Japanese EFL Learners' Syntactic Analyses:
Focusing on Learners' Sentence Comprehension and Production

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Abstract

This research presents two conclusions about EFL learner's syntactic processing in the written language. First, the experiment made on senior high school students showed the possibility that an enforced decrease of syntactic processing strategies leads to a smaller difference between comprehension and production. Second, it demonstrated that some of the subjects clearly followed the different syntactic processing mechanisms in comprehension and in production. Some could not comprehend relative clauses well though they could produce them. Others could not produce but could comprehend them. These results show the possibility that there is little difference between comprehension and production in EFL learners' pure syntactic processing in the written language, though the learners may have two different syntactic processing mechanisms running in opposite directions.

1. Introduction

This study was prompted by the observation that so called slow learners cannot comprehend the structures of intricate sentences. I set out to find and analyze the differences between the syntactic processing of advanced learners and that of slow learners. I assumed that the higher the syntactic processing ability, the smaller the gap between comprehension and production. The study herein described was designed to prove this hypothesis.

The study was based on a frequent complaint voiced by slow learners. They said that they could read (comprehend) sentences but could not write (produce) them. To be sure, they seemed to be able to comprehend simple sentences, but they could not consistently produce them correctly. As they continued studying English, they were presented with increasingly complex syntactic structures which they could not understand. In contrast, advanced learners could not only read but
also produce all the sentence structures in their curriculum. As a teacher, I came to a question whether slow learners could actually comprehend even simple sentences. They might only seem to be able to comprehend them. My class room experience raised the issue of whether it was actually possible that people who could comprehend the syntactic structures might be unable to produce them. This study was designed to solve this question.

When we study syntactic processing, two points must be considered. First, sentence meaning must not be understandable by techniques other than syntactic processing. Many studies in the field of neurolinguistics (e.g., Caramazza and Zurif, 1976) have proven that a syntactic structure can be understood by the meanings of the words which construct sentences without resorting to syntactic processing. In these studies, “reversible sentence” and “implausible sentence” were used to prevent shortcuts past syntactic processing activity. In reversible sentences, the meanings are normal even if any nouns in the sentences are reversed. In implausible sentences, the meanings become abnormal. Second, sentence material must have a complicated structure because simple sentences can be comprehended or produced without syntactic processing if you know that the first noun is the agent of the verb and the second noun is the object of the verb. Thus, passives, clefts, and relative clauses were the primary materials used in the first language acquisition research and neurolinguistics studies. Of these structures, I selected relative clauses as material for my study because relative clauses are generally said to be the most difficult items for Japanese EFL learners.

Considering the above situation, I have conducted an experiment to prove my hypothesis that there are no gaps between comprehension and production.

2. Previous Studies

2.1. Relationship between Comprehension and Production

The studies of the relationship between comprehension and production have been conducted mainly in the fields of the first language acquisition and neurolinguistics. Bever (1975) argues that speech production and perception use different processes and are independently represented in two separate behavior running in opposite directions. On the other hand, Caramazza and Zurif (1976) argue that the same resource is used in both comprehension and in production. However, the relationship between these two modalities turns out to be more complex than Caramazza and Zurif's hypothesis can account for (Grodzinsky, 1995). They consistently show that, in the studies conducted on first language use, speech production and perception use different processes.

All these, however, are the hypotheses about speech perception and production in the first language. There have been few studies about comprehension and production of the written language in foreign language learning, though Yamada (1986) says that it seems that there must be a gap between comprehension and production. No studies have previously been done to try to clear up this question.
2.2. Comprehension and Production of Relative Clauses

In the field of the first language acquisition, a number of researchers have examined children's acquisition of relative clauses. These studies are consistent in some points and inconsistent in others.

In these researches, relative clauses are subcategorized into four types in terms of its embedded position and case:

SS: The cat that bumped the dog bit the monkey.
SO: The cat that the dog bumped bit the monkey.
OS: The cat bumped the dog that bit the monkey.
OO: The cat bumped the dog that the monkey bit.

These studies show that there are differences in the difficulties of processing these four types of relative clauses. Most of the studies agree that SO is the most difficult in both comprehension and production. De Villiers, Tager-Flusberg, Hakuta, and Cohen (1979) suggest that SO is difficult because of the differing functions of two strategies. One, the Noun-Verb-Noun strategy (NVN strategy), considers any noun-verb-noun (NVN) sequence as subject-verb-object (Bever, 1970). The other, the minimal distance principle (MDP) elucidated by Smith (1974), interprets the noun immediately preceding a syntactically marked embedded clause as the subject of that clause. According to de Villiers et al. (1979), neither of the strategies can work in the sentence of the type SO. The sentence of the type SS is more difficult than OS because the NVN sequence in the main clause is interrupted. In OO, the relative noun clause cannot be interpreted by MDP.

As for the three types other than SO, there are some discrepancies among the studies. In de Villiers et al. (ibid.), where an acting-out test was used, OS is the easiest followed by OO and SS in order of increasing difficulty. On the other hand, Smith (1974), in which a sentence imitation task was used, indicates that SS is the easiest followed by OS and OO. Sheldon (1974), using an acting out test, reports that OO and SS are easier than OS. The cause of these differences is unclear, though task differences are the most likely explanation (de Villiers et al., ibid.).

As mentioned above, these studies contain numerous inconsistencies though almost all the studies agree that SO is the most difficult. However, since all these studies looked at the spoken language of English-speaking children, it is problematic to conclude that SO is the most difficult for Japanese EFL learner's written language. Therefore, all four types of clauses must be examined.

3. Experiment

Subjects

The subjects were 65 senior high school students.
Material

All stimulus sentences included the relative clauses. The sentences were all reversible sentences and were subcategorized into four types by the case of the relative noun and its embedded position. The meanings of all the verbs were shown in Japanese because some sentences contained words not familiar to Japanese EFL learners.

Procedure

The first test was a written test to examine the subjects' sentence comprehension ability. Three sentences were given for each type. The subjects were instructed to select the correct expression concerning “Who did the activity to whom?” as shown in the appendix. The second test was designed to examine their sentence production. The subjects were instructed to construct English sentences with randomly ordered English words, as shown in model Japanese sentences. Again, three sentences were given for each type. In conducting the test, the subjects were first given the first test. After they had finished, the first test was returned to the experimenter and the second one was immediately given to them.

4. Results and Analysis

4.1. Scoring

The responses obtained from the subjects were coded in the following way. In both the comprehension test and the production one, sentences were scored as either totally correct (score = 1) or incorrect (score = 0). Next, to analyze the subjects’ errors, each noun in a sentence was given a number corresponding to its position in the sentence. For example, in Figure 1, cat is labeled N1, dog N2, and monkey N3. Using these numbers, in the comprehension test, the correct answer is N1V1N2 in the first clause and N1V2N3 in the second clause. Thus the correct answer of the sentence can be written “N1V1N2 + N1V2N3.” In the production test, the correct answers including the position of the relative pronoun are shown as “N1 that V1N2V2N3” since the subjects themselves must decide the position of the relative pronoun.

\[
\begin{array}{lllll}
N1 & V1 & N2 & V2 & N3 \\
\end{array}
\]

Figure 1. The cat that bumped the dog bit the monkey.

4.2. Outcome

The correlation between comprehension and production by the total subjects is \( r = .75, p < 0.01 \). The result shows the very high correlation between comprehension and production of the relative clauses. Correlation of each relative clause type is SO: \( r = .66, p < 0.01 \), SS: \( r = .61, p < 0.01 \), OO: \( r = .55, p < 0.01 \) and OS: \( r = .41, p < 0.01 \). The correlation is the highest in SO and the lowest in OS. That is, the responses in the comprehension and production tests are most consistent in SO and least
consistent in OS, regardless of whether the responses are correct or incorrect.

Next, we must examine the rates of correct responses for the four types in both comprehension and production. If NVN strategy and MDP work, the rate of correct responses should be the highest in SO and the lowest in OS. OO and SS should be located between SO and OS. The rates of correct answers in each of four types are as follows in the order of increasing difficulty:

<table>
<thead>
<tr>
<th>Type</th>
<th>Comprehension</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>(64.1%)</td>
<td>(57.9%)</td>
</tr>
<tr>
<td>SO</td>
<td>(62.1%)</td>
<td>(64.4%)</td>
</tr>
<tr>
<td>SS</td>
<td>(53.8%)</td>
<td>(49.2%)</td>
</tr>
<tr>
<td>OO</td>
<td>(53.3%)</td>
<td>(43.6%)</td>
</tr>
</tbody>
</table>

The result is as expected except that SO is not the most difficult in comprehension. As for production, OS is the easiest and SO is the most difficult as predicted. That means that de Villiers et al.'s theory works in sentence production for the subjects of this study. As for comprehension, the result indicates that OS is the easiest. Observing the result of error analysis in the comprehension test (Table 2), it seems that the subjects used NVN strategy and MDP. In OO, for instance, most subjects answered correctly to the sequence N1V1N2 in OO, which is the sequence of NVN in the matrix clause of the sentence, though the correct answers to N3V2N2 decreased, which is the sequence of NNV. So far as OS, SS and OO are concerned, therefore, the result is consistent with de Villiers et al.'s theory that OS is the easiest because NVN strategy and MDP work the best.

However, as for SO, though the result in production can be explained by de Villiers et al.'s theory, the result in comprehension cannot. The rate of correct responses to N2V1N1 in SO, which is the sequence of NNV, is not low enough. This result cannot be explained either by NVN strategy or by MDP. Moreover, the gap in the rates of correct answers between comprehension and production is strikingly greater in SO than in the other three types. What caused the great discrepancy between comprehension and production in SO? The discrepancy between comprehension and production in SO might be attributed to the differences between the object of my research and those of previous studies in the first language acquisition, or the differences between the written language and the spoken language. The structure of center–embedded sentences such as SS or SO becomes a burden on short–term memory in the spoken language because the stacking of nouns and verbs needs to be recorded before the structure can be interpreted (Hakuta, 1982). In case of the written language, on the other hand, a burden on short–term memory is not significant because the subjects can read the stimulus sentences as often as necessary. However the matter is open to question.

It is clear, from what has been said, that the better syntactic processing ability is extracted (as in SO), the higher the correlation of comprehension and production. On the other hand, the worse
syntactic processing ability is extracted (as in OS), in other words, the better the NVN strategy and MDP work, the lower the correlation becomes. We may go on from this to the conclusion that there are minimal or no gaps between comprehension and production in EFL learners' syntactic processing in the written language when these two strategies do not work.

Table 2. Errors of Response Types for Individual Sentences in the Comprehension Test

<table>
<thead>
<tr>
<th>Sentence</th>
<th>N1V1N2</th>
<th>N1V2N3</th>
<th>N2V1N1</th>
<th>N2V2N3</th>
<th>N3V2N2</th>
<th>others</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS N1 that V1N2V2N3</td>
<td>74%*</td>
<td>64%*</td>
<td>8%</td>
<td>15%</td>
<td>5%</td>
<td>9%</td>
</tr>
<tr>
<td>SO N1 that N2V1V2N3</td>
<td>18%</td>
<td>75%*</td>
<td>69%*</td>
<td>11%</td>
<td>1%</td>
<td>12%</td>
</tr>
<tr>
<td>OS N1V1N2 that V2 N3</td>
<td>92%*</td>
<td>8%</td>
<td>3%</td>
<td>69%*</td>
<td>4%</td>
<td>14%</td>
</tr>
<tr>
<td>OO N1V1N2 that N3V2</td>
<td>90%*</td>
<td>5%</td>
<td>2%</td>
<td>10%</td>
<td>54%*</td>
<td>8%</td>
</tr>
</tbody>
</table>

Note: Each row should add up to 200% because two responses are required for each sentence. However, the row totals are always less than 200% since not all subjects made two responses. Correct responses are indicated by asterisks.

4.3. Strategies in Individual Subjects

It was observed in the preceding section that NVN strategy and MDP work not only in comprehension but in production as well. As a result, there are sometimes gaps between comprehension and production. However, it is unclear how individual subjects use their strategies, that is, whether they use them only in comprehension, only in production or all the time. I analyze the data showing the relationship between comprehension and production for each subject.

The analysis proceeded in the following way. If a subject correctly answered more than two of the three questions (above chance level) in comprehension of one type (for example, SS), he was classified as able to make the correct answer about comprehension in SS. If he answered correctly only once, he was classified as unable to make correct answer about comprehension in SS. The same analysis was made about production. So if a subject made the correct answer in comprehension but not in production, his diagram was shown as 'comprehension > production.' If he made more than or less than two correct answers both in comprehension and production, his syntactic processing was shown as 'comprehension = production.' The totals of the results in the comprehension test and production test for each subject are as follows:

Table 3. The Numbers of the Subjects for Each Type of Relationships and for Each Type of the Structures

<table>
<thead>
<tr>
<th>Relationships</th>
<th>SS</th>
<th>SO</th>
<th>OS</th>
<th>OO</th>
</tr>
</thead>
<tbody>
<tr>
<td>comprehension = production</td>
<td>49 (75.4%)</td>
<td>53 (81.5%)</td>
<td>45 (69.2%)</td>
<td>48 (73.8%)</td>
</tr>
<tr>
<td>comprehension &gt; production</td>
<td>10 (15.4%)</td>
<td>10 (15.4%)</td>
<td>10 (15.4%)</td>
<td>9 (13.8%)</td>
</tr>
<tr>
<td>comprehension &lt; production</td>
<td>6 (9.2%)</td>
<td>2 (3.1%)</td>
<td>10 (15.4%)</td>
<td>8 (12.3%)</td>
</tr>
</tbody>
</table>

As mentioned above, discrepancies happened between comprehension and production in some subjects because of the strategies they employed. It is remarkable that there were some subjects who
could produce but could not comprehend the sentence in each type (comprehension < production). Comprehension was not necessarily easier than production for some learners. According to Bever (1970), NVN strategy is characteristically seen in production pattern by children who are younger than three years old, and when children at around the age of three use NVN strategy regularly in perception, it is not accompanied by any marked change in production. Bever (1975) says that speech perception and production leapfrog one another.

In conclusion, some learners used NVN strategy and MDP only in production, others used them only in comprehension. That means EFL learners’ syntactic processing ability develops independently in comprehension and production.

4.4. Syntactic Processing in Individual Subjects

So far, we have seen that there are minimal gaps between comprehension and production when some strategies do not work. However, it cannot be concluded that a “pure” syntactic processing mechanism, where a strategy does not work, is identical in comprehension and production. Not all subjects reach correct answers by using such strategies.

Consider the subjects who made 10 correct answers in comprehension and made less than half correct ones in production and vice versa. This group consists of four subjects. Table 4 shows their scores. Table 5 displays the errors made by the two subjects who got high scores in comprehension but not in production. Table 6 displays the errors made by the two subjects who got high scores in production but not in comprehension.

<table>
<thead>
<tr>
<th>Table 4. Scores by Four Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>comprehension</td>
</tr>
<tr>
<td>SS</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D</td>
</tr>
</tbody>
</table>

Subject A and B could process the syntactic structures appropriately in the comprehension test. However, they could not do the same in the production test. Subject A neglected the relationship of the matrix clause and the relative clause on SS, SO and OS. She adapted the sequence ‘NVN that VN’ to almost all the sentences. Moreover, she could not map the case appropriately. On the other hand, subject B was sensitive to the mapping of the case. She made only one error in the case. Her error was caused by a failure to put the antecedents before the relative nouns in OO and in two OS’s. In SO, she neglected the relationship of the matrix clause and the relative clause. Thus, the syntactic processing of these subjects was different in comprehension and production.
As for subject C and D, they could process the syntactic structure far better in production than in comprehension. Subject C's error in comprehension is that he could not map the appropriate case to the nouns in the relative clauses, though he made no such error in the production test. Except for the mapping of the cases, however, subject C could process syntactic structure to some degree in comprehension test, too. On the other hand, subject D could not process the sentences syntactically at all in the comprehension test. He seems to have had no rules to process them. He made errors in both the matrix clause and the relative clause. He could not recognize the phrase structures at all. Although there was a little difference between their processing ability in comprehension, it is clear that subject C and D followed different syntactic processing in comprehension and production.

Finally, data for these four subjects indicates that some learners activated their high-degree syntactic processing ability only in comprehension or only in production. They processed syntactic structure in different ways in the two modalities. Therefore, the fact that there are minimal or no gaps does not mean that the syntactic processing mechanisms are identical. Rather, two mechanisms develop independently and any gaps are eventually closed.

5. Conclusion

This experiment shows that there are minimal or no gaps between comprehension and production in EFL learners' syntactic processing in the written language. However, the existence of minimal or no gaps does not mean that syntactic processing mechanism is identical in both cases. Rather, the two mechanisms continue to develop independently and the gaps are closed in the end. The magnitude of the gaps is smaller when the learners use similar strategies in both modalities. However, larger gaps appear when the learners use syntactic processing ability in only one modality. In these cases, the two modalities are extremely ill-balanced. It is especially striking that there are the subjects who can produce but cannot comprehend relative clauses, despite the fact that it is generally thought that comprehension is easier than production. From the results, I make two suggestions:

(1) English teachers should give learners greater opportunities to produce sentences.
(2) English teachers should use reversible sentences to enhance the learners' development of syntactic processing ability.

If syntactic processing mechanisms of comprehension and production develop independently, EFL learners should be given the opportunities to activate the two modalities. In that case, English teachers must devise classroom strategies to prevent learners from surmising syntactic structure by the meanings of the words which construct the sentences. Such techniques will help learners develop syntactic processing ability and other language comprehension and production strategies.
Comprehending or constructing reversible sentences might be useful to develop syntactic processing ability that will function in both modalities. Of course, it is important to stress the meaning of the sentences. That should be welcomed. However, it is probable that too much emphasis on the meaning of the sentences prevents EFL learners from developing syntactic processing ability. In conclusion, EFL learning should be well-balanced between comprehension and production. That will help EFL learners improve their syntactic processing ability for the two modalities.

References


Bever, T. G. (1975). Psychologically real grammar emerges because of its role in language acquisition. In Dato, D. P. (ed.), Developmental psycholinguistics theory and applications. (pp.63-


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**Appendix**

Extraction from the Comprehension and Production Tests

第1問 次の各英文は2つの内容について述べます。それぞれのカッコに適する記号を選び、○で囲んで下さい。なお、文中の that はすべて関係代名詞です。

(1) The cat that the dog bit bumped the monkey. ※ bit：bite（かみつく）の過去形、bump：ぶつかる

(a. monkey  b. cat  c. dog) が (a. dog  b. cat  c. monkey) にかみついた。

(a. cat  b. dog  c. monkey) が (a. dog  b. monkey c. cat) にぶつかった。

第2問 日本語で説明された内容を表すように単語を並べてください。

(11) 犬を追い越した猫に、サルが触った。 ※ 追い越す：pass，触る：touch

1. the cat  2. that  3. passed  4. touched  5. the dog  6. the monkey

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