

### XIII. LINGUISTICS\*

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#### A. ON "GAPPING AND THE ORDER OF CONSTITUENTS"

The nature of the level of Deep Structure, or more generally, the question of abstractness in syntax, is now the subject of intense debate. See, for example, the theoretical discussion in Postal.<sup>1</sup> This report is concerned with word order, in particular with the relative order of the major sentence constituents: Verb, Subject, and Object. In most analyses of English a base order has been (implicitly) assumed which more or less resembles Surface Structure order,<sup>2</sup> as expressed in the following Phrase-Structure rules:

$$S \rightarrow NP VP (\text{Adv}_{\text{place}}) (\text{Adv}_{\text{time}})$$

$$VP \rightarrow \text{Aux } V (NP) (NP)(PP) (PP) (\text{Adv}_{\text{manner}})$$

When, however, we must determine the base order for a language in which surface word order is much freer than in English, we realize how little we actually know about the relation between the order of constituents in Deep Structure and Surface Structure.<sup>3</sup> The little understood rule of Scrambling, characteristic of Latin, Sanscrit,

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and Russian, for example, poses special problems. To handle the many-many relation between sentences in such languages, some linguists, including Staal<sup>4</sup> and Closs Traugott,<sup>5</sup> have proposed that the consequent of the P-S rules be unordered sets, and therefore that word order be a purely surface structure fact to be introduced at some point in the derivations. While this is an interesting problem concerning the trade-off in power between the transformational and Phrase Structure Rules of the syntactic component in a grammar, for the more limited purposes of this report, I shall assume that (i) the P-S rules are ordered, and (ii) Scrambling is a low-level, last-cyclic rule (although perhaps a transformation of a special kind).

J. R. Ross<sup>6</sup> has discussed the interaction of input order, Scrambling, and a rule (or rules) that he termed "Gapping," which deletes verb(s) in a conjoined structure to produce sentences like "Mary drank wine and her husband beer." To explain the Gapping phenomena in various languages, Ross suggested that there is a single rule that gaps both forward and backward, and hypothesized as follows.

Hypothesis A: The order in which Gapping operates depends on the order of elements at the time that the rule applies; if the identical elements are on left branches, Gapping operates forward; if they are on right branches, it operates backward..

Ross further assumes that Gapping is an "anywhere" rule that can apply before or after Scrambling. Table XIII-1 lists the possible outputs of Gapping (keeping Ross' labels, but adding the outputs of VSO input order). The starred outputs never occur

Table XIII-1.

A	SVO + SO	C	SO + SOV
B	SOV + SO	*D	SO + SVO
(E)	VSO + SO	(*F)	SO + VSO

in any language.

Besides the obvious interest engendered by a proposal for a mechanism as strong as "anywhere" rules, a notion that seems to me to be counter to the notion of ordered rules, there is further theoretical interest. Although the Gapping phenomena reflect Surface Structure rather than Deep Structure order (as shown by German, in which subordinate clauses exhibit different Gapping patterns than main clauses), they are highly suggestive of Deep Structure order in languages with few or no Verb-movement rules such as Japanese. But, more important, the ordering arguments of Ross' analysis force him to conclude that a language with any kind of extraposition, V-movement or Scrambling rule must be SVO in the base. Otherwise (backward) Gapping, which under his analysis is an "anywhere" rule, could apply to the coordinate structure SOV + SOV

to produce SO + SOV, and then Scrambling could apply in turn to give \*SO + SVO. Therefore Ross claims that a language is SOV if and only if it has no such movement rules. The only possible argument against this division of languages would be to show that there are significant generalizations, either universal or language particular, which can only be expressed at the level of Deep Structure, and which require that some language having such a movement rule be verb-final in the base. I believe this can be shown for German.

Taking Ross' data, I shall give another analysis of Gapping which makes the same predictions and which is independently motivated. Then I shall discuss certain facts about German which, in the light of a hypothesis for a universal principle, require that German be an SOV language.

1.1 Table XIII-1 shows that all kinds of forward Gapping occur, but backward Gapping occurs only when the identical verbs are sentence-final, and therefore output C is the same as the output of conjunction reduction (stated below). As Ross has noted,<sup>6</sup> the operations of forward and backward Gapping are formally quite different, and, in fact, with respect to backward Gapping, the most reasonable derived constituent structure would be the output of conjunction reduction. Nevertheless, Ross claims that they are the same process, the application of which is determined by Hypothesis (A). "Right branches" and "left branches" refer to the right and left branches of the VP. Note that if (A) is extended to VSO languages,<sup>7</sup> it must refer to linear strings rather than to branches of the VP, whatever they might look like. But if Ross' hypothesis must refer to linear strings (as I suspect it must) rather than to tree structure, then there is no motivation for choosing the direction of Gapping when the verb is medial, as in SVO + SVO.

1.2 Suppose that backward and forward Gapping are really two separate rules, namely:

- (i) Conjunction Reduction (Node-Raising)
- (ii) Forward Gapping.

One might ask if there is any motivation for assuming that they are distinct rules. In fact, as Ross has pointed out to me,<sup>8</sup> the two rules have different conditions. The following sentences show that (i) and (ii) behave differently with respect to the Perfect and Modal Auxiliaries:

- 1a. Peter hat (den Brief) geschrieben und Heidi (ein Buch) gelesen.
- 1b. Weil Peter (den Brief) geschrieben und Heidi (ein Buch) gelesen hat, wurde nichts getan.
- 1c. ?\*Weil Peter (den Brief) geschrieben hat, und Heidi (ein Buch) gelesen, wurde nichts getan.

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- 2a. Peter will (den Brief) schreiben und Heidi (ein Buch) lesen.
- 2b. Weil Peter (den Brief) schreiben und Heidi (ein Buch) lesen will, wird nichts getan werden.
- 2c. ?\*Weil Peter (den Brief) schreiben will und Heidi (ein Buch) lesen, wird nichts getan werden.

Now, assuming that Gapping is the output of two rules, let us look at what the output of these two rules will be. According to Ross (23.751 handout),<sup>9</sup> the structural description of (i) looks something like this:

$$\left\{ \begin{array}{l} \text{and} \\ \text{or} \end{array} \right\} S[X - [Z_1]_A - X]_S S[X - [Z_2 \dots n]_A - X]_S^n$$

S. D.	1	2	3	4	5	6	7	$\implies$ Opt.
S. C.	0	2	1+3+6	4	0	0	0	

Conditions: 2=5  
4=7

Let us apply (i) to the following strings of coordinate sentences, where  $X \neq W$  and  $Y \neq Z$ , and verb is the identical verb to be gapped.

- (a) Verb XY and verb WZ  $\implies$  verb XY and WZ  
           2 3    $\emptyset$  5   6           2 3   + 6
- (b) X verb Y and W verb Z  $\not\implies$  X verb Y and WZ
- (c) XY verb and WZ verb  $\implies$  XY and WZ verb  
           3 4    $\emptyset$  6   7           3   + 6   4

Note that the derivation in (b) blocks because of the conditions on identity (2=5, 4=7); it cannot be analyzed to satisfy the structural description of Conjunction Reduction. Rule (ii) can apply to (b), however, to produce the desired "gapped" output A of Table XIII-1.

Thus (i) can produce only outputs C and E of Table XIII-1, whereas (ii), which can apply to a verb in initial, medial or final position, produces outputs A, B, and E.

By using these two rules there is another way of explaining the Gapping facts, and of making the same predictions. Since Gapping is now the result of two rules, it seems plausible that a language could have one rule but not the other. Furthermore, it seems reasonable to say that the independently motivated rule of Conjunction Reduction is the more basic rule, probably universal. Therefore I suggest the following hypothesis:

Hypothesis B: If a language has Forward Gapping (ii), then it also has Conjunction Reduction (i). Gapping is ordered after Scrambling (or any V-movement rule) and works only forward.

That is, a language can have only (i) or both (i) and (ii). This hypothesis needs to be verified, of course, and could easily be disproved, but I shall assume that it proves true. Under this hypothesis, if a language is SVO and lacks a Scrambling rule, (i) will never have a chance to apply to the verb, and only A but not \*D will be produced. Since there is no rule of backward Gapping, and Gapping is ordered after Scrambling, D and F will always be starred outputs.

This hypothesis makes the following predictions about the distribution of Gapping outputs:

Table XIII-2.

Rules in Grammar	Input Order		
	SOV	SVO	(VSO)
only (i)	C	none	(E)
(i) and (ii)	BC	A	(E)
(i), (ii) and Scrambling	ABC(E)	ABC(E)	ABC(E)

The predictions in Table XIII-2 agree with those in Ross' chart,<sup>6</sup> in that no language should have only output types B, AB or AC. They disagree, in that Table XIII-2 allows for a language to exhibit none of the Gapping outputs whatsoever in Table XIII-1. Emmon Bach<sup>10</sup> observes in a footnote that Chinese and Thai have no Gapping; that both are SVO languages according to Greenberg<sup>11</sup> supports my analysis (see Table XIII-2).<sup>12</sup> Note that German falls very neatly into place in Table XIII-2: It exhibits orders BC in subordinate clauses (at least for simple tenses), but only A in main clauses. German cannot be said to have a scrambling rule, since the verb has a definite and fixed position. Furthermore, Table XIII-2 clearly shows that no claim about base order can be made for languages exhibiting all types of Gapping, that is, for languages that scramble.

2.1 The preceding section showed that Gapping is a property of Surface Structure order, or strictly speaking, a property of order at the time of application of Gapping. I should now like to discuss certain universal facts about order which imply that the Deep Structure order of German should be SOV. The generalization that is relevant here has to do with the relative order of Direct and Indirect Objects universally. I propose that the following be added to the list of Universals given by Greenberg<sup>11</sup>:

Principle C: The Direct Object occurs closer to the verb than the Indirect Object (in the unmarked or dominant order). In a language with dominant order SOV, the Indirect Obj. precedes the Dir. Obj.; in a language with dominant order SVO or VSO, the Indirect Obj. follows the Dir. Obj.

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Note that the traditional terminology (direct vs indirect) may be thought to reflect this principle.

2.2 It is not hard to find support for this principle. First, languages with relatively free word order may nevertheless have certain constructions with restricted or fixed word order; such constructions tend to obey (C). Papago, for example, has totally free word order, except in preposed relative clauses wherein word order is completely fixed (this restriction is actually part of a more general property of Papago about order in preposed modifiers). In such clauses, the order is necessarily I. O. - D. O. - Verb (Hale<sup>13</sup>).

Second, we can find support for (C) in German. Most generative grammars for German (e. g., Bierwisch,<sup>14</sup> Steinitz<sup>15</sup>) have assumed a base order Dative + Accusative + Verb, in part because of facts about stress and because this is the "unmarked" Surface Structure Order. Remark that in general the (unmarked) order of VP-constituents in English is exactly the reverse, as shown by the following sentences (from Kirkwood,<sup>16</sup> his numbering in parentheses):

3a. He is going-home-tomorrow. (11)

3b. \*He is going-tomorrow-home. (12)

4a. Er fährt-morgen-nach Hause. (11a)

4b. \*Er fährt-nach Hause-morgen.

The major constituent breaks are indicated by hyphens; the numbers above those constituents indicate the relative degree of "closeness to the verb." Now consider the following sentences:

5. Die Akademie-hat-im vergangenen Jahr-dem Schriftsteller A-  
den Preis-verliehen. (1)

6. The Academy-awarded-the prize-to writer A-during the  
past year.

This inverse correspondence would be explained by (C) if we assume that the underlying order in German is SOV, and that the to-Dative in English is basic (see Kirkwood<sup>16</sup> for further examples).

Third, Principle (C) explains certain developments in the history of English syntax.

The facts for Old English are about the same as those for modern German with respect to the relative order of Direct and Indirect Objects. But notice that if OE is assumed to be verb-final, then English can be said to have maintained the same universal "closeness of relation to the verb" or "closeness of construction to the verb" principle, i.e., (C). This principle predicts that if the verb should move from VP-final to VP-initial (as in fact happened from OE to ME), then there should be a consequent reordering of the other VP constituents. Since other factors such as definiteness influence the relative surface structure order of Dative and Accusative Objects (in both English and German), one can only talk about frequency percentages, but reordering is in fact what happened (Einenkel<sup>17</sup>). The most common order in OE was Dative-Accusative; the order Accusative-Dative, which was very rare in OE, has become the dominant order. This is not only explained but also predicted by (C).

Fourth, the structure of derived nominals may also be determined by the same principle. Just as the objects of the verb obey (C), the objects of the deverbal noun obey a parallel principle (C'):

(C'): In a derived nominal, the PP corresponding to the Direct Object occurs closer to the deverbal noun than the PP corresponding to the Indirect Object.

That is, there is a correspondence between Verb-Direct Obj.-Indirect Obj.-Adverb and deverbal Noun-of NP-Prep NP-Adverb. Because the head noun in a derived nominal phrase is on the left in both English and German, the order in derived nominals will be the same in both languages, as shown by the following examples (also from Kirkwood<sup>16</sup>):

7. Die Verleihung-des Preises-an den Schriftsteller A-im vergangenen Jahr ... (2)

8. The awarding-of the prize-to writer A-during the last year . . . .

2.3 Under the assumption that (C) is a universal generalization that must be captured by a grammar, the next question is where to state it. This "constraint" could be stated at the level of Deep Structure, or alternatively at the level of Surface Structure. Although some kind of related output conditions or interpretive rules are likely to be needed, I shall try to show that (C) itself cannot be handled in this way. (C) cannot be an absolute surface structure template, since languages exist with Scrambling and V-movement rules, including German. But possibly it could be stated as an S.S. interpretive rule, which would in effect say that the unmarked orders are V ACC Dat. or Dat. Acc. V. But this is impossible, for at least two reasons. First, the principle is operative even when the Verb has been deleted, for example, by Gapping. Second, the principle does not depend on the surface structure position of the finite verb: in German, the unmarked order is Dat. Acc. in both main and subordinate

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clauses. If the principle is to be stated at the level of Surface Structure, then it can only refer to the direct and indirect Objects, and not to the Verb. But then each language will have an S.S. Interpretive Rule of this kind, a rule that would designate either Dat. Acc. or Acc. Dat. as the unmarked order (as in German and English, respectively). But for the language-specific template to be motivated, it must refer to the verb at a level at which its position is fixed, namely, the level of Deep Structure. That is, if we state the principle as a Surface Structure principle, it must nevertheless refer to the Deep Structure Position of the Verb. One could conceivably consider this a Derivational Constraint in the sense of Lakoff; alternatively, (C) could be stated at the level of Deep Structure. There is no way of deciding against the former on the grounds of descriptive adequacy, since derivational constraints are certainly powerful enough, and include all other kinds of constraints. Only theoretical considerations can be used to decide. Since I believe that we are looking for ways to constrain grammars, rather than add to their power, I prefer to state (C) at the level of Deep Structure.

Whatever one's theoretical framework, one conclusion can be drawn. Unless one denies the generalization and the relevance of unmarked order in syntax, German must be an SOV language. Hence, even if the analysis of Gapping presented here proves incorrect, another explanation of the phenomena must be found which would allow German to be SOV.

I should like to thank Professors Paul Kiparsky, Kenneth L. Hale, and especially John R. Ross for many inspiring discussions, and Michael Helke for patiently answering my questions about German.

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Footnotes and References

1. P. Postal, "On the Surface Verb 'Remind'," *Linguistic Inquiry* 1, 37-120 (1970), see Sec. V.
2. J. D. McCawley, "English as a VSO Language," a paper presented at the Winter Meeting of the Linguistic Society of America, New York, 1968. McCawley's suggestion will not be considered here.
3. See J. E. Emonds, "Constraints on Transformations," Ph.D. Thesis, M.I.T., 1970 for a proposal on a possible general constraint on the output of transformations, and hence on the degree to which Deep Structure and Surface Structure can differ.
4. J. F. Staal, Word Order in Sanscrit and Universal Grammar (D. Reidel Publishing Company, Dordrecht-Holland, 1967).
5. Elizabeth Closs Traugott, "Toward a Grammar of Syntactic Change," *Lingua* 23, 1-27 (1969).
6. J. R. Ross, "Gapping and the Order of Constituents," in M. Bierwisch and K. E. Heidolph (eds.), Progress in Linguistics (to be published by Mouton and Co. n.v., The Hague). Since 1967, when he first wrote this paper, Ross has changed his mind about certain parts of the analysis. In particular, he now believes that forward and backward Gapping are two separate rules. This agrees with my analysis, which was written to refute the earlier version. Ross still is of the opinion, however, that

German is SVO (or rather VSO as McCawley has suggested). It is this claim that I hope to answer in this report.

7. I suspect that (A) makes the wrong predictions about OVS languages (Algonquian). In such a language the verb would be on the right branch of the VP, and therefore (A) would predict that the language would gap backward. If, however, the linear order is important, Gapping should be forward.
8. J. R. Ross, private communication, 1969.
9. J. R. Ross – M. Halle, M.I.T. Course 23.751, Fall, 1968.
10. E. Bach, "Is Amharic an SOV Language?," unpublished memorandum, University of Texas at Austin, 1967.
11. J. H. Greenberg, "Some Universals of Grammar with Particular Reference to the Order of Meaningful Elements," in Universals of Language, J. H. Greenberg (ed.) (The M.I.T. Press, Cambridge, Mass., 1966), pp. 73-113.
12. This implies an interesting psychological property, namely that it is more "difficult" to delete medial constituents. Note that Gapping must apply only to verbs. Given a conjoined string  $ab_1c + db_2e$ , where  $a \neq d$ ,  $c \neq e$ , and  $b_1 = b_2$ ,  $b_2$  can be deleted (gapped) if  $b_1$  is a verb, but not if  $b_1$  is an NP. In "Ich wusste, dass Heinrich den Brief diktierte und Heidi schrieb," den Brief is not interpreted as the object of schrieb. An identical NP is pronominalized rather than deleted. The difference in behavior in this respect is probably due to the fact that the verb is a necessary, and therefore more fundamental, part of the VP. Note that the condition that Gapping works only forward is the same as the condition on pronominalization. Pronominalization works only forward in coordinate structures, both backward and forward in subordinate structures. Gapping, of course, applies only to coordinated sentences.
13. K. L. Hale, private communication, 1969.
14. M. Bierwisch, "Grammatik des deutschen Verbs," Studia Grammatica II (Berlin: Akademie-Verlag, 1966).
15. Renate Steinitz, "Adverbial-Syntax," Studia Grammatica X, (Berlin: Akademie-Verlag, 1969).
16. H. W. Kirkwood, "Aspects of Word Order and Its Communicative Function in English and German," J. Linguistics 5, 85-107 (1969).
17. E. Einkenel, Geschichte d. eng. Sprache II: Historische Syntax (Strassburg, 3rd edition, 1916), pp. 186-187.

