On the Acquisition of Scrambling in Japanese[*]

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This paper presents an experimental study of the acquisition of Japanese scrambling. Japanese is a free word-order language, and allows both the subject-object-verb order and the object-subject-verb order. Harada (1977) and Saito (1985), among others, have proposed that the former is the basic order and that the latter is derived by movement of the object. We first show that children understand scrambled sentences much earlier then generally assumed, even at age 2. Then, we present evidence that those children actually have proper knowledge of the syntactic properties of scrambling. We used sentences with the anaphor *zibun* to test children's knowledge of the reconstruction property of scrambling. Our results show that those who were successful with the interpretation of simple scrambled sentences and the interpretation of *zibun* in active non-scrambled sentences showed perfect performance with scrambled sentences containing *zibun*. This suggests that children not only can properly interpret simple scrambled sentences, but actually know the properties of scrambling as a movement operation from a very early age.

Key words: scrambling, reconstruction, movement, acquisition, passive

1. Introduction

This paper presents an experimental study of the acquisition of Japanese scrambling. Japanese is a free word-order language, and allows both the subject-object-verb order and the object-subject-verb order. Harada (1977) and Saito (1985), among others, have proposed that the former is the basic order and that the latter is derived by movement of the object. Thus, (1b) is derived from (1a).

(1) a. Ahiru-ga   ushi-o   oikaketa.
      duck-Nom   cow-Acc   chased
      'The duck chased the cow.'
   b. Ushi-o   ahiru-ga   oikaketa.
      cow-Acc   duck-Nom   chased
      'The duck chased the cow.'

The movement operation involved in (1b) is called scrambling. The main question to be addressed in this paper is when and how Japanese-speaking children acquire this operation and its properties.

Hayashibe (1975) examines how Japanese-speaking children interpret the scrambled sentences, and reports that scrambling is acquired quite late in the development of grammar. He attributes this to the Canonical Sentence Strategy discussed in Bever (1970). That is, according to Hayashibe, children tend to interpret the first NP as agent and the second NP as patient even in scrambled sentences. The hypothesis seems quite plausible as it is argued in de Villiers and de Villiers (1973) that English-speaking children employ this strategy when they comprehend passive sentences. However, Otsu (1992) questions Hayashibe's results and demonstrates that 3-to-4-year-old Japanese-speaking children interpet scrambled sentences correctly when appropriate discourse contexts are provided. Further, Murasugi (2000) suggests that 2-to-4-year-old children interpret scrambled sentences correctly even without any discourse context. The possibility raised there is that the relevant factor is not discourse context but rather the subjects are made to pay proper attention to the Case markers.

In this paper, we first show that children understand scrambled sentences at a very early age, confirming the results of Murasugi (2000). Then, we present evidence that those children actually have proper knowledge of the syntactic properties of scrambling. In the first experiment, we test Japanese-speaking children's comprehension of the predicate-argument relations in passive and scrambled sentences, and, by so doing, compare the acquisition of passive with the acquisition of scrambling. The actual test sentences include basic, passive, and scrambled sentences such as the following:

(2) a. Kuma-ga   nezumi-o oikake-ta.
      bear-Nom   rat-Acc   chase-past
      'The bear chased the rat.'
   b. Kaeru-ga$_i$ nezumi-ni t$_i$ oikaker-are-ta.
      Flog-Nom   rat-by   chase-passive-past
      'The flog was chased by the rat.'

    c. Usi-o$_i$ ahiru-ga   t$_i$ oikake-ta.
       cow-Acc duck-Nom   chase-past
       'The cow, the duck chased.'

The result shows that children acquire scrambling at a very early stage, much earlier than passive, in fact.

    In the second experiment, we examine whether those children who comprehend the scrambled sentences in the first experiment know the syntactic properties of scrambling as well. As discussed in Saito (1985), scrambling exhibits the reconstruction property, which is typical of A'-movement. Focusing on this property, we test the children's comprehension of examples such as the following:

(3) a. Ahiru-ga   zibun-no   niwa-de   usi-o   oikaketa.
       Duck-Nom himself-Gen garden-at cow-Acc chased
       'The duck chased the cow at the garden of himself.'
     b. [Usi-o]$_i$ [zibun-no   niwa-de]$_j$ ahiru-ga   t$_j$ t$_i$ oikaketa.
        cow-Acc himself-Gen garden-at duck-Nom   chased
       'The cow, at the garden of himself, the duck chased.'

The anaphor *zibun* must have a c-commanding antecedent at LF. In (3a), the subject *ahiru-ga* c-commands *zibun* and can therefore be the antecedent of the anaphor. Number (3b) allows the same interpretation despite the fact that the required c-command relation is destroyed by scrambling. The example then requires reconstruction of *zibun-no niwa-de* 'at self's garden' to its initial position at LF. Our experiment demonstrates that those children who assign correct predicate-argument structures to scrambled sentences exhibit the knowledge of this reconstruction property as well.

    In the following, we will briefly go over the adult grammar of Japanese scrambling and the previous literature on its acquisition. Then, we present the results of the first and the second experiments in §3 and §4 respectively. In §5, we summarize the conclusions and discuss further implications of the experimental results. In particular, we argue that they indicate not only that children have knowledge of scrambling quite early, but also that the acquisition of passive is much delayed, even more so than children's comprehension of simple passive sentences indicate. This, we argue, provides further supporting evidence for Borer and Wexler's (1987) A-chain maturation hypothesis, which is already pursued in the acquisition research on Japanese by Sugisaki (1997) and Sugisaki and Isobe (2001).

2. Previous research on the syntax and acquisition of Japanese scrambling

2.1 The adult grammar

As was noted in the preceding, the free word-order phenomenon in Japanese is attributed to scrambling. One piece of evidence for scrambling as a movement operation is provided in Haig (1976) and Harada (1977). They show that scrambling exhibits the island phenomenon (Ross 1967).

(4) a.   John-ga [$_{NP}$ [ano hon-o   katta] hito-o]   sagasite iru rasii.
            -Nom   that book-Acc bought person-Acc looking-for seem
            'It seems that John is looking for the person who bought that book.'
     b. ?*Ano hon-o$_i$ [John-ga [$_{NP}$ [t$_i$ katta] hito-o]   sagasite iru rasii].
            that book-Acc   -Nom   bought person-Acc looking-for seem
(5) a.   Mary-ga [John-ga   Tokyo-ni ikitagatte iru noni]   musisite iru rasii.
            -Nom   -Nom Tokyo-to want-to-go   although ignoring   seem
            'It seems that although John wants to go to Tokyo, Mary is ignoring that fact.'
     b. ?*Tokyo-ni$_i$ Mary-ga [John-ga t$_i$ ikitagatte iru noni]   musisite iru rasii.
            Tokyo-to   -Nom   -Nom want-to-go   although ignoring   seem

Numbers (4) and (5) indicate that scrambling out of a complex NP or an adjunct phrase makes the sentence ungrammatical. These facts imply that movement is involved in the free word order phenomena.

Kuroda (1980) presents further evidence for scrambling based on the distribution of floating quantifiers. A floating quantifier and the NP it modifies must be adjacent as shown in (6).

(6) Otokonoko-ga   onnanoko-o   hutari   mita.
    boy-Nom   girl-Acc   two-person   saw
    'a. The boy saw two girls. b.#The two boys saw a girl.'

In this example, the quantifier *hutari* 'two-person' is adjacent to *onnanoko-o* 'girl-Acc' but not to *otokonoko-ga* 'boy-Nom'. So, it can only modify *onnanoko*. That is, the interpretation {A boy saw two girls.} is possible, but the interpretation {Two boys saw a girl.} is not. However, somewhat surprisingly (7) is ambiguous:

(7) Onnanoko-o   otokonoko-ga   hutari   mita.
    girl-Acc   boy-Nom   two-person   saw
    'a. Two boys saw a girl. b. The boy saw two girls.'

In (7), *onnanoko-o* is scrambled from the object position to the sentence-initial position. *Otokonoko-ga* and the quantifier *hutari* are adjacent. Thus, the interpretation {Two boys saw a girl.} is allowed. Interestingly, the interpretation {A boy saw two girls.} is also allowed, despite the fact that the quantifier *hutari* is not adjacent to *onnanoko-o*. Kuroda (1980) argues that *onnanoko-o* and the quantifier *hutari* are adjacent to each other before the application of scrambling and hence, this reading is allowed. The ambiguity, thus, supports the movement analysis of the free word order phenomenon.

Scrambling has a unique property, called the radical reconstruction property. Saito (1989) argues that the scrambled element can be totally reconstructed to the base-generated position at LF. Consider the following example:

(8) Dono hon-o$_i$ [Mary-ga [John-ga t$_i$ tosyokan-kara karidasita   ka]
    which book-Acc   -Nom   -Nom library-from   checked-out Q
    siritagatte iru] (koto)
    want-to-know fact
    'Mary wants to know Q John checked out which book from the library.'

The *wh*-object is scrambled out of the embedded clause to the initial position of the matrix clause, but it takes scope at the embedded clause. It should then be possible to move the *wh*-phrase back to the embedded clause in LF so that it can receive proper interpretation. Saito suggests that scrambling can be literally undone in the LF component.

Scrambling exhibits standard reconstruction effects as well. Thus, the following contrast obtains:

(9) a. ?* Otagai$_i$-no   sensei-ga   [John-to Mary]$_i$-o   hihansita.
         each other-Gen teacher-Nom   -and   -Acc criticized
         'Each other's teachers criticized them.'
    b.   [Otagai$_i$-no   sensei-o]$_j$ [John-to Mary]$_i$-ga t$_j$ hihansita.
          each other-Gen teacher-Acc   -and   -Nom criticized
          'John and Mary criticized each other's teacher.'

Otagai 'each other' is subject to Condition (A) and requires a c-commanding antecedent. Number (9a) is ill-formed because the anaphor fails to satisfy this requirement. On the surface, (9b) seems to have the same problematic configuration as (9a). However, in (9b), the anaphor can satisfy Condition (A) through reconstruction. That is, (9b) is grammatical because the anaphor is properly licensed at its initial position. The second experiment discussed below is designed to examine children's knowledge of this reconstruction property of scrambling.

2.2 Acquisition studies

Some studies report that the acquisition of Japanese scrambling is relatively late. One of them is Hayashibe (1975), briefly mentioned above. He conducts an experiment with the act-out task, where the subjects are asked to demonstrate the meaning of the stimulus sentences by manipulating toy animals on the table. One of the sentences is shown in (10).

(10) Ahiru-san-o   kame-ga   osimasita.
  duck-Acc   turtle-Nom   pushed
  'The duck, the turtle pushed.'

The reported result is that 4-to-5-year-old children tend to assign wrong interpretations to these sentences rather consistently. Thus, they take *ahiru-san* 'duck' to be the agent and *kame* 'turtle' to be the patient in the case of (10). Similar experiments were conducted by Sano (1977) and Suzuki (1977), and similar results have been reported.

Hayashibe suggests that the wrong interpretations by children are due to the canonical sentence strategy or its Japanese version noun-noun-verb (NNV) strategy, where the first NP is interpreted as the agent and the second NP as the patient. The children tend to apply this strategy even to scrambled sentences, and their interpretations therefore differ from the adults'. He concludes that scrambling is acquired late, even as late as the fifth year.

Otsu (1992), on the other hand, argues that Hayashibe's experimental results do not accurately reflect the children's grammatical knowledge. He shows that 3-to-4-year-old Japanese-speaking children interpret scrambled sentences correctly when appropriate discourse contexts are provided. One of his context-stimulus pairs is shown in (11).

(11) a. Kooen-ni   ahiru-ga   imasita.
   park-at   duck-Nom   there was
   'There was a duck at the park.'
  b. Sono ahiru-o   kame-ga   osimasita.
   that duck-Acc turtle-Nom   pushed
   'The turtle pushed the duck.'

Otsu tests ten 3-year-olds and ten 4-year-olds, and reports that those children had no difficulties comprehending scrambled sentences. He also conducts a control experiment, where the test sentences are given to the children directly without the context sentences. The result of this experiment was consistent with Hayashibe's. Based on these observations, Otsu concludes that the children's performance on scrambled sentences is affected by the

presence or absence of the appropriate discourse context.

Otsu relies on Masunaga (1983) for the concrete analysis of the experimental results. Masunaga argues that scrambling is legitimate when the scrambled element serves the "bridging function" to connect the sentence with the preceding discourse. Otsu suggests that the use of scrambled sentences without any context violates this discourse principle, and this is the reason why many incorrect agent-patient-verb interpretations of the test sentences were observed in Hayashibe's experiment.

This suggestion seems quite reasonable because it is known that children are sensitive to pragmatics. However, it is also curious because no context is necessary for the adults to interpret scrambled sentences correctly. It would be necessary to investigate the more precise nature of the "bridging function" to pursue this suggestion further.

Murasugi (2000), a pilot study of the present research, tries to examine whether or not 2-to-4-year-old children understand scrambled sentences without discourse contexts. One innovation of the experiment was the inclusion of passives in the test sentences. Its primary purpose was to compare the acquisition of scrambling with that of passive. The following are examples of the test sentences from her experiment:

(12) a. Ahiru-ga   usi-o   oikake-ta.
        duck-Nom   cow-Acc chase-past
        'The duck chased the cow.'
     b. Usi-ga$_i$ ahiru-ni t$_i$ oikake-rare-ta.
        cow-Nom duck-by   chase-passive-past
        'The cow was chased by the duck.'
     c. Usi-o$_i$ ahiru-ga t$_i$ oikake-ta.
        cow-Acc duck-Nom   chase-past
        'The cow, the duck chased.'

Number (12a) is a regular active sentence, and (12b) and (12c) are the corresponding passive and scrambled sentences respectively. The results of the experiment suggest that scrambling is acquired much earlier than generally assumed. More precisely, 70% correct answers were elicited from the two-year-old subjects, and 100% correct answers from the three-year-olds for the scrambled sentences. At the same time, some subjects who had no problem with scrambling showed mixed results with passives. Passive is clearly acquired later than scrambling.

3. Experiment 1

3.1 The test sentences and the method

The experiment is basically the same as the one conducted by Murasugi (2000), but we tested a larger number of children from ages 2 to 6. The total number of subjects in this experiment was 22, including two two-year-olds, six three-year-olds, six four-year -olds, six five-year-olds and two six-year olds. All of them were monolingual, native speakers of Japanese living in Nagoya. Two adults were tested as the adult control. The subjects were interviewed individually. His/her mother or friend accompanied the subject in the playroom where the session took place.

As in Murasugi (2000), we gave regular active, passive, and scrambled sentences randomly to the subjects. Twenty-one test sentences, seven from each type, were given to each subject in the session. The regular active sentence, as in (12a), constitutes the lexical and syntactic tests. The experimental technique we employed was act-out. Accordingly, the subjects were asked to demonstrate the meaning of the test sentence by manipulating toy animals. The protocol for the scrambled sentence in (12c) is shown in (13).

(13) Experimenter: Kore-wa nani?
(What is this?)

Subject: Usi.
(A cow.)

Experimenter: Zya, kore-wa nani?
(Then, what is this?)

Subject: Ahiru.
(A duck.)

Experimenter: Soone, zya, kore kara, usi-to ahiru de watasi-ga iu koto, yattemite-ne.
(Good, then, please play with the cow and the duck as I say.)
"Usi-o ahiru-ga oikaketa." (= (12c))
(The cow, the duck chased.)
Nani-ga okita kana?
(What happened?)

Subject: <The subject manipulate the toy animals on a table.>

Experimenter: Yoku dekita ne!
(Excellent!)

We consider the subject's response correct in this example if he/she picks up the duck and makes it chase the cow.

3.2 The results and discussions

The results of this experiment are shown in (14). The numbers in the columns of *Active*, *Scrambling*, and *Passive* indicate the percentage of correct performance for each type of the test sentences.

(14) Table 1

Subject	Age (years)	Active (%)	Scrambling (%)	Passive (%)
A	2	83	83	50
B	2	83	66	17
C	3	100	100	100
D	3	100	100	28
E	3	100	100	42
F	3	28	42	0
G	3	71	71	28
H	3	100	85	57
I	4	100	100	0
J	4	100	100	71
K	4	100	100	42
L	4	100	100	85
M	4	100	100	100
N	4	100	100	100
O	5	100	100	100
P	5	100	100	100
Q	5	100	100	100
R	5	100	100	100
S	5	100	100	100
T	5	100	100	100
U	6	100	100	100
V	6	100	100	100
W	Adult	100	100	100
X	Adult	100	100	100

These results confirm the conclusion of Murasugi (2000) and show two facts. First, when we compare the columns *Active* and *Scrambling*, we notice that those who interpret active sentences correctly get a high percentage of correct answers also in scrambling. For

example, Subject A, who is two years old, interpreted 83% of the active sentences correctly and assigned correct interpretation to the same number of scrambled sentences. This fact suggests that the acquisition of scrambling can be as early as the acquisition of the basic sentences. Second, a significant difference is observed between the columns *Scrambling* and *Passive.* Two-to-four-year-old children almost always performed better for scrambled sentences than for passives. At ages three and four, children understand the predicate-argument relation of scrambled sentences, but show mixed results with passives.

The results obtained here are consistent with Otsu (1992), who showed that children's knowledge of scrambling surfaces when appropriate discourse contexts are provided. But since no explicit discourse sentences were given in our experiment, the results also suggest that the relevant factor is probably just <u>attention</u>. We speculate that the inclusion of passives in the test sentences made the children pay more attention to the relation between Case particles and theta-roles, and that this is the main reason they performed so well with the scrambled sentences. Whatever the precise reason may be, the results indicate that the knowledge of scrambling is acquired much earlier than generally assumed. Even two-year-old children interpreted scrambled sentences correctly, or more precisely, their performance with scrambled sentences was as good as their performance with non-scrambled basic sentences.

Borer and Wexler (1987), Sugisaki (1997), and others have already observed that verbal passives are acquired at a later stage of grammar acquisition. There are three possible reasons for this delay. The first possibility, argued for in Borer and Wexler (1987) and Sugisaki (1997), is that A-chain matures and accordingly, the acquisition of A-movement takes time. The second possibility is that passive involves complex morphology, and complex predicates in general take time to be acquired. The third possible reason for the children's failure with passive in experiments is that passive sentences do not conform to the "canonical sentence pattern" (Bever 1970 and de Villiers and de Villiers 1973).

Our findings show that the third possibility cannot be the whole story. If this were the only source of difficulty, then children should have problems with passive and scrambled sentences in the same way, because neither conforms to the "canonical sentence pattern." Since scrambling is clearly easier than passive for the children, the difficulty with passive is likely to be due to the property of movement or the complex morphology. Further discussion is given on this point in §5.

In the following, we report the second experiment. We demonstrate that the children who correctly interpret the predicate-argument relations of scrambled sentences actually possess knowledge of the reconstruction property of scrambling.

4. Experiment 2

4.1 The test sentences and the method

This experiment tests the Japanese-speaking children's knowledge of the reconstruction property of scrambling. The test sentences include those in (15).

(15) a. Ahiru-ga   usi-o   [zibun-no   niwa-de]   oikaketa.
       duck-Nom   cow-Acc   self-Gen   garden-at   chased
       'The duck chased the cow at the garden of himself.'
    b. Usi-o$_i$ [zibun-no   niwa-de]$_j$ ahiru-ga t_j t_i oikaketa.
       cow-Acc   self-Gen   garden-at   duck-Nom   chased
       'The cow, at the garden of himself, the duck chased.'

The purpose of this study is to examine whether those children who assign the correct predicate-argument structures to scrambled sentences have indeed acquired scrambling as a movement operation. It is logically possible that those children have some sort of <u>linking</u> <u>rules</u> connecting Case and theta-roles and have not yet acquired scrambling. It is therefore important to investigate whether those children have knowledge of the properties of scrambling. As an initial step toward this goal, we designed an experiment around the reconstruction property of scrambling.

Number (15b) is the test sentence that checks the children's knowledge of the reconstruction property of scrambling. Children's performance on sentences like this one is significant only if they interpret simple scrambled sentences as in (16) correctly.

(16) Usi-o$_i$ ahiru-ga t_i oikaketa.
      cow-Acc duck-Nom   chased
      'The cow, the duck chased.'

This was tested in Experiment 1. It is also necessary to check if the children have acquired the lexical and syntactic properties of the anaphor *zibun*. If not, they would fail to assign the correct interpretation to (15b), even if they knew the reconstruction property of scrambling. Number (15a) serves this purpose. *Zibun* not only requires a c-commanding antecedent but also is subject-oriented. Hence, if the children's grammar is the same as the adults', they will take *ahiru* 'duck', and not *usi* 'cow', as the antecedent of *zibun* in (15a). The question is whether those children who assign correct interpretations to (16) and (15a) apply reconstruction and understand *ahiru* 'duck' to be the antecedent of *zibun* in (15b).

We also included in the test sentences passives like the following, where *zibun* refers

unambiguously to the surface subject:

(17) [Kuma-ga]ᵢ usagi-ni   zibun-no niwa-de tᵢ oikakerareta.
       bear-Nom   rabbit-by self-Gen   garden-at   was-chased
       'The bear chased the rabbit at the garden of himself.'

The purpose was to make children pay more attention to the relation of Case particles and theta-roles, on the assumption that this was indeed a relevant factor in Experiment 1, and to examine the acquisition of passives further. Thus, our test sentences consist of regular active sentences as in (15a), scrambled sentences as in (15b), and passive sentences as in (17), all with *zibun*. Twenty sentences including six regular actives, six passives, and eight scrambled were presented to the subjects in random order.

The experimental technique we employed was again act-out. The subjects and the experimental setup were the same as those in Experiment 1. The 22 subjects included two two-year-olds, six three-year-olds, six four-year-olds, six five-year-olds, and two six-year-olds. Two adults were tested for control. This time, a house and a garden were prepared for each toy animal. Before each test sentence was presented, the experimenter picked up the relevant toy animals and their houses and put them on the table for the session. The subjects were asked to demonstrate the meaning of the test sentence by manipulating the toy animals in the appropriate house or garden.

The protocol for the test sentence (15b) is shown in (18).

(18) Experimenter: Ahiru-wa dore?
                    (Which is the duck?)

     Subject: Kore.
                    (This.) <The subject picks up the duck.>

     Experimenter: Usi-wa dore?
                    (Which is the cow?)

     Subject: Kore.
                    (This.) <The subject picks up the cow.>

     Experimenter: Kotti-ga usi-no niwa ne.
                    (Here is the cow's garden.)
                    <The experimenter points to the cow's garden.>
                    Kotti-ga ahiru-no niwa ne.
                    (Here is the duck's garden)
                    <Experimenter points to the duck's garden>

Experimenter: Zya, kore kara, watasi-ga iu koto, yattemite-ne.
(Now, please act-out what I say.)
"Usi-o zibun-no niwa-de ahiru-ga oikaketa." (= (15b))
(The cow, in self's garden the duck chased.)

Subject: <The Subject manipulates the toys on the table.>

Experimenter: Yoku dekita ne!
(Good job!)

If the subject makes the duck chase the cow in the duck's garden, the performance is judged to be correct.

4.2 The results and discussion

The results of Experiment 2 are shown in (19). The first two columns give information on the subjects, and the results of Experiment 1 are repeated in the next three columns. The last three columns show the results of the present experiment.

(19) Table 2

Subject	Age (year)	Exp.1: Active (%)	Exp.1: Scrambling (%)	Exp.1: Passive (%)	Exp.2: Active (%)	Exp.2: Scrambling (%)	Exp.2: Passive (%)
A	2	83%	83%	50%	0%	NT	NT
B	2	83	66	17	0	NT	NT
C	3	100	100	100	100	100	50
D	3	100	100	28	100	100	33
E	3	100	100	42	100	100	16
F	3	28	42	0	50	38	16
G	3	71	71	28	66	50	50
H	3	100	85	57	83	87	50
I	4	100	100	0	100	100	33
J	4	100	100	71	100	100	33
K	4	100	100	42	66	75	16
L	4	100	100	85	83	87	33
M	4	100	100	100	100	100	33
N	4	100	100	100	100	100	50
O	5	100	100	100	100	100	100
P	5	100	100	100	100	100	100
Q	5	100	100	100	100	100	100
R	5	100	100	100	100	100	100

S	5	100	100	100	100	100	33
T	5	100	100	100	100	100	50
U	6	100	100	100	100	100	100
V	6	100	100	100	100	100	50
W	Adult	100	100	100	100	100	100
X	Adult	100	100	100	100	100	100

Three observations can be made from these results. First, neither of the two-year old children (A and B) could interpret the regular active sentences when the anaphor *zibun* was added. This indicates that children do not yet know the lexical and syntactical property of *zibun* at age two. This is the reason the tests for scrambled sentences and passives could not be meaningfully pursued and we have "NT" in the result columns. On the other hand, some of the three-year-old subjects clearly know the properties of *zibun,* though others still show mixed results. It seems then that the properties of the anaphor *zibun* are acquired around three or four years of age.

Secondly and most importantly for our purpose, the results indicate that those who interpret the predicate-argument relation of scrambled sentences correctly are also successful in the interpretation of scrambled sentences with *zibun*. Let us consider the three-year-old subjects, C, D and E, and the four-year-old subjects, I, J, M, and N, who were perfect in the scrambling test in Experiment 1. In Experiment 2, they had no problem finding the antecedent of *zibun* in scrambled sentences. Hence, we conclude that the subjects assigning correct interpretation to simple scrambled sentences have knowledge of the reconstruction property of scrambling. The results of the other three-to-four-year olds, F, G, H, K, and L, do not contradict this conclusion. K and L, for example, were perfect with the scrambled sentences in Experiment 1, but had difficulty with the interpretation of *zibun* in regular active sentences in Experiment 2. This suggests that they have not perfectly acquired the properties of *zibun*, and that this is the source of the difficulty with the scrambled sentences with the anaphor. It is quite possible that they have knowledge of the reconstruction property of scrambling.

Third, we again observe a difference between scrambling and passive. In this experiment too, no subject did better with passive than with scrambling. The subjects C, M, N, S, T, and V showed particularly interesting results. They were perfect in Experiment 1 and had no problem with the interpretation of *zibun* in regular active or scrambled sentences. Yet, they had difficulty with passive sentences containing *zibun*. We will offer a possible explanation for this interesting pattern in the following .

5. Summary and further remarks on the acquisition of passive

In this paper, we reported the results of two experiments on the acquisition of Japanese scrambling. The first experiment showed that scrambling is acquired much earlier then generally assumed, even at age two. In fact, it was impossible to differentiate children's performance on scrambled and non-scrambled sentences. We suspect that this result was obtained because we made the children pay attention to the relation between Case particles and theta-roles by mixing passives in the test sentences. It turned out that there were three-to-four-year-olds who were perfect with scrambling but had difficulty with passive. This clearly indicates that scrambling is acquired earlier than passive.

In the second experiment, we used sentences with the anaphor *zibun* to test children's knowledge of the reconstruction property of scrambling. Those who were successful with the interpretation of simple scrambled sentences and the interpretation of *zibun* in active non-scrambled sentences showed perfect performance with scrambled sentences containing *zibun*. This suggests not only that children can properly interpret simple scrambled sentences, but that they actually know the properties of scrambling as a movement operation from a very early age. The experiment has also indicated that the properties of *zibun* are acquired around three to four years of age.

The difference between scrambling and passive was striking in both experiments. This highlighted the early acquisition of scrambling, the main conclusion of this paper. But it also poses an interesting question on the acquisition of passive: Why is it that the acquisition of passive is delayed? We would like to give some remarks on this question before we conclude this paper. We will discuss the reason for the late acquisition of passive, and also the curious result in the second experiment; i.e., some children had difficulty only with passive sentences that contain *zibun*.

In the discussion on Experiment 1 in §3, we argued that the late acquisition of passive cannot be due to the canonical sentence strategy but must be due to the complex morphology or the A-movement. There are important works that directly address this issue. Among them are those works that entertain the A-chain maturation hypothesis; e.g., Borer and Wexler (1987), Schaeffer (1995), Sugisaki (1997), and Sugisaki and Isobe (2001). Borer and Wexler (1987), briefly mentioned above, propose the maturation hypothesis based on the acquisition study of English and Hebrew. In both English and Hebrew, the same passive morpheme is used in adjectival passive and verbal passive. The syntactic difference between them is in the existence of A-movement: adjectival passive does not involve A-movement, while verbal passive does. Borer and Wexler observe a delay in the acquisition of verbal passive, and suggest that it is due to the delay in the acquisition of A-chain, which requires a certain degree of biological development, that is, maturation.

Even more directly relevant is Sugisaki's (1997) work on the acquisition of Japanese passives. Japanese actually has two types of passives, direct and indirect. The former contains a gap as in English passives, but the latter does not. Examples of each type are shown in (20).

(20) a. John$_i$-ga   Mary$_j$-ni zibun$_{i/*j}$-no   heya-de t$_i$ nagur-are-ta.
          -Nom   -by self   -Gen room-at   hit-passive-past
        'John was hit by Mary in self's room.'
    b. John$_i$-ga   Mary$_j$-ni zibun$_{i/j}$-no   heya-de kodomo-o   nagur-are-ta.
          -Nom   -by self   -Gen room-at child-Acc   hit-passive-past
        'John is such that his child was hit by Mary in self's room.'

Since Kuno (1973), it has been standard to analyze direct passives as involving NP-movement to the subject position. (See also Saito (1982), Hoshi (1995). See Kuroda (1965), Kitagawa and Kuroda (1992) for a contrary view.) On the other hand, in indirect passives, the passive morpheme is assumed to be a higher predicate taking a sentential complement. One piece of evidence for this can be seen in (20b), where the subject-oriented anaphor *zibun* has two potential antecedents, indicating that the sentence contains two subjects. No movement is involved in the derivation of indirect passives.

Sugisaki reports that for children, indirect passives are easier to comprehend than direct passives. Since there is no notable difference in the morphological complexity between the two types of passives, he concludes that A-movement is the source of the delay in the acquisition of direct passives. Since the passive sentences tested in our experiments are all direct passives, his proposal accounts for our data as well.

Further evidence for the A-chain maturation hypothesis is presented in Sugisaki and Isobe (2001). Tada (1993) investigates the typology of Japanese scrambling, and shows that scrambling to the sentence-initial position can be A'-movement, while VP-internal scrambling is strictly A-movement. Thus, a contrast is observed between (21b) and (22b).

(21) a. Taroo-to   Hanako-ga   otagai-o   hihansita (koto)
          -and   -Nom each other-Acc   criticized fact
        'Taroo and Hanako criticized each other.'
    b. Otagai-o$_i$ Taroo-to Hanako-ga t$_i$ hihansita (koto)
        each other-Acc   -and   -Nom   criticized fact
(22) a. Yamada-ga Taroo-to Hanako-ni otagai-o   syookaisita (koto)
          -Nom   -and   -to each other-Acc introduced   fact
        'Yamada introduced Taroo and Hanako to each other.'
    b. *Yamada-ga   otagai-o$_i$ Taroo-to Hanako-ni t$_i$ syookaisita (koto)
          -Nom each other-Acc   -and   -to   introduced fact

It is possible to scramble the anaphor *otagai* 'each other' across its antecedent to the sentence-initial position as in (21b). The result is a case of reconstruction typically observed with A'-movement. On the other hand, (22b) shows that VP-internal scrambling of the anaphor across its antecedent yields an ungrammatical sentence. If this type of scrambling is strictly A-movement, the example is ruled out by Condition (C) of the binding theory.

Sugisaki and Isobe examine the acquisition of these two types of scrambling using test sentences such as those in (23).

(23) a. John-ga Mary-ni sono hon-o ageta.
        -Nom   -Dat that book-Acc gave
    'John gave that book to Mary.'
  b. Mary-ni$_i$ John-ga t$_i$ sono hon-o ageta.
        -Dat   -Nom that book-Acc gave
  c. John-ga sono hon-o$_i$ Mary-ni t$_i$ ageta.
        -Nom that book-Acc   -Dat gave

Using truth-value judgment task, they observe that four-year-old children (mean age 4;2) cannot interpret sentences that involve VP-internal scrambling, while they have no problem with scrambling to the sentence-initial position. Given Tada's analysis, this indicates that A-scrambled sentences are more difficult for children to comprehend than A'-scrambled sentences. Thus, it seems that the acquisition of A-movement takes more time than that of A'-movement. Sugisaki and Isobe, in fact, interpret the acquisition data as supporting evidence for the A-chain maturation hypothesis.

If we accept the A-chain maturation hypothesis, the difference between scrambling and passive observed in our experiments is automatically accounted for. As noted above, the passive sentences we tested are all instances of direct passive. On the other hand, the scrambling examples in our experiments all involve scrambling to the sentence-initial position, and hence, can be A'-scrambling. Thus, our results confirm that A-movement is acquired later than A'-movement. The early acquisition of A'-scrambling observed in our first experiment shows that the discrepancy between A-movement and A'-movement in acquisition is quite large.

Our second experiment in fact suggests that the discrepancy is in fact even larger than the first experiment indicates. Recall that there were six three-to-six-year-olds (C, M, N, S, T, and V) who had no problem with scrambled or passive sentences in Experiment 1 and with the interpretation of *zibun* in regular active or scrambled sentences in Experiment 2, but had difficulty with passive sentences containing *zibun*. This includes three of the eight 5-6 year-old subjects. In the act-out, the incorrect performances they

showed included "mistakes" with the antecedent of *zibun*. Let us consider one of the test sentences in (24).

(24) Kuma-san-ga$_i$ Usagi-san-ni zibun-no   niwa-de t$_i$ oikaker-are-ta.
     bear   -Nom rabbit   -by self-Gen garden-at   chased-passive-past
     'The bear was chased by the rabbit at self's garden.'

Since this is a direct passive sentence, the antecedent of *zibun* has to be *kuma-san* 'bear', according to the adult grammar. However, some children acted out the situation in which the rabbit chased the bear in the rabbit's garden, not in the bear's garden.

This type of incorrect performance makes perfect sense if the children construed (24) not as direct passive but as indirect passive. This is so because as we have seen above, the *by*-phrase qualifies as the antecedent of *zibun* in indirect passives. If this is correct, then for those children, the <u>direct</u> <u>passive</u> <u>sentences</u> in the experiments do not involve movement but are generated with *pro* in the object position. The structure they assign to <u>direct</u> <u>passives</u> makes observable difference in the act-out only when the test sentence contains *zibun*. But our hypothesis implies that those children failed to construe direct passive with movement even in Experiment 1, despite their correct performances.

If this conclusion is correct, our experiments have shown not only that children know A'-scrambling earlier than generally assumed, but also that direct passive with A-movement is acquired later than simple observation would suggest. Thus, they provide further evidence for the A-chain maturation hypothesis. More specifically, they suggest that the maturation indeed takes quite some time.

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日語攪拌規律的習得

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　　本文以實驗的方法研究日語攪拌規律的習得。日語的語序自由，同時允許 SOV 與 OSV 語序。Harada (1977)，Saito (1985) 與一些學者都主張日語的基礎語序是 SOV，OSV 語序是由賓語移前衍生。我們首先指出兒童早在兩歲即能夠理解攪拌句，接著證明這些兒童具有攪拌規律語法特性的正確知識。我們使用帶有照應詞 "zibun" 的句子來測試兒童對攪拌的重構特性的知識。結果顯示，那些能理解簡單攪拌句、並且能理解非攪拌主動句中 "zibun" 的兒童同時也能理解含有 "zibun" 的攪拌句。這說明兒童在很小的年紀就能夠理解簡單攪拌句，並且知道攪拌規律移位的性質。

關鍵詞：攪拌規律，重構，移位，習得，被動