Acquisition Order of Word Order in the Complement Adjunct Structure: An Explanation from the Viewpoint of the Subset Principle

Katsumasa Shimada

1. Introduction

1.1 Background

During the last decade second language acquisition (SLA) researchers have been concerned with Universal Grammar, which is dealt with in the framework of Chomsky’s Government Binding (GB) theory. The GB theory can be seen as a modular system of a set of sub-theories which consist of certain principles and parameters.

X-bar theory, one of the sub-theories, describes the structure of phrases. According to X-bar theory all phrases are headed by a lexical head. The head of the phrases must belong to a particular category. For instance, a Noun Phrase (NP) always contains a Noun (N), and a Verb Phrase (VP) always contains a Verb (V). X-bar theory distinguishes two levels of projection. The complements combine with X to form X’ projection, the adjuncts combine with X’ to form X’ projection and the specifier combines with the X’ to form the maximal projection X”. We see that adjuncts are sisters of X’ whereas complements are sisters of X. It can be predicted that complements will be always closer to their head than adjuncts. In other words, complements must precede adjuncts (Cook, 1988; Haegeman, 1991; Radford, 1988). The configurational rela-
tionship is schematized as in (1) below.

(1) \[ X'' (=XP) \]
\[ \text{specifier} \]
\[ X' \]
\[ X' \text{ adjunct} \]
\[ X \text{ complement} \]

(head)

The lexical heads qualify as lexical governors which can assign a theta-role to its arguments. A further property by the lexical heads is that they enter into a case relationship with their argument. So that the government relationship characterizes a stronger combination between a head and its complement than a head and its adjunct. A supporting evidence of the strong relationship between a head and its complement is adjacency condition on case assignment observed in VPs. NPs receiving case must be next to its case assigner, so that adverbs generally cannot intervene between a verb and its direct object. Matsuoka (1992) found that NPs accompanied by a complement are acquired easier than NPs followed by an adjunct, which empirically supports the strong relationship between a head and its complement.

Radford (1988:253) claims that there is broad structural symmetry across all major lexical categories. The structural similarities can be explained by "the automatic consequence" of a parameter setting. When learning a language, children must set the head position parameter at either head-initial, where the ordering is a head and its complement, as in English, or head-final, where the ordering is a complement before its head, as in Japanese. Taking an example of a child learning English, White (1989:30) argues that "once the parameter has been set on the basis of evidence relating to one phrasal category, it does not have to be reset for the other phrasal categories; the rest follow as an automatic conse-
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quence of the head-initial setting of the parameter, and do not have to be triggered or learned individually".

Shimada (1994a) investigated whether the four phrase categories such as NPs, VPs, APs and PPs can be acquired simultaneously as the automatic consequence of the parameter resetting and found that NPs are acquired later than the other phrase categories. The results disconfirm White's statement cited above.

1.2 Research Questions and Hypotheses

The purpose of the present study is to seek why NPs including both a complement and an adjunct, which we call the Noun Complement Adjunct (NCA) structure, are learned later rather than VPs with both a complement and an adjunct, which we will refer to as the Verb Complement Adjunct (VCA) structure, focusing on the syntactic differences between the two structures. It will be explained from the viewpoint of the Subset Principle.

The Subset Principle is a learning principle that accounts for how learners set the correct value of a parameter in L1 acquisition. It is argued that L1 acquisition takes place on the basis of positive evidence alone and that when the target language grammar and the interlanguage grammar are in a subset/superset relation, the most restrictive grammar consistent with input will be adopted. Negative evidence is not available in L1 acquisition, and it does not play a significant role, if any."

If the Subset Principle operates in L2 learning as it does in L1, then L2 learners generate a subset grammar with positive evidence alone (subset hypothesis). In contrast to this view is a position which assumes that L2 learners no longer apply the Subset Principle, instead they will
be influenced by their L1 (transfer hypothesis). (White, 1989)

When English (L2) and Japanese (L1) are in a subset/superset relation, it seems that Japanese learners of English cannot abandon the superset grammar and create the subset grammar effectively because they are influenced by their L1 (the transfer hypothesis, as opposed to the subset hypothesis.)

Let us examine the case of word order of the NCA and the VCA structure.

(1) a. I know a teacher of physics with long hair.
   (head + complement + adjunct = N + PP₁ + PP₂)
b. *I know a teacher with long hair of physics.
   (head + adjunct + complement = N + PP₂ + PP₁)
c. He teaches physics in the laboratory.
   (head + complement + adjunct = V + NP + PP₂)
d. *He teaches in the laboratory physics.
   (head + adjunct + complement = V + PP₂ + NP)

(2) a. watashi-wa nagai kami-no butsuri-no sensei-o shitteiru.
   (adjunct + complement + head = PP₁ + PP₂ + N)
b. watashi-wa butsuri-no nagai kami-no sensei-o shitteiru.
   (complement + adjunct + head = PP₁ + PP₂ + N)
c. kare-wa jikkenshitsu-de butsuri-o oshieru.
   (adjunct + complement + head = PP₁ + PP₂ + V)
d. kare-wa butsuri-o jikkenshitsu-de oshieru.
   (complement + adjunct + head = PP₁ + PP₂ + V)

When Japanese learners of English reset the head position parameter from the the value of the superset grammar (head-final) to the value of the subset grammar (head-initial), they must do two things simultaneously; they must move both a complement phrase and an adjunct phrase.
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to the right of the head at the same time, which causes some problems.

First of all, we will look at the NCA structure. Whether Japanese is a configurational language or not has been a controversial issue. Assuming that Japanese is a non-configurational language, Japanese word order of the two phrases are not rigidly restricted, as in (3)a. and (3)b.

(3)a.

```
      N```
```
    / \    
PP₂  PP₁ N
```
```
  /   \
nagai kami-no  butsuri-no sensei
```

(3)b.

```
      N```
```
    / \    
PP₂  PP₁ N
```
```
  /   \
butsuri-no  nagai kami-no sensei
```

Even if Japanese is a configurational language and adjuncts precede complements, the word order of the two PPs modifying the N is not restricted, as in (4)a. and (4)b.

Although there may be some semantic differences between the two Japanese NPs because of the word order, they can be both grammatically correct.

(4)a.

```
      N```
```
    / \    
PP₂  PP₁ N
```
```
  /   \
nagai kami-no  butsuri-no sensei
```

(4)b.

```
      N```
```
    / \    
PP₁  PP₂ N
```
```
  /   \
butsuri-no  nagai kami-no sensei
```
On the other hand, in English the word order of a complement phrase and an adjunct phrase is rigidly restricted. That is, a complement must precede an adjunct. We will call it the Complement + Adjunct (C + A) pattern. (5)a. is grammatical whereas (5)b. is ungrammatical because an adjunct precedes an complement. We will call it the Adjunct + Complement (A + C) pattern. The tree diagram shows that it violates ‘no crossing of branches’ restriction.

(5)a.

(5)b.

There is structural symmetry between NPs and VPs. For example, a NP [teacher of physics] derives from a VP[teach physics] by the process of of-insertion. Nouns and adjectives are not case assigners in English. Case filter violation can be avoided by inserting the preposition of between the Ns (Haegeman, 1991), resulting in that the NCA structure has two PPs: PP₁ and PP₂.

It is difficult for Japanese learners of English to distinguish the PP₁ from the PP₂ in the English NCA structure on the ground that the Japanese NCA structure has two interchangeable PPs.

On the other hand, there are not two PPs in the English VCA structure, instead the structure has an NP preceded by a verb, as in (6)a.
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Japanese learners of English are familiar with the combination of V and NP. (6)a.

\[
\begin{array}{c}
V' \\
\downarrow \\
V' \\
\downarrow \\
V \\
\downarrow \\
NP \\
\downarrow \\
PP_2 \\
\end{array}
\]

teach physics in the laboratory

(6)b.

\[
\begin{array}{c}
V' \\
\downarrow \\
V' \\
\downarrow \\
V \\
\downarrow \\
PP_2 \\
\downarrow \\
NP \\
\end{array}
\]

teach in the laboratory physics

It seems to be easy for them to distinguish the NP from the PP_2 and to notice that (6)b. is ungrammatical because it violates not only ‘no crossing of branches’ restriction but also the adjacency condition of case assignment.

If the learners do not notice the structural similarity between the NCA and the VCA structure and the syntactic differences between the PP_1 and the PP_2 in the English NCA structure, that is, the PP_1 is a complement and the PP_2 is an adjunct, then the NCA structure will be learned later than the VCA structure.

The three hypotheses addressed here are as follows:

1. More correct C + A pattern would be chosen than the incorrect A + C pattern in both the NCA and the VCA structure.
2. The NCA structure would be learned with more difficulty than the VCA structure.
3. As the learners’ proficiency increases, there would be less accuracy gaps between the NCA and the VCA structure.
2. Method

2.1 Subjects

Sixty-five freshmen enrolled in English I at Meijo University participated in the experiment. They majored in mathematics or traffic engineering. On the basis of the result of a rational cloze test which includes 30 deleted words, the subjects were divided into three proficiency groups upper (n = 16), middle (n = 33) and lower group (n = 16). A one-way Analysis of Variance (ANOVA) was performed and indicated a significant difference among the test score means (F(2,62) = 269.33, p < .000).

2.2 Procedure

A grammaticality judgement test (see Appendix) was devised and administered to investigate whether the hypotheses above are supported or rejected. The test took the form of a comparison test because it has an advantage that the subjects have only to pay attention to the syntactic differences of the two sentences presented. The test consists of 20 question items. Half of them deal with the NCA structure and the rest are concerned with the VCA structure. Each of the question items is made up of a pair of two options; one is an grammatical sentence in which a complement phrase precedes an adjunct phrase (e.g., a student of physics with long hair). The other is an ungrammatical sentence in which an complement phrase follows an adjunct phrase (e.g., a student with long hair of physics), which violates the 'no crossing of branches' restriction. They were required to choose a grammatical sentence from the two options. The corresponding Japanese sentences were not presented so that they may not influence the choice. It took about 15 minutes to complete the task.
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2.3 Data Collection and Analysis

In the present study a cross-sectional method was used, therefore, accuracy order observed in the test performance was regarded as acquisition order.

The choice of both the C+A and the A+C pattern was summed up respectively. Then the differences of the total scores and the mean scores were computed. Those scoring procedures were applied to all of the three proficiency groups.

The first hypothesis was tested in terms of the statistical significance of the difference of the total score between the choice of the C+A pattern and the choice of the A+C pattern. A one-way chi-square test was used to examine the significance of the differences of the total scores between the choices.

The second hypothesis was examined on the basis of the differences between the mean scores of the NCA structure and the VCA structure. A one tail paired t-test was used in order to compare the mean scores between the NCA and the VCA structure with respect to the three groups.

The third hypothesis, namely that there would be less accuracy gaps between the NCA and the VCA structure as their English proficiency increases, was examined by comparing the mean scores among the three proficiency groups. A one-way ANOVA was used to check whether there were significant differences among the three groups.

3. Results and Discussion

3.1 Findings

Table 1 gives the total scores (TS), the mean scores (MS) and the standard deviations (SD) of the grammaticality judgement test. It also presents the differences of the total scores and the mean scores between
the C+A pattern choice and the A+C pattern choice, and the differences between the NCA and the VCA structure, as well as the differences among the three proficiency groups.

Table 1: The Total Scores and Means (SD) of the Grammatical Judgement Test

<table>
<thead>
<tr>
<th>GROUP</th>
<th>PROFI C+A</th>
<th>A+C</th>
<th>DIFF</th>
<th>VCA C+A</th>
<th>A+C</th>
<th>DIFF</th>
<th>NCA C+A</th>
<th>A+C</th>
<th>DIFF</th>
<th>VCA-NCA DIFF</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHOLE</td>
<td>TS 352</td>
<td>549</td>
<td>101</td>
<td>448</td>
<td>***</td>
<td></td>
<td>473</td>
<td>177</td>
<td>296</td>
<td>***</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>MS 5.42</td>
<td>8.45</td>
<td>1.55</td>
<td>6.89</td>
<td></td>
<td></td>
<td>7.28</td>
<td>2.72</td>
<td>4.55</td>
<td>***</td>
<td>1.17</td>
</tr>
<tr>
<td></td>
<td>SD 3.17</td>
<td>1.78</td>
<td>1.78</td>
<td>1.69</td>
<td></td>
<td></td>
<td>1.69</td>
<td>1.69</td>
<td></td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>UPPER</td>
<td>TS 155</td>
<td>152</td>
<td>8</td>
<td>144</td>
<td>***</td>
<td></td>
<td>128</td>
<td>32</td>
<td>96</td>
<td>***</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>MS 9.69</td>
<td>9.50</td>
<td>0.50</td>
<td>9.00</td>
<td></td>
<td></td>
<td>8.00</td>
<td>2.00</td>
<td>6.00</td>
<td>***</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>SD 1.93</td>
<td>0.94</td>
<td>0.94</td>
<td>1.66</td>
<td></td>
<td></td>
<td>1.66</td>
<td>1.66</td>
<td></td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>MIDDLE</td>
<td>TS 173</td>
<td>279</td>
<td>51</td>
<td>228</td>
<td>***</td>
<td></td>
<td>242</td>
<td>88</td>
<td>154</td>
<td>***</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>MS 5.24</td>
<td>8.45</td>
<td>1.55</td>
<td>6.91</td>
<td></td>
<td></td>
<td>7.33</td>
<td>2.67</td>
<td>4.67</td>
<td>***</td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td>SD 1.07</td>
<td>1.69</td>
<td>1.69</td>
<td>1.25</td>
<td></td>
<td></td>
<td>1.25</td>
<td>1.25</td>
<td></td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>LOWER</td>
<td>TS 24</td>
<td>118</td>
<td>42</td>
<td>76</td>
<td>***</td>
<td></td>
<td>103</td>
<td>57</td>
<td>46</td>
<td>***</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>MS 1.50</td>
<td>7.38</td>
<td>2.63</td>
<td>4.75</td>
<td></td>
<td></td>
<td>6.44</td>
<td>3.56</td>
<td>2.88</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD 1.06</td>
<td>1.96</td>
<td>1.96</td>
<td>2.09</td>
<td></td>
<td></td>
<td>2.09</td>
<td>2.09</td>
<td></td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>DIFF</td>
<td>U-M 4.45</td>
<td>1.05</td>
<td>-1.05</td>
<td>0.67</td>
<td></td>
<td></td>
<td>0.67</td>
<td>0.67</td>
<td></td>
<td>***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M-L 3.74</td>
<td>1.08</td>
<td>-1.08</td>
<td>0.90</td>
<td></td>
<td></td>
<td>0.90</td>
<td>0.90</td>
<td></td>
<td>***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>U-L 8.19</td>
<td>2.13</td>
<td>-2.13</td>
<td>1.56</td>
<td></td>
<td></td>
<td>1.56</td>
<td>1.56</td>
<td></td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

The results will be addressed to each of the three hypotheses separately. The first hypothesis was confirmed because the total scores of the C+A pattern choice were significantly higher than those of the A+C pattern choice at all the proficiency levels, in both the NCA structure ($\chi^2=57.6$ (Upper), $\chi^2=71.8$ (Middle), $\chi^2=13.2$ (Lower), df = 1, p < .001 at each level) and the VCA structure ($\chi^2=129.6$ (Upper), $\chi^2=157.5$ (Middle), $\chi^2=36.1$ (Lower), df = 1, p < .01 at each level). The results show that there is stronger relationship between a head and its complement rather than a head and its adjunct.
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The differences of the mean scores between the NCA and the VCA structure were statistically significant at the upper group (t = 3.216, df = 15, p < .01) and the middle group (t = 3.681, df = 32, p < .001). The mean score of the VCA was higher than that of the NCA at the lower group, however, the difference did not reach the 5% significant level. The second hypothesis was partially supported.

The third hypothesis was disconfirmed. There were significant differences among the three proficiency groups, with respect to both the NCA (F(2,62) = 3.683, p < .05) and the VCA structure (F(2,62) = 6.562, p < .01). Contrary to our expectation, the differences of the mean scores between the NCA and the VCA structure got larger as the learners’ proficiency increased.

3.2 Discussion

The results showed that more correct C+A pattern were chosen than the incorrect A+C pattern in both the NCA and the VCA structure and that the NCA structure was learned with more difficulty than the VCA structure.

We must consider why the third hypothesis, namely that as the learners’ proficiency increases, there would be less accuracy gaps between the NCA and the VCA structure, was disconfirmed. As the proficiency level increased, the mean scores of the VCA structure increased, although those of the NCA structure increased less than expected. Comparing the total scores of the A+C pattern in the upper group, that of the VCA structure was 8, while that of the NCA structure was 32. The choice of the ungrammatical structure reached 20 per cent of the number of all the possible answers (32 out of 160). The results mean that even the more proficient learners had more difficulty in choosing the correct C+A pattern.
in the case of the NCA structure. Nonetheless, it can be predicted that as learners’ proficiency level increases, the accuracy gap between the NCA and the VCA structure will decrease. The hypothesis will be supported by much more proficient subjects.

The difficulty that our subjects had in choosing the grammatical pattern seems to be attributed to the fact that they could not notice the syntactic difference between the two PPs. Then, it is necessary to give them explicit knowledge of the syntactic difference between the two phrases.

Input, which is referred to as the samples of the L2 that the learners are exposed to, interacts with learners’ built-in language acquisition device and it acts as a trigger for the acquisition of learnable rules. One of the problems with input in SLA has to do with how students learn ungrammaticality. There are two types of conceivable input available to an L2 learner; positive evidence and negative evidence. The former is referred to evidence as to what is possible in a language. The latter is evidence of ungrammaticality.

The question arises as to whether learners can reset the value of a parameter from L1 to L2 effectively with positive evidence alone (Shimada, 1994b). White (1991) claims that negative evidence plays a crucial role to avoid negative transfer from L1, especially when L1 and L2 are a superset/subset relation. Providing the learners with negative evidence as input is indispensable to reset the value of a parameter from a more inclusive grammar to a more restricted grammar. Negative evidence functions as a trigger a parameter resetting. In the case of the Complement Adjunct structure, it is necessary to show the learners that the A+C pattern is not permitted in English, especially in the NCA structure. It is also necessary to show why the pattern is not permitted,
Acquisition Order of Word Order in the Complement Adjunct Structure showing the difference of the word order between Japanese and English.

Input in real situation does not usually include information of the ungrammaticality. It is formal instruction that can provide input including negative evidence.

Notes
1) In first language acquisition correction by a mother (negative evidence) does not influence the process of the child's structuring first language, as illustrated below.
Child: I putted the plates on the table.
Mother: You mean, I put the plates on the table.
Child: No, I putted them on all by myself.
(cited from Lightbown and Spada, 1993:14)
2) The relationship between the subset hypothesis and the transfer hypothesis proposed by White (1989) has some similarities to the relationship between the creative construction hypothesis, which claims "the second language growth is independent of a particular first language and develops rather in the manner in which a child 'create' his first language" and the restructuring hypothesis, which claims that "a second language learner develops his second language by a process of restructuring his first language" (Stern, 1983:396). According to Dulay, Burt, and Krashen's analysis, only 4.7% of the children's errors could be classified as interlingual errors, on the other hand, 87.1% was classified as intralingual errors. The study advocated the creative construction hypothesis (Dulay, Burt and Krashen, 1982).
3) The comparison test may have a disadvantage that it measures learners' competence only at recognition level, as opposed to production level.

References

Appendix: The Grammaticality Judgement Test

DIRECTIONS: Choose one of the options; a. is correct(a), b. is correct(b).

1. a. Peter told the story without hesitation.
   b. Peter told without hesitation the story.

2. a. I met a professor of history in a red tie.
   b. I met a professor in a red tie of history.

3. a. The explanation in the waiting room of the delay was not satisfactory.
   b. The explanation of the delay in the waiting room was not satisfactory.

4. a. Kate saw in the darkness a strange thing.
   b. Kate saw a strange thing in the darkness.
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5. a. Ellen talked about the advertisement in the newspaper of the car.
   b. Ellen talked about the advertisement of the car in the newspaper.

6. a. John ate breakfast in a hurry.
   b. John ate in a hurry breakfast.

7. a. Bill read the fairy tale in a loud voice.
   b. Bill read in a loud voice the fairy tale.

8. a. Mary heard on the radio the news.
   b. Mary heard the news on the radio.

9. a. I met a student with long hair of physics.
   b. I met a student of physics with long hair.

10. a. Tom enjoyed with his friends tennis.
     b. Tom enjoyed tennis with his friends.

11. a. Jack watched for a few hours the baseball game.
     b. Jack watched the baseball game for a few hours.

12. a. A knock on the door in the kitchen was heard.
     b. A knock in the kitchen on the door was heard.

13. a. My father read her reply to my letter on the table.
     b. My father read her reply on the table to my letter.

14. a. I enjoyed the discussion of the problems with my friends.
     b. I enjoyed the discussion with my friends of the problems.

15. a. Susie cut her birthday cake with a knife.
     b. Susie cut with a knife her birthday cake.

16. a. The committee postponed the meeting for some reason.
     b. The committee postponed for some reason the meeting.

17. a. Nancy answered with a smile the questions.
     b. Nancy answered the questions with a smile.

18. a. I heard of the murder in the hotel of the salesman.
     b. I heard of the murder of the salesman in the hotel.

19. a. They reported the attack at the station on the Prime Minister.
     b. They reported the attack on the Prime Minister at the station.

20. a. I read the reports on the war from countries in Europe.
     b. I read the reports from countries in Europe on the war.
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An Explanation from the Viewpoint of the Subset Principle

Katsumasa Shimada

Abstract

The purpose of the present study is to seek why the Noun Complement Adjunct (NCA) structure is acquired later than the Verb Complement Adjunct (VCA) structure, focusing on the syntactic differences between them. It will be explained from the viewpoint of the Subset Principle.

When English (L2) and Japanese (L1) are in a subset/superset relation, it seems that Japanese learners of English cannot abandon the superset grammar and create the subset grammar effectively because they are influenced by their L1 (the transfer hypothesis, as opposed to the subset hypothesis.) (White, 1989)

When Japanese learners of English reset the head position parameter from the value of the superset grammar (head-final) to the value of the subset grammar (head-initial), they must move both a complement phrase and an adjunct phrase to the right of the head at the same time. Although Japanese word order of the two phrases are not rigidly restricted, in English complements must precede adjuncts, which causes some problems.

If the learners do not notice the structural similarity between the NCA and the VCA structure, the NCA structure will be acquired later than the VCA structure because of the influence of the L1. The results of a grammaticality judgement test support the hypothesis. The results
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suggest negative evidence is indispensable to avoid the negative transfer from the L1.