What Can Child Japanese Tell Us about the Syntax of Scrambling?

Koji Sugisaki and Miwa Isobe

University of Connecticut and Keio University

1. Introduction

This study is an attempt to determine the validity of two competing syntactic analyses of the Direct Object (DO) – Indirect Object (IO) order within the VP in Japanese, based on data from child language acquisition. One analysis suggests that this order is derived from the IO – DO order via application of the movement operation called scrambling (e.g. Hoji 1985, Nemoto 1993, Saito 1994, Tada 1993, Takano 1996, Yatsushiro 1999). The other analysis claims that both orders can be base-generated (Miyagawa 1997). We will show that, under certain acquisitional assumptions, these two analyses make different predictions for child Japanese, and that experimental results bear out the predictions of the movement analysis. The broader implication of this study is that the time course of child language acquisition has the potential to be an important testing ground for syntactic theories.

2. Free word order and scrambling in Japanese

The word order in Japanese is relatively free: The verb must come at the end of the sentence, but the order of other phrases can be changed freely. Thus, for a ditransitive sentence, the following six word orders are available:

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(1) a. Subject (SUB)-IO-DO-V:
John-ga Mary-ni sono hon-o ageta.
‘John gave that book to Mary.’

b. IO-SUB-DO-V:
Mary-ni John-ga sono hon-o ageta.
Mary-DAT John-NOM that book-ACC gave

c. DO-SUB-IO-V:
Sono hon-o John-ga Mary-ni ageta.
That book-ACC John-NOM Mary-DAT gave

d. IO-DO-SUB-V:
Mary-ni sono hon-o John-ga ageta.
Mary-DAT that book-ACC John-NOM gave

e. DO-IO-SUB-V:
Sono hon-o Mary-ni John-ga ageta.
That book-ACC Mary-DAT John-NOM gave

f. SUB-DO-IO-V:
John-ga sono hon-o Mary-ni ageta.
John-NOM that book-ACC Mary-DAT gave

Since Hoji (1985) and Saito (1985) it has been widely assumed that this flexibility of word order in Japanese is due to the existence of a movement operation called *scrambling.* More specifically, it has been assumed that the order SUB-IO-DO-V in (1a) is basic, and that the other orders are derived from it via optional applications of the scrambling operation.

A detailed study of scrambling by Tada (1993) has revealed that scrambling in Japanese consists of three distinct subclasses: L(ong)-scrambling, M(iddle)-scrambling and S(hort)-scrambling. L-scrambling moves an element to sentence-initial position across a clause boundary. M-scrambling is clause-internal scrambling to sentence-initial position. S-scrambling is permutation of the IO-DO order within the VP. Examples of these three types of scrambling are given below:

1. For a good summary of the studies on Japanese scrambling, see Nemoto (1999) and Ueyama (1998).
   Bill-NOM John-NOM Mary-DAT met that think
   ‘Bill thinks that John met Mary.’

   b. \textit{L-scrambling}:
   Mary-ni Bill-ga [John-ga \(t_1\) atta to] omotteiru.
   Mary-DAT Bill-NOM John-NOM met that think

(3) a. John-ga Mary-ni sono hon-o ageta.
   John-NOM Mary-DAT that book-ACC gave
   ‘John gave that book to Mary.’

   b. \textit{M-scrambling (IO-SUB-DO-V)}:
   Mary-ni\(_1\) John-ga \(t_1\) sono hon-o ageta.
   Mary-DAT John-NOM that book-ACC gave

   c. \textit{M-scrambling (DO-SUB-IO-V)}:
   Sono hon-o\(_1\) John-ga Mary-ni \(t_1\) ageta.
   that book-ACC John-NOM Mary-DAT gave

(4) \textit{S-scrambling (SUB-DO-IO-V)}:
   John-ga sono hon-o\(_1\) Mary-ni \(t_1\) ageta.
   John-NOM that book-ACC Mary-DAT gave

Tada (1993) argues that the landing sites of these three types of scrambling are associated with distinct syntactic properties. In the following, by making use of three syntactic tests, we investigate the nature of the landing sites of M-scrambling and S-scrambling, which will have a direct bearing on our experiment.

The first test is weak crossover (WCO) effects. As exemplified by the English sentences in (5), while A’-movement induces weak crossover effects, A-movement does not:

(5) a. *Who\(_1\) does his\(_1\) mother love \(t_1\)?
   b. Who\(_1\) \(t_1\) seems [to his\(_1\) mother] \(t_1\) to have come?

In Japanese, while in-situ \textit{wh}-phrases exhibit WCO effects, either M- or S-scrambling of the \textit{wh}-phrase ‘remedies’ the WCO effect, as illustrated in (6)

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2. Below we exclude syntactic tests based on the binding of \textit{otagai}, which is often treated on a par with English \textit{each other}. See Hoji (1997) for arguments that \textit{otagai} is not in fact a local anaphor.
These examples indicate that the landing site of M- or S-scrambling can be an A-position.

(6) a. An instance of WCO effects:
   ?* [so-itu-no1 hahaoya]-ga dare-o1 aisiteiru no?
   that-guy-GEN mother-NOM who-ACC love Q
   ‘Who does his mother love?’

   b. Neutralization of WCO effects via M-scrambling:
   ? Dare-o1 [so-itu-no1 hahaoya]-ga t1 aisiteiru no?
   who-ACC that-guy-GEN mother-NOM love Q
   (Ueyama 1998: 31)

(7) a. An instance of WCO effects:
   * John-ga [e so-itu-ni1 aitagatteiru] hito]-ni dare-o1 shookaisita no?
   John-NOM that-guy-DAT want-to-meet person-DAT who-ACC introduced Q
   ‘Who did John introduce t1 to the person who wanted to meet that guy1?’

   b. Neutralization of WCO effects via S-scrambling:
   ? John-ga dare-o1 [e so-itu-ni1 aitagatteiru] hito]-ni t1 shookaisita no?
   John-NOM who-ACC that-guy-DAT want-to-meet person-DAT introduced Q
   (Tada 1993: 17)

   The second test comes from reconstruction effects. In English, wh-movement shows a reconstruction effect, but raising does not:

(8) a. [Which of his sons]1 does every father think t1 won?
   b. *[His eldest son]1 seems to every father t1 to have won.
   (c. It seems to every father that his eldest son won.)

3. See Yoshimura (1992) for a detailed discussion of scrambling and weak crossover effects.
4. There are examples reported in the literature which have the same structure as the one in (8b) but are regarded as grammatical:
   (i) [His father]2 seems to every boy1 [t2 to be a genius].
   (Fox 2000: 147)
   We have no account for the difference between (8b) and (i). See Lasnik (1999) for a detailed discussion of the absence of scope reconstruction with A-movements.
M-scrambling exhibits a reconstruction effect, as illustrated in (9), and this suggests that the landing site of M-scrambling can be an A'-position. On the other hand, in the case of S-scrambling, such reconstruction is not totally unavailable, but is very weak, as shown in (10):

(9) [Soko-o tekitaisiteiru kaisya]-o1Toyota-sae-ga t1 uttaeta.
    that-place-ACC be:hostile company-ACC Toyota-even-NOM sued
    ‘[The company which is hostile to it], even Toyota sued t1.’
    (Ueyama 1998: 33)

(10) ?Mary-ga [soitu-no sensei]-o1 [subete-no gakusei]-ni t1 miseta
    Mary-NOM he-GEN teacher-ACC all-GEN student-DAT showed
    ‘Mary showed his teacher to every student.’ (Takano 1996: 152)

The third test is movement out of a finite clause (L-scrambling). In English, while wh-movement out of a finite clause is possible, raising out of it is not:

(11) a. Who1 do you think [ t1 will win the race]?
    b. *John1 seems [it is likely [ t1 to win the race]].

While scrambling out of a finite clause is possible when it targets the IP-peripheral position, this is not possible when the scrambling targets the VP-peripheral position, as exemplified in (12). This suggests that the IP-peripheral position, which is the landing site for M-scrambling, can be an A'-position, but the VP-peripheral position, which is the landing site for S-scrambling, must be an A-position.

(12) a. [IP John-ga [VP Bill-ni [CP Mary-ga sono-hon-o motteiru to] itta]]
    John-NOM Bill-to Mary-NOM that book-ACC have that said
    ‘John said to Bill that Mary has that book.’

b. [IP Sono-hon-o1 [IP John-ga [VP Bill-ni [CP Mary-ga t1 motteiru to] itta]]]

c. ??[IP John-ga [VP sono-hon-o1 [VP Bill-ni [CP Mary-ga t1 motteiru to] itta]]]  (Saito 1994: 264)

A summary of the results of the three syntactic tests is given in (13). These results show that while the landing site of M-scrambling can be either an A- or an A'-position, that of S-scrambling is solely associated with the properties of an A-position.
(13) Landing sites:

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<tr>
<th></th>
<th>WCO</th>
<th>Reconstruction</th>
<th>Movement out of finite CP</th>
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<td>M-scrambling:</td>
<td>A</td>
<td>A'</td>
<td>A'</td>
</tr>
<tr>
<td>S-scrambling:</td>
<td>A</td>
<td>(A)</td>
<td>A</td>
</tr>
</tbody>
</table>

Given this A-nature of S-scrambling, two competing analyses have been proposed in the syntactic literature. One analysis, which we call the A-movement Analysis, argues that SUB-DO-IO-V order is derived from SUB-IO-DO-V order via A-movement of DO (e.g. Nemoto 1993, Tada 1993). The other analysis, which we call the Base Generation Analysis, claims that both orders can be base-generated (Miyagawa 1997): 5

(14)a. **A-movement Analysis** (e.g. Nemoto 1993, Tada 1993):
   SUB-DO-IO-V order is derived from SUB-IO-DO-V order via A-movement of DO.

b. **Base Generation Analysis** (Miyagawa 1997):
   Both SUB-IO-DO-V and SUB-DO-IO-V orders can be base-generated.

The question that we address below is the following: Can the data from child Japanese determine which analysis is on the right track?

3. Acquisition of scrambling and passives in Japanese

In this section, we review some of the studies on the acquisition of movement constructions in Japanese, and set up an acquisitional hypothesis that we crucially make use of in our experiment.

3.1. M-scrambling in child Japanese

In the late 1970’s, several studies showed that children have difficulties in comprehending an M-scrambled sentence such as (15a) (e.g. Hayashibe 1975). However, Otsu (1994) has claimed that this difficulty is an experimental artifact caused by the lack of attention to discourse factors governing the use of scrambled sentences. To prove this point, Otsu added a discourse context as in (15b), and showed that in this situation children as young as three have no difficulty in interpreting M-scrambled sentences.

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5. Ishii (1998) proposes a hybrid analysis in which A-movement and base generation are both possible. Unfortunately we have not yet worked out the implication of such an analysis for our study.
This indicates that M-scrambling is in the grammar by the age of three years, if not earlier.

(15) a. Ahirusan-o kamesan-ga osimasita.
    duck-ACC turtle-NOM pushed.
    ‘A/The turtle pushed a/the duck.’

      b. Kooen-ni ahirusan-ga imasita.
    park-in duck-NOM was
    Sono ahirusan-o kamesan-ga osimasita.
    the duck-ACC turtle-NOM pushed
    ‘There was a duck in a park. A turtle pushed the duck.’

3.2. Passives in child Japanese

Japanese has two major types of passives. One is the direct passive, and the other is the indirect passive.6 Examples are given in (16) and (17):

(16) a. Active Transitive:
    Mary-ga John-o osita.
    Mary-NOM John-ACC pushed. ‘Mary pushed John.’

      b. Direct Passive:
    John-ga Mary-ni os-are-ta.
    John-NOM Mary-by push-PASS-PAST
    ‘John was pushed by Mary.’

(17) a. Active Intransitive:
    Ame-ga hutta.
    rain-NOM fell / rained ‘It rained.’

      b. Indirect Passive:
    John-ga ame-ni hur-are-ta.
    John-NOM rain-by fall-PASS-PAST
    ‘John was adversely affected by rain.’

Direct passive corresponds to verbal passive in English. On the other hand, indirect passive can be created not only from a transitive verb but also from an intransitive verb. Specifically, in indirect passives an additional argument appears as the surface subject, and this NP is interpreted as being adversely affected by the state of affairs expressed in the rest of the clause.

For this reason, indirect passives are often called *adversity passives*. According to Miyagawa (1989:37-41), there is an important structural difference between direct passives and indirect passives: While the former involves A-movement of an NP from object to subject position, the latter does not.

Sugisaki (1997) investigated experimentally how young Japanese-speaking children acquire these two types of passives. By testing 17 children, he found that indirect passives, which do not contain A-movement, are easier to comprehend than direct passives, which involve A-movement. Furthermore, it was found that direct passives are not correctly comprehended until children reach almost five years of age. This pattern, he has argued, is consistent with the A-chain maturation hypothesis proposed by Borer and Wexler (1987).

However, Otsu (2000a) has pointed out that since the subject NP in both passives bears the sense of “affectivity,” as argued by Kuroda (1979), this pragmatic notion may be the source of children’s difficulty. Otsu controlled this factor in an experiment, and successfully showed that three-year-olds can correctly comprehend passive constructions.

There is one very strong similarity between Otsu’s (2000a) and Sugisaki’s (1997) results, however: Even in Otsu’s experiment, indirect passives (and actives) come to be correctly comprehended earlier than direct passives. Otsu (2000b) attributes this developmental difference to the presence of movement in direct passives, leaving the precise details for future research.

3.3. Summary of the acquisitional findings

We have seen that children’s performance on M-scrambled sentences is as good as sentences with the basic order. In the case of passives, we have seen that children have more difficulty in comprehending passives with A-movement (i.e. direct passives) than passives without A-movement (i.e. indirect passives). Thus, we can say that in the acquisition of Japanese, there is a comparative difficulty: A construction with an A-movement word-order change is more difficult for children to comprehend than the corresponding construction without that property. This is the situation for passives. In the case of M-scrambling, we conjecture that children are making use of the A'-movement option.7

Based on these considerations, we set up (18) as our acquisitional hypothesis:

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(18) **Acquisitional Hypothesis:**
Japanese-speaking children have more difficulty in comprehending constructions that involve word order permutation via A-movement than those that do not.

4. Predictions for child Japanese

If the acquisitional hypothesis in (18) is correct, then the two analyses of ‘S-scrambling’ mentioned in section 2 make different acquisitional predictions. Since the A-movement Analysis postulates the presence of A-movement in deriving the SUB-DO-IO-V order from the SUB-IO-DO-V order, it will predict (19). On the other hand, the Base Generation Analysis, which allows the base-generation of both orders (and does not relate them via A-movement), will predict (20):

(19) **Prediction from the A-movement Analysis:**
Japanese-speaking children have more difficulty in comprehending sentences with SUB-DO-IO-V order than those with SUB-IO-DO-V order.

(20) **Prediction from the Base Generation Analysis:**
The difficulty that Japanese-speaking children have in comprehending sentences with SUB-DO-IO-V order is the same as for those with SUB-IO-DO-V order.

The experiment reported in the next section is an attempt to test these predictions.

5. Experiment

5.1. Subjects

The subjects were 20 monolingual Japanese-speaking children ranging in age from 3;11 (three years, eleven months) to 5;0 (mean age 4;6). They were tested individually.

5.2. Method

The task was truth-value verification (Crain and Thornton 1998). The child was told a story, which was accompanied by an animation presented on a laptop computer, and at the end of each story, the character Meowce appeared on the screen and described verbally what he thought had happened in the story. The task for the child was to judge whether Meowce’s description was correct or wrong, by pointing at one of the cards.
Meowce had in his hands: O (circle, which means ‘correct’) or X (cross, which means ‘wrong’).

There were nine sentences tested: two sentences with the order SUB-IO-DO-V, one sentence with the order SUB-DO-IO-V, one sentence with the order IO-SUB-DO-V, and five filler sentences. The test sentences are given in (21) to (24), and a sample story is presented in (25):

(21) **SUB-IO-DO-V:**

Satoshi-ga akachan-ni Pokémon-o misetayo.

Satoshi-NOM baby-DAT Pokémon-ACC showed

‘Satoshi showed his Pokémon to the baby.’

(22) **SUB-DO-IO-V:**

Satoshi-ga Pikachu-o okaasan-ni misetayo.

Satoshi-NOM Pikachu-ACC mother-DAT showed

‘Satoshi showed Pikachu to his mother.’

(23) **SUB-IO-DO-V:**

Ookido Hakase-ga Kasumi-ni atarashii Pokémon-o misetayo.

Dr. Ookido-NOM Kasumi-DAT new Pokémon-ACC showed

‘Dr. Ookido showed a new Pokémon to Kasumi.’

(24) **IO-SUB-DO-V:**

Kasumi-ni Satoshi-ga Pichu-o misetayo.

Kasumi-DAT Satoshi-NOM Pichu-ACC showed.

‘Satoshi showed Pichu to Kasumi.’

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8. The sentence with the SUB-DO-IO-V order in (22) was presented in a story that made it false if interpreted correctly, but true if interpreted as if it had the order SUB-IO-DO-V. Similarly, the sentence with the IO-SUB-DO-V order in (24) was presented in a story that made it false if interpreted correctly, but true if interpreted as if it had the order SUB-IO-DO-V. Accordingly, one of the two SUB-IO-DO-V sentences (the one in (21)) was presented with a story that made it true if interpreted as if it had the order SUB-IO-DO-V. The other SUB-IO-DO-V sentence (the one in (23)) was presented with a story that made it true if interpreted as if it had the order IO-SUB-DO-V. The sentence with the order DO-SUB-IO-V could not be included in the experiment, due to the difficulty of constructing a story in which the sentence became true if interpreted as if it had the order SUB-IO-DO-V. If it turns out that the order DO-SUB-IO-V (like SUB-DO-IO-V) is difficult for children, this will suggest that M-scrambling of the DO has to pass through the landing site of S-scrambling as an intermediate landing site (Mahajan 1990: 34-7).
(25) Sample story: The story for (22):
Satoshi came back home with his Pokémon Pikachu during his long
journey, in order to introduce Pikachu to his mother. Opening the door,
Satoshi said, “Mom, I’m back home!” However, there was no response.
On the table he found a memo that said, “I am out shopping.” Looking
at the memo, he said, “Oh no, Mom cannot meet Pikachu right now.”
However, he got a good idea. He took Pikachu to his room, and showed
him a picture. In that picture, Satoshi and his mother were smiling. He
said, “Hey look, Pikachu. This is my mom!” Pikachu looked very
happy to see Satoshi’s mother.

Meowce: Satoshi-ga Pikachu-to ouchi-ni kaette kitayo.
Sosite, Satoshi-ga Pikachu-o okaasan-ni misetayo. (= (22))
‘Satoshi came back home with Pikachu. And Satoshi
showed Pikachu to his mother.’

5.3. Results

The results are summarized in (26):

(26)

<table>
<thead>
<tr>
<th>Order</th>
<th># correct answers</th>
<th>% correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUB-IO-DO-V (21)</td>
<td>17 / 20</td>
<td>.85</td>
</tr>
<tr>
<td>SUB-DO-IO-V (22)</td>
<td>12 / 20</td>
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<tr>
<td>SUB-IO-DO-V (23)</td>
<td>19 / 20</td>
<td>.95</td>
</tr>
<tr>
<td>IO-SUB-DO-V (24)</td>
<td>18 / 20</td>
<td>.90</td>
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</table>

5.4. Discussion

Our subjects, given that they are relatively old, had little difficulty in
comprehending the “basic” order SUB-IO-DO-V. Furthermore, they had
little difficulty in comprehending the IO-SUB-DO-V order, which is
derived via M-scrambling. This is in conformity with Otsu’s (1994)
observation that M-scrambling poses no extra difficulty to children’s
comprehension. However, compared with these two types, performance on
SUB-DO-IO-V was relatively poor: It was around the chance level.\footnote{9} Thus,
the results bear out the prediction of the A-movement Analysis in (19):
Japanese-speaking children have more difficulty in comprehending the
SUB-DO-IO-V order than the SUB-IO-DO-V order.

\footnote{9} The difference in children’s performance on M-scrambled vs. S-scrambled
sentences was significant, \( p = .01 \) by paired \( t \)-test.
Could we still explain our results if we adopted the Base Generation Analysis? We can think of the following two possibilities. One approach would be to say that the verb with SUB-IO-DO-V order and the verb with SUB-DO-IO-V order constitute separate lexical entries (possibly with different theta-grids), and that for some reason the entry with SUB-DO-IO-V order is quite difficult to acquire, taking more than four and a half years. The other approach is to attribute the developmental difference to a difference in phrase structure. According to Miyagawa (1997: 8), while the IO in IO-DO order is an NP, the one in DO-IO order is a PP. Thus, it might be the case that children have difficulty comprehending sentences with [VP NP PP V] structure in general, including the one illustrated in (27):

(27) Satoshi-ga ringo-o Takeshi-kara moratta.
     Satoshi-NOM apple-ACC Takeshi-from received
     ‘Satoshi received an apple from Takeshi.’

As far as we are aware, there is no independent evidence in the literature to support either of these two possibilities. Therefore, the data from child Japanese not only lend support to the A-movement Analysis of S-scrambling, but also constitute a problem for the Base Generation Analysis.

6. Conclusion

Even though the results reported here are still preliminary, in the sense that the numbers of subjects and test items were relatively small, our results bear out the prediction of the A-movement Analysis. Thus, the data from child Japanese provide an argument in favor of the A-movement Analysis of the DO-IO order within the VP in Japanese, and pose a problem for the Base Generation Analysis.10

Our results, in effect, indicate a substantial difference between children’s performance on M-scrambling, and their performance on S-scrambling. This finding supports the view that scrambling is not a uniform phenomenon, but consists of at least two distinct types (Mahajan 1990).

Finally and most importantly, we believe that this study has demonstrated the potential of child language acquisition as an important testing ground for syntactic theories.

10. See Miyamoto and Takahashi (to appear) for an argument from adult sentence processing for the movement analysis of DO-IO order.
### Appendix: Individual responses

<table>
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<th>(21)</th>
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(C = correct, W = wrong)

### References


