Japanese Learners' Strategy of English Sentence Processing
−On Word Order Strategy−

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0. Introduction

In order to be fluent in the target language, learners have to acquire the strategies which process the target language most effectively. This paper deals with Japanese learners' word order strategy in the subject case assignment in English. How do Japanese learners acquire English language specific word order strategies?

1. Background

1.1. Word order strategy in English

A large body of crosslinguistic research investigating the subject role assignment in the three kinds of transitive verb sentence which consist of one transitive verb and two nouns (NVN, VNN, NNV) has extracted a specific function mapping onto these word orders by English native speakers viz., NVN=SVO, VNN=VOS, NNV=OSV. The latter two are called the 'second noun strategy' because the second noun is exclusively chosen as the sentence subject (Bates et al, 1982).

These form−function mappings reflect the probabilistic occurrence of word order in English. Macwhinney et al. (1984) cite some examples of the possible word order which should contribute to the second noun strategy of English native speakers.

VOS: Makes a mean apple pie, my old lady.　　OSV: The red one I want.
　　　Get the ball, Bill.　　　　　　　　　　　　　It was the dog the cat chased.
　　　She makes a mean apple pie, my old　　　　　What do you eat ?
　　　lady.　　　　　　　　　　　　　　　　　　My dog, John likes him.
　　　　　　　　　　　　　　　　　　　　　　　(Macwhinney et al. 1984: 131−132)

1.2. Sentence Processing in L2

Language conveys the underlying function through the surface linguistic forms. Among those cues available in language are, e.g. word order, inflections, prepositions and lexical semantic properties such as animacy or concreteness, etc.

A handful of studies have investigated how L2 learners use these cues in L2 sentence processing (e.g. Gass, 1987, Harrington, 1987, Kilborn and Correman, 1987, McDonald, 1987). Although these studies differ in size, scope, and methodologies etc., the following general conclusion can be made; L2 learners tend to transfer the weights they acquired in their L1 to the processing of L2[1]. Therefore the present study begins by investigating what kind of word order strategies English native speakers and Japanese native speakers have in their L1 and then proceeds to compare these strategies, which are taken as

baseline; one as a starting point, and the other as a goal, with those of Japanese learners' processing of English sentences.

2. The study

2.1. Subjects

The subjects consist of the following five groups;

12 Japanese native speakers	(JNS)
41 Junior high school students (2nd year)	(JHS)
45 Senior high school students (2nd year)	(SHS)
23 University students (English major seniors)	(UNS)
16 English native speakers	(ENS)

2.2. Material

Two sets of materials were prepared; one in English for the ENS and interlanguage groups (JHS, SHS, UNS), and the other in Japanese for the JNS. These English and Japanese versions are translation equivalents. Four verbs and five animate nouns were combined to make three kinds of word order (NVN, VNN, NNV). Each word order type has four sentences, therefore 12 sentences altogether. The test sentences were randomly ordered for presentation. The English version was tape–recorded by a female native speaker so that the subjects would do the task following the tape. The example sentences appear in Appendix.

2.3. Procedure

The experiment was administered in a group for the JNS, JHS, SHS, and UNS, and individually for the ENS. Subjects were asked to circle the noun which they thought was the subject of a sentence. After completing the task, the learner groups were asked to write down their own definition of a sentence subject and to answer the multiple—choice type questionnaire on their own strategies (see Appendix).

2.4. Analysis

Those data in which more than half of the answers were invalid because of missed or incomplete answers were omitted. This left the following number of data for analysis; 12 JNS, 25 JHS, 42 SHS, 23 UNS, 16 ENS.

The number of the first nouns selected as the subject was tallied for each word order type. A $2 \times 3 \times 3$ ANOVA for the native speakers' baseline strategy and a $5 \times 3 \times 3$ ANOVA for the interlanguage processing strategy were computed. In both ANOVAs, the subject group was a between—subject variable, and word order and animacy were within—subject variables [2]. In order to specify the word order strategies which each group internalizes, consistency was used as a measure. Figure coming next shows the consistency under each word order. Consistency is calculated by distracting 50%(chance level) from the percent choice of first noun. It can be interpreted to show the pure value of the first noun selection. If a column comes into the upper half of the graph it indicates the first

noun strategy and if it hangs down under the line of zero, second noun strategy. The length of the column can be interpreted to show the strength of the strategies.

## 2.5. Results and discussions
2.5.1. Native baseline strategies

The percentages of the first noun choice were 52.1%, 45.8%, 43.8%, for JNS, and 100%, 23.4%, 4.7%, for ENS, in NVN, VNN, NNV sentences respectively. The word order effect was significant for ENS (p<.01) but not for JNS. Consistency indicates that ENS adopt a first noun strategy (choosing the first noun as the sentence subject) in NVN sentences and the second noun strategy in VNN, NNV sentences, but JNS don't show any preference for the position of the noun in sentence subject selection.

As word order is a very reliable cue in English, ENS internalize these word order strategies that make them judge the subject based on the position of the noun. In Japanese word order is relatively free and is not very informative for interpretation, therefore JNS don't make use of word order cue in their judgment[3]. From this result, it could be assumed that Japanese learners don't have any word order bias as a starting point.

The following hypotheses about inter-language group were made based on those baseline data.

Hypothesis 1: As for NVN word order, even elementary learners will show a preference for the first noun strategy. This part of the hypothesis was derived from the assumption that, as NVN is the canonical word order in English, there is much chance even for elementary learners to be exposed to this word order. The rest of this hypothesis states that this first noun strategy becomes strong as the learning proceeds.

NVN WORD ORDER

VNN WORD ORDER
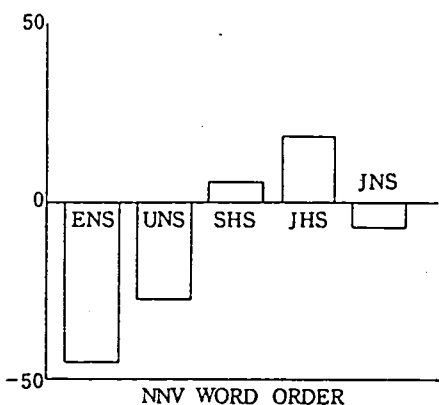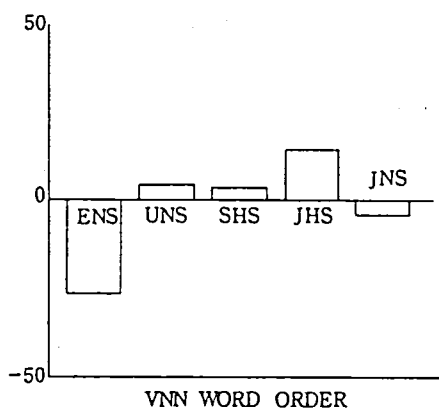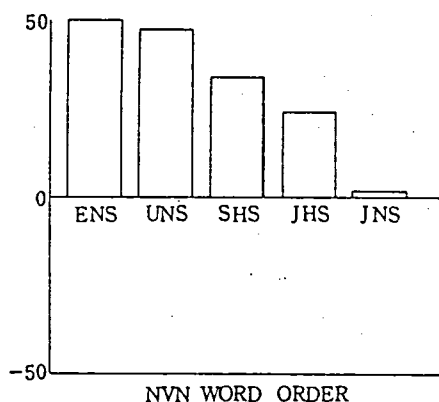
NNV WORD ORDER

Hypothesis 2: As for VNN and NNV word order, the learners won't show any preference
for word order strategy at the elementary stage. But as they progress in learning,
they will begin to gradually show the second noun strategy.

These hypotheses will be considered in the following discussion.


2.5.2. Interlanguage strategies

In this section, discussion starts with the definition data and introspection data, then
goes on to learners' word order strategy.

Learners' definition of 'subject'

The definitions the learners wrote were categorized into five types;
1) definitions based on the semantic information, i.e. "Subject is the agent."
2) definitions based on the Japanese system, i.e. "Subject is what corresponds to the words
attached with postpositions "ha" or "ga" when translated into Japanese."
3) definitions based on the syntactic information, i.e. "Subject is what comes before the
verb." or "Subject is what comes at the head of a sentence."
4) definitions which regard subject as something especially important in a sentence, e.g.
"subject is the center of a sentence."
5) none of the above

The figure below represents the percentage of learners' definition shared by the above
categories.
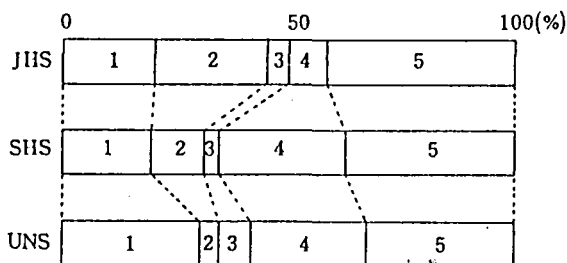
Introspection of the strategy

Six items made for extracting introspection data was intended to represent the following
strategies; (original items appear in appendix)
1. SVO English canonical word order strategy
2. SOV Japanese canonical word order strategy.
3. Agent—patient strategy, which means that they don't care the place of the verb
and just pick up the noun which comes first in any word order.
4. Semantic strategy
5. Intuition or feeling
6. None of the above

The percent choice of each item by learner groups comes next:

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        0              50          100(%)
JHS   | 1 |      2       |3| 4 |
SHS   |   1    |   2  |3| 4 | 5 |
UNS   |        1        |2|3|
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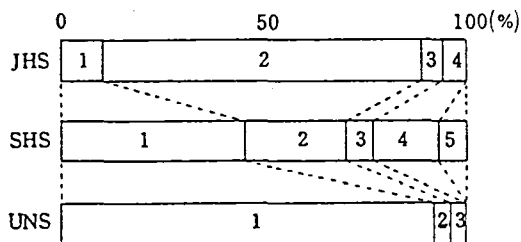
The definition data show that JHS are predominantly using the Japanese system when they define the concept of English sentence subject. Probably it's easiest for them to use their L1 system as a template onto which they map the new L2 system in order to generally grasp the concept which is central to understanding English sentences. Most Japanese teachers of English seem to be using this strategy to make elementary learners understand the subject system in English. Although this strategy itself is not a wrong one at all, this does suggest that there is a conscious translation process when elementary learners understand English sentences. The percentage of reliance on the L1 system decreases as the learning proceeds. Instead, a semantically based definition increases remarkably. Over 90% of the UNS gave a semantically based definition. This tendency can be interpreted as showing that learners first use probabilistic mapping between L1 and L2 but gradually discard this strategy and instead begin to use the most prototypical mapping between form and semantic function in the target language.

Interestingly, the introspectional analysis of the strategy reflects their metalinguistic knowledge of the subject. Again the L1 based strategy decreases as the proficiency goes up and judging the sentence subject based on the semantic information increases. Also the SVO strategy based on the L2 canonical word order increased. From these results, the following points were suggested;
1) There could be translation from English to Japanese especially at the elementary stage.
2) The more advanced the learners are, the more they use a semantic strategy.
3) The more advanced the learners are, the more strongly they use English specific formal properties.

Turning to the word order effect, a significant effect was obtained for SHS, UNS, ENS (p<.01), but not for JHS and JNS. The results of each subject group indicate that ENS, UNS, and SHS change their strategy according to the word order, but JHS and JNS don't. The latter two groups either have a consistent word order strategy across the three configurations or have no word order strategy at all. A comparison of these two groups revealed the difference. Even a glance at the consistency figures will suggest that JHS have chosen more first nouns than JNS in every word order. (The difference was statistically significant (p<.01)). This means that JHS have a greater preference for the first noun compared with the JNS. So the no word order strategy of these two groups must be interpreted differently. JNS don't have any word order strategy but JHS have the first noun strategy for any word order. UNS revealed as strong a first noun strategy as regards NVN word order as that of ENS (The difference wasn't significant)

but they didn't show a second noun strategy for a VNN configuration. They slightly preferred the first noun but as the first noun choice is so small, it should be interpreted that they don't have a particular word order strategy for this type of word order. As for NNV sentences, they showed the second noun strategy though theirs was significantly (p<.01) weaker than that of ENS. SHS showed the first noun strategy in NVN sentences. Their first noun strategy didn't differ significantly from that of UNS. The second noun strategy didn't appear under any word order. Although they rather preferred the first noun in VNN and NNV sentences, this first noun choice was small, which implies that they don't have any specific word order strategy for these sentences.

Turning back to the hypotheses, hypothesis 1, which states that even the beginners will show a preference for the first noun strategy for NVN sentences and this strategy will grow stronger in proportion to the proficiency, was verified. But hypothesis 2, which predicted that the learners wouldn't show any word order strategy at an elementary stage but would gradually acquire the second noun strategy, wasn't verified because JHS revealed the first noun strategy under every configuration. Why did they prefer the first noun in the judgment of the sentence subject?

A similar experiment was conducted for the examination of the development of processing strategies of English native children. Bates et al. (1984) and Slobin and Bever (1982) have drawn more or less similar results. The children's age were approximately from two to five. They found that children developed a SVO strategy for NVN sentences but didn't show any particular strategy for VNN and NNV sentences.

Although these data indicate no overgeneralization of the SVO first noun strategy by English native children, this fact can't lead to the exclusion of the possibility for JHS subjects to overgeneralize the acquired SVO configuration to the other two orders, because their cognitive development should be different from the pre-schoolers. Their exposure to English is so limited that most of the structures they have met are probably SVO word order. Therefore, if they use previous knowledge in the L2, the SVO first noun strategy should be the only available one for them.

There is, however, another possibility. They may have made interlingual transfer, adopting Japanese canonical SOV word order to NNV sentences. As was discussed, their introspection and the metalinguistic definition of sentence subject suggest the translation process is intervening in their judgment. They are regarding English sentence subjects as equivalent to the nouns with attached postpositions 'ga' or 'ha'.

Although no SOV preference appeared in the interpretation of Japanese sentences, if translation from English to Japanese occurs during the processing, it is quite likely that JHS will adopt Japanese SOV canonical word order for NNV sentences. Hakuta (1982) reports that in a production task (picture description), Japanese children uttered more SOV active sentences. So if translation occurs during the processing and if this is regarded as a kind of production, an SOV bias is likely to occur. The SVO English canonical word order and SOV Japanese canonical word order together may have led them to prefer the first noun in VNN sentences, too.

Further research, however, is needed to determine the cause of this first noun choice.

But regardless of the cause, it could be concluded that JHS have a strategy to take the first noun in an English sentence as the subject. And if this first noun strategy is taken as a starting point, it can be said that SHS are losing this first noun strategy and moving toward the second noun strategy. So their no word order strategy is not an aimless random choice but reflects the process of learning. Japanese learners appear to gradually develop the feel of probabilistic word order patterns in English and come to use that intuition in the processing. The second noun strategy isn't a rule stated in a grammar book nor taught explicitly at school. Nevertheless, it seems that advanced learners somehow acquire this kind of specific strategy unconsciously through exposure to various English sentences.

3 . Conclusion

In recent years psycholinguistic research has revealed strategies used by English native speakers in real-time processing of English sentences. The strategies discussed here are only some of those already acknowledged. Such fixed reaction patterns shown by English native speakers to the three word orders make us realize how reliable and therefore how important the syntactic cues are in sentence processing in English.

It would seem logical that L2 learners would benefit by adopting these strategies in processing English sentences. The second noun strategy, for example, should have a potential to be integrated in English language teaching. However, care must be taken in making any assertions on the pedagogical application of such a strategy. Much work remains to be done on how native speakers' strategies are taught in the classroom.

NOTES

1) For example, German speaking learners of English, whose native language puts heavy weight on case inflection, are likely to choose 'she' as a sentence subject in an English sentence such as 'Tom kicked she'. They rely on case inflection (she vs. her), carrying over heavy reliance on case inflection in their L1 (Just and Carpenter, 1987:143). English native speakers would choose 'Tom' because of the word order cue.

2) As this paper only deals with the word order strategy, which is one of the two strategies investigated together, the animacy cue which represents the other strategy probably seems abruptly inserted here to the readers who are not familiar with this kind of topic. In the following discussion, however, we don't take into account the animacy cue. The discussion was formulated based on the data from the AA condition (both nouns are animate) where there is no semantic bias. For more detailed information on this point, see the other paper by Yamashita in this volume.

3) Some sentence interpretation studies in Japanese reported an SOV bias, but the SOV strategy is related to the postposition strategies. There appeared no word order strategy in the sentences without postpositions (Suzuki, 1977).

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APPENDIX

(1) Words and sample sentences

	English	Japanese
noun	dog, cat, monkey, fish, bird,	いぬ，ねこ，さる，さかな，とり，
verb	like, want, hear, see,	好く，欲する，聞く，見る，
sample sentences NVN: The dog sees the bird. VNN: Likes the cat the dog. NNV: The fish the bird hears.		いぬ　見る　とり 好く　ねこ　いぬ さかな　とり　聞く

(2) Percentage and consistency of first noun choice as a function of word order

	JNS		JHS		SHS		UNS		ENS	
	%	con.	%	con.	%	con.	%	con.	%	con.
NVN	52.1	2.1	74.0	24.0	83.9	33.9	97.8	47.8	100.0	50.0
VNN	45.8	4.2	64.0	14.0	53.8	3.8	54.3	4.3	23.4	26.6
NNV	43.8	6.2	69.0	19.0	56.0	6.0	32.6	17.4	4.7	45.3

(3) Format used for obtaining introspection

[2]　今の問題を解く解き、どのように考えましたか、あなたの考え方にあてはまるものを選んでいくつでも〇して下さい。
1．主語（太郎が）・動詞（こわした）・目的語（窓を）の語順を頭にうかべ．動詞の前の名詞が主語だろうと思った。
2．主語（太郎が）・目的語（窓を）・動詞（こわした）の語順を頭にうかべ．始めの名詞が主語だろうと思った。
3．とにかく先にきた名詞が主語だろうと思った。
4．生物のほうが無生物より主語になるだろうと思った。
5．なんとなく自分に語感に頼って主語を決めた。
6．その他（どんなに小さなことでもかまいません。なんでも書いて下さい）