

REMARKS ON THE NOTION OF SUBJECT
WITH REFERENCE TO WORDS LIKE ALSO, EVEN, OR ONLY,
Illustrating Certain Manners in Which
Formal Systems Are Employed as Auxiliary Devices
in Linguistic Descriptions*
Part 2

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The problem discussed above (Annual Bulletin, No. 3) concerning the words like mo, sae, and dake may remind the reader of the familiar problem of the "order of quantifiers" in language and logic. In formal logic if two variables in a predicate formula are bound by different quantifiers, the order of these quantifiers is relevant to determination of the meaning of the formula. Assume, for example, that variables x and y in $P(x, y)$ are known to be bound by the existential and the universal quantifier, respectively. This much information is not sufficient to make a unique well-formed formula from $P(x, y)$. It must further be specified which quantifier precedes the other; if the existential precedes the universal one obtains $(\exists x)(\forall y) P(x, y)$, and otherwise, $(\forall y)(\exists x) P(x, y)$. These two formulas are not equivalent. Assume now that predicate P is semantically interpreted, say, by an English transitive verb V in such a way that the first and second places of V correspond to the syntactic subject and object of V , respectively; in other words $P(a, b)$ is assumed to mean $a V b$ in English. Consider then a sentence whose verb is V and whose syntactic subject and object are words corresponding to occurrences of an existential and a universal variables (i. e. variables bound by the existential and the universal quantifier), for example, someone and everything, respectively. This much information would uniquely determine a syntactic form:

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(38) Someone V everything.

But the semantic contents of (38) are yet to be described; all that is known now is that the first and the second place of P are filled with an existential and a universal variable. The form (38) could still be taken to mean $(\exists x) (\forall y) P(x, y)$ or $(\forall y) (\exists x) P(x, y)$, or perhaps both. To complete the syntactic and semantic description of (38), some indication must be given as to how to interpret "the order of quantifiers" in (38).

In this connection it will be recalled that the "linear order principle" for quantifiers was proposed.¹⁷⁾ Let me put this principle in the following form: if a sentence contains occurrences of words corresponding to an existential and a universal variable (in brief, existential and universal words), then the sentence is understood in such a way that the linear (word) order of these words in the surfact structure of the sentence corresponds to the linear order of the corresponding occurrences of the existential and the universal quantifiers in a formula in the ordinary system for predicate calculus¹⁸⁾ that would represent the meaning of the sentence. Given this principle, sentence (38) would be taken to mean $(\exists x) (\forall y) P(x, y)$.

With respect to this principle two questions arise. One is whether this principle is factually correct.¹⁹⁾ The other is, if it is correct, whether the principle must be assigned some significant status in the explanatory, formalized theory of language, and, if so, what status. These questions are not the concern of the present study. As will be explained later, for independent reasons, quantifiers in Japanese do not serve the main purpose of the present study, i. e. of detecting a formal trace of the subject-predicate paradigm, as readily as words like mo, sae, or dake; I do not intend to go into questions that properly belong to the analysis of Japanese quantifiers. But one might have wondered why a similar principle concerning the linear order of words like mo, sae, or dake and correlatively that of quantifier-like elements like μ , σ , or δ would not have been evoked in order to account for the data discussed above. I would have to clarify to some extent what significance it has to set up such principles as the linear order principle for quantifiers, independently of the above mentioned factual and theoretical questions.

Thus, one might construct a descriptive formal system with the quantifier-like elements in which they bind constants "remotely" in the way the ordinary quantifiers bind variables in the ordinary system for predicate calculus; instead of $P(a, \int b)$ one might have $(\int b) P(a, b)$, etc. Then, one could express the "order" of quantifier-like elements in the same way as the "order" of quantifiers is expressed in the ordinary system for predicate calculus; (26) and (30) would be represented by:

$$(39) (\sigma \text{John}) (\int \text{s. s.}) Y(\text{John}, \text{s. s.})$$

and

$$(40) (\int \text{s. s.}) (\sigma \text{John}) Y(\text{John}, \text{s. s.})$$

and, in fact, the linear (word) order of the words sae and dake in (26) and, (30) corresponds to the linear order of the quantifier-like elements in the corresponding formula in the descriptive formal system. From this observation one might conclude that the reference to the subject-predicate paradigm in the preceding discussion for the purpose of accounting for the order of words like mo, sae, or dake is artificial and not well justified. In order to make it clearer just what is intended of the subject-predicate paradigm in connection with words like mo, sae, or dake, I would have to examine in some more detail the significance behind formulating principles like the linear order principle for quantifiers.

A formal system that contains the existential and the universal quantifier must meet the problem of ordering of quantifiers in one way or another. In other words, it must incorporate a convention which specifies how occurrences of these quantifiers in a formula are related to each other in their semantic interpretation. The ordinary system for predicate calculus meets the problem with the familiar solution: each variable that occurs inside a predicate recurs at its head with a quantifier that binds it, and the linear order of such binding quantifiers determines the semantic interpretation of the formula in the familiar way. But in no absolute sense is this "the solution" to the problem posed by coexistence of the existential and the universal quantifier. Just to take a trivial modification, one could construct a system for predicate calculus in which binding quantifiers follow the predicate symbol in which the variables bound by them are contained in the

order opposite to the one in the ordinary system for predicate calculus. Then, the linear order principle for quantifiers in language would have to be stated: quantifier words in a sentence are interpreted in such a way that their linear order in the surface structure corresponds to the mirror image of the linear order of the quantifiers in the corresponding formula in the (now constructed imaginary) system for predicate calculus. Reference to the ordinary system for predicate calculus in the ordinary statement of the linear order principle for quantifiers would not have any absolute sense; it would only serve to fix a frame of reference.

But it would be maintained that if any formal system for predicate calculus contains the existential and the universal quantifier, there is some absolute, semantic sense in which the order of quantifiers may be talked about independently of the syntax of the particular formal system. In an obvious sense which would need no further specification, an occurrence of a quantifier may be said to be within the range of another occurrence of a quantifier in the semantic interpretation; one might say that the latter occurrence precedes the former in the "semantic" order of quantifiers. Then, in the ordinary system for predicate calculus, the linear order, from left to right, of quantifiers will correspond to the semantic order of quantifiers defined this way. One might interpret the linear order principle for quantifiers as stating the relation between the linear (word) order of quantifiers in language and the semantic order of logical quantifiers. The principle would say that given a sentence in language the semantic order of logical quantifiers in a logical formula in any formal system for predicate calculus which represents the meaning of the given sentence is exactly given by the linear (word) order of the quantifier words in the surface structure of the sentence; in brief, one might say, the semantic order of quantifier words in a sentence is given by their linear order in the surface structure of the sentence.

To the extent that the linear order principle for quantifiers is correct this restatement is correct and the fact which is stated this way may or may not be considered to be interesting from the psychological point of view. But this fact is not the essential point concerning comparison of syntactic treatment of the order of quantifiers in language and logic, the comparison that one

wants to point out by stating the linear order principle. In particular, one must not be misled into overestimating the syntactic similarity in the treatment of quantifiers in language and the ordinary system for predicate calculus, the similarity that one might assume is implied in the statement of the linear order principle. The similarity even if such implication is intended, must be of a very limited character. In fact, the reason why one is led to state such a principle as this one lies rather in the fact that language exploits a syntactic device essentially different from the one used in the ordinary system for predicate calculus for the purpose of dealing with the problem posed by the semantic order of quantifiers. I shall clarify this point below.

For a real understanding of the essential significance of the linear order principle for quantifiers, it would be desirable to construct a formal system for predicate calculus, call it Σ , different from the ordinary one in the way suggested below. Σ contains the same primitive symbols as the ordinary system for predicate calculus. The rules of formation of well-formed formulas in Σ are the same as in the ordinary system, except that the quantifiers are directly prefixed to the variables they bind, instead of being prefixed to the predicate symbols that contain those variables; for example, $\underline{P}(\forall x, \exists y)$ is a well-formed formula in Σ , but not $(\forall x)(\exists y) P(x, y)$. For the intended "standard" semantic interpretation of this system, a set of axioms is assumed to exist to the effect that for any predicate symbol \underline{P} of \underline{n} places and for any permutation $(\underline{k}_1, \underline{k}_2, \dots, \underline{k}_n)$ of the set of the first \underline{n} integers $(1, 2, \dots, \underline{n})$ there exists a predicate \underline{Q} such that it holds

$$(41) \quad \underline{Q}(\underline{a}_1, \underline{a}_2, \dots, \underline{a}_n) \equiv \underline{P}(\underline{a}_{\underline{k}_1}, \underline{a}_{\underline{k}_2}, \dots, \underline{a}_{\underline{k}_n}), \text{ where } \underline{a}_i, 1[\leq] i[\leq] \underline{n},$$

are arbitrary constants. Then, the standard interpretation is given to Σ in the same way as the standard interpretation is given to the ordinary system for predicate calculus except that the linear order of quantifiers as they appear inside a predicate symbol²⁰⁾ is interpreted in the same way as the order of quantifiers prefixed to a predicate symbol is interpreted in the ordinary system for predicate calculus. Σ , constructed and interpreted this way, is equivalent to the ordinary system for predicate calculus in the sense that for each well-formed formula of one system there is a well-formed formula of the other system which is interpreted in the same way.

Σ may be considered to be another formal system for predicate calculus.²¹⁾ In what follows I shall refer only to two-placed predicates. For ease of exposition I shall call a predicate Q an order-inverse of another predicate P if they are related by $P(\underline{a}, \underline{b}) \equiv Q(\underline{b}, \underline{a})$.

Now, with Σ as the frame of reference, a principle that would replace the linear order principle for quantifiers would be phrased as follows: to the extent that the ordinary form of the linear order principle for quantifiers is correct, human language may be considered to be a realization (or a model, a formal interpretation) of (a subsystem of) Σ , in a reasonably natural way. By "a reasonably natural way" it would have to be meant, at least, that the correspondence between Σ and the language, as a realization of it, is "order-preserving".

By way of example, take the sentence:

(42) John read S. S.

A two-placed predicate in Σ , say, $P(\underline{\quad}, \underline{\quad})$, is assumed to correspond to the transitive verb read, or more precisely, to the transitive sentence frame — read —. It is assumed that the intended realization of Σ in English makes the first and the second place of P correspond to the first and the second slot of the sentence frame (or, the surface structure frame) — read —, respectively. By the definition of Σ , it contains an order-inverse predicate, Q , of P . Q may be considered to be realized in English by the "passive verb" was/were read, or more precisely, by the passive sentence frame — was/were read by —. The first and the second place of Q corresponds to the first and the second slot of this sentence frame. The passive transformation in Harris' sense (i. e. as a correspondence between active and passive sentences) may be considered to give a systematic correspondence between certain sentences and order-inverses of them.

The above rephrasing of the linear order principle for quantifiers would serve to make it clear that the essential significance of stating such a principle does not reside in the fact that the linear (word) order of quantifiers in language corresponds to the semantic order of quantifiers as well as the linear order of logical quantifiers in the ordinary system for predicate calculus, which fact may, of course, be of independent interest; the significance resides rather in the fact that in language, different sentence frames are used

to represent a different semantic order of quantifiers.

I shall now return to our main topic, the subject-predicate paradigm and its relation to words like also, even, or only. To reveal the role of the subject-predicate paradigm in this respect I have made use of a descriptive formal system which is equipped with the "higher" predicate, \underline{S} , and the quantifier-like elements, μ , σ , and δ , in addition to the primitive symbols of the ordinary system for predicate calculus.²²⁾ Let us re-examine the significance of introducing such a system.

To the extent that the meanings of also, even, and only can be made explicit by means of predicate calculus, perhaps by means of formulas like (18), (20), and (21), a formal system that contains the quantifier-like elements μ , σ , and δ with the intended semantic interpretation is nothing but another formal system for predicate calculus.²³⁾ Such a system may be considered to be a formal system for predicate calculus that is "more homomorphic" to the structure of human language in that it contains primitive symbols corresponding to words like also, even, or only. In order to accomplish construction of such a system, however, the introduction of primitive symbols like μ , σ , or δ does not suffice. In the same way as one may talk about the semantic order of the ordinary quantifiers, one may talk about the semantic order of quantifier-like elements, like μ , σ , or δ . One must specify the way in which the semantic order of these elements is to be expressed in formulas that contain more than one occurrence of them. One might construct a system in which the quantifier-like elements have syntactic properties similar to those of the quantifiers in the ordinary system for predicate calculus, introducing formulas like:

$$(43) (\sigma \underline{a}) (\delta \underline{b}) P(\underline{a}, \underline{b})$$

The intended interpretation of this system would interpret the linear order of σ and δ as it appears in (43) to be identical to their semantic order; that is, (43) is interpreted to be synonymous with the formula in the ordinary system for predicate calculus that is obtained from (43) by substituting for δ and σ in (43) the expressions obtained by means of the defining formulas for δ and σ , respectively, in this order of substitution. Or, one might construct a system in which the quantifier-like elements have syntactic properties similar to those of the quantifiers in Σ , as previously defined, introducing formulas like:

$$(44) \underline{P}(\underline{\sigma a}, \underline{\delta b})$$

and its "order-inverse":

$$(45) \underline{Q}(\underline{\delta b}, \underline{\sigma a}).$$

The intended semantic interpretation of this system assigns to (44) the same meaning as is assigned to (43) in the preceding system; (45), on the other hand, is assigned the same meaning as would be assigned to

$$(46) (\underline{\delta b}) (\underline{\sigma a}) \underline{P}(a, b)$$

Or, finally, the system that was introduced earlier containing the S symbol (the marker for the subject-predicate paradigm) might also be considered to be another realization of a system for predicate calculus containing primitive symbols like μ, σ , or δ .²⁴ In this system different semantic orders of quantifier-like elements are represented by different ways of subjectivization. Corresponding to (43) and (46) or, equivalently, to (44) and (45) one would have:

$$(47) \underline{S}(\underline{\sigma a}, \underline{P}(\text{---}' \underline{\delta b}))$$

and

$$(48) \underline{S}(\underline{\delta b}, \underline{P}(\underline{\sigma a}, \text{---})),$$

respectively.

Note that in each of these three systems, an analogy of the linear order principle for quantifiers holds with respect to the quantifier-like elements if the principle is understood in a direct and non-essential way; that is, the linear order of quantifier-like elements in a formula corresponds to their semantic order. But only in the second system described above may the analogy of the linear order principle be said to hold with respect to the quantifier-like elements in the meaningful sense specified above.

Now the question is, which of these three systems represents most faithfully the syntactic device employed in the section of Japanese treated above for the purpose of expressing the semantic order of words like mo, sae or dake in a sentence.

If it were the case that Japanese utilized a form like:

$$(49) \text{John sae S. S. dake John ga S. S. o yonda.}$$

or perhaps with pronominalization applied:

$$(50) \text{John sae S. S. dake kare ga sore o yonda.}$$

in order to express the meaning of (26), one could reasonably say that the

first system given just above, illustrated in (43) is one that describes a portion of Japanese. But the device illustrated in (49) or (50) is not employed in Japanese.

Assume, next, that the linear order principle holds for the words like mo, sae and dake, that is, the second system given above is adequate for the description of the syntactic device in Japanese we are concerned with. Then, the sentence frames:

(51) — wa — o yonda.

and

(52) — wa — ga yonda.

might be interpreted as realizations of two primitive predicate symbols, P and Q, which are related by the "order-inverse" correspondence. If John sae and S. S. dake are inserted in the first and the second slot of (51), one would get (26) with the deletion of wa in the presence of sae; on the other hand, if S. S. dake and John sae are inserted in the first and the second slot of (52), one would get (30).

But the sentence frame (51) also contrasts with the frame:

(53) — ga — o yonda.

(51) and (53) are exemplified by sentences (9) and (13), respectively. There is no word-order inversion or permutation that is to be represented by the contrast of frames (51) and (53). In the framework of the system associated with the linear order principle this contrast is not represented at all, while it is in the system equipped with the higher predicate S. Thus, the third system is judged to be the system that gives an adequate description of the portion of Japanese we are concerned with.

It was assumed that (51) represents an instance of the subject-predicate paradigm in the traditional sense, and that (53) is an instance of the subject-less structure. The formal system that contains the higher predicate S provides formal representations that express this intuitive distinction. Moreover, the assumption that the semantic order of quantifier-like elements like μ , σ , or δ is expressed by means of the higher predicate S is compatible with the actual readings assigned to sentences like (26) and (30). The formal system with the higher predicate S would be taken as the most adequate system

of which Japanese is considered as a realization, so far as the syntactic and semantic aspects of our present interest are concerned.

The formal system that contains the higher predicate S would appear at first glance to be logically superfluous as would be the structure of a language which can be interpreted as a realization of such a system. Thus, the existence of the subject-predicate paradigm in language might appear spurious. But closer observation has revealed that the higher predicate S serves to indicate the semantic distinction due to different semantic orders of quantifier-like elements, and correspondingly the subject-predicate paradigm has also been seen to reveal its semantic relevance on a level quite distinct from a mere rhetorical one.

Why the linear order principle was not made use of in accounting for the semantic order of words like mo, sae, or dake should now be clear. But there still remain certain facts that must be discussed in connection with this principle. By way of introduction, I shall now turn to certain somewhat incidental remarks on the ordinary quantifiers.

The reader might have wondered whether the subject-predicate paradigm is utilized in Japanese to express the semantic order of ordinary quantifiers in the same way as it is utilized to express the semantic order of the quantifier-like elements as described above, and, if so, why I did not have recourse to the ordinary quantifiers, more familiar objects in current linguistic discussions, in order to uncover the semantic role of the subject-predicate paradigm.

The reason I did not is that relevant facts in Japanese are far more complicated and less clear with ordinary quantifier words than with words like mo, sae or dake. This is not the place to try to give any systematic account of Japanese quantifiers,²⁵⁾ but just to get a glimpse at complexities involved here, let us, rather arbitrarily, consider the following sentence and some others that are apparently related to it transformationally:

(54) (Kono ie no) dareka ga (kono heya no) subete no hon o yonda.

This sentence may be translated by:

(55) Someone (in this house) read all the books (in this room).

Its meaning is consistent with the linear order principle for quantifiers;

that is, it means that there is someone (in this house) who read all the books (in this room). If the syntactic subject marker ga in (54) is replaced by wa, the marker of the subject in the sense of logic, one obtains

(56) (Kono ie no) dareka wa (kono heya no) subete no hon o yonda.

This form is at best highly marginal. If the order of the syntactic subject and object in (54) is inverted, one obtains

(57) (Kono heya no) subete no hon o (kono ie no) dareka ga yonda.

This form is grammatical and seems to allow two readings, one synonymous with that assigned to (54) and the other with the inverted semantic order of quantifiers, i. e. meaning that for each book (in this room) there is someone (in the house) who has read it. If one replaces the object marker o in (57) by wa, one gets

(58) (Kono heya no) subete no hon wa (kono ie no) dareka ga yonda.

This form sounds somewhat disagreeable, though incomparably better than (56). One obtains a perfectly acceptable form if one extracts subete out of the noun phrase that contains it and makes it a surface adverbial form:

(59) (Kono heya no) hon wa subete (kono ie no) dareka ga yonda.

The meaning of this sentence is that for each book (in this room) there is someone (in the house) who has read it; the other reading with the inverted semantic order of quantifiers, if possible, seems quite marginal.²⁶⁾ But if the word order of the two quantifiers subete and dareka is further inverted, which is now possible because subete has become a surface adverbial, one obtains a sentence in which the semantic order of quantifiers is also inverted:

(60) (Kono heya no) hon wa (kono ie no) dareka ga subete yonda;

this sentence is thus synonymous to (54) so far as the aspects of meaning which interest us at present are concerned.

This should be enough to hint at the complexities involved in the problem of the order of quantifiers. Some perhaps originate in language-general phenomena and some others are certainly particular to Japanese. Even from the limited data given above one may draw some tentative plausible generalizations that would reveal some regularity hidden under those complexities, and one may prove that the subject-predicate paradigm also serves the purpose of distinguishing the semantic order of quantifiers. But, as men-

tioned, I shall not go into analysis of Japanese quantifiers in this study.

There is, however, one thing about quantifiers which I shall consider briefly as a stepping stone to the discussion which follows. Whatever the role of the subject-predicate paradigm in indicating the semantic order of quantifiers may turn out to be, it would seem that other devices are also employed for the same purpose. The facts are again far from clear, but take sentences (54) and (57). To my mind these sentences do not appear to be completely synonymous. The reading with the semantic order: existential-universal seems to be assignable only to (54), while the inverted order: universal-existential is assignable (certainly to (57) and) perhaps to both (54) and (57). Note that neither (54) nor (57) involves the subject-predicate paradigm and that they are most plausibly related by mere word order change. Recall that in Japanese word order is generally quite free. Then, in order to account for pairs like (54) and (57), one might evoke a somewhat revised version of the linear order principle for quantifiers. One might assume that the sentence frames (53) and

(61) — o — ga yonda.

are realizations of predicates, say, P and Q, of a certain formal system, which are "order-inverses" of each other. In this formal system the semantic order of quantifiers is given by the following principle: if a predicate corresponds to a sentence frame with the "preferred" word order, the semantic order of quantifiers is given by their linear order; if a predicate corresponds to a sentence frame with "inverted" word order, the semantic order of quantifiers is ambiguous.

Returning now to the main concern of the paper, one may ask whether word order change, in addition to the subject-predicate structure, plays some role in indicating the semantic order of words like mo, sae, or dake. Recall that (26) was assumed to have the subject-predicate structure, wa being deleted in the presence of sae. Alongside (26) we also have:

(62) John sae ga S. S. dake o yonda.

This sentence would have to be assumed to be subjectless; sae and dake are simply added to (13). The semantic order of sae and dake in (62) is the same as in (26), and the semantic difference between (26) and (62) would be diffi-

cult to describe, being "rhetorical" in the same sense that the semantic difference between (9) and (13) is. Now, if one inverts the word order of the syntactic subject and object of (62), one obtains:

(63) S. S. dake o John sae ga yonda.

This form, to my mind, slips away, somewhat mysteriously, from any clear semantic interpretation, whereas the meaning of (30), which one obtains by replacing o in (63) by wa, is perfectly clear.

Let us take another example:

(64) John dake ga S. S. o sae yonda.

This sentence has the same semantic order of dake and sae as

(65) John dake wa S. S. o sae yonda.

(64) and (65) are assumed to be not having and having subjects in the sense of logic, respectively, and the semantic difference is again only rhetorical". As mentioned in note 10), o in (64) may be, and in fact normally is, deleted after sae with no obvious semantic effect:

(66) John dake ga S. S. sae yonda.

Now invert the word order of the syntactic subject and object of (65) and (66), we have:

(67) S. S. o sae John dake ga yonda.

(68) S. S. sae John dake ga yonda.

The meaning of (68) is clear and the semantic order of sae and dake in (68) is the opposite to that in (65). (68) implies that all the books in question including S. S. were read only by John. On the contrary I encounter the same kind of fuzziness of meaning for (67) as for (63).

One can account for these facts by the following assumption. The surface form (68) is assumed not to be derived generatively from (67) by deletion of o, nor from (66) by word order change. On the contrary, (68) is assumed to be a subject-predicate structure, the marker wa being deleted in the presence of sae. Thus, an underlying structure of (68) may be given in the form of:

(69) S. S. o sae wa John dake ga yonda.

This assumption allows one to state the following generalization. Given a sentence with sae and dake attached to two noun phrases contained in it, if

one of them is attached to a noun phrase which is the subject in the sense of logic, it precedes the other in semantic order (e. g. (26), (30), (65), (68)). If both sae and dake are attached to constituents that are not subjects in the sense of logic and if the word order of these constituents is as given by the base, the semantic order of sae and dake is determined by their surface order (e. g. (62), (64), (66)); where sae and dake are attached to constituents that are not subjects in the sense of logic and these constituents undergo word order changes, then the sentence is devoid of meaning (e. g. (63), (67)).

The reader will recall that without much formal evidence John was assumed to be the subject in the sense of logic in (26), the subject marker wa being assumed to be deleted in the presence of sae. (See note 11.) In fact, as mentioned in note 10 the syntactic object marker o must also be assumed to be deletable in the presence of sae. Likewise, one might have assumed that ga is optionally deleted from (62) to yield (26). This assumption would have sufficed for a formal explanation of (26) and would have been hard to refute semantically, because the semantic difference between (26) and (62) would be at best "rhetorical". However, such an assumption will not be accepted here. Only by assigning the subject status (in the sense of logic) to S. S. sae in (68), and making the assumption that wa is deleted in the presence of sae, is one able to attain the generalization obtained above that accounts for the data in (26), (30), and (62) – (68).

From the foregoing observations and discussions it can be concluded that, so far as our limited data is concerned, the syntactic device of word-order change is not involved in indicating the semantic order of sae and dake, and no analogy of the linear order principle for quantifiers in any interesting sense is involved. But apparently, word order is an essential factor in determining the semantic order of these words in some other situations. Take examples like the following where dake and sae are attached to adverbial phrases.

(70) John wa nitiyôbi ni dake 20D-102-gô situ de sae S. S. o yonda.
and

(71) John wa 20D-102-gô situ de sae nitiyôbi ni dake S. S. o yonda.

These sentences would be translated, respectively, as

(72) Only on Sundays John read S. S. even in room 20D-102.

and

(73) Even in room 20D-102 John read S. S. only on Sundays.

(70) and (71) are not synonymous, and the semantic order of sae and dake is identical to their linear (word) orders, both in (70) and (71). Hence, whatever the linear order of time and place adverbials in the base component may be, the operation of word order change giving either (70) or (71) seems to be crucial in determining the semantic order of sae and dake.

It would now follow that word order has different grammatical significance with respect to the syntactic subject and object on the one hand and with respect to the time and place adverbials on the other. Japanese is sometimes said to be close to a free word order language. In contrast, word order is assumed to have an essential grammatical rôle in English. But word order between different pairs of grammatical constituents of a sentence may have different grammatical significance. Thus, the word order between the syntactic subject and object in English can be assumed to have a real grammatical significance, while it seems unlikely that one can bring forward an argument with equal force which establishes some basic word order between the time and place adverbials. Even in Japanese, where real grammatical significance of word order is harder to establish than in English, it now seems to follow from our observation that word order between the subject and object has a different status from word order between the time and place adverbials.

More specifically, it is clear that a basic subject-object word order, which one assumes is to be given in the base component, is established by the fact that in a sentence in which neither the (syntactic) subject nor object is made the subject (in the sense of logic) the semantic order of the quantifierlike elements attached to the (syntactic) subject and object of a sentence is represented by their word order in the surface structure only if that word order is the same as the basic word order; otherwise, the sentence gets no semantic interpretation. The pair (70) and (71), on the contrary, would indicate that similar evidence cannot be brought forth to support the legitimacy of a basic word order between the time and

the place adverbial. To make our discussion of the sentences like (70) and (71) complete further complications would have to be mentioned, however. Thus, one might propose an alternative analysis of sentences like (70) and (71) along the line suggested below. Note that alongside (70) and (71) one has also the following sentences, in which dake is followed by wa:

(74) John wa nityôbi ni dake wa 20D-102-gô situ de sae S. S. o yonda.

(75) John wa 20D-102-gô situ de sae nityôbi ni dake wa S. S. o yonda.

On the one hand, the semantic difference between (70) and (74), or between (71) and (75), if any, would be very small. On the other hand, it will be recalled that a rule was assumed to exist that deletes wa optionally in the presence of dake. (cf. note 12) One might then take (70) and (71) as superficial variants of (74) and (75), respectively. But what do the recurrent wa's such as observed in (74) and (75) represent?

The recurrence of wa is not necessarily tied up with occurrence of words like dake or sae. One has forms like:

(76) John wa nityôbi ni wa 20D-102-gô situ de S. S. o yonda.

(77) John wa 20D-102-gô situ de wa nityôbi ni S. S. o yonda.

(78) John wa S. S. wa nityôbi ni 20D-102-gô situ de yonda.

In brief, an arbitrary number of constituents of a sentence may have wa attached to them and be brought to sentence initial position.

Note that wa is obligatorily deleted in the presence of sae and consequently the form

(79) John wa 20D-102-gô situ de sae wa nityôbi ni dake wa S. S. o
yonda.

could be assumed to underlie (75). Then, in this less superficial form the three sentence-initial positions are occupied by wa phrases, though in the surface form (75) the wa phrase nityôbi ni dake wa appears to follow a non-wa phrase, 20D-102-gô situ de sae.

It will be assumed that all such wa constituents can be subjects of the sentence that contains them. This hypothesis implies that a sentence may have more than one subject in the sense of logic, contrary to what might be taken for granted from the traditional conception of this notion and contrary to what in fact has been assumed tacitly so far in the above discussion.²⁷⁾

This hypothesis of multiple subjects may be hard to justify not only before the eyes of the modern logician but also in the traditionalist's view. Even the traditionalist's concept of the simple subject-predicate paradigm has been observed to be hard to justify on an absolutely formal basis independent of psychological intuition. All that has been done so far is to accept the existence of the subject-predicate paradigm, the subject being marked by wa in Japanese, and then to show that. This Paradigm is utilized in indicating semantic order of words like mo, sae, or dake. It may not be expected that one can do little more with multiple subjects than with single subjects. However, since multiple subjects of a sentence are unheard of in the linguistic or logical tradition, some nonintuitive hints for the justification of their existence may be in order. I intend to give such hints from two different viewpoints, one formal and the other semantic. The latter will lead us to consider the wider or, one may say, more general usage of wa than as the subject marker and its more general, or one may say, more basic meaning.

Consider, then, first a formal system which contains a predicate of a higher order, \underline{S} , to represent the subject-predicate paradigm. From a predicate form of an ordinary type, say, $\underline{P}(\underline{a}, \underline{b}, \underline{c})$, a subject-predicate structure, say, $\underline{S}(\underline{a}, \underline{P}(\underline{—}, \underline{b}, \underline{c}))$ is derived. But this latter form may itself be considered to be a three-placed predicate form. Thus, if one assumes that this three-placed predicate is represented by a predicate symbol \underline{Q} , one should be able to "subjectivize" any of the constants it contains; for example, one may have $\underline{S}(\underline{b}, \underline{Q}(\underline{a}, \underline{—}, \underline{c}))$. Now, let us substitute $\underline{S}(\underline{a}, \underline{P}(\underline{—}, \underline{—}, \underline{c}))$ for $\underline{Q}(\underline{a}, \underline{—}, \underline{c})$ in this expression, thus obtaining $\underline{S}(\underline{b}, \underline{S}(\underline{a}, \underline{P}(\underline{—}, \underline{—}, \underline{c})))$, where two of the constants in the original predicate \underline{P} appear to get subjectivized. Unfortunately this last expression is defective, since it contains no information as to which places of \underline{P} the constants \underline{a} and \underline{b} originally occupied. In order to obtain a satisfactory formal system in which recursive operation of subjectivization may be incorporated we must introduce some additional technical complications. One might introduce a series of "suffixed" \underline{S} -symbols, \underline{S}_i , instead of one \underline{S} , where the suffix i is assumed to refer to the i -th place in an ordinary predicate symbol in which the subjectivized constant

originates. The above expression, for example, will be rendered as $S_2(\underline{b}, S_1(\underline{a}, P(\underline{—}, \underline{—}, \underline{c})))$.

It does not matter here what the syntactic device one would introduce in order to construct a formal system which is equipped with a device of recursive subjectivization; nor does it matter what complications such a device would entail in characterizing well-formedness of formulas in such a system. It is only necessary to note that once the subjectivizing higher predicate S is introduced it is conceptually, if not technically, a straight-forward generalization to conceive of a recursive process of subjectivization. If one assumes, then, that a predicate of the form $P(\underline{a}, \underline{b}, \underline{c}, \underline{d})$ represents the sentence frame

(80) a ga b ni c de d o yonda.

sentences (76)-(78) would correspond to forms like

(81) $S_1(\text{John}, S_2(\text{nityôbi}, P(\underline{—}, \underline{—}, 20D-102-gô\ situ, S. S.)))$,

(82) $S_1(\text{John}, S_3(20D-102-gô\ situ, P(\underline{—}, \text{nityôbi}, \underline{—}, S. S.)))$,

(83) $S_1(\text{John}, S_4(S. S., P(\underline{—}, \text{nityôbi}, 20D-102-gô\ situ, \underline{—})))$.

I shall now take another look at recursive subjectivization from the semantic point of view. In fact I shall have to discuss wa from a more general point of view than before and then return to the semantic justification of recursive subjectivization. As the marker of a subject, wa is assigned to the first or first several noun phrase constituents of a sentence. But, as was mentioned earlier (cf. p. 116, this Bulletin, No. 3), wa has a distributional similarity with the huku-zyosi's like mo, sae, or dake. The character of wa as a huku-zyosi would perhaps be demonstrated most clearly with examples in which wa is assigned to the verbs of sentences in the way the other huku-zyosi's may be assigned to verbs. Compare the following sentences:

(84) John wa S. S. o yomi mo sita.

(85) John wa S. S. o yomi sae sita.

(86) John wa S. S. o yomi dake sita.

(87) John wa S. S. o yomi wa sita.

Here the first wa phrase, John wa, is assumed to represent the subject of each sentence. Observe specifically the second wa in (87). The form yomi contained in these sentences is, one may say for the present purpose, the stem form of the verb yomu "read"; sita is the past form of suru "do" but

here it serves only as a carrier of the past marker, much like the English verb do in certain contexts. The first three of these sentences (84)-(86) might be rendered into English as

(88) John also read S. S.

(89) John even read S. S.

(90) John only read S. S.

Each of (84)-(87) is ambiguous. (84), for example, may presuppose either that John read something other than S. S., or that John did something with S. S. other than to read it, or that John did something other than to read S. S. I shall not be concerned with the systematic manner of ambiguity of sentences like (84)-(87) which is characteristic of words like mo, sae, or dake. Suffice it to say that (87) is ambiguous in the same way as (84) - (86) are. What concerns us principally is the meaning of wa, as it is used in (87). Unlike mo, sae, and dake, which may be glossed as "also", "even", and "only", respectively, there is no single English tag translation of wa. The word also or mo makes an assertion about an object or an event with the presupposition that the same assertion holds with some other specific objects or events. The basic meaning of wa may be described as an assertion about an object or event where the speaker intends to imply that he is not committing himself to the validity of that assertion relating to other specific objects or events. The implication may, depending on the context, indicate the negation of the same assertion relating to some other things or events. Let us return to example (87). As was mentioned above, the implicational force of wa may act on different parts of the sentence so that ambiguity results. Assume first that it acts only on S. S.. Then, (87) means that John read S. S. but whether or not he read some other things in the range more or less definitely defined in the context is not known; or it may mean, depending on the context, that John read S. S., but not some other things in question. Assume that the implicational force of wa acts only on yomi. Then, (87) means that John read S. S. but whether or not he did some other things with it (for example, whether or not he made notes of it, whether or not he understood it) is not known, depending on the context explicitly negative force may be added in this case, too. Assume that the implicational force of wa acts on S. S. o

yomi. Then, (87) means that John read S. S. but whether or not he engaged himself in some other activities, for example, whether or not he cut salami, is not known; or, depending on the context, that he did so is disclaimed.

Like other huku-zyosi's, wa may be assigned in surface structure not only to verbs but also to some other kinds of constituents, in particular noun phrases. On the other hand, it was assumed that subjects of sentences are marked by wa. When wa serves as a subject marker it does not carry the implicational force of wa as a huku-zyosi that I tried to explain just now. Hence, wa attached to a noun phrase can in principle be ambiguous, but the ambiguity is partially resolved by the following two conditions. First, a subject or subjects of a sentence must be a noun phrase or noun phrases that occupy the sentence-initial position or first several sentence-initial positions of a sentence.²⁸⁾ Secondly, a heavy stress put on a wa may be used to indicate that the occurrence of wa is to be understood as a huku-zyosi with the implicational force explained above. But some other factors may also seem to contribute in an intricate and poorly understood way to determining the manner in which occurrences of wa are to be understood or are preferred to be understood. For example, compare the following sentences:

(91) John wa S. S. wa yonda.

(92) John wa S. S. wa 20D-102-gô situ de yonda.

If these sentences are read without special stress on S. S. wa, it would most likely be understood with an implication about some other things in (91), but not in (92). (92), then, is taken simply as a statement "about" John and S. S. Understood that way, the meaning of (92) would not change noticeably if word order of the two wa phrases is inverted:

(93) S. S. wa John wa 20D-102-gô situ de yonda.

On the other hand, if one inverts the order of the two wa phrases in (91), one gets the sentence

(94) S. S. wa John wa yonda.

in which, contrary to what one has in (91), S. S. would be taken as a subject while John would be understood with the implicational force explained above.

Putting aside complications like these, one should notice the essential fact that the nonsubjective use of wa is syntactically and semantically of the

same character as mo, sae and dake. In particular, the meaning of wa would be such that it may possibly be formalized in a form similar to (18), (20), and (21), perhaps, in the scheme of some kind of modal logic. To give a formal description of wa is irrelevant for the present purpose. It is only necessary to note that such description would include, as in the case of mo, sae, and dake, a logical variable whose range would be defined more or less distinctly in the context.

But why is the same word wa used as the subject marker? Should it simply be considered as a word accidentally homophonous with the nonsubjective wa? I would think it should not. It is not a simple question to ask how the relatedness of the two different uses of wa would have to be represented in a formalized grammar. But it seems to me reasonable to assume, for an informal account of the relatedness of the two usages of wa, that the subjective wa is a "limit case" of the nonsubjective wa with respect to the range of the variable involved in the implicational force. More specifically, for the implicational force of wa in a sentence to be properly understood, a set of objects "in question" must be presupposed which consists on the one hand of the object or objects about which the assertion of the sentence is made and on the other hand of the object or objects about which the assertion obtained by replacing the former objects by the latter is specially intended not to be made. If the latter part of this set of the objects "in question" "reduces" to null, the implicational force of wa will be lost and yet one might be able to assume that the sentence retains its core meaning now with a "rhetorical" force which explains why it still feels like an assertion "about certain objects". Hence the subject-predicate structure.

I shall now return to the question of multiple subjects. Let us first note that the wa with implicational force as well as mo, sae, and dake may recur in a sentence, although we may have to admit that the degree of naturalness decreases rapidly with an increase in number of occurrences of such an element. Consider examples like the following:

- (95) John wa nitiyôbi ni 20D-102-gô situ de mo S. S. mo yonda.
- (96) John wa nitiyôbi ni 20D-102-gô situ de sae S. S. o sae yonda.
- (97) John wa nitiyôbi ni 20D-102-gô situ de dake S. S. dake o yonda.

(98) John wa nitiyôbi ni 20D-102-gô situ de wa S. S. wa yonda.

The meaning of (95) would be described by saying that John read not only S. S. but also some other books not only in 20D-102 but also in some other places on Sunday(s). Similarly for the meanings of the other sentences, (96)-(98). Now, if the implicational force of the second and third wa in (98) is, so to speak, reduced to zero, as a limiting situation, the sets of the objects "in question" being reduced to one-member sets, one may assume that a multiple subject sentence in which 20D-102-gô situ and S. S. are subjects as well as John results:

(99) John wa 20D-102-gô situ de wa S. S. wa nitiyôbi ni yonda.

Returning now to (70) and (71) let us recall that they could be analyzed as being derived from underlying representations (74) and (79), respectively. According to this analysis they would correspond to the formal representations:

(100) $S_1(\text{John}, S_2(\delta\text{nitiyôbi}, P(\text{---}, \text{---}, \sigma\text{20D-102-gô situ}, \text{S. S.})))$,

and

(101) $S_1(\text{John}, S_3(\sigma\text{20D-102-gô situ}, S_2(\delta\text{nitiyôbi}, P(\text{---}, \text{---}, \text{---}, \text{S. S.}))))$,

respectively, where \underline{P} is a predicate corresponding to the sentence frame (80), and the suffixed \underline{S} symbols, \underline{S}_1 etc., are as in (81)-(83). If this analysis of sentences like (70) and (71) is to be adopted, the semantic order of dake and sae in these sentences must be considered to be not a matter of mere word order, but rather a matter of the order of successive subjectivization of constituents that appear as subjects of these sentences.

Previously, it was claimed that evidence could be given according to which a particular basic word order would be set up in Japanese for the syntactic subject and object (in fact, the order subject-object) while similar evidence cannot be found that bears on the basic order of the time and place adverbials. This claim depends essentially on the fact that forms like (63) and (67) tend to mysteriously escape one's mind when one tries to understand their meaning, while such is not the case with either (70) or (71). The claim itself is not invalidated even if (70) and (71) must be analyzed as having the multiple subject structure in the way described just now. But then, it would not be word order that must be taken as responsible for the determination of

the semantic order of dake and sae in (70) and (71).

Apparently there is no plausible way to contest the claim that (70) and (71) can be derived from (74) and (79), respectively, and to show that word order, rather than multiple subject-predicate structure, is responsible for the semantic order of dake and sae in (70) and (71). But slight modification of (70) and (71) will yield indirect support for the claim that word order is in fact responsible. Let us make the object phrase S. S. o precede the place and time adverbials in (70) and (71). We will have:

(102) John wa S. S. o nitiyôbi ni dake 20D-102-gô situ de sae yonda.

(103) John wa S. S. o 20D-102-gô situ de sae nitiyôbi ni dake yonda.

These two sentences are synonymous with (70) and (71), respectively.

Recalling the morphological rules that deletes wa in the presence of dake and sae one might assume that the forms that directly underlie (102) and (103) are

(104) John wa S. S. o nitiyôbi ni dake wa 20D-102-gô situ de sae wa
yonda.

and

(105) John wa S. S. o 20D-102-gô situ de sae wa nitiyôbi ni dake wa
yonda.

respectively. But, as stated earlier, a wa phrase can be a subject only if it is preceded, if at all, by other wa phrases which are also subjects. This condition is not met in (104) and (105) for the noninitial wa phrases due to the object phrase, S. S. o, which precedes them. The multiple subject-predicate structure cannot be assumed to exist in (104) and (105). Accordingly, the semantic order of dake and sae in (102) and (103) must be accounted for by means of word order rather than multiple subject-predicate structure. From this one might conclude indirectly that the semantic order of dake and sae in (70) and (71) are also due to word order rather than multiple subject-predicate structure that could be assumed to underlie these surface forms.

Notes

17) This principle has been well known in the oral tradition of transformational generative grammar for a long time, though it has rarely been dis-

cussed in print. I heard about it for the first time from Chomsky, I believe, sometime before 1965. But I will not bother now to determine to what extent and in what sense he committed himself to it then or he would commit himself to it at present. Since the first draft of this article was written, the interest in the relationship between the semantic order and the surface order of quantifiers has been renovated due to Lakoff's works on derivational constraints. (Cf. Lakoff (1969), (1970))

18) Obviously the expression "the ordinary system for predicate calculus" is ambiguous, but for our present purpose what is essential is that it contains both the existential and the universal quantifier as primitive symbols, and any ambiguity in other respects may be left unclarified without fear of any confusion.

19) In fact, taken strictly literally as it was formulated just now the principle is trivially not correct; counterexamples are easy to find. For example,

(A) There are some fish in every pond.

and

(B) There is some solution for every equation.

are synonymous with

(C) In every pond there are some fish.

and

(D) For every equation there is some solution.

respectively; thus, the principle must apparently be applied to some 'shallow' level, to use Postal's term, rather than the surface level in the strict sense. Furthermore, comparison of sentences like

(E) Everyone expected that someone would vote for Nixon.

(F) That someone would vote for Nixon was expected by everyone.

(G) Everyone expected someone to vote for Nixon.

(H) Someone was expected by everyone to vote for Nixon.

would convince one that not only linear word order but also command relationship (cf. Langacker (1969)) are necessary to characterize the meanings of these sentences. See Lakoff's works cited in note 17 for related discussions. The purpose of the following discussion is to establish the claim that the assumption of the subject-predicate structure cannot be replaced by the simple form of the principle of the linear order in order to account for the meanings of sentences like (26) and (30) discussed in part I. Once the existence of the subject-predicate structure is accepted, one might argue that the subject belongs to a higher sentence, i. e. one might assign a structure like:

(I) (John wa (S. S. o yonda)_S)_S

to sentence

(J) John wa S. S. o yonda.

Then, sentences like (26) and (30) would be assigned the structures:

(K) (John sae (S. S. dake o yonda)_S)_S

(L) (S. S. dake wa (John sae ga yonda)_S)_S.

One would point out that the characteristic relationship that holds between sae and dake in (K) and (L) is the relationship of command rather than linear word order. The semantic order of sae and dake in these sentences would then be accounted for in terms of command. Arguments along these lines would bring the topics discussed in this paper in a framework more familiar in current trends in transformational generative grammar. But our primary purpose in

this paper is to secure the status of the subject-predicate structure, independently of the extent to which such arguments are considered to be useful.

20) This expression is not quite satisfactory, because the same variable may occur more than once, in which case its meaning is not clear. Hence one would have to say more exactly "the linear order of quantifiers prefixed to the first occurrence of each variable in a predicate as they appear inside the predicate symbol."

21) In order to call Σ a formal system for predicate calculus one must give in addition the rules of inference of Σ , whose formulation may turn out to be not so simple. But this point is not relevant to our present purpose and is left open.

22) In this paper I am not concerned with interaction of the quantifier-like elements and the ordinary quantifiers in our formal system. Accordingly, in reality it suffices for our present purpose to assume a degenerate type of predicate calculus which is devoid of logical variables and of the logical quantifiers and to supplement it with the quantifier-like elements. But in what follows, instead of formulating explicitly a formal system for such a degenerate type of predicate calculus, I continue mentioning to predicate calculus, in the ordinary sense, without, however, specifying formally how the quantifiers and their order are to be treated syntactically in the formal system in question.

23) In the case of even, however, one would have to have recourse to a predicate calculus that contains a special predicate of a higher order that represents the semantic nuance of even. Hence, a system that contains σ may not be said to be a formal system for first order predicate calculus. But I shall use the term predicate calculus somewhat ambiguously in this respect without, I hope, causing any confusion.

24) This statement is not in fact correct; this system, as it stands now, is capable of distinguishing different orders of quantifier-like elements only if at most two occurrences of such elements are contained in a formula. Thus, exactly speaking this system represents only a substructure of predicate calculus. I shall later have an occasion to extend it to a more general system, but for the convenience of exposition it would be sufficient for the time being to restrict ourselves to this approximation.

25) For each of the universal and the existential quantifiers there are several words that may be taken to represent them in Japanese, e. g. subete(no), nandemo, doredemo, daredemo etc. and nanika, doreka, dareka, etc. These words in each group are not synonymous and differ by obvious semantic factors of "humanness", in addition to having syntactic characteristics of their own. Any attempt of description as to how they are interpreted vis-a-vis other co-occurring quantifiers must involve considerable analysis of the semantics and syntax of these words.

26) Note, however, that these two readings are related in such a way that when the latter is true the former is true. Besides, if dareka is used "specifically", denoting some particular person, it fulfils the role of a logical constant rather than a logical variable, and the problem of the possible ambiguity in question disappears. These factors concerning the problem of the order of ordinary quantifiers which are language universal make judgments on the relevant data more delicate than in the case of the problem of the semantic order of words like mo, sae or dake.

- 27) Thus, I have been using the expression "the subject of a sentence".
28) This condition is not strictly correct, if it is applied to surface structures. It must be applied to some near-surface structures. One may have sentences like:

(a) John ga S. S. o yonda koto o Bill wa sitte iru.
(Bill knows that John read S. S.)

This sentence may be described as a result of a "late" word order changes from:

(b) Bill wa John ga S. S. o yonda koto o sitte iru.

In a natural reading of both (a) and (b) Bill wa is taken as subject.

R e f e r e n c e s

G. Lakoff, "On Derivational Constraints," Papers from the Fifth Regional Meeting, Chicago Linguistic Society, 117-139(1969).

----- "On Generative Semantics," in L. A. Jakobovits and D. D. Steinberg (eds.), Semantics - An Interdisciplinary Reader in Philosophy, Linguistics, Anthropology and Psychology. Cambridge University Press, London (1970).

Ronald W. Langacker, "On Pronominalization and the Chain of Command," in D. A. Reibel and S. A. Schane (eds.), Modern Studies in English, 160-186 (1969).