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An Experimental Study on the Acquisition of Long-Distance Binding of *Zibun*

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0. Introduction

This experimental study¹ deals with how Japanese children acquire long-distance binding of an anaphoric expression² *zibun*. Long-distance binding can be defined as the case where an anaphoric expression refers to an antecedent across the boundary of the finite clause. Look at this example.

- (1) Taroo_i wa [Ziroo_j ga zibun_{i/j} o semeta]
Taro TOP/SB Ziro NOM self ACC blame-PAST
to itta.
COMP say-PAST³
'Taro_i said that Ziro_j blamed self_{i/j}.'

As the index *i* shows, *zibun* can refer to the matrix subject, *Taroo*, across the embedded clause. In addition, *zibun* can also refer to the embedded subject, *Ziroo*, which is shown by the index *j*. I will call the coindexing between *zibun* and the embedded subject to be local binding of *zibun*. It is generally acknowledged that *zibun* allows long-distance binding (see Aikawa (1999) for references).

Such long-distance binding can be found in other languages. For example, (2) is from Icelandic and (3) is from Chinese respectively. Each anaphoric expression, Chinese *ziji* and Icelandic *sig*, can select an antecedent across the clause.

- (2) Jon_i segir [ao Petur_j raki sig_{i/j} a hverjum degi].
 John says that Peter shaves sig on every day
 'John_i says that Peter_j shaves self_{i/j} every day.'

(Sigurjónsdóttir and Hyams 373-374)

- (3) Milaoshu_i mengjian [Tanglaoya_j zhi-yi-zhi zij_{i/j}].
 Mickey-Mouse dream Donald-Duck point-one-point self
 'Mickey Mouse_i is dreaming that Donald Duck_j is pointing at
 self_{i/j}.'

(Chien, Wexler and Chang 230)

The previous acquisitional studies, however, cannot find the evidence that children allow long-distance binding. It has been reported that children prefer local binding and tend to disallow long-distance binding (see Sigurjónsdóttir and Hyams 1992, Chien, Wexler and Chang 1993, and Yuhaku 2000).

This paper proceeds in the following way. In the first section, I will review the previous acquisitional findings about long-distance binding. In the second section, I will point out the problems of the previous studies. In the third and the fourth sections, I will present a new acquisitional study which shows that children allow long-distance binding of *zibun*. A concluding remark and implication for the future study come in the fifth and the sixth section respectively.

1. Previous studies

Several acquisitional studies have paid attention to how children acquire long-distance binding in each language. Chien, Wexler and Chang (1993) examined the acquisition of Chinese anaphoric expression *ziji*. Their study included 80 native Chinese children. The children's mean age is about five years old, ranging from three to seven years old. Using pictures, the authors conducted experiments on how Chinese chil-

dren interpreted the sentences which allow both local and long-distance binding as shown in (4).

- (4) Milaoshui mengjian [Daxingxingj nazhe zijij-de
 'Mickey Mouse_i dreams Big Gorilla_j hold self_{i/j}'s
 zhaopian].
 picture.'

(Chien, Wexler and Chang 242)

The result of their experiment is summarized in TABLE 1. As TABLE 1 shows, Chinese children accepted long-distance binding of *ziji* (21%) much less than its local one (61%).

TABLE 1

	local	long-distance
accept	49 (61%)	17 (21%)
reject	8 (10%)	33 (41%)
random	23 (29%)	30 (38%)
sum	80(100%)	80(100%)

Yuhaku (2000) examined 26 Japanese kindergarten children from five to six years old. Yuhaku found that most Japanese children did not allow long-distance binding of *zibun* in the following sentence:

- (5) Kumasani wa [Usatyan ga zibun_i no e
 bear TOP/SB rabbit NOM self POSS picture
 o kaiteiru to] omotteiru ka na?
 ACC drawing COMP thinking QP CFP
 'Is the bear_i thinking that the rabbit is drawing self's picture?'

The results of Yuhaku (2000) is summarized in TABLE 2.

TABLE 2

	long-distance
accept	6 (23%)
reject	18 (69%)
random	2 (8%)
sum	26(100%)

The same tendency to prefer local binding to long-distance one was confirmed among Icelandic children by Sigurjónsdóttir and Hyams (1992).

It may be said that most children tend not to show long-distance binding in their early language acquisition. On the other hand, adult native speakers allow long-distance binding. For example, Yuhaku (2000) asked several adult Japanese native speakers of the interpretation of the above example (5), and all of them allowed long-distance binding of *zibun*.

Such discrepancy between children and adults, however, casts serious doubt on the assumption of Noam Chomsky's (1986) generative grammar, on which all the above experimental studies are based. Generative grammar assumes that human beings are equipped with Universal Grammar at birth. It means that children's grammar and adult are not different from each other in essence (Wexler and Thornton 1999). If so, how should the difference between children and adult be treated? In the next section, I will reconsider the facts on *zibun* and show that these previous researchers did not test children's knowledge of binding conditions.

2. Theoretical Background

2.1. Reconsideration of the facts on *zibun*

A careful consideration tells us that long-distance binding is not as simple as it looks. For example, Japanese *zibun* does not always show both local and long-distance binding. Look at the next example.

- (6) Tarooi wa [Zirooj ga zibun_{i/j} o yonda]
 Taro TOP/SB Ziro NOM self ACC call-PAST
 to itta.
 COMP say-PAST
 'Taro_i said that Ziro_j called self_{i/j}.'

Zibun in this example allows only long-distance binding in contrast to *zibun* in (1) which accepts both local and long-distance interpretations (repeated here for convenience).

- (7) Tarooi wa [Zirooj ga zibun_{i/j} o semeta]
 Taro TOP/SB Ziro NOM self ACC blame-PAST
 to itta.
 COMP say-PAST
 'Taro_i said that Ziro_j blamed self_{i/j}.'

These two sentences do not differ in their syntactic configurations. The difference between (6) and (7) lies in the embedded clause verb. In (6), *yobu* 'call' is chosen while *semeru* 'blame' is selected in (7). It means that the selection of the embedded verb causes different interpretation of *zibun*. Such different interpretation can be found in the next pairs. In (8), *bengosuru* 'defend' is used whereas *naguru* 'strike' is selected in (9). *Zibun* allows both local and long-distance binding in (8), but only long-distance binding of *zibun* is accepted in (9).

- (8) Tarooi wa [Zirooj ga zibun_{i/j} o bengosita]
 Taro TOP/SB Ziro NOM self ACC defend-PAST
 to itta.
 COMP say-PAST
 'Taro_i said that Ziro_j defended self_{i/j}.'

- (9) Tarooi wa [Zirooj ga zibun_{i/sj} o nagutta]
 Taro TOP/SB Ziro NOM self ACC strike-PAST
 to itta.
 COMP say-PAST
 'Taro_i said that Ziro_j struck self_{i/sj}.'

I will call the verb which allows both local and long-distance binding of *zibun* to be the "ambiguous" verb and the verb which allows only long-distance binding to be the "LD-only" verb.

In addition, interesting facts emerge when *zibun* occurs in non-argument positions, in other words, possessive *zibun*. For example, compare the following sentences (10) and (11) with (6) and (9) above.

- (10) Tarooi wa [Zirooj ga zibun_{i/sj} no kodomo o
 Taro TOP/SB Ziro NOM self POSS child ACC
 yonda] to itta.
 call-PAST COMP say-PAST
 'Taro_i said that Ziro_j called self_{i/sj}'s child.'
- (11) Tarooi wa [Zirooj ga zibun_{i/sj} no kodomo o
 Taro TOP/SB Ziro NOM self POSS child ACC
 nagutta] to itta.
 strike-PAST COMP say-PAST
 'Taro_i said that Ziro_j struck self_{i/sj}'s child.'

In (6) and (9), *zibun* allows only long-distance binding while *zibun* accepts both local and long-distance binding in (10) and (11). The difference between (6)/(9) and (10)/(11) is derived from the position of *zibun* in the embedded clause. In (6) and (9), *zibun* occurs in argument position, that is, taking non-possessive form. On the other hand, *zibun* in (10) and (11) appears in non-argument position, that is, taking possessive form. I will call *zibun* in non-possessive form as "argument" *zibun* and *zibun* in

possessive form as “non-argument” *zibun*.

In summary, interpretations of *zibun* are influenced by the verb with which it occurs and the position *zibun* occupies. In the next section, I will show how the above facts on *zibun* can be explained.

2.2. Reinhart and Reuland (1993)

Reinhart and Reuland (1993) propose that binding conditions should apply only to the relationship between coarguments of the predicate. In other words, binding conditions restrict coindexation between coarguments. Reinhart and Reuland’s (1993) binding conditions are defined in the following way.

(12) Conditions :

A: A reflexive-marked predicate is reflexive.

B: A reflexive predicate is reflexive-marked.

Definitions:

(a) A predicate is reflexive iff two of its arguments are coindexed.

(b) A predicate (of P) is reflexive-marked iff either P is lexically reflexive or one of P’s arguments is a SELF anaphor. (Reinhart and Reuland 670-71)

Reinhart and Reuland (1993) classify anaphoric expressions between SE anaphor (simplex anaphor) and SELF anaphor (complex anaphor). The difference between SE anaphor and SELF anaphor lies in their structures. SELF anaphor usually consist of two parts and includes the morpheme expressing ‘self’. For example, the English reflexive *oneself*, the Dutch reflexive *zichzelf* ‘self-self’ and the Japanese *zibun-zisin* ‘self-self’. On the other hand, SE anaphor consists of itself. For example, Dutch *zich* ‘self’, Chinese *ziji* ‘self’, and Japanese *zibun*. Reinhart and

Reuland (1993) assume that only SELF anaphor has the ability to reflexive-mark the predicate. Aikawa (1993) claims that Japanese *zibun* belongs to SE anaphor and that *zibun* cannot reflexive-mark the predicate.

Reinhart and Reuland's definition (b) above claims that there are two ways to reflexive-mark the predicate. One way is SELF anaphor. The other is a lexically reflexive predicate. Then, what is a lexically reflexive predicate? How can a predicate be classified into a lexically reflexive one? Reinhart and Reuland (1993) propose to nominalize a predicate. They assume that a predicate is lexically reflexive if its nominalized form allows a reflexive interpretation. For example, if the embedded clause predicates above, *semeru* 'blame', *yobu* 'call', *bengosuru* 'defend', and *naguru* 'strike', are nominalized, the following paradigms emerge.

- (13) (Anmari) *semeru koto wa yokunai.*
 (Too much) blaming NM TOP/SB be-bad-PRE
 'Too much) blaming oneself / others is bad.'
- (14) *Yobu toki wa ki-o-tuketa hou ga yoi.*
 call when TOP/SB take-care would NOM be-better.
 'It would be better to take care in calling *oneself / others.'
- (15) *Bengosuru no wa taihen desu.*
 Defending NM TOP/SB difficult be
 'Defending oneself / others is difficult.'
- (16) *Naguru koto wa yokunai.*
 Striking NM TOP/SB be-bad-PRE
 'Striking ??(*) oneself / others is bad.'

As can be seen, the predicates in (13) and (15) allow both reflexive and non-reflexive interpretations concerning the object of the predicate while those in (14) and (16) accept only non-reflexive interpretation. So, the former predicates, *semeru* 'blame' and *bengosuru* 'defend' can be classified

as lexically reflexive predicates and the latter *yobu* 'call' and *naguru* 'strike' into lexically non-reflexive ones.⁴ I will call the former type predicate to be a 'reflexive' predicate and the latter to be a 'non-reflexive' predicate.

With this in mind, let's look at the examples above (repeated here for convenience).

- (17) Taro_i wa [Ziroo_j ga zibun_{i/j} o semeta]
 Taro TOP/SB Ziroo NOM self ACC blame-PAST
 to itta.
 COMP say-PAST
 'Taro_i said that Ziroo_j blamed self_{i/j}.'
- (18) Taro_i wa [Ziroo_j ga zibun_{i/*j} o yonda]
 Taro TOP/SB Ziroo NOM self ACC call-PAST
 to itta.
 COMP say-PAST
 'Taro_i said that Ziroo_j called self_{i/*j}.'
- (19) Taro_i wa [Ziroo_j ga zibun_{i/j} o bengosita]
 Taro TOP/SB Ziroo NOM self ACC defend-PAST
 to itta.
 COMP say-PAST
 'Taro_i said that Ziroo_j defended self_{i/j}.'
- (20) Taro_i wa [Ziroo_j ga zibun_{i/*j} o nagutta]
 Taro TOP/SB Ziroo NOM self ACC strike-PAST
 to itta.
 COMP say-PAST
 'Taro_i said that Ziroo_j struck self_{i/*j}.'

In these examples, *zibun* occurs in the embedded clause and is coargument with the embedded subject, *Ziroo*. As is written above, the embedded predicate must be reflexive-marked in order to obtain the coindexation between *zibun* and its corargument *Ziroo*. Of course, *zibun* is not SELF anaphor, so it cannot reflexive-mark the predicate. So, the predi-

cate must be lexically reflexive for coindexing between coarguments. The predicates, *semeru* ‘blame’ and *bengosuru* ‘defend’ are lexically reflexive while *yobu* ‘call’ and *naguru* ‘strike’ are not. As a result, the coindexation between *zibun* and the embedded subject noun *Zi-roo* is allowed in (17) and (19) but it is not in (18) and (20).

Let us move on to the next question. As is seen in the preceding section, the interpretation of *zibun* can be changed according to the position in which *zibun* occurs. Let’s consider the examples above. (repeated here for convenience)

- (21) Taro_i wa [Zi-roo_j ga zibun_{i/j} no kodomo o
Taro TOP/SB Zi-roo NOM self POSS child ACC
yonda] to itta.
call-PAST COMP say-PAST
‘Taro_i said that Zi-roo_j called self_{i/j}’s child.’
- (22) Taro_i wa [Zi-roo_j ga zibun_{i/*j} o yonda]
Taro TOP/SB Zi-roo NOM self ACC call-PAST
to itta.
COMP say-PAST
‘Taro_i said that Zi-roo_j called self_{i/*j}.’
- (23) Taro_i wa [Zi-roo_j ga zibun_{i/j} no kodomo o
Taro TOP/SB Zi-roo NOM self POSS child ACC
nagutta] to itta.
strike-PAST COMP say-PAST
‘Taro_i said that Zi-roo_j struck self_{i/j}’s child.’
- (24) Taro_i wa [Zi-roo_j ga zibun_{i/*j} o nagutta]
Taro TOP/SB Zi-roo NOM self ACC strike-PAST
to itta.
COMP say-PAST
‘Taro_i said that Zi-roo_j struck zibun_{i/*j}.’

In these examples, *zibun* occurs in argument position in (22) and (24) while *zibun* occupies non-argument position in (21) and (23). Non-argu-

ment *zibun* allows both local and long-distance binding whereas argument *zibun* accepts only long-distance binding.

Such difference can be explained by Reinhart and Reuland's (1993) binding conditions. They claim that binding conditions constrain the coindexation between coarguments. It means that the coindexation between non-coarguments is beyond the scope of binding conditions. So, non-argument *zibun* in (21) and (23) is allowed freely to refer to the embedded subject *Ziroo*.

What do Reinhart and Reuland's (1993) binding conditions tell us about long-distance binding of *zibun*? The matrix subject and *zibun* in the embedded clause are not coargument of the predicate. So, binding conditions do not constrain long-distance binding of *zibun*. Then, how is long-distance binding of *zibun* derived? *Zibun* has no intrinsic reference, so we need some mechanism which connects *zibun* with its antecedent. Aikawa (1993) proposes that the chain is formed between *zibun* and its antecedent.⁵ She claims that the chain transmits several features (including reference, index, person, number, and so on) of the antecedent to *zibun*. She applies this idea to long-distance binding of *zibun*. Aikawa supports her claim by observing the cases where honorification prefix is attached to *zibun*. In Japanese, honorification prefix *go* is attached only to the element which is related to an honorable person. When this prefix is attached, *zibun* changes into *go-zibun*. The expression *go-zibun* requires its antecedent to be in a socially high position [+H] as the next examples show.

- (25) Taro_i wa [Yamada-sensee_j ga go-zibun_{*i/j}
 Taro TOP/SB professor [+H] NOM self [+H]
 no seito o suisensareta] to itta.
 POSS student ACC recommend-PM-PAST COMP say-PAST
 'Taro_i said that Professor Yamada_j recommended self_{*i/j}'s

- student.'
- (26) Yamada-sensee_i wa [Taro_j ga go-zibun_{i/*j}
 professor [+H] TOP/SB Taro NOM self [+H]
 no seito o suisensita] to ottusyatta.
 POSS student ACC recommend-PAST COMP say-PM-PAST
 'Professor Yamada_i said that Taro_j recommended self_{i/*j}'s
 student.'

In these examples, *zibun* occupies in non-argument positions, so *zibun* could take both the matrix subject and the embedded subject in principle. In fact, *zibun* can take only *Yamada sensee* as its antecedent because of the prefix *go*. This phenomenon can be explained by the assumption that the feature [+H] is percolating through the chain between *zibun* and its antecedent. As is claimed above, binding conditions constrain the coindexation between *zibun* and its coargument. In other words, binding conditions rule out the chain between *zibun* and its coargument when the predicate is non-reflexive. Otherwise, the chain between *zibun* and its antecedent can be formed.

I have shown that binding conditions constrain the coindexation between coarguments and do not restrict the coindexation between *zibun* and its non-coargument. In the next section, I will show what binding conditions can predict for language acquisition of *zibun*.

3. Binding Conditions and Acquisition of Long-distance Binding

As seen in the preceding section, binding conditions essentially constrain the coindexation between coarguments. In other words, non-argument *zibun* is beyond the scope of binding conditions. With this in mind, let us consider the previous language acquisition studies on long-distance binding. For example, Chien, Wexler and Chang (1992) examined long-distance binding of Chinese *ziji*, involving the following sentence.

- (27) Milaoshui mengjian [Daxingxingj nazhe zijij-de
 ‘Mickey Mousei dreams Big Gorillaj hold selfj’s
 zhaopian].
 picture.’

(Chien, Wexler and Chang 242)

Their other experimental sentences included *ziji* in non-argument positions. Yuhaku (2000) tested long-distance binding of Japanese *zibun* in non-argument positions like (28):

- (28) Kumasani wa [Usatyan ga zibun no e o
 bear TOP rabbit NOM self POSS picture ACC
 kaiteiru to] omotteiru ka na?
 drawing COMP thinking QP CFP
 ‘Is the beari thinking that the rabbit is drawing self’s picture?’

As shown above, anaphoric expressions, *ziji* and *zibun*, occurred in non-argument positions, where binding conditions do not apply. In such environments, both local and long-distance antecedents are appropriate for anaphoric expressions. Children, as a result, might select the local antecedent because of their processing immaturity. If so, these previous studies do not show that children are not equipped with binding conditions. It can be predicted that children will show the effects of binding conditions in other environments.

Then, when do children show long-distance binding of *zibun*? In other words, what kind of environments force children to select long-distance binding of *zibun*, based on binding conditions? First of all, such environments require that binding conditions apply. So *zibun* must occur in argument positions. Otherwise, binding conditions do not work. Second, the embedded clause predicate has to be lexically non-reflexive like *yobu*

‘call’. When argument *zibun* occurs with a non-reflexive predicate in the embedded clause, *zibun* has to choose long-distance binding as have been shown.

- (29) Taroo_i wa [Zirooj ga zibun_{i/*j} o yonda]
 Taro TOP/SB Ziro NOM self ACC call-PAST
 to itta.
 COMP say-PAST
 ‘Taro_i said that Ziro_j called zibun_{i/*j}.’

In summary, it is possible that previous experimental studies did not test children’s knowledge of binding conditions. It can be predicted that children will choose the matrix subject as its antecedent of *zibun* when binding conditions prohibit local binding: when argument *zibun* occurs with a non-reflexive predicate.

4. Experiment⁶

4.1. Predictions

In this section, I will show that the prediction in the preceding section is actually borne out. In the last section, it is predicted that children will show long-distance binding of *zibun* when binding conditions require it. The environment in which binding conditions force long-distance binding is: argument *zibun* occurs with a non-reflexive predicate in the embedded clause. I will call such environment as “LD-only” environment. In contrast, this experiment included the sentences where both local and long-distance binding of *zibun* are allowed like the examples in the previous studies. I will call such environments as “local/LD” environment. This experiment compares the responses by children to “LD-only” environment with those to “local/LD” one. If the discussion in the preceding parts is on the right track, it can be predicted that children will allow

long-distance binding of *zibun* in the former “LD-only” environment while they will not in the latter “local/LD” one.

4.2. Experimental participants

All the experimental participants were native Japanese children. 16 kindergarten children participated in this experiment. Their ages ranged from five to six years old. The number of female and male participants were almost the same.

4.3. Experimental procedure

The children were required to look at the pictures, and to respond ‘Yes’ or ‘No’ to each question from an experimenter. One experimenter asked experimental questions of children, interacting with them. Another experimenter set the video-tape-recorder, and recorded their answers on the score sheet.

In the beginning of the experiment, it was confirmed that children figured out the experimental characters, *kumasan* ‘bear’, *toramaru* ‘tiger’, *usatyan* ‘rabbit’ and *usatyan-no-mama* ‘rabbit’s mother’, all of which are familiar figures to Japanese children. Since children have a bias to say ‘Yes’ to the questions, they were first asked a false warm-up question, which did not include *zibun*. This warm-up question intended to make them understand that they could answer ‘No’ to the experimental questions (see McDaniel, McKee, and Cairns 1996 and Crain and Thornton 1998). Then, they were asked a true warm-up question, which did not include *zibun*, either. In the middle of the experiments, they were asked a true or false control question in order to see whether or not they concentrated on the experiment. When a child lost interest in the experiment, the experiment stopped and I did not call such child to the next experiments. I exclude the data of such child from the TABLE 3 below,

and only report the data of the children who answered all the experimental questions.

4.4. Experimental sentences

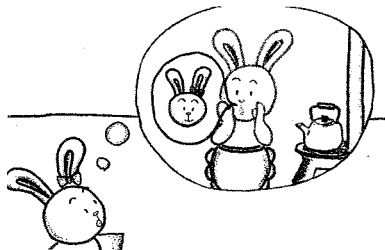
Two types of experimental sentences were asked of the children. One type consisted of the sentences where argument *zibun* occurs with a non-reflexive predicate in the embedded clause: “LD-only” environment. Three kinds of non-reflexive predicates were used in the experiment: *yobu* ‘call’, *motareru* ‘lean-against’, and *nokkaru* ‘mount’. Their non-reflexivity was shown below.

- (30) Yobu toki wa ki-o-tukeru hou ga yoi.
 calling when TOP/SB take-care would NOM be-better.
 ‘It would be better to take care in calling *oneself / others.’
- (31) Motareru to omoi.
 leaning-against NM be-heavy-PRE
 ‘(Your) Leaning against *oneself / others is heavy.’
- (32) Nokkaru to kiken desu.
 mounting NM dangerous be-PRE
 ‘Mounting *oneself / others is dangerous.’

The example of “LD-only” type used in this experiment is as follows.

- (33) Usatyan_i wa [Usatyan-no-mama ga zibun_i o
 rabbit TOP/SB rabbit’s mother NOM self ACC
 yondeiru] to omotteru ka na?
 calling COMP thinking QP CFP
 ‘Is Rabbit_i thinking that Rabbit’s mother calling self?’

Children were asked this sentence, looking at the following picture.



The other type consisted of the sentences including non-argument *zibun* in the embedded clause: “local/LD” environment. In this case, both local and long-distance binding of *zibun* are allowed in principle. The experimental pictures depict the scene in which only long-distance binding is allowed. The matrix predicate used was *omou* ‘think’. The example of this “local/LD” type is as follows.

- (34) Usatyan_i wa [Toramaru ga zibun_i no
 rabbit TOP/SB tiger NOM self POSS
 syasin o motteiru] to omotteru ka na?
 picture ACC holding COMP thinking QP CFP
 ‘Is Rabbit_i thinking that Tiger is holding self_i’s picture?’

Children responded to this sentence, looking at the picture below.



4.5. Results and discussion

Children were asked three “LD-only” and three “local/LD” type questions respectively. I judged their responses to be “accept” or “reject” if they accepted or rejected every three questions of each type. Other inconsistent answers were included as “random” in TABLE 3. Their overall results are summarized in TABLE 3.

TABLE 3

	LD-only	local/LD
accept	13 (81%)	3 (19%)
reject	1 (6%)	6 (38%)
random	2 (13%)	7 (43%)
sum	16(100%)	16(100%)

As is evident in TABLE 3, children’s responses to “LD-only” type questions differed from those to “local/LD” ones. In “LD-only” environments, they accepted long-distance binding at 81 percent, rejected at 6 percent, and responded randomly at 13 percent. On the other hand, their responses in “local/LD” environments were similar to those found in Yuhaku (2000) or other previous studies. They accepted long-distance binding at 19 percent only, rejected at 38 percent, and responded randomly at 43 percent. The difference in their response patterns are clear.

TABLE 4 summarizes the results of each participant. As written above, each children answered three “LD-only” type and “local/LD” type questions respectively. The correct response to both type questions is ‘Yes’. The percentage in TABLE 4 is calculated on how many times children correctly answered ‘Yes’ to three questions of each type.

TABLE 4

NO.	Age	LD-only	local/LD
1	6	100%	100%
2	6	100%	100%
3	6	100%	100%
4	6	100%	66%
5	6	100%	66%
6	6	100%	66%
7	6	100%	0%
8	5	100%	66%
9	5	100%	66%
10	5	100%	33%
11	5	100%	33%
12	5	100%	33%
13	5	100%	0%
14	5	66%	66%
15	5	66%	66%
16	5	33%	0%

As TABLE 4 clearly shows, significant difference emerges between “LD-only” and “local/LD” environments. In “LD-only” environment, all six-year-old and almost all five-year-old participants obtained perfect results. On the other hand, in “local/LD” environment, only three six-year-old children showed perfect answers. No children accepted long-distance binding more often in “local/LD” environment than in “LD-only” one. It is clear that children responded differently to “LD-only” and “local/LD” type sentences.

To be sure, some children, No. 14, 15, and 16, did not allow long-distance binding even in “LD-only” environment, but such children rejected

long-distance binding in “local/LD” one, too. It might be said that these children did not acquire the property of non-reflexive predicates and that binding conditions did not inhibit local binding of *zibun* in “LD-only” environment. I, however, have not arrived at a firm conclusion at this time, leaving this problem to the future study.

What does this result mean for binding conditions and long-distance binding of *zibun*? First, this experiment shows that children allow long-distance binding. They can actually take the matrix subject as the antecedent of *zibun* when argument *zibun* occurs with a non-reflexive predicate in the embedded clause. Second, Reinhart and Reuland’s binding conditions ban the coindexation between coarguments in “LD-only” environment. If children do not obey binding conditions, they will allow the coreference between the embedded subject and *zibun*. In fact, most of them rejected the coindexation in such cases. So, it can be said that binding conditions really work at children’s syntax. Third, children did not show long-distance binding when *zibun* occurred in non-argument position. Such response patterns were found at the previous researches and cast serious doubt on the assumption that children are equipped with Universal Grammar including binding conditions. This experiment shows that non-argument *zibun* are beyond the scope of binding conditions and that children’s rejection of long-distance binding in the case of non-argument *zibun* does not mean that children are not equipped with binding conditions. In summary, children can show long-distance binding when binding conditions prohibit local binding, and binding conditions really work in their early grammar.

5. Conclusion

In this paper, I first examined the previous acquisitional studies concerning long-distance binding. It was found that children did not accept

long-distance binding in their early grammar and such results might pose serious doubt on the existence of binding conditions. Second, I reexamined long-distance binding of *zibun*, and pointed out that the previous studies tested children's grammar in the environments where binding conditions do not work. Third, I predicted that children can accept long-distance binding of *zibun* when binding conditions require it: in other words, argument *zibun* occurs with a non-reflexive predicate. This prediction was borne out. They actually showed long-distance binding in "LD-only" environment. This result supports the existence of binding conditions and it can be concluded that binding conditions really work in children's grammar.

6. Implications for future research

As this paper shows, it is necessary to pay attention both to the position of *zibun* and to the property of the predicate in order to explain various aspects of *zibun*. The previous studies concerning binding conditions have concentrated on the configuration of an anaphoric expression, and neglected the role of the predicate. The predicate, however, plays a very important role in grammaticality of *zibun*, as shown above. It is impossible to explain the acquisition of various aspects of *zibun* without researches concerning how children find, classify and acquire the property of the predicate.

This problem of learning the predicate is closely related with the problem of "bootstrapping". The bootstrapping problem is how children learn the property of various predicates at first. There are two major positions toward the bootstrapping problem. One position is the "semantic" bootstrapping hypothesis. Pinker (1989, 1994) proposes that children pay attention to the scene in which a predicate is used and that they infer the meaning of the predicate. Brooks and Tomasello (2000) develop this posi-

tion and approach this problem in terms of “schematization”. The other position is the “syntactic” bootstrapping hypothesis. Gleitman (1990) claims that children cannot decide the meaning of a predicate from their environments and that they infer its meaning from the syntactic frame with which the predicate is used. It remains to be seen that children acquire the lexicon in either way. The studies of binding conditions will surely shed a light on this bootstrapping problem.

Notes

- 1 This experimental study was supported under the Grant-in Aid for Scientific Research from Japanese Ministry of Education. I participated in the experiment as a research assistant of Mari Takahashi (Kyoto Sangyo University). The result was reported in Takahashi (2000) and Yuhaku (1999) respectively. This paper is a revised version of my unpublished manuscript Yuhaku (1999). It was also presented at the meeting of the Japan Association of Comparative Culture at Tohoku Gakuin University on June 10, 2000.
- 2 An anaphoric expression can be defined as a nominal element which does not have its own fixed reference and gets its reference from other elements.
- 3 The abbreviations used in this paper are:
 NOM: Nominative Case, ACC: Accusative Case, POSS: Possessive Case, TOP/SB: Topic/Subject, PAST: Past Tense, PRE: Present Tense, COMP: Complementizer, CFP: clause finite particle, NM: Nominalization Marker, PM: politeness marker
- 4 Strictly speaking, the predicates, *semeru* ‘blame’ and *bengosuru* ‘defend’, are doubly recorded in the lexicon as lexically “reflexive / non-reflexive” predicate. See Aikawa (1993).
- 5 To make it more precise, *zibun* makes a chain with Inflectional node in the clause. Inflectional node agrees with the subject noun. It follows that *zibun* takes the subject noun as its antecedent and that the object noun is ruled out as the antecedent of *zibun*. Such preference for the subject noun is called to be subject-orientation of *zibun*. See Aikawa (1993).

6 I am very grateful for the cooperation of children and teachers at Doshisha Kindergarten in Kyoto city. See also Takahashi (2000) for the original data.

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