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The Order of Elements in a Transformational Grammar of German

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IN A TRANSFORMATIONAL GRAMMAR OF GERMAN

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Zellig S. Harris distinguishes three situations in the ordering of morphemes relative to each other: 'restricted', 'contrasting', and 'descriptively equivalent order'.[1] Candidates for all three types are found in Modern German. It is the purpose of this paper to examine some problems of order in German within the framework of a transformational grammar.[2]

One of the attractive features of transformational syntax is the ease with which problems of order can be handled. The first of Harris's types enters into the machinery of rewrite rules in the following ways. A fixed order of two or more constituents may result directly from the form of a rule: a → b + c, where b and c are either terminal symbols or lead to terminal symbols without rearrangement. For instance, a rule which turns the symbol NP into the sequence T+N automatically produces the one and only possible order of determiner and noun in English. In contrast to this direct production of a fixed order, a rule may produce first one order of symbols, and then at some later point a further rule may perform a permutation to yield the proper order: a → b+c, b+c → c+b. This freedom to produce first a fictitious order and then to rearrange the units into the actual order of sentences is especially useful for handling discontinuous constituents. In English grammar the order of possible units making up the verbal auxiliary has been treated in this way. After a kind of musical-chairs game, in which the stems and affixes are shifted into the actual order of English morphological constructions, the dummy verb 'do' may be neatly introduced for any suffix left without a place.[3] A third possibility would be to produce first 'unordered' sets of units and then map them into the specified order. Obviously, any rule could be thus factored into two rules, but such a factoring would work against the goal of simplicity on several counts. Yet just such proliferation of rules is presupposed if we place element-order charts into a generative grammar.[4] Furthermore, such charts presuppose a grammar of transformational complexity, since we cannot know from the actual shape of many sequences in German what kind of elements they are or even whether they are in fact 'elements' at all.

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[1] *Methods in structural linguistics* 184–6 (Chicago, 1951).

[2] For the general approach followed here see esp. Noam Chomsky, *Syntactic structures* ('s-Gravenhage, 1957), and Robert B. Lees, *The grammar of English nominalizations* (Bloomington, 1960). For a previous application of this approach to German see Lees, Structural Grammars, *Mechanical translation* 4.5–10 (1957). Part of the work reported here was made possible by a summer research grant from the Excellence Fund of the University of Texas.

[3] Chomsky 62.

[4] A chart of this sort for German is given, for instance, by James W. Marchand in a pedagogical article, The Teaching of German Word Order—a Linguistic Approach, *Language learning* 8.27–35 (1958). I am, of course, not questioning here the value of such devices for teaching languages.

The problem, then, is to set up the grammatical rules in such a way that the restricted order of sentence elements results directly from the rules rather than through the sorting screen of an order chart.

Two quite different situations are included in Harris's category of 'contrasting order.' In one (*John hit Bill* vs. *Bill hit John*) the differing orders result simply from the lexical options chosen, where two positions in a construction may be filled by members of the same class (or two overlapping classes). The other situation occurs when one order is derived from the other by an optional permutation —what Bloomfield would call a difference in 'taxemes of order'.[5]

Problems of 'free' or 'descriptively equivalent' order have not, to my knowledge, been treated yet in the framework of a deductive theory of grammar. It would be easy to define a new kind of bracket to indicate that any permutation of the enclosed symbols could result from a rule. If there really are constructions in someanguages in which order is completely irrelevant, then such a notation might be useful; but it would still be desirable to restrict it as much as possible and to keep such notations at a low level of the grammar. For, as soon as unordered sets of symbols are introduced, we lose one of the useful means of specifying units, namely, by their position. The situation in German is, I take it, much more typical: the free orderings are rather limited, and can be easily produced by optional shifts of two or a few elements relative to each other.

The attempt to extend previous treatments of German to cover a few more of the details has led to several minor innovations. When it is said that the finite verb occupies the 'second position' in declarative sentences and suppletive questions, or that under certain conditions any 'element' (*Satzglied*) can be shifted to front position, and so on, it is assumed that we know what an 'element' is. The construction of a theory which can include such possibilities as shifts of elements, or which can identify unambiguously the 'second' position, has led to an increase in the number of boundary symbols to three: # for sentence boundaries, / for element or phrase boundaries, + for concatenation within elements.[6] Without the possibility to specify a level of shiftable units intermediate between the 'word' and the sentence, the formulation of transformational rules which include permutations would be enormously complicated. Nor can we 'define' the element as the class of sequences which can occupy the 'first' position in a declarative sentence, for such a statement implies that we have a native speaker as a necessary *Beilage* to our grammar.

Furthermore, as soon as we try to write rules that will yield more than a few simple types of sentences, we encounter the problems of the selectional relations of government and agreement. Here I have adopted the convention of using superscript lower-case letters on base-type symbols to indicate characteristics

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[5] *Language* 168 (New York, 1933). Cf. Sol Saporta's discussion of this point in a review, *Lg.* 36.93 (1960).

[6] It should perhaps be emphasized that these symbols have nothing directly to do with German junctural phonemes, although I suspect they will prove useful for the eventual production of such junctural phenomena and the related ones of pitch and stress. One of the main difficulties in the way of writing morphophonemic rules for German is the almost complete lack of good and detailed phonemic studies (in the usual sense) of the suprasegmentals. The slant line is, of course, simply a terminal symbol (with respect to the IC-component) introduced early and repeatedly in the constituent-structure rules.

of government, and the same letters to produce ultimately the proper inflections of the governed items. This notation or something like it must be used for German in connection with the noun phrase for gender and number, in the verb phrase (and prepositional phrase) for case government. The first transformations in the fuller set of rules from which this presentation is drawn add the appropriate case and gender-number markers to the governed items.[7] Here it turns out that the element-boundary symbol is useful both in specifying the domain of government and in preventing recursion.

The following sentences illustrate some of the facts of order that a German syntax must account for:

1. *Der Mann gab dem Jungen einen Ball.*
2. *Der Mann hat dem Jungen einen Ball gegeben.*
3. *Der Mann wird dem Jungen einen Ball gegeben haben.*
4. *Hat der Mann dem Jungen einen Ball gegeben?*
5. *..., dass der Mann dem Jungen einen Ball gegeben hat.*
6. *(Ein Mann sah einen Jungen.) Dem Jungen gab er einen Ball.*
7. *(Ein Mann sah einen Jungen,) dem er einen Ball gab.*
8. *Wem hat der Mann einen Ball gegeben?*
9. *Es gab der Mann dem Jungen einen Ball.*
10. *(Es wurde lange getanzt.)*
11. *(Lange wurde getanzt.)*[8]

Examples 2, 3, and 5 show the restricted order of verbal parts at the end of the clause. The addition of the modals, which I omit from consideration here, necessitates a few special details in our later rules, but makes no basic difference. The first three examples, as opposed to the fourth and again to the fifth (and seventh), show typical contrasts in the position of the finite verb. Examples 6, 7, 8, and 9 illustrate some of the situations in which some element other than the subject stands in front position. Finally, 9, 10, and 11 illustrate the habits of 'disappearing *es*' (sometimes called 'grammatical subject', although that is precisely what it is not). Our rules must produce such sentences as 9, 10, and 11, but exclude such non-sentences as the following:

*Der Mann gab es dem Jungen einen Ball.
*..., dass es der Mann dem Jungen einen Ball gab.
*Hat es der Mann dem Jungen einen Ball gegeben?
*Lange wurde es getanzt.

The last example demonstrates the existence of a situation which entails the use of transformational rules. The sentences *Es wurde lange gesungen* is ambiguous, since it may have been derived by application of the passive transformation to the strings underlying either, say, *Man sang lange* or *Man sang es lange*, where *es* may be a replacement for e.g. *das Lied*. Only in the latter instance will a permutation of the passive transform preserve the *es* to give *Lange wurde es gesungen*.

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[7] My colleague Robert T. Harms has found a similar attack—including the use of a phrase-level boundary marker—useful in dealing with Estonian syntax; see his *Estonian grammar* (to be published).

[8] Parentheses enclose sentences with which this study does not deal directly but which are either (6 and 7) part of the relevant preceding context or (10 and 11) examples of problems closely related to those dealt with here. Cf. the discussion of the passive below.

The verb parts which occur at the end of the clause (with certain exceptions) are the nonfinite forms, and in dependent clauses the finite verb, always in a fixed order relative to each other. In independent clauses, the finite verb comes either first (in yes-no questions and some other types) or second. That is, we have here a situation in which the order of the participles and infinitives is fixed but where there is a contrast (not always minimal) between the three positions of the finite verb. Unless we wish to treat the three contrasting orders as completely unrelated constructions (ignoring the parallelism that otherwise exists and repeating numerous rules of co-occurrence and government several times), we must set up the verb phrase in one order and derive the other orders from this one by shifts of the finite verb, also following the general technique, mentioned above, of deriving discontinuous constructions from continuous sequences. In an article (and MLA address) several years ago, R. B. Lees outlined a number of rules for the verb phrase in German.[9] Although he did not deal directly with the possibility of verb-first and verb-last clauses, he chose to set up a fictitious order patterned on Chomsky's rules for the English verb phrase, and then to derive the actual order of verb parts in German sentences by two obligatory rules, one switching verb stems and affixes, the second placing nonfinite parts one by one at the end of the clause by repeated application of the rule. There is, however, no necessity for a fictitious intermediate sequence in German, since there is already a basic order in which the verb phrase is a continuous sequence, namely, the order of explicitly dependent clauses. Moreover, one of the main motivations for treating the English verb phrase in the way referred to above is lacking in German (that is, the neat introduction of 'do'). The rules of constituent structure given here take the order of dependent clauses as a 'base order'. (Superior a means accusative, d dative, f feminine, m masculine, nt neuter; full-size n means nominative.)

Initial string: $\#\ \mathrm{S}\ \#$

F 1. $\mathrm{S} \rightarrow \mathrm{NP} + n\ /\ \mathrm{VP}$

F 2. $\mathrm{VP} \rightarrow \mathrm{VB} + \mathrm{Aux}$

F 3. $\mathrm{VB} \rightarrow \begin{cases} \mathrm{NP}\ /\ \mathrm{NP}\ /\ \mathrm{Verb}^{da} \\ \mathrm{NP}\ /\ \mathrm{Verb}^{a} \\ \mathrm{etc.} \end{cases}$

F 4. $\mathrm{NP} \rightarrow \mathrm{D} + \mathrm{Nom}\ (+ \mathrm{Pl})$

F 5. $\mathrm{Nom} \rightarrow \begin{cases} \mathrm{Noun}^{m} \\ \mathrm{Noun}^{f} \\ \mathrm{Noun}^{nt} \end{cases}$

F 6. $\mathrm{Aux} \rightarrow (\mathrm{PP}\ /\ \mathrm{Perf}\ +) \left(\begin{cases} \mathrm{Inf}\ /\ \mathrm{werd}\ + \\ \mathrm{Past}\ + \end{cases} \right) \mathrm{C}$

F 7. $\mathrm{Noun}^{m} \rightarrow \{\mathrm{Mann, Junge, Ball, ...}\}$

F 8. $\mathrm{Verb}^{da} \rightarrow \{\mathrm{geb, zeig, ...}\}$

F 9. $\mathrm{Verb}^{a} \rightarrow \{\mathrm{seh, treff, ...}\}$

F10. $\mathrm{D} \rightarrow \{\mathrm{de, ein}\}$

[9] Structural Grammars, cited in fn. 2

The terminal strings produced by a set of rules of the sort sketched out here[10] will consist of a rigidly ordered sequence with the subject first, then one or more nominal adjuncts (or, in a fuller treatment, prepositional objects, adverbials, predicate adjectives, and so on), then the central verb base followed optionally by one or more 'auxiliaries', each with the proper nonfinite verb suffix to be attached to the preceding member of the verbal complex, and ending obligatorily with the symbol C to produce (by a transformational rule) the proper person-number suffix on the finite verb, whatever it turns out to be. In this way we are able to eliminate the two mapping rules of Lees's analysis. It seems to me that the arrangement used here brings out more clearly a general difference between the systems of word order in English and German. It also provides an explanation for other instances where corresponding sentence elements in the two languages—which are, after all, very similar in their general structure—occur in exactly the reverse order (for instance, time and place adverbials, pronoun objects, accented adverbs) and also an explanation for the habit of placing *nicht* and other negatives at the end of the clause (but before any final verbal elements).

We must now, of course, produce the other two positions for the finite verb, leaving it at the end for subordinate clauses (and changing the Aux into a participle or participle formant in certain adjectivalizations). We must also permit other elements to be shifted to front position, since not all German sentences with the verb in second position begin with the subject.

If we examine the instances in which the first element in a German clause is not the subject noun phrase, we are led to see that precisely the same shifts must be accounted for in subordinate clauses and suppletive questions as in independent declarative sentences, and we find other parallelisms as well. In constructing shift and question rules, we find that a simpler solution can be achieved and several details accounted for if we make our rules for shifts and questions general enough to include the finite verb as a possible element to be shifted and combined with a question-forming symbol.

The rules sketched out here in a very tentative way must be presumed to follow such optional transformations as may be needed to produce passives and two-sentence transforms like *lassen* constructions. The passive transformation in German differs from the English one, among other things, in the fact that some sentences without accusative objects (but not all) as well as some (but not all) transitive phrases may undergo it. As it looks now, it would seem best to analyse those verb phrases that have no accusative object and can undergo the passive transformation as containing a zero direct object, which is written into

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[10] Aside from the special notations explained above, the signs are used in their usual meanings. Separation by commas within braces is equivalent to a vertical listing. The rules given here are minimal, set up mainly to illustrate the treatment of order. In the fuller set of rules many more steps are needed and further distinctions must be made, for instance, between those verbs which can and those which cannot undergo the passive transformation, or between the two types of *ein* and *der* for both syntactic and morphological rules. Problems of morphology are not considered, nor the problems presented by the development of Perf as either *hab* or *sei* (which must be done after a number of transformations). Bases are spelled in traditional orthography, whereas a fuller treatment will use morphophonemic representations (including one stress morphophoneme).

the derivations and shifted to front position by application of the passive rule just like any object in the accusative.

Also, at some point before the first transformation considered here we must produce the five distinctions necessary to yield proper person-number endings on the finite verb. If this is done before the operation of shift rules, we can identify the subject by its initial position.

T 1. Optional, Topic-shift:

$$\# \text{NP} + \text{n} / \ldots / \text{X} \begin{bmatrix} / \\ \# \end{bmatrix} \Rightarrow \# \text{X} / \text{NP} + \text{n} / \ldots \begin{bmatrix} / \\ \# \end{bmatrix}$$

This rule permits the shift of any element, including the finite verb, to front position. Since it may be said that every string contains a zero element, we can include $\emptyset$ as a possible element to be shifted, in effect making it possible to write an overt zero symbol at the head of any string. It is apparently necessary to exclude shifts of infinitives and participles in this rule. (There is another shift connected with special pitch and stress for contrast or emphasis, which has not been considered here.) Many shifts are the result of preceding context, where the first element repeats a "topic" from the preceding sentence. It may be possible to reformulate this rule as a two-sentence transformation in which only the second of a pair of sentences undergoes any change.[11] Such shifts take place not only in the second of a pair of independent sentences (example 6 above), but also before the production of subordinate clauses, which must begin with the subordinator (including the 'zero'-subordinator *dass*), and in *w*-questions, which begin with the interrogative. In the one case, the antecedent provides the topic, in the other the form of the question is derived from the expected answer. By including the finite verb as a possible topic we are preparing the way for yes-no questions, and at the same time we account for the fact that shifts of the other elements occur only in verb-second and verb-last clauses, not—or at least not with the same freedom—in yes-no questions.

T 2. Optional, Question:

$$\# \text{X} / \ldots / \text{Z} \# \Rightarrow \# \text{w} + \text{X} / \ldots / \text{Z} \#$$

T 2 introduces questions and presupposes later rules which will turn combinations of *w*, the question formant, and various elements into the proper interrogatives, for instance, *welch* with the proper inflections before noun phrases, *wer*, *wem*, etc. for *w* plus a personal pronominal, *wann* for *w* plus *dann*, and so on. It is also assumed that a later rule will delete a *w* followed immediately by the finite verb and provide /213‖/ intonation or the like for yes-no questions. In other words, both *w*-questions and yes-no questions are produced by the same optional transformation. The difference in word order and intonation between them can be automatically derived. And we also have a source for those sentences which begin with a finite verb but are not questions (topic-shift of finite verb, but without application of question rule) as well as for those questions which differ from statements only by their intonation (topic-shift of zero with application

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[11] Cf. Karl Boost, *Neue Untersuchungen zum Wesen und zur Struktur des deutschen Satzes: Der Satz als Spannungsfeld* (Berlin, 1956). Boost calls the 'topic' *Thema*.

of question rule). These special details have been provided for by making the original rules more general, a fact which would seem to support the correctness of the analysis. One condition must be placed on T 2 to prevent recursion, namely, that X itself not contain w.

Between T 2 and T 3, the final shift rule, must be placed the whole class of transformations which produce subordinate clauses included in larger constructions. Each of them must include a change of boundary symbols to allow the proper application of T 3 and to prevent the shifting of the finite verb within explicitly subordinate clauses; that is, $/ \rightarrow +$, and $\# \rightarrow /$ or $\# \rightarrow +$ (except where the subordinate clause is itself final in the sentence).

T 3. Obligatory, Verb second:
$$\# X / Y / \ldots / Z + C \# \Rightarrow \# X / Z + C / Y / \ldots \#$$

This is the only transformation governing the position of the finite verb alone. It performs a shift to second position, if and only if it still remains at the end between an element boundary and the final sentence boundary.[12] Thus, all three "contrasting" positions for the finite verb are derivable, and only one explicit and special rule is necessary. Both declarative sentences (the kernel sentences) and direct suppletive questions will have the finite verb in the second position. All explicitly subordinate clauses will have it in the last place, and yes-no questions will have it in the first position after automatic deletion of w.

However, some strings will begin with a Ø. These are produced by a shift of Ø as topic in T 1, and, in the fuller set of rules, by a passive transformation on strings with a zero direct object, as well as by a zero subject for a small class of verbs like *hungern* and *grauen*. For such strings a rule can be provided to rewrite the Ø symbol occurring immediately before the finite verb at the head of a string as *es* to produce sentences like examples 9 and 10 above, but automatically and properly preventing the presence of this *es* in verb-first and verb-last clauses or when some other element stands in the first position of a verb-second clause.

[12] Something like this arrangement is implied in the article by G. H. Matthews and Syrell Rogovin, German Sentence Recognition, *Mechanical translation* 5.114–20 (1958). The shift of the finite verb to final position in a sentence-recognition routine—the inverse of a derivation—is equivalent to a 'division' by a transformation like T 3 here.