_2) C_{\text{ins}} + N_1 + Y$$

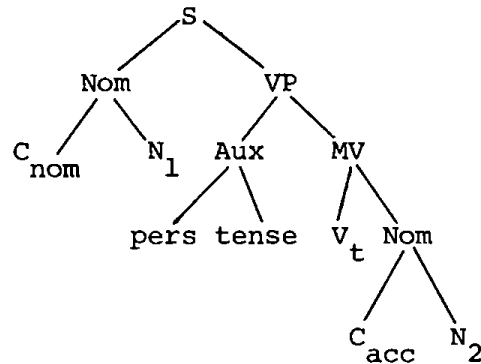
where N = noun, N_a = abstract noun, num = number, C_{nom} = nominative case, C_{acc} = accusative case, C_{ins} = instrumental case, pers = person morpheme, tense = tense morpheme, suff_{nom} = nominalizing suffix, V_t = transitive verb, and X and Y are arbitrary strings.

The representation of the second source sentence, the one that is nominalized, is given here in a nonstandard word order, i.e., with most of the nominal and verbal suffixes preceding their base morphemes, since, as in English grammar, this order seems to permit the simplest IC-structure grammar. Thus, we assume there will be a later obligatory rule in Russian to affix all these endings to the immediately following base noun or base verb to yield the natural morpheme order, and our derived string would then become:

$$X + V_t + \text{suff}_{\text{nom}} + \text{number} + C(N_2 + C_{\text{gen}})N_1 + C_{\text{ins}} + Y$$

where C = the case ending of the original N_a , which had been buried within the arbitrary string X in the first sentence.

The constituent structure of the second source sentence might then look like this:



where Nom = nominal, VP = verb phrase, Aux = auxiliary, MV = main verb, and S = sentence.

A specific example of how this proposed rule would enumerate the set of sentences that contain the verbal noun in *-anie* would be:

Let $X = C_{nom}$, num = Sg, $Y = izumljaet\ nas$ 'astonishes us', $N_1 = \check{c}elovek$ 'person' + Sg, tense = Pres, $V_t = pisa(-t)$ 'write', and $N_2 = knig(-a)$ 'book' + Sg.

$C_{nom} + N_a + Sg + izumljaet + nas$

$C_{nom} + \check{c}elovek + Sg + 3rd + Pres + pisa- + C_{acc}$
 $+ knig + Sg.$

$\rightarrow C_{nom} + pisa + suff_{nom} + Sg + C_{gen} + knig + Sg$
 $+ C_{ins} + \check{c}elovek + Sg + izumljaet + nas$

$\rightarrow pisa + suff_{nom} + Sg + C_{nom} + knig + Sg + C_{gen}$
 $+ \check{c}elovek + Sg + C_{ins} + izumljaet + nas$

$\rightarrow pisa + ani + e + knig + i + celovek + om + izumljaet$
 $+ nas$

$\rightarrow Pisanie\ knigi\ \check{c}elovekom\ izumljaet\ nas.$
 'The writing of the book by the man astonishes us'

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where the underlying second source sentence itself, after the application of all the latter morphophonemic rules, would have yielded:

$\check{c}elovek + Sg + C_{nom} + pisa + Pres + 3rd + knig + Sg + C_{acc}$

→ $\check{c}elovek + \emptyset + pisa + e + t + knig + u$

→ $\check{c}elovek + pi\check{s} + e + t + knig + u$

→ $\check{c}elovek\ pi\check{s}et\ knigu.$

'The man writes the book'

NOTES

¹It is hardly necessary to document the use of these terms in the literature, but I shall cite a few randomly chosen references: Gudschinsky (1959a, b); Haas (1960); Householder (1959a, b); Stockwell (1959); Worth (1958, 1959).

²That is, modern linguistic analysis had given no formalization for the ancient, common-sense notion that a passive sentence is derived from its corresponding active.

³It is of no importance at this point in our study whether we believe the absence of (3) to be entailed by the applicability of some formal rule of Russian grammar or simply by the absurdity of its meaning. It is sufficient to note that whenever a sentence of the form (3) is absent, then so is the corresponding sentence of form (6). Lest there be confusion, however, let me remark immediately that there is nothing at all unreasonable about there being formal, syntactic rules of Russian grammar that forbid the missing sentence types. This should be clear from the following simple examples. We would say unhesitatingly that the utterance *Itti spit* 'To go sleeps' is ungrammatical because the subject of a sentence must be a noun, not a verb; *Čelovek spjat* 'The man sleep (3 pl.)' is ungrammatical because a singular subject cannot govern a plural verb; and finally that the utterance *Čelovek slučætsa* 'The man happens' is ungrammatical because a noun like *čelovek* (concrete, animate, etc.) cannot be the subject of a verb like *slučat'sa*, which requires inanimate subjects like *sobytie* 'event'. If, then, the

classification of Russian nouns into animate and inanimate (which is required in any case in order to specify the form of the accusative case) and the verbs into those that take animate subjects, inanimate subjects, or both serves to explain many regularities in the way Russian speakers construct acceptable sentences, there should be nothing to prevent us from considering the distinction in question to be a purely formal, grammatical feature of the language, and from saying that (3) is ungrammatical. After all, that "ungrammatical" and "meaningless" are independent notions can already be seen from the fact that common utterances that are admitted by everyone to be utterly ungrammatical are nevertheless understood without difficulty, as in the case of the speech of a small child or of a foreigner with little command of the language. We should also find great difficulty in paraphrasing the meaning of many an utterance that is clearly recognizable as a grammatical sentence. For example, when a theologian assures me that "The human soul is immortal", I know that he has spoken a sentence in my language, but I must confess that I do not know what it means.

⁴A full description of this view of linguistic studies may be found in the following selected references: Chomsky, 1955, 1956, 1957a, b, 1958, 1959, 1961a; Chomsky, Halle, and Lakoff, 1956; Halle, 1959, 1961; Lees, 1957, 1960a-c.

⁵We are aware, of course, that these sentences are stylistic variants of the somewhat more elegant versions with the object of the verb in third position and the modifying participial expressions afterward, separated by a comma from their antecedent nouns:

- (7') *My našli sposoby, sodejstvujuščie okisleniju kisloty.*
'We found means that assist the oxidation of acid'
- (8') *My našli okislenija kisloty, sodejstvujuščie osaždeniju.*
'We found oxidations of the acid that assist the precipitation'
- (9') *My našli kisloty, sodejstvujuščie reakcii okislenija.*
'We found acids that assist the reaction of oxidation'
My našli okislenija kisloty, sodejstvujuščie reaktsii.
'We found oxidations of the acid that assist the reaction'

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Nevertheless, they are grammatical utterances of Russian, and they have constituent structures as given by the bracketing in (10) (11). Furthermore, we suppose that (7) and (8) are unambiguous by virtue of likely grammatical rules preventing the construction of underlying utterances of the forms **Sposob imeet kisloty* 'The means has acids' and **Ono osaždaet okislenija* 'It precipitates oxidations', whatever these rules may be in detail. On the other hand, we might suppose that underlying the two permitted versions of (9) we could have the kernel sentences *Okislenie javljaetsa reaktsiej* 'The oxidation is a reaction' and *Ono okislaet kisloty* 'It oxidizes the acids'.

⁶The ambiguity in (12) is brought out when we notice the contrast in the underlying kernel sentences:

My poseščaem rodstvennikov.

'We visit relatives'

Rodstvenniki poseščajut nas.

'Relatives visit us'

⁷In our representation of the IC structure of these conjoined expressions, we have arbitrarily assumed that the suffix constituent on each noun is correctly construed with that noun constituent. This is probably not correct; the nominal suffix morphemes are in construction with other sentence elements (e.g., the accusative suffix may be construed together with a preceding verb that governs that case in its object noun) and are later positioned as endings on their respective nouns by means of obligatory transformations. Our diagram still illustrates the point to be made in the text, however, regardless of how the affixal morphemes are connected into the tree.

⁸The contrasting underlying source sentences for (19) and (20) might be:

My postroili mašinu.

'We constructed a machine'

U nas opyt.

'We have an experiment'

My postroili mašinu.

'We constructed a machine'

U skoly mašina.

'The school has the machine'

