언어 제 7 권 제 2 호 (1982)

Reordering in Japanese*

Shinsho Miyara (University of the Ryukyus)

0. Introduction

In this paper, formal analysis of reordering, especially scrambling, is developed for Japanese within the framework of a generalized categorial grammar. The present framework is an extended version of Montague's theory of grammar that is developed along the lines of Bach and Partee 1980 (henceforth B & P), Partee and Bach MS (henceforth P & B), and Bach 1979, 1980. I argue that there are two types of reordering in Japanese, one a bounded rule, scrambling, and the other an unbounded movement rule, and that they should be sharply distinguished from each other in terms of the difference in the domain and the manner of their application.

The analysis proposed here differs from previous analyses, e.g. Kuroda 1965, 1978 and Kuno 1973, in regard to the specification of what syntactic categories can take case marking. For example, in principle, only NP's can take case particles in previous analyses of Japanese.[1] In the present framework, there is no such phrase structure rule for an NP complement sentence, as in

$$NP \longrightarrow \left\{ \begin{matrix} S \\ N \\ \cdots\cdots \end{matrix} \right\}$$

but distinct syntactic categories, $\overline{S}$ and $\overline{IVP}$, are proposed for tensed clausal complements and tensed non-clausal complements, respectively. Each categorial rule consists of a syntactic rule and the corresponding semantic rule. The syntactic rule is either a binary function-argument rule or a unary rule.

---

* This is a slightly revised and abridged version of Miyara 1982.

1) Following Kuroda 1965, I will take as case-marking particles only the nominative *ga* (NOM), the accusative *o* (ACC), and the dative *ni* (DAT).

For every binary rule, an expression of category A/B is the function that takes an argument of category B to make a larger phrase of category A.

In general, any argument can take a case particle except in phrases of adjectival or adverbial modification. $\overline{S}$ and $\overline{IVP}$ are always taken as arguments, so they take case particles. Whatever syntactic category is given to the subject in (1), the subject will take the nominative particle ***ga*** as long as it is interpreted as an argument. In (1), the subject is an adverbial clause. This particular example raises a problem in previous analyses, in which only NP's take case particles.

(1) [kekkonsi-te kodomo ga deki-te kara] ga taihen da
marry child bear after NOM serious is
'It gets serious after one got married and has children.'

The syntactic categories that frequently appear in this paper are as follows:

category name	definition	
S		sentence
NP		noun phrase
IVP	S/NP	(intransitive) verb phrase
TVP	(S/NP)/NP	transitive verb phrase
IVP/$\overline{IVP}$	(S/NP)/$\overline{IVP}$	phrasal intransitive taking the IVP-complement
TVP/$\overline{IVP}$	((S/NP)/NP)/$\overline{IVP}$	phrasal transitive taking the IVP-complement
$\overline{IVP}$		non-clausal complement
AVP	(S/NP)/(S/NP)	adverb phrase
IVP//IVP	(S/NP)//(S/NP)	quasi-adverb phrase
N		noun
IV		intransitive verb
TV		transitive verb
IV/$\overline{IVP}$		intransitive verb taking the IVP-complement
TV/$\overline{IVP}$		transitive verb taking the IVP-complement
AV		adverb

Some categorial rules relevant to discussion are illustrated in the appendix. The semantics is a direct model-theoretic interpretation of the syntax, but I won't touch upon the semantics here. Only some knowledge of the basic tenets of categorial grammar is presupposed in the following sections.

The main purpose of this paper is to show a plausible way to deal with reorderings of constituents within the framework of a categorial grammar. In Section I, I will argue for the existence of the unmarked word order, at least in Japanese. In Section 2, it is argued that c-subjacency and left or right branching structure are relevant to the reordering of terminal strings both in Japanese and in English, and then I propose a general convention for structural reduction that makes use of c-subjacency and branching structure. We will see a number of favorable consequences of this proposal. In Section 3, I will discuss an unbounded movement in Japanese. Section 4 is devoted to the summary of the results in the present paper.

1. Unmarked Word Order

In this section, I will present some Japanese facts favorable to the standard interpretation that the outputs of phrase structure rules define a syntactically basic word order of the language.

Phrase structure trees represent dominance relations of labelled constituents and the left-to-right ordering of the constituents. Under standard assumptions, phrase structure rules define word order among the terminal strings. Japanese is a relatively free word order language. It then follows from the above assumption that the outputs of phrase structure rules are to define the unmarked or basic word order of this language and a reordering transformational rule rearranges the terminal strings in arbitrary orders.

This view is controversial, however. The opposing view is that there is no direct evidence for an unmarked word order, which is a mere reflection of statistically most frequent word order. As long as one employs phrase structure rules, this position requires a drastic change in the interpretation of phrase structure rules. For example, instead of previous recursive definition of sentences by rules, Gazdar 1980 introduces an inductive definition of the set of phrase structure rules, which is called a metarule that maps rules into rules. In fact, Stucky MS suggests a metarule treatment of reordering rules. Given an inductive definition of rules, it is in principle possible to

express the fact of relatively free word order without transformations. The categorial approach makes extensive use of binary rules that define function-argument structures. Each binary rule gives one argument and one function to form a larger phrase. Japanese is a verb-final language. This is a strict restriction on the word order of this language. Considering this language-particular fact, it is impossible to state metarules over binary rules keeping the V-final restriction intact since each rule allows only one argument to be rearranged.

One syntactic argument for the underlying SOV order has been given in Kuno 1971: in double-nominative constructions, the order of the two nominative phrases is fixed in the order SOV because, when reversed, this brings about a change in meaning.

(2) a. John ga yakyuu ga suki-da
NOM NOM fond
'John is fond of baseball.'
b. *yakyuu ga John ga suki-da
'*Baseball is fond of John.'

If one views SOV as the statistically most frequent order, it should be the preferred word order. Therefore, the difference between (2a) and (2b) should only be the difference in the degree of acceptability. (2b) is in fact unacceptable as long as the same meaning as that of (2a) is assumed to be expressed. Even if one finds (2b) acceptable as a sentence with the object noun focused in case it is accompanied with an elaborate intonation, we still have to explain why the subject normally should come first and why the object should not come first. This fact is naturally explainable when the unmarked word order SOV is assumed.

Fixed word orders are observable in double-*o* constructions and double-*ni* constructions too. The reversal of two identically-marked phrases is not permissible. (3a) is taken from Shibatani 1978:281. The reversal of two dative NP's causes (4a) to mean 'John caused Mary to send the book to Fred.'

(3) a. Taroo ga kiri no naka o kuruma o hasirase-ta
NOM fog middle ACC car ACC drive

'Taro drove his car in the fog.'

b. ??Taroo ga kuruma o kiri no naka o hasirase-ta
'Taro drove his car in the fog.'

(4) a. John ga [$_S$ Fred ni Mary ni hon o okur] sase-ta
DAT DAT book ACC send
'John caused Fred to send the book to Mary.'

b. *John ga [$_S$ Mary ni Fred ni hon o okur] sase-ta
'John caused Fred to send the book to Mary.'

The constraint shown in (3) is the one between the locative phrase ***kiri no naka*** 'in the fog' and the direct object ***kuruma*** 'car'. (4) reveals a strict constraint on the ordering of the subject and the indirect. The ill-formedness of (3b) shows that it is not simply the problem of a preferred word order. The notion of statistically most frequent word order cannot give any explanation for the sheer unacceptability of (4b). Accordingly, there must be the unmarked word order. The suggested unmarked word order is the following.

(5) a. Subject Direct object (cf. (2))
b. Locative Direct Object (cf. (3))
c. Subject Indirect Object (cf. (4))

There is a case in which the interpretation of the reflexive pronoun ***zibun*** must be based on the SOV order. If one holds the position that in a (relatively) free word order language the word order should be arbitrary in the underlying representation and that one of all possible orders is taken at a preferred word order contingent on the pragmatic context, then there is no direct account of the oddness of (6b) since the antecedent ***Bill***, the subject NP, commands ***zibun*** in the accusative case.[2] Pragmatic context alone cannot account for this sort of fact.

(6) a. Bill ga zibun o home-ta
NOM ACC praise

2) In Japanese, any subject noun that is animate can be coreferential with the reflexive ***zibun*** if the former commands the latter and if the former does not cooccur with an emotive verb.

'Bill praised himself.'

b. ??zibun o Bill ga home-ta

If we assume the SOV unmarked order, the awkwardness can be directly related to a constraint on the preposing of *zibun*.

Advocates of arbitrary word order in the underlying representation have to postulate at least two constraints to prevent the generation of the *b*-sentences of (2)-(4) and (6). Whatever the constraints may be, they have to make some reference to the SOV order, but would not be able to provide a natural reason for why the SOV order is relevant. The advocates of the arbitrary order approach would attack the peculiar status of a reordering rule scrambling. The next section now deals with scrambling under the assumption that phrase structure rules determine a syntactically basic word order of terminal strings.

2. Scrambling

In this section, I will discuss some necessary conditions on reordering rules. In Section 2.1, I propose c-subjacency and right branching structure as the necessary conditions on scrambling in Japanese. In Section 2.2, I will relate c-subjacency and left branching structure to a reordering rule named "Right-Wrap" (Bach 1979) in English. In Section 2.3, I propose a general convention of "tree-flattening", which provides the grounds for a natural condition that reordering, if necessary, takes place among sister constituents. In Section 2.4, the proposed analysis of scrambling will be compared with the previous analyses.

2.1. C-Subjacency and Right Branching in Japanese

In Japanese, the arguments NP, $\overline{\text{IVP}}$, and $\bar{\text{S}}$ are in principle marked by case particles and, as a first approximation, we assume that any argument marked by a particle can be scrambled. Consider the following.

(7) a. John ga Mary ni [$\overline{\text{IVP}}$ Bill ni hon o okur-u koto] o susume-ta
book send COMP advise
'John advised Mary to send the book to Bill.'

b. Mary ni John ga [$\overline{\text{IVP}}$ Bill ni hon o okur-u koto] o…

c. John ga [$\overline{\text{IVP}}$ Bill ni hon o okur-u koto] o Mary ni…

d. ?Mary ni [$\overline{\text{IVP}}$ Bill ni hon o okur-u koto] o John ga…

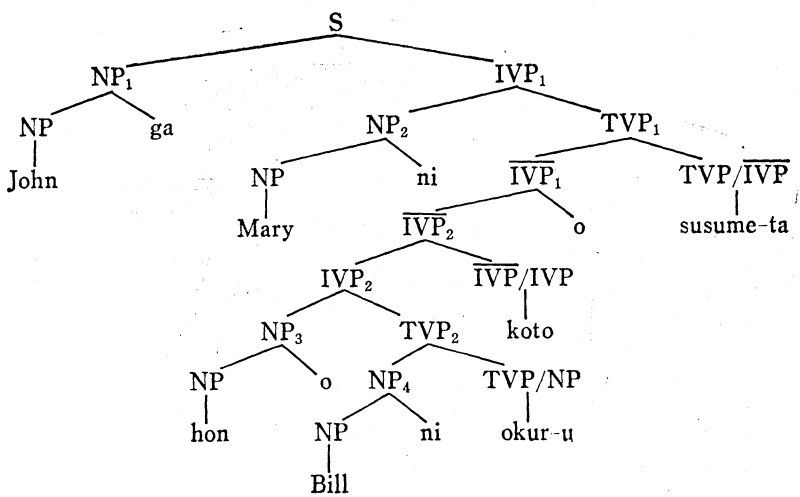
e. [$\overline{\text{IVP}}$ Bill ni hon o okur-u koto] o John ga Mary ni…

f. [$\overline{\text{IVP}}$ Bill ni hon o okur-u koto] o Mary ni John ga…

At first glance, (7d) may sound less acceptable. This is not solely a problem for scrambling. Even on the assumption that underlying word order is arbitrary, the difference must be explained. Only the proper pragmatic contexts alone would account for the subtle differences in (7).

Scrambling can take place between the two NP's in the $\overline{\text{IVP}}$-complement of (7). This will double the number of 'scramblable' variants of (7a). Observe the constituent structure of (7a).

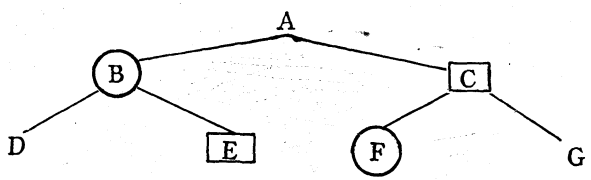
(8)



What is interesting in (8) is that $\overline{\text{IVP}}_1$ is c-subjacent to NP_2 and NP_2 is c-subjacent to NP_1; and then $\overline{\text{IVP}}_1$, NP_2, and NP_1 can be reordered in any arbitrary way. (I owe this point to Emmon Bach.) Likewise, NP_4 is c-subjacent to NP_3 and then NP_4 and NP_3 are scramblable.

Not all the two constituents that are in c-subjacency relation can be scrambled. They must be in the "right branching" structure. Since the term "right branching" is used in a non-standard way, it will be necessary to clarify this notion. To illustrate this point, in a branching structure (9):

(9)



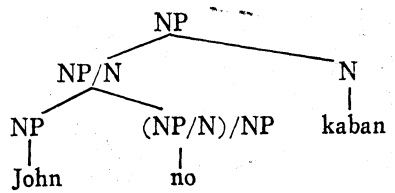
the constituent F is c-subjacent to B in the right branch and E is c-subjacent to C in the left branch. I will claim that the former case is significant as the condition on reordering in Japanese, i. e. circled constituents B and F are 'scramblable' in Japanese, and the latter case is significant in English, i.e., boxed constituents E and C can be reordered.

The right branching condition, if adopted, would rule out many cases in which pairs of constituents that are in c-subjacency relation could be scrambled. What is significant among these pairs is that all functions, IVP_1, TVP_1, TVP/$\overline{\text{IVP}}$, IVP_2, TVP_2, TVP/NP, and $\overline{\text{IVP}}$/IVP, in (8) are not c-subjacent to other constituents in right branching structure, but they are c-subjacent to others in left branching structure. For example, TVP_2 is c-subjacent to $\overline{\text{IVP}}$/IVP, but they are in left branching structure; the syncategorematically introduced *ga* is c-subjacent to IVP_1 but they are in left branching structure. Thus the two conditions correctly predict which constituents in a certain configuration can be scrambled. If, besides, the right branching condition were adopted in the formulation of scrambling, it would dispense with such a strict constraint on word order that verbs should take a sentence-final position. Since any category of verb in (8),

such as $\overline{\text{TVP}}$/IVP and TVP/NP, takes the rightmost and the lowest position of each IVP in right branching structure, it never can be c-subjacent to any other constituent in right branching structure.

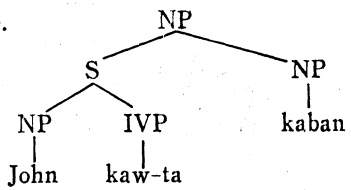
The generality of the right branching condition is verified when we observe some other major constructions in Japanese. In the genitive construction (10a), the genitive particle *no* of category (NP/N)/NP is c-subjacent to the head N but they are in left branching structure. In the relative clause construction (10b), two constituents that stand in c-subjacency relation are in left branching structure. We can therefore predict correctly that no two constituents in (10a) or (10b) can be reordered.

(10)



'John's bag'

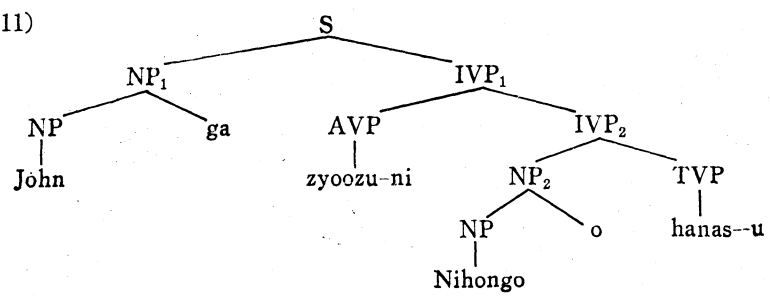
b.



'The bag John bought'

The right branching condition is more general than our first approximation that any constituent that is followed by a particle can be scrambled, because this condition furnishes an explanation of why adverbs can be scrambled

(11)



even if they do not take particles. Observe the constituent structure (11). NP_2 is c-subjacent to AVP and AVP to NP_1; therefore NP_1, AVP, NP_2 are scramblable as shown in (12).

(12) a. John ga zyoozu-ni Nihongo o hanas-u
well Japanese speak
'John speaks Japanese well.'

b. John ga Nihongo o zyoozu-ni hanas-u
Japanese well speak

c. zyoozu-ni John ga Nihongo o hanas-u
well Japanese speak

d. zyoozu-ni Nihongo o John ga hanas-u
well Japanese speak

e. Nihongo o John ga zyoozu-ni hanas-u
Japanese well speak

f. Nihongo o zyoozu-ni John ga hanas-u
Japanese well speak

Notice that the tree structure (11) is not arbitrarily represented. It strictly follows the assumed unmarked word order in Japanese; cf. (5). To have the categorial structure (11), we need three rules, such as $S=[NP\ \textit{ga}]_{NP}$ IVP(subject-predicate rule), IVP=AVP IVP(rule of predicate modification), and $IVP=[NP\ o]_{NP}$ TVP (object-transitive verb phrase rule).[3] Reversal of argument and function in any of these binary function-argument rules immediately results in the violation of such a strict word order that verbs take sentence-final position. The ill-formedness of (13a-c) is due to the fact that the ordering of argument and function in any of the above rules is inadequately represented.

(13) a. $*[_{IVP_1}$ zyoozu-ni Nihongo o hanas-u$]$ $[_{NP_1}$ John ga$]$
well Japanese speak

3) In a strict sense, two syntactic rules are not adequate as they are because the subject NP is not always followed by the nominative particle *ga*, nor is the object NP always followed by the accusative *o*. Nevertheless, these rules are sufficient for our present purpose. For more detailed discussion of the relation between the subject (or the object) and possible case particles, cf. Kuroda 1965, 1978, Kuno 1973, and Miyara 1982.

b. *[$_{NP_1}$ John ga] [$_{IVP_1}$ [$_{IVP_2}$ Nihongo o hanas-u] [$_{AVP}$ zyoozu-ni]]
Japanese speak well

c. *[$_{NP_1}$ John ga] [$_{IVP_1}$ zyoozu-ni [$_{TVP}$ hanas-u][$_{NP_2}$ Nihongo o]]
well speak Japanese

The condition that two constituents must be in c-subjacency relation and in right branching structure is a general one on scrambling. This condition simultaneously can define relations between the two constituents that cannot be scrambled, if the condition of c-subjacency and left branching is assumed. The next question is when scrambling takes place and how it is applied under this condition. Before entering this question, I will discuss reordering in English, in the next section, to show that the condition of c-subjacency and branching structure is still general enough to predict reordering in English.

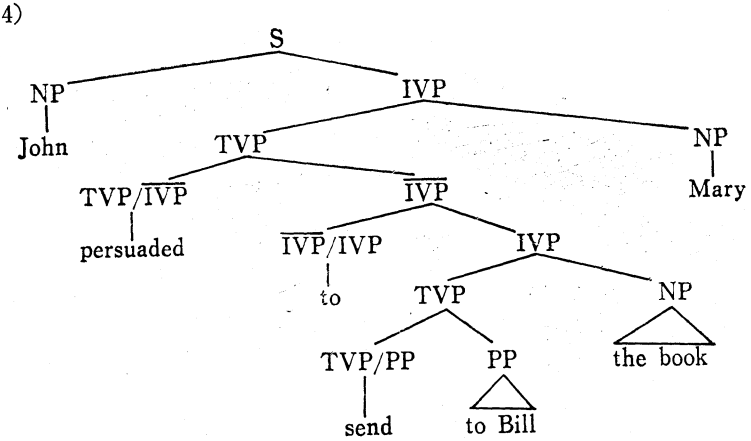
2.2 C-subjacency and Left Branching in English

In the preceding section, I presented the conditions of c-subjacency and right branching held among scramblable constituents in Japanese. In this section, I will briefly observe that the notion of c-subjacency is relevant to a reordering rule like "Right-Wrap" (Bach 1979) and the relevant constituents must be in left branching structure in this SVO language.

Consider (14). It corresponds to the Japanese example in (8). (14) is a well-motivated categorial structure reflecting the fact of the object control property and passivizability of *persuade* (cf. Thomason 1976, Partee 1975, Dowty 1978, and Bach 1979). In addition, in Bach 1979, it is shown that the ordering of categories TVP and NP that surfaces in (14) is maintained in such a sentence with coordinate structure as *Sally* [$_{TVP}$[$_{TVP}$ *visited*] *and* [$_{TVP}$ *persuaded to vote for her*]][$_{NP}$ *everyone in the precinct*] or in such sentences with 'heavy' object NP's as *I* [$_{TVP}$ *persuaded to do the dishes*] [$_{NP}$ *the three kids that were hanging around the house*] and *I* [$_{TVP}$ *regard as nutty*][$_{NP}$ *anyone who holds such a view*].

To yield the well-formed surface sentence of English, "Right-Wrap" is

(14)



assumed to be necessary. This reordering rule is explicitly represented in B & P and P & B as in the following:

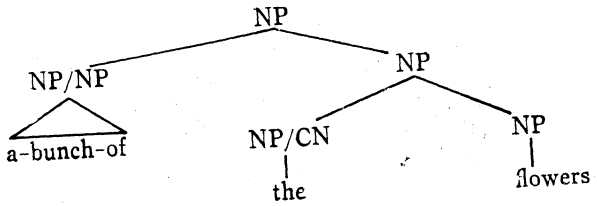
(15) "transformation" RIGHTWRAP: [TVP/x x NP]⇨[TVP/x NP x]

The syntactic operation in (15) is also necessary in Gazdar & Sag's 1980 framework, and is expressed by a metarule. In (14), it takes place between a complex expression of category $\overline{IVP}$ and a basic expression, *Mary*, of category NP; it applies also between an expression *to Bill* of category PP and an expression *the book* of category NP.

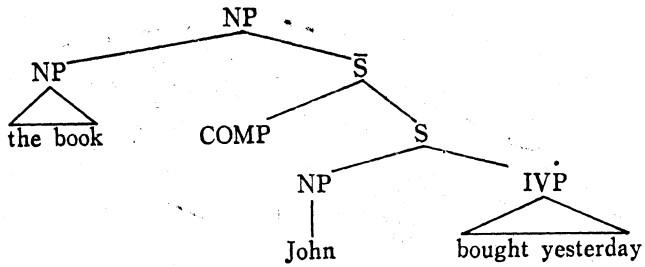
Interestingly, the reordering rule (15) is applicable only when two constituents are c-subjacent and in the "left branching" structure and, in addition, there are only two instances that satisfy this condition in (14). That is, the non-clausal complement $\overline{IVP}$ is c-subjacent to the object NP *Mary* in left-branching structure and *to Bill* of category PP is c-subjacent to the object NP *the book* in left-branching structure; when the two constituents in question are reversed respectively, a well-formed surface sentence *John persuaded Mary to send the book to Bill* results. To examine the validity of this condition further, let us consider complex NP constructions, namely a partitive or NP complement construction (16a) and a relative clause construction (16b) (cf. Bach and Cooper 1978). The internal structure of the NP expression *a bunch of the flowers* may be still controversial in

EST (cf. Selkirk 1977 and I will tentatively assume (16a) as our analysis.

(16) a.



b.

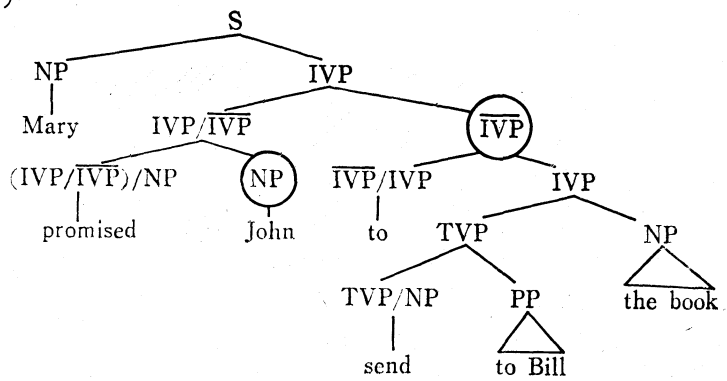


Although, in (16a), NP/CN is c-subjacent to NP/NP, they are not in left branching structure but in right branching structure. If we admit left branching as a necessary condition of reordering in English, this will be the reason that no reordering takes place in the configuration of (16a). The same thing is applicable between the two constituents that are the subject NP in the relative clause and the head NP in (16b).

I assume that only when two constituents are in c-subjacency relation and in left branching structure *can* they be reordered. Reordering should be able to take place in the construction with the subject control verb ***promise***, structure is assumed to be something like (17) in Thomason 1976, Partee 1975, Bach 1979, and many others.

In the above, the NP *John* is c-subjacent to the $\overline{\text{IVP}}$ with a complex expression and they are in left branching structure. If a reordering rule RIGHTWRAP in (15) is such a restricted one—as explicitly represented in B & P and P & B—that the rightmost constituent must be an NP in the structural description of this rule, then the two circled constituents NP and $\overline{\text{IVP}}$ in (17) simply do not satisfy the structural description of RIGHT-

(17)



WRAP. To repeat, the two constituents in (17) satisfy a necessary condition on reordering, i.e., the condition of c-subjacency and left branching, but they simply do not meet the structural description of RIGHTWRAP.

In fact, the proposed view of reordering has the effect of simplifying the reordering rule RIGHTWRAP in English. If the condition of c-subjacency and left branching is a general one for reordering in this SVO language, this need not be stated in the rule itself. We can state RIGHTWRAP in a more general fashion as in (18):

(18) RIGHTWRAP: [y/x x NP]$\Longrightarrow$[y/x NP x]

where y can be either TVP or IVP/$\overline{\text{IVP}}$ and x can be either NP, $\overline{\text{IVP}}$, or PP. We do not have to specify the domain which the rule takes place, as long as reordering takes place only in the domain where the necessary condition of c-subjacency and left branching is satisfied.

The tree diagram (14) is a representation of the underlying SVO order, the subject NP-[$_{\text{IVP}}$ TVP-the object NP]. But, to maintain the surface SVO order, the direct object NP *Mary* and the $\overline{\text{IVP}}$-complement must be somehow permuted. This is what Rule (15) or (18) does. In the constituent structure with *promise*, the surface SVO order is already maintained and no reordering is necessary. The difference in the condition of reordering in English and Japanese is left branching vs. right branching. In the next secton, I will develop the necessary condition on reordering and attempt to

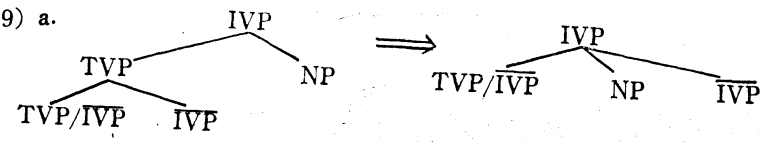
relate this difference to the difference in word order type, SVO, and SOV.

2.3 The Tree-Flattening Convention

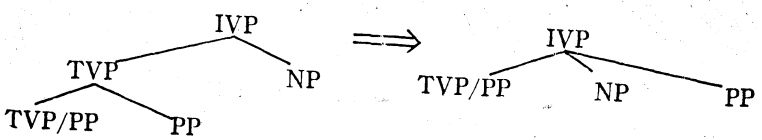
Based on the discussion in the previous two sections, I will propose a general convention of structural reduction named the "tree-flattening convention", which makes crucial use of c-subjacency and the direction of branching. When this tree-flattening convention applies, yielding two or more sister constituents, one of them may (or may not) be fixed in word order and the rest of the sister constituents may be either rearranged in arbitrary orders or maintained as the basic word order of the language. Within a transformational framework that freely allows such structural operations as deletion and permutation, Ross 1969 proposed a general convention of tree pruning. The present framework basically allows a simple structural operation concatenation. The tree flattening convention, if admitted, is a general condition on the transformational operation permutation.

A reasonable structural change, effected by RIGHTWRAP, would be this.

(19) a.



b.

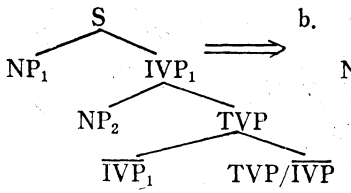


In the above cases, RIGHTWRAP has not only the effect of reducing a hierarchical structure into a flat one by removing the category TVP, but also the effect of permuting the order of the two arguments $\overline{IVP}$ and NP or PP and NP.

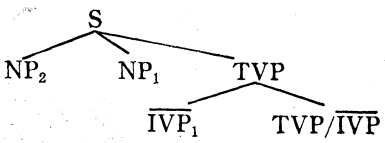
Provided that, in Japanese, a similar structural change takes place among the constituents that satisfy the condition of c-subjacency and right

branching, (8) would yield either (29a-c) or (21a-c) depending on the difference in the direction of the application of scrambling. In (20), IVP_1 is first removed and then TVP is, reversing the ordering of NP_1 and NP_2 and that of NP_1 and $\overline{IVP}_1$ successively. In (21), the bottom-up application of the same type of operation is observed.

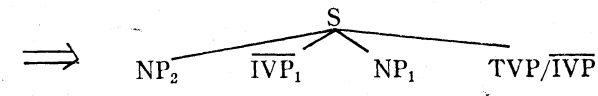
(20) a.



b.

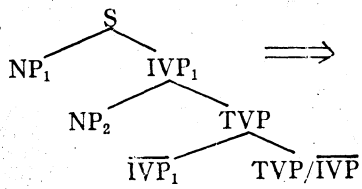


c.

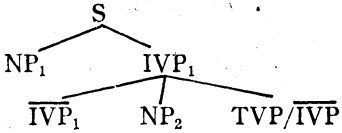


(21)

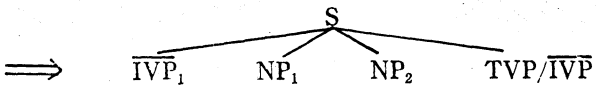
a.



b.



c.



(20) and (21) show not only that the choice of the direction of the application of this reordering rule is arbitrary but that this treatment does not give six possible outputs shown in (7). Hence, this treatment is clearly wrong.

The above treatment of reordering does two things at once, i.e., structural reduction and reordering. I will treat them separately. I propose a general convention of structural reduction named the "tree-flattening convention", which makes essential use of c-subjacency and particular branching and which does not change the left-to-right order of constituents. The particular branching will be determined by the relative position of the verb to the direct object NP, since it has the effect of leaving the position of so-called

verbs intact to hold the basic SOV order or the SVO order of the object language. For example, in an SOV language the verb is positioned to the right of the direct object NP, therefore right branching will be relevant to structual reduction. On the other hand, in the SVO language the verb is positioned to the left of the direct object and therefore left branching will be relevant to structural reduction. On the basis of this reasoning, we can predict that in a VOS language, left branching will be relevant for structural reduction. Whether or not this is an accurate claim is an empirical question.

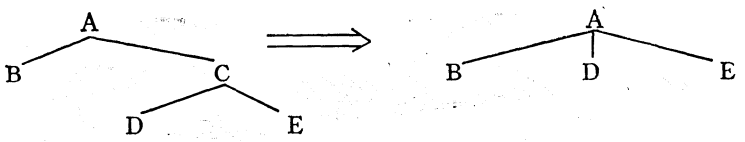
One more clarification is necessary. Greenberg (1963:79) calls the "rigid" subtype the SOV languages "in which the verb is always at the end". According to Greenberg, Burushaski, Kannada, Japanese, Turkish, Hindi, and Burmese belong to the "rigid" subtype of the SOV, while Nubian, Quechua, Basque, Loritja, and Chibcha do not. Among the SVO languages, English is a "rigid" subtype, while German appears not to be[4]; the SOV order is observed in the complement sentence of German. I claim that the particular branching structure of a particular language is relevant only in the "rigid" subtype, and that right branching structure is relevant to the "rigid" subtype of SOV and left branching to the "rigid" subtype of SVO.

The tree-flattening convention is stated as follows:

(22) The Tree-Flattening Convention (TFC)

If, in an SOV language, two constituents are in a right branching structure and in c-subjacency relation, the structure can be reduced into a flat structure, as in (a).

(a)

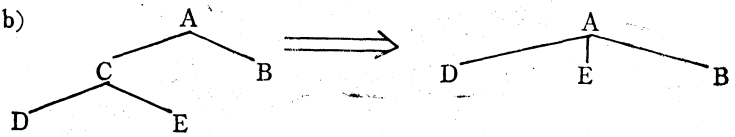


In an SVO or a VOS language, hierarchical structures with two constituents that are in a left branching structure and in c-subjacency relation,

4) Further discussion of this matter will appear later.

those structures will be reducible, as in (b).

(b)

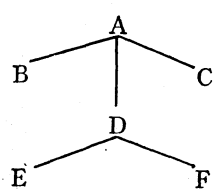


Now that this general convention is responsible for structural reduction, the RIGHTWRAP rule for English rearranges only the linear ordering of relevant constituents, but it does not affect the hierarchical arrangement.

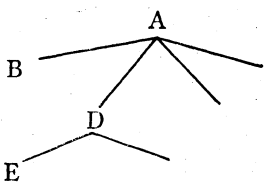
The TFC applies to the outputs of syntactic rules as many times as c-subjacency and particular branching are simultaneously satisfied, without changing the left-to-right order of relevant constituents. When the TFC applies to the constituent structure in (8), the structure allows a multiple application of this convention. The manner of its application is arbitrary; its application starts anywhere. Various possible applications of the TFC are shown below. For the sake of simplicity, (8) is simplified in (23) by leaving out irrelevant constituents.[5]

5) I would like to make clearer the branching condition stated in (9). In (a)-(b), E is c-subjacent to B and F to C. The structural relation between E and B or F and C satisfies the c-subjacency condition, but not the branching condition. This is because the branch D-A is neither in the left branch nor in the right.

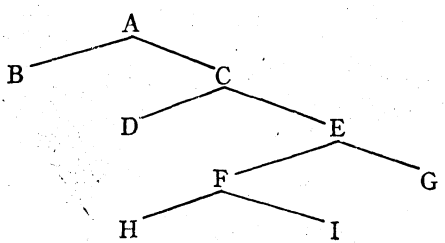
(a)



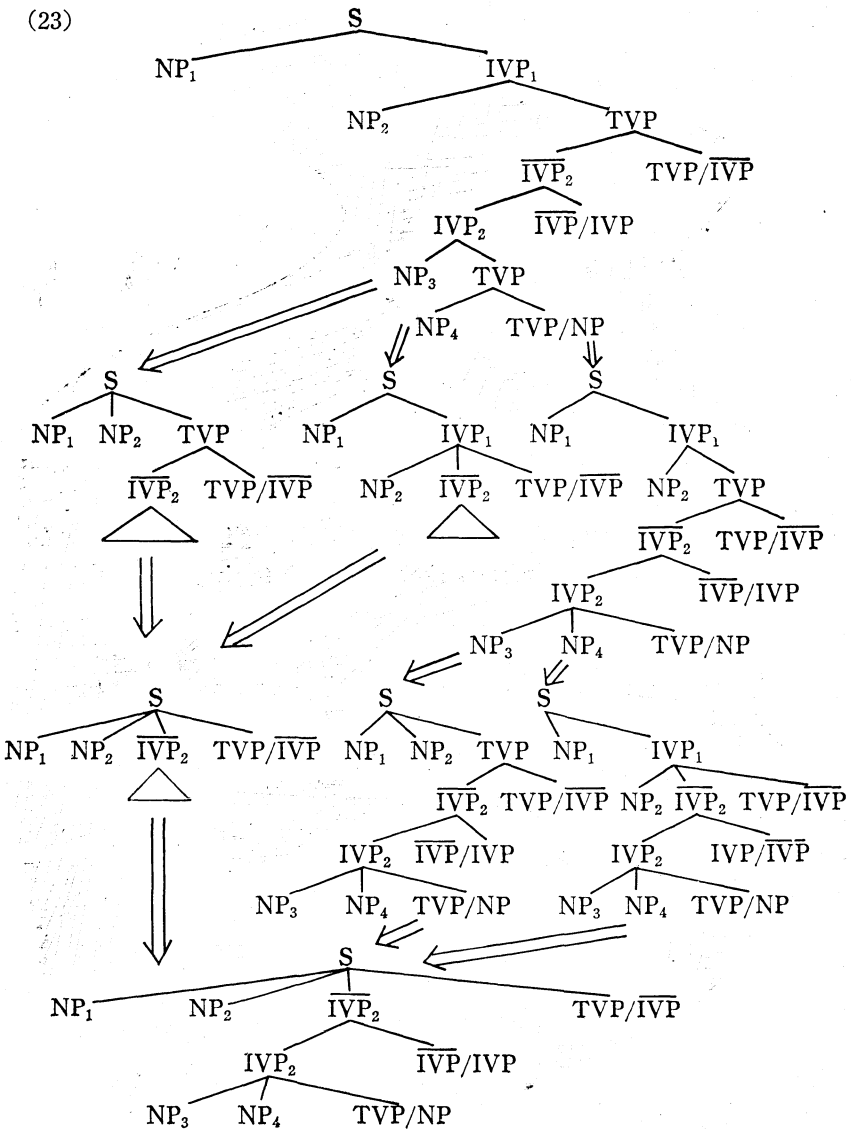
(b)



(c)



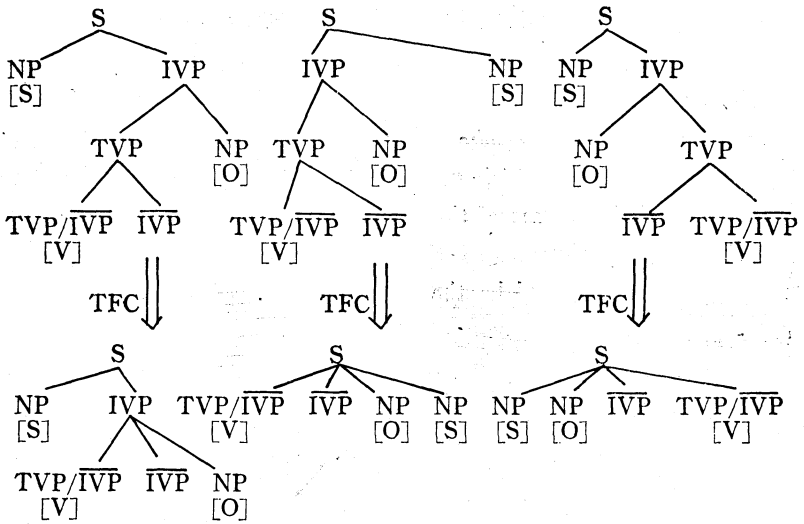
(23)



The structural relation D-C-A-B in (c) above satisfies both conditions that are necessary, because the branch C-A is in the right branch. Likewise, the

TFC itself is derivative from function-argument structures. We can predict constituent structures of three typical word orders in terms of the application of rules involving function-argument structure. For example, constructions with the TVP have direct object NP's. Structures for three different word order languages would be like the following.

(24) a. SVO b. VOS c. SOV



The specific reordering rule is different from language to language, but a general convention, TFC, claims that any reordering rule affects only sister constituents. A further claim that the TFC makes for a SVO language is that no reordering is allowable between the subject NP and the other arguments but that it is possible between the verb and nonsubject arguments. In fact, the aforementioned point, in German, of the word order change in the complement sentence, could support this claim, because the order change occurs except in the position of the subject. That is, German is the "rigid" subtype of the basic SVO order in Greenberg's sense and it is then predicted that reordering can occur between the verb

relation I-F-E-G satisfies both conditions in (c), because F-E is in the left branch.

and the object NP that are, after the application of the TFC, sisters of the IVP. The TFC thus defines a possible domain of reordering. (Note that passivization is not a reordering rule in this framework; for example, cf. Bach 1980 or Dowty 1978.)

There is, in addition, a case in which the TFC is not merely derivative from function-argument structure. The TFC makes crucial use of the right branching condition in Japanese, and it predicts that AVP's are scrambl-able; cf. (11). The function-argument structure itself does not account for this fact, because arguments can be scrambled in general, but the AVP's cannot be arguments.

A favorable consequence of the TFC is that it dispenses with the specification of the domain in which reordering applies, since it defines sister constituents consisting of more than one argument. Thus a scrambling rule need not make reference to the sister constituents. Scrambling in Japanese will be represented by the following rule.

(25) Scrambling (Japanese)

$[\ldots[_X \ldots\alpha][_Y \ldots\beta] \ldots] \Rightarrow [\ldots [_Y \ldots\beta][_X \ldots\alpha]\ldots]$

Condition: $\alpha \neq \beta$ when X, Y $\in$ {NP, $\bar{S}$, IVP},

where $\alpha, \beta \in$ {*ga, o, ni, de, e, to, kara, made*}

and X, Y $\in$ {NP, $\overline{\text{IVP}}$, $\bar{S}$, AVP, IVP//IVP}

For the above reason, it is not necessary to state that X and Y are sister constituents of S.

In Section 1, it was shown that two phrases with a certain set of identical particles cannot be scrambled. The specification of particles α, β is also significant even when the verbs take sentence particles (SP's) like the indicative *no* and the interrogative *ka*. Note the difference in grammaticality between (26) and (27).

(26) a. John ga Mary o but-ta no
hit SP
'John hit Mary.'

b. John ga but-ta no Mary o
hit SP

c. Mary o but-ta no John ga
hit SP

(27) a. John ga Mary o but-ta
hit
'John hit Mary.'
b. *John ga but-ta Mary o
hit
c. *Mary o but-ta John ga
hit

(28) a. omae wa doositemo ik-u no ka?
you in any case go SP
'Do you go in any case?'
b. doositemo ik-u no ka omae wa?
SP

(26) and (28) show that α, β can be sentence particles, but any phrase that crosses over the verb is associated with a falling intonation. The type of reordering in (26) and (28) should be included in the formulation of the rule (25), but I won't discuss it further here. It will be sufficient enough to show here that the specification of α, β is necessary and α, β can be not only case particles but also other kinds of particles.

The condition 'when α, $\beta \in \{NP, \bar{S}, \overline{IVP}\}$' is necessary in the formulation of a scrambling rule such as (25). In the present analysis, locative phrases (LOC), comitative phrases, source phrases (SRC), goal phrases (GOL), instrumental phrases (INS), terminus phrases, and directional phrases are of category IVP//IVP and particles cooccurring with these phrases are assigned an independent syntactic category (IVP//IVP)/NP. These particles are thus treated differently from case-marking particles *ga*, *o*, and *ni*. In this respect, I follow Kuroda's (1978) original assumption about the different treatment of case particles and particles of the other type. In (29), both the two homophonous *de*-phrases and the three homophonous *ni*-phrases can be freely scrambled.

(29) a. Mary ga heya de kami de ningyoo o tukur-ta
room LOC paper INS doll make
'Mary made a doll with paper in the room.'
b. John ga Mary ni go-zi ni tosyositu ni
DAT five LOC reading room GOL
ki-te-moraw-ta
come
'John received the favor of coming to the reading room at five from Mary.'

The above *de*-phrases and the *ni*-phrases, excluding the dative NP ***Mary ni***, are all of the category IVP//IVP. (For a similar observation, cf. Kuno 1980b.) Accordingly, α, β in the specification, $\alpha \neq \beta$, of (25) should indicate case-marking particles only to exclude the generation of the ***b***-sentences in (2)-(4) and to allow that of (29).

2.4 Comparison with Previous Analyses of Scrambling

I will briefly compare the proposed rule (25) with previous analyses of scrambling in order to point out some inadequacies of the previous analyses and to show that the proposed analysis is free from such inadequacies.

After pointing out some inadequacy of Muraki's (1974) formulation of scrambling, Harada 1977 introduced his own formulation of scrambling within the framework of the X-bar convention.

(30) Harada's scrambling rule

	S	(X″)	W	(X″)	W	V	W
	1	2	3	4	5	6	7
→	1	4	3	2	5	6	7

X″ is a cross-categorial variable and the application of (30) makes crucial use of the "Relativized A-over-A Principle" proposed by Bresnan 1976. Rule (30) is well-formulated, but as pointed out by Whitman 1979 it cannot account for the fixed word order in a double-nominative construction. For a more adequate formulation of scrambling, the stipulation of particles α,

β is necessary in (30).

Tonoike 1980 argues against Kuno 1980a, 1980b about scrambling rule and he proposes the clausemate condition on scrambling. Kuno 1980a, 1980b, however, argues against the clausemate condition and, instead, proposes a cross-over condition. Neither of them provides any explicit formulation of scrambling, and it turns out that neither condition on scrambling is sufficient. Tonoike's clausemate condition, as Kuno shows, cannot provide any direct account of constructions with double-*ga*, double-*o*, and double-*ni*. Kuno's cross-over condition cannot be adequate by itself, because it allows (31b) which is effected by the reversal of the matrix dative NP *Bill ni* and the embedded subject *John ga*. That is, (31b) does not violate his cross-over condition, but it is, nevertheless, unacceptable. The unacceptability of (31b) proves that his cross-over condition alone is insufficient in his framework.

(31) a. Fred ga Bill ni [$_{S}$John ga Mary ni tegami o
letter
mise-ta koto] o hanas-i-ta
show COMP tell
'Fred told Bill that John had shown the letter to Mary.'

b. *Fred ga John ga Bill ni Mary ni tegami o
letter
mise-ta koto o hanas-i-ta
show COMP tell

In the proposed analysis, Tonoike's clausemate condition is handled by a general convention TFC and Scrambling (25) has only to incorporate Kuno's cross-over condition.

The TFC defines scramblable constituents as sisters and rule (25) is applied to the output of this general convention. Then, it naturally follows that the subsequent reordering rule applies to sister constituents reduced by the TFC. In other words, the TFC leaves a significant effect on the domain of the application of the reordering rule, whose application does not go outside the domain of IVP in the non-clausal complement and

which is otherwise operative within the bounds of S.

Without the explicit domain of the rule application, (32b) could be one of the scrambled versions of (32a). The importance of limiting the domain of the rule application is in the automatic consequence of precluding the generation of a sentence such as (32b) from (32a).

(32) a. John wa [$_{\bar{S}}$ Mary ga heya ni i-nai koto] o *sotto*
NOM room LOC be-not COMP ACC secretly
Jane ni osie-ta
DAT tell-Past
'John secretly told Jane that Mary was not in the room.'

b. *John wa [$_{\bar{S}}$ Mary ga heya ni *sotto* i-nai koto] o ___ Jane ni
osie-ta

Besides, since Scrambling in (25) is an upward bounded rule, it provides a natural basis for preventing the generation of (31b). These consequences of limiting the domain of the application by the TFC becomes more important to learn that there is an unbounded movement rule in Japanese. I will discuss this topic in the next section.

Rule (25) maps trees onto trees. It is a transformation. The peculiar status of scrambling has been pointed out in many works, e.g. Ross 1967, Whitman 1979, Lapointe 1981, and Stucky MS. An investigation by Inoue (cited in Whitman 1979:345) also points out the peculiarity that scrambling keeps "re-applying to its own output" generating a potentially infinite number of surface sentences. It is certainly quite different from regular transformations. In this respect, Harada's (30) suffers from the severe criticism made by Whitman 1979. However, in the present framework, reordering, like scambling, is the only possible type of transformation and it is, therefore, justifiable on this ground.

To recapitulate, (i) the TFC is a general convention for structural reduction, (ii) it provides uniform conditions on various reordering rules by making use of two configurational notions, c-subjacency and either left or right branching structure, (iii) its left or right branching is determined

by the word order type of the language, (iv) it makes some interesting claims on reordering since only the sister constituents reduced by this convention are to be reordered if the structural description of the language-particular reordering rule is met, (v) it naturally determines the domain of the application of possible reordering rules (that is, it is unnecessary to state the condition as to whether scrambling is clause-bounded or not), thereby simplifying the formulation of a particular reordering rule, and (vi) it provides natural grounds for the scrambling rule (or some other reordering rules) that is not "structure-preserving" (Emonds 1976).

3. Unbounded Movement

Scrambling is a bounded rule. In this section, I discuss some constraints on an unbounded movement rule in Japanese. This movement rule is what Haig 1976 calls "Emphatic Fronting". These two reordering rules should be sharply distinguished from each other in terms of the difference in the domain and the manner of their application.

Haig (1976:369) first introduced into the study of Japanese grammar a rule called Emphatic Fronting, which is stated as:

> a rule that lifts NP's out of embedded clauses and places them at the head of the main clause. It cannot leave pronominal traces and it can apply to any embedded NP.

Haig's (24) and (25) are given below as (33c) and (34c) with structural analysis provided.

(33) a. watasi wa [$_{\bar{S}}$Hanako ga Taroo o aisi-te iru to iu koto] o kii-ta
I love that heard
'I heard that Hanako loves Taro.'

b. Hanako ga watasi wa [$_{\bar{S}}$ ___ Taroo o aisi-te iru
↑ love
to iu koto] o kii-ta
hear

'Hanako, I heard that ø loves Taro.'

c. Taroo o watasi wa [$_{\bar{S}}$ Hanako ga ___ aisi-te iru
love

to iu koto] o kii-ta
hear

'Taro, I heard that Hanako loves ø.'

(34) a. watasi wa [$_{NP}$[$_{\overline{IVP}}$ Bill ni Mary o syookaisi-ta-i to]
I introduce want

iu kiboo] o motte i-ru
desire have

'I have a desire such that I want to introduce Mary to Bill.'

b. Bill ni watasi wa [$_{NP}$ [$_{\overline{IVP}}$ ___ Mary o syookaisi-ta-i to]
I

iu kiboo] o motte i-ru
desire have

'Bill, I have a desire such that I want to introduce Mary to ø.'

c. Mary o watasi wa [$_{NP}$ [$_{\overline{IVP}}$ Bill ni ___ syookaisi-ta-i to]
I

iu kiboo] o motte i-ru

'Mary, I have a desire such that I want to introduce ø to Bill.'

The two constituents that are scramblable are determined in terms of structural configuration and adverbs are freely scrambled with other constituents. But in the Emphatic Fronting, adverbials of manner, time, and place, in principle, would not be fronted as shown in (35c). This fact makes it impossible to handle the Emphatic Fronting in the same way as Scrambling is treated. (35c) only means 'At school John told Jane that Bill had kissed Mary.'

(35) a. Bill ga John wa [$_{\bar{S}}$ ___ gakkoo de Mary ni kisusi-ta
school LOC DAT kiss-Past

koto] o Jane ni osie-ta
COMP DAT tell-Past

'John told Jane that Bill had kissed Mary at school.'

b. Mary ni John wa [$\bar{S}$ Bill ga gakkoo de ___ kisusi-ta

koto] o Jane ni osie-ta

c. gakkoo de John wa [$\bar{S}$ Bill ga ___ Mary ni kisusi-ta

koto] o Jane ni osie-ta

The fronting would be applied once to preclude the generation of sentences like (36).

(36) ??Mary ni Bill ga John wa [$\bar{S}$ ___ gakkoo de ___ kisusi-ta

koto] o Jane ni osie-ta

'John told Jane that Bill had kissed Mary at school.'

The matrix subject NP's in (32)-(36) are all marked by the topic *wa*, but once they are marked by the nominative *ga*, all the sentences turn out to be more or less unacceptable. (37a) and (37b) are the same as (33b) and (35a), respectively, except that the matrix subject is marked by the nominative *ga*. The fact that fronting of the embedded subject NP marked by *ga* is disallowed in (37a) indicates the existence of a cross-over constraint. (37c) reinforces this prediction; the dative NP in the embedded clause has the effect of crossing over the matrix dative NP by the application of Emphatic Fronting.

(37) a. *Hanako *ga* watasi *ga* [$\bar{S}$ ___ Taroo o aisi-te iru to

iu koto] o kii-ta (cf. (33a))

b. *Bill *ga* John *ga* [$\bar{S}$ ___ gakkoo de Mary ni kisusi-ta

koto] o Jane ni osie-ta (cf. (35a))

c. *Mary *ni* John wa Jane *ni*[$\bar{S}$ Bill ga gakkoo de ___ kisusi-ta

koto] o osie-ta (cf. (35b))

A significant consequence of this is that it becomes necessary to assign

a uniform condition, the cross-over constraint, to the two reordering rules, Scrambling and Emphatic Fronting, possibly, in the present framework, as a property of permissible reordering rules.[6]

4. Summary

I have presented an explicit analysis of two types of reordering in Japanese, concluding that the two types should be sharply distinguished from each other in terms of the difference in the domain and the manner of rule application, in spite of the fact that the two need a uniform condition, i.e. a cross-over constraint.

The central topic in this paper was to expound on a plausible way of handling scrambling in Japanese within the framework of a generalized categorial grammar. I invented a general convention for structural reduction, i.e. the TFC, that makes crucial use of two configurational notions, c-subjacency and (left or right) branching structure. This convention is purely configurational and general, because it is argued that reordering takes place among the constituents that are in c-subjacency relation, but not among those to which particular syntactic categories are assigned, and that relevant branching structure is determined by the word order type, rather than in the way that left branching is relevant to English and right branching to Japanese. The TFC is general enough to apply whenever the condition of c-subjacency and particular branching is met. The TFC makes an interesting claim that reorderng is possible only among the sister constituents that appeared as the output of the TFC. For example, it claims that since, in the SVO language, only the constituents corresponding to VO are sisters by the application of the TFC, it is predicted that non-subject constituents *can* be reordered. In fact, there is such a rule in

6) Now that the formulation of Scrambling and discussion of Emphatic Fronting were given, we can see that one of the mismatches in the disputes over scrambling between Kuno 1980a, 1980b and Tonoike 1980 comes from the fact that, as Tonoike showed, Kuno did not distinguish scrambling from a different process of fronting.

German and the reordering rule is obligatory in the complement sentence in German. The TFC thus defines a possible domain of reordering.

Appendix

Rules (sample)

(Each rule consists of a pair of a syntactic rule and its semantic rule. The numbers 0, 1, and 2 indicate categories from left to right, and 0′ means the translation of element 0, e.g. XP in Rl, and 1′ that of element 1, e.g. X in Rl, etc.)

R1. XP = X (X ϵ {N, IV, TV, TV/$\overline{\text{IVP}}$,…})
0′ = 1′

R2. S = [NP *ga*]$_{\text{NP}}$ IVP
0′ = 2′(^1′)

R3. IVP = AVP IVP
0′ = 1′(^2′)

R4. IVP = IVP//IVP IVP
0′ = 1′(^2′)

R5. IVP = [NP *o*]$_{\text{NP}}$ TVP
0′ = 2′(^1′)

R6. TVP = [IVP *o*]$_{\overline{\text{IVP}}}$ TVP/$\overline{\text{IVT}}$
0′ = $\lambda\mathcal{P}_i$[2′(^1′ ($\mathcal{P}_i$))($\mathcal{P}_i$)]
.....

By Rl, it is shown that all phrasal categories have corresponding lexical categories. R2 is a rule regarding subject NP and the predicate phrase. R3 and R4 are rules of adverbial modification and AVP indicates adverbs of manner, degree, frequency, etc. and IVP//IVP is a category for a locative phrase, an instrumental phrase, a direction phrase, etc. R5 is a rule regarding the object NP and the transitive verb phrase. R6 is a rule for verbs with the object control property, which is internalized in the semantic rule, and $\mathcal{P}$ is a variable ranging over sets of properties. R2 and R5 cannot

be adequate as they are in terms of the specification of case marking particles, but would be sufficient for the present purpose. For further discussion of this matter along this line, cf. note 3.[7]

References

Bach, E. 1979. Control in Montague grammar. Linguistic Inquiry 10. 515-531.

Bach, E. 1980. In defense of passive. Linguistics and Philosophy 3. 297-341.

Bach, E. and R. Cooper. 1978. The NP-S analysis of relative clauses and compositional semantics. Linguistics and Philosophy 2. 145-150.

Bach, E. and B. H. Partee. 1980. Anaphora and semantic structure. In Papers from the Parasession on Pronouns and Anaphora, ed. by J. Kreiman and A. Ojeda, 1-28. Chicago, Illinois: Chicago Linguistic Society.

Bresnan, J. 1976. On the form and functioning of transformations. Linguistic Inquiry 7. 3-40.

Dowty, D. 1978. Lexically governed transformations as lexical rules in a Montague grammar. Linguistic Inquiry 9. 393-426.

Emonds, J. E. 1976. A transformational approach to English syntax: Root, structure-preserving, and local transformations. New York: Academic Press.

Flynn, M. 1980. A categorial theory of structure building. Delivered at the LSA Winter Meeting, December 1980.

Greenberg, J.H. 1963. Some universals of grammar with particular reference to the order of meaningful elements. Universals of language, ed. by J. H. Greenberg, 73-113. Cambridge, Mass.: The MIT Press.

7) For an interesting extension of categorial grammar, cf. Flynn 1980. He proposes word order conventions for English, Hopi (its word order type, SOV), and Malagasy(its word order type, VOS) to capture generalizations about word order. I did not attempt to postulate such a convention in Japanese, but it is possible to make a general statement about word order in Japanese aud I have only to specify the type of function whether it is a modifier or a non-modifier. I tentatively suggest the following general statement of the word order between the immediate constituents of a binary construction:

To form an expression of category XP, one of the two immediate constituents is either of category XP/XP (or XP//XP) or XP/YP (where $X \neq Y$): then the XP/XP (or XP//XP) is in the lefthand position and the XP/YP is in the righthand position.

Gazdar, G. 1980. Phrase structure grammar. To appear in On the nature of syntactic representation, ed. by. G.K. Pullum and P. Jacobson.

Gazdar, and I. A. Sag. 1980. Passive and reflexives in phrase structure grammar. To appear in Formal Methods in the Study of Language, Proceedings of the Third Amsterdam Colloquium, March 25-28, 1980. Amsterdam: Mathematical Centre Tracts.

Haig, J. H. 1976. Shadow pronoun deletion in Japanese. Linguistic Inquiry 7. 363-371.

Harada, S.I. 1977. Nihongo ni 'henkei' wa hitsuyo da. Gengo 6 (10). 96-103.

Kuno, S. 1971. The position of locatives in existential sentences. Linguistic Inquiry 2. 33-378.

Kuno, S. 1973. The structure of the Japanese language. Cambridge, Mass.: The MIT Press.

Kuno. 1980a. A note on Tonoike's intra-subjectivization hypothesis. MIT Working Papers in Linguistics 2: Theoretical issues in Japanese Linguistics, ed. by Y. Otsu and A. Farmer, 149-156.

Kuno. 1980b. A further note on Tonoike's intra-subjectivization hypothesis. MIT Working Papers in Linguistics 2: Theoretical issues in Japanese linguistics, ed. by Y. Otsu and A. Farmer, 171-184.

Kuroda. S. -Y. 1965. Generative grammatical studies in the Japanese language. Doctoral dissertation, MIT.

Kuroda. S. -Y. 1978. Case marking, canonical sentence patterns, and counter equi in Japanese (Preliminary survey). Problems in Japanese syntax and semantics, J. Hinds and I. Howard, 30-51. Tokyo: Kaitakusha.

Lapointe, S. G. 1981. Free order phrase structure rules. To appear in University of Massachusetts Occasional Papers in Linguistics 7, ed. by W. Chao and D. Wheeler.

Miyara, S. 1982. Reordering in Japanese. To appear in Linguistic Analysis 9, 309-342.

Muraki, M. 1974. Presupposition and Thematization. Tokyo: Kaitakusha.

Partee, B. H. 1975. Montague grammar and transformational grammar. Linguistic Inquiry 6. 203-300.

Partee, and E. Bach. Forthcoming. Quantification, pronouns, and VP anaphora. To appear in Proceeding of the Third Amsterdam Colloquim: Formal Methods in the Study of Language.

Ross, J. R. 1967. Constraints on variables in syntax. Doctoral dissertation, MIT.

Ross, J. R. 1969. A proposed rule of tree-pruning. Modern Studies in English, ed. by. D. Reibel and S. Schane, 288-299. Englewood Cliffs, N.J.: Prentice-Hall,

Selkirk, E.O. 1977. Some remarks on noun phrase structure. Formal syntax, P.W. Culicover, T. Wason, and A. Akmajian, 285-316. New York: Academic Press.

Shibatani, M. 1978. Nihongo no bunseki. Tokyo: Taishukan-Shoten.

Stucky, S. U. Forthcoming. Free word order languages, free constituent order languages, and the gray area in between. To appear in Proceedings of the Eleventh Annual Meeting of the North East Linguistic Society.

Thomason, R. 1976. Some extensions of Montague grammar. Montague Grammar, ed. by B. H. Partee, 77-118. New York: Academic Press.

Tonoike, S. 1980. More on intra-subjectivization hypothesis. MIT Working Papers in Linguistics 2: Theoretical Issues in Japapese Linguistics, ed. by Y. Otsu and A. Farmer, 157-170.

Whitman, J. 1979. Scrambled, over easy, or sunny side up? Papers ed. by From the Fifteenth Regional Meeting, Chicago Linguistic Society, ed. by P.R. Clyne, W.F. Hanks, and C.L. Hofbauer, 324-352.