

Children's Acquisition of Causatives and Bi-clausality in Japanese: An Experimental Study

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1. Introduction

The aim of this study is to shed light on children's comprehension of Japanese causative constructions by looking at experimental data. Since the 1960's, a number of studies on Japanese causatives have been done. Despite the fact that there is a fair amount of work in this area, there are only a few acquisition studies. Furthermore, there are only a few studies on acquisition of complex complementation in general (Limber 1973, Hyams 1986). Thus, the primary goal of the current study is to provide experimental data concerning children's comprehension of the causative constructions and examine whether children can build a bi-clausal structure for one of the causative constructions in Japanese. This paper is organized as follows: in section 2, we will survey syntactic analyses of two distinct types of Japanese causatives. In section 3, we will examine the children's acquisition of causatives and the results of the experiments will be reported. In section 4, we will discuss what the results of the experiments tell us about the children's ability to build a mono-clausal structure and a bi-clausal structure. Section 5 concludes this study.

2. Two types of Japanese causatives

In this section, we will describe two distinct types of causatives in Japanese; the productive causative and the lexical causative. The most important syntactic difference between these causatives is that the productive causative shows properties associated with a bi-clausal structure, while the lexical causative has a mono-clausal structure (Kuroda 1965, Kuno 1973, Shibatani 1976, among others). Section 2.1 deals with the productive causative. In section 2.2, we will survey the lexical causative. In section 2.3, we will show that these two types of causatives have different structures.

2.1 Productive causative

Since Kuroda (1965), a number of studies analyzed the Japanese productive causative which is formed by a verb stem and the causative affix *-(s)ase*.¹ An example is shown in (1).

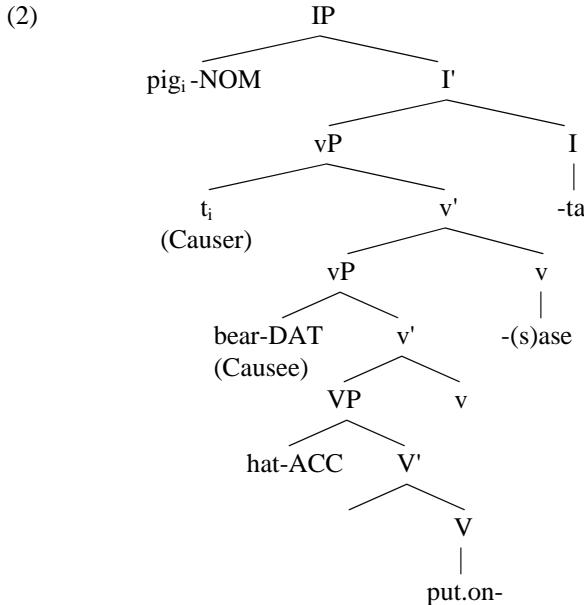
- (1) Buta-ga Kuma-ni bousi-o kabur-ase-ta.
pig-NOM bear-DAT hat-ACC put.on-CAUS-PAST²
'The pig made the bear put the hat on.'

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¹ When a verb stem ends with a consonant, the causative affix which attaches to it is *-ase*, while *-sase* attaches to a stem which has a vowel ending.

² Abbreviations used throughout this paper are: NOM = nominative case, DAT = dative case, ACC = accusative case, GEN = genitive case, TOP = topic marker, intr.= intransitive verb, tr.= transitive verb, PAST = past tense, CAUS = causative affix, and COMP = complementizer.

A Causer appears in the matrix subject position, with nominative case. A Causee and subject of *put.on* is marked with dative case *-ni*. The causative affix *-(s)ase* attaches to the verb stem, forming a verbal complex. The causative affix *-(s)ase* takes clausal complement. Following Hasegawa (2001) and Harley (2005), we assume that the complement is vP and that this type of causative has a bi-clausal structure. A simplified structure for the productive causative in (1) is shown in (2).



Another property of this type is that it is fully productive. Any kind of verb can appear in this type of causative. This property leads us to assume that the productive causatives are syntactically derived, contrary to the other type of causative, which we will look at shortly. In terms of meaning, the productive causative typically expresses "indirect causation." The productive causative sentence generally denotes the situation where the Cause tells or orders the Causee to do something and two separate events are involved: the causing event and the caused event.

2.2 Lexical causative

There is another distinct type of Japanese causative: the lexical causative. An example of this type is given in (3).

- (3) Buta-ga kuma-ni bousi-o kabuse-ta.
 pig-NOM bear-DAT hat-ACC put.on-PAST
 'The pig put the hat on the bear.'

In contrast to the productive causative, the lexical causative is assumed to have a mono-clausal structure, and it cannot be formed freely from a verb stem and an affix (Miyagawa 1989, Shibatani 1976, 1990). It has been observed that there are quite a number of lexical causatives in Japanese, and most of them have unaccusative counterparts, sharing a similar verb stem, such as *ok-osu* 'wake up (tr.)' and *ok-iru* 'make up (intr.)', *mag-eru* 'bend (tr.)' and *mag-aru* 'bend (intr.)'. Notice that the verb used in (3) shares the similar verb stem with the verb used in the productive causative sentence in (1). Also, most of the alternation patterns of causative and unaccusative pairs seem to be quite arbitrary and idiosyncratic. This is why we assume that each of the lexical causatives must be learned and stored in the lexicon. Another characteristic is that the lexical causative denotes "direct causation." Thus, the example sentence in (3) necessarily implies that the pig put the hat on the bear's head by using its own hand.

2.3 Evidence for the structural difference

In the previous two subsections, we noted that the productive causative is bi-clausal, while the lexical causative is mono-clausal. In this section, we will look at evidence for the structural difference between the two types of causatives.

The first piece of evidence involves the interpretation of the reflexive pronoun *zibun* 'self.' As is well known, the reflexive pronoun *zibun* can have only a subject as its antecedent, i.e., *zibun* is bound by a subject (Kuroda 1965, among others). Keeping this in mind, let us look at examples in (4) and (5).

(4) Buta_i-ga [kuma_j-ni zibun_{i/j}-no bousi-o kabur] -ase-ta.
 pig-NOM bear-DAT self-GEN hat-ACC put.on -CAUS-PAST
 'The pig made the bear put self's hat on.' (self = pig, bear)

(5) Buta_i-ga kuma_j-ni zibun_{i/*j}-no bousi-o kabuse-ta.
 pig-NOM bear-DAT self-GEN hat-ACC put.on-PAST
 'The pig put self's hat on the bear.' (self = pig, *bear)

The productive causative in (4) allows two interpretations. The possessor of the hat can be either the pig or the bear. The availability of the two interpretations shows that the productive causative has an embedded structure with two subjects: one in the matrix clause and the other in the embedded clause. On the other hand, the lexical causative in (5) does not show such an ambiguity. The hat must be the pig's hat. This fact suggests that the lexical causative has only one subject, and is hence mono-clausal.

The second piece of evidence involves adverbial scope (Shibatani 1990). The productive causative in (6) with a subject-oriented adverb such as *isoide* 'quickly' is ambiguous, whereas the lexical causative in (7) with the same adverb is unambiguous.

(6) Buta-ga kuma-ni isoide bousi-o kabur-ase-ta.
 pig-NOM bear-DAT quickly hat-ACC put.on-CAUS-PAST
 'The pig made the bear put the hat on quickly.'
 i) The manner of the pig's action was quick.
 ii) The manner of the bear's action was quick.

(7) Buta-ga kuma-ni isoide bousi-o kabuse-ta.
 pig-NOM bear-DAT quickly hat-ACC put.on-PAST
 'The pig put self's hat on the bear quickly.'
 i) The manner of the pig's action was quick.
 ii) *The manner of the bear's action was quick.

In (6), the subject-oriented adverb *isoide* 'quickly' can modify either the pig's action or the bear's action. More precisely, the adverb modifies either the causative affix *-(s)ase* or the verb stem *kabur-* 'put on.' The availability of these two interpretations leads us to assume that both *the pig* and *the bear* in (6) are subjects, and that the productive causative has a bi-clausal structure. In (7), on the other hand, the same subject-oriented adverb modifies only the pig's action. This shows that the lexical causative has only one subject, hence is mono-clausal.

3. Acquisition of causatives

In this section, we will report on two experiments that examined children's comprehension of the causatives in Japanese. The purpose of the first experiment was to examine whether children knew the productive causative affix *-(s)ase* at all. The second experiment examined whether those who had already acquired the causative affix *-(s)ase* knew the structural difference between the two types of causative we have been looking at. The procedures and the results of each experiment will be reported in sections 3.1 and 3.2 respectively.

A total of 20 mono-lingual Japanese children participated in both experiments. The detailed information about the subjects is given in (8).

(8) N=20

4-year-olds: N=3 (age=4;6-4;11, mean=4;8)

5-year-olds: N=8 (age=5;2-5;7, mean=5;4)

6-year-olds: N=5 (age=6;0-6;11, mean=6;5)

7-year-olds: N=4 (age=7;0-7;10, mean=7;6)

The method used in both experiments is the Truth Value Judgment Task (Crain and McKee 1986). Children were presented short stories performed by an experimenter manipulating various stuffed animals and props. Each story was followed by a target stimulus sentence uttered by a puppet, *Kermit the Frog*, manipulated by another experimenter. The children were asked to say whether the puppet's utterance was correct or not. The children were tested individually in a quiet room in their day-care center. All of their utterances were recorded for further analyses.

3.1 Experiment I: Acquisition of the productive causative affix

The aim of Experiment I was to examine children's comprehension of the productive causatives. A sample scenario used in this experiment is as follows: A pig found an apple on a tall tree and asked a bear to pick it up and bring it to him. The bear would not do so until the pig finally screamed, "Take that apple for me!" The bear then reluctantly climbed the tree and brought the apple to the pig. After the story was presented to a child, *Kermit the Frog* said one of the test sentences in (9) or (10) below to the child. The sentences in (9) are benefactive sentences, one of which matches the scenario and the other does not match it, and those in (10) are matching and mismatching productive causative sentences. Note that the benefactive sentences in (9) have similar case-marking pattern and a similar structure as the productive causative in (10), differing only in the specific suffixed morpheme, *-(s)ase* vs. *-age*.

(9) Benefactive sentences

a. Kuma-wa buta-ni ringo-o totte-age-ta.
bear-TOP pig-DAT apple-ACC take-give-PAST
'The bear took the apple for the pig.' (TRUE)

b. Buta-wa kuma-ni ringo-o totte-age-ta.
pig-TOP bear-DAT apple-ACC take-give-PAST
'The pig took the apple for the bear.' (FALSE)

(10) Productive causative sentences

a. Kuma-wa buta-ni ringo-o tor-ase-ta.
bear-TOP pig-DAT apple-ACC take-CAUS-PAST
'The bear made the pig take the apple.' (FALSE)

b. Buta-wa kuma-ni ringo-o tor-ase-ta.
pig-TOP bear-DAT apple-ACC take-CAUS-PAST
'The pig made the bear take the apple.' (TRUE)

In this particular sample scenario, (9a) is true and (9b) is false, while (10a) is false and (10b) is true. If the children have already acquired the causative affix, we would expect them to correctly distinguish the productive causatives from the benefactive sentences.³

Let us turn to the results of the Experiment I. Children's correct response rates of both benefactives and productive causatives are shown in Table 1.

³ Uyeno et al. (1978) reported that even 3-year-olds could correctly interpret the benefactive sentences with *age-ru* 'give', as in (9) about 80% of the time. In Okabe (2005), it was also reported that children aged 4-6 could interpret similar benefactive sentences over 90% of the time.

Table 1: Correct response rates of benefactives/productive causatives

	Benefactives (9)	Causatives (10)
4-yrs (N=3)	100% (6/6)	83.3% (5/6)
5-yrs (N=8)	100% (16/16)	100% (16/16)
6-yrs (N=5)	100% (10/10)	100% (10/10)
7-yrs (N=4)	100% (8/8)	100% (8/8)

As the table above shows, almost all children understood the productive causative sentences and distinguished them from the benefactive sentences. Even at the age of four, the children correctly accepted the productive causatives when they matched the scenarios and rejected them when the two arguments were reversed. Only one 4-year-old child gave a wrong answer to a causative sentence, which should have been rejected. Overall, we can conclude from the results that the children had acquired the productive causative affix *-(s)ase* by the age of four.

3.2 Experiment II: Productive causative and lexical causative

Let us move on to the second experiment. The ultimate goal of Experiment II was to see whether or not the children, who had already acquired the productive causative affix, assigned a bi-clausal structure to the productive causative and a mono-clausal structure to the lexical causative. Specifically, we examined whether they could distinguish productive causatives from lexical ones with respect to the interpretation of the reflexive pronoun *zibun* 'self,' discussed in section 2.3 above.

Experiment II had three sessions: The first session dealt with the children's knowledge of a semantic difference between a lexical causative *kabuse-ru* 'put on' and a corresponding productive causative verb *kabur-ase-ru* 'make someone put on.' The second session tested whether the children had acquired the reflexive pronoun *zibun* 'self' in the first place. In order to do so, children's comprehension of complex sentences with finite embedded clause was examined. The last session was our main focus. We examined children's interpretation of both lexical and productive causatives with *zibun* 'self.' We will look at results of each session in turn in the following sections.

3.2.1 Session 1

First, we need to confirm whether or not the children know the lexical and the productive causative verbs which were used throughout Experiment II as stimuli; *kabuse-ru* 'put on' and *kabur-ase-ru* 'make someone put on.' Recall that the lexical causative expresses direct causation, while the productive causative one typically denotes indirect causation. I prepared a sample scenario depicting the indirect causation, in which a pig orders a bear to put a hat on, the bear refuses it first, and at last the bear puts the hat on by himself. As we observed in sections 2.1 and 22, the lexical causative cannot be used in this situation. The sample test sentences used in this session are given in (11) and (12).

(11) Productive causative

Buta-wa kuma-ni bousi-o kabur-ase-ta.
 pig-TOP bear-DAT hat-ACC put.on-CAUS-PAST
 'The pig made the bear put the hat on.'

(12) Lexical causative

Buta-wa kuma-ni bousi-o kabuse-ta.
 pig-TOP bear-DAT hat-ACC put.on-PAST
 'The pig put the hat on the bear.'

We tested whether the children could tell that the productive causative in (11) is correct, whereas the lexical causative in (12) is wrong in this case.⁴

The results of this session are shown in Table 2.

Table 2: Correct response rates of productive/lexical causative for "indirect causation"

	Productive causative (11) TRUE	Lexical causative (12) FALSE
4-yrs (N=3)	100% (3/3)	33.3% (1/3)
5-yrs (N=8)	100% (8/8)	62.5% (5/8)
6-yrs (N=5)	100% (5/5)	100% (5/5)
7-yrs (N=4)	100% (4/4)	100% (4/4)

As Table 2 shows, two 4-year-olds and three 5-year-olds did not always reject the lexical causative in (12). The responses by these five children will be eliminated from the results of further sessions of the experiment. The other 15 children correctly distinguished the productive causative *kabur-ase-ru* 'make someone put on' from the lexical causative *kabuse-ru* 'put on.' More specifically, they understood that the lexical causative in (12) cannot be in the "indirect causation" case, while the productive causative in (11) is grammatical. Since the only difference between the sentences in (11) and (12) is the form of the verb, the results of this session tell us that the 15 children knew the semantic difference between the two causatives.

3.2.2 Session 2

In session 2, we examined children's acquisition of the property of *zibun* 'self.' First, the children's knowledge about the subject-oriented property of *zibun* 'self' was tested. Recall that the reflexive pronoun *zibun* 'self' must be bound by a subject. A sample scenario used in this part is as follows: a pig finds a big fried chicken, which turns out to be an elephant's chicken. The pig asks the elephant to allow him to eat it, and they decide to eat it together. A target sentence is given in (13) below.

- (13) Buta_i -wa zou_j -to issyoni zibun_{i/*j} -no furaidotikin-o tabe-ta.
 pig-TOP elephant-together self-GEN fried chicken-ACC eat-PAST
 'The pig ate self's fried chicken with the elephant.' (*zibun* 'self' = pig, *elephant)

According to this particular scenario, the sentence in (13) is false; the reflexive pronoun *zibun* 'self' can be bound only by a subject, which is *the pig*. In the scenario, however, the fried chicken is the elephant's, not the pig's. Hence, the sentence in (13) is wrong for the situation.

The result was that all of the 15 children correctly rejected the target sentence in (13), indicating that they knew that *zibun* 'self' cannot be bound by NPs other than subjects.

In addition to the confirmation of the children's knowledge that *zibun* 'self' cannot be bound by NPs other than subject, we needed to examine whether they could treat *zibun* 'self' correctly, i.e., allow *zibun* 'self' to take any subject as antecedent, when it is used in complex sentences with finite embedded clauses, which undoubtedly have a bi-clausal structure. A target sentence is given in (14).

- (14) Buta_i -wa [usagi_j -ga zibun_{i/j} -no ringo-o tabechat-ta] to it-ta.
 pig-TOP rabbit-NOM self-GEN apple-ACC eat.up-PAST COMP say-PAST
 'The pig said that the rabbit ate up self's apple.' (*zibun* 'self' = pig, rabbit)

⁴ I did not use a scenario depicting "direct causation" to test whether the children would be able to tell that the lexical causative is used for the "direct causation" and the productive causative is used for the "indirect causation." Although it is true that the productive causatives are *typically* used in situations of the "indirect causation", they can be used in the "direct causation" as well: the productive causative in (11) is not unnatural in a situation where a pig directly puts a hat on a bear. Therefore, it should be noted that the lexical causative and the productive causative are not complementary in this sense.

The sentence in (14) is ambiguous as to who is the possessor of the apple. Both the matrix subject, *the pig*, and the embedded subject, *the rabbit*, are possible antecedents of *zibun* 'self.' In order to examine whether the children allow two interpretations for the sentence in (14), two scenarios were prepared: scenario (A) in which a rabbit ate a *pig's* apple, and the other scenario (B) in which a rabbit ate a *rabbit's* apple. In both scenarios, the pig says to the rabbit, "You ate up the apple!" Since *the rabbit* and *the pig* in (14) are both possible antecedents of *zibun* 'self,' the complex sentence in (14) can express either scenario. If the children knew that two subjects are involved in the sentence and that both of them can be antecedents of *zibun* 'self,' we would expect them to accept the target sentence in both scenarios.

The results are shown in Table 3.

Table 3: Correct response rates of *zibun* 'self' in complex sentence

	<i>zibun</i> = matrix subj. (A) TRUE	<i>zibun</i> = embedded subj. (B) TRUE
4-yrs (N=1)	100% (1/1)	100% (1/1)
5-yrs (N=5)	0% (0/5)	80% (4/5)
6-yrs (N=5)	40% (2/5)	40% (2/5)
7-yrs (N=4)	75% (3/4)	75% (3/4)
Total (N=15)	40% (6/15)	66.7% (10/15)
Adults (N=5)	80% (4/5)	80% (4/5)

The children accepted the sentence only 40% of the time in the case of scenario (A). They accepted it 66.7% of the time in scenario (B). Thus, although we found that the children had a preference of the local antecedent for *zibun* 'self' over the long-distance antecedent, they overall accepted the sentence with *zibun* 'self' bound by the embedded subject, as the rates were close to the adult acceptance rate of 80%. However, the results are not conclusive. First, there was only one 4-year-old tested in this session, who accepted the sentence in both cases. Secondly, there was a methodological problem. At least two children took the sentence as "direct quotation," and rejected the sentence in both cases because they found that the sentence the puppet said ("the rabbit ate up self's apple!") was not *exactly* the same as what the pig said in the stories ("you ate up the apple!"). Some true bridge verbs such as "think" or "consider" should have been selected in this session. It is possible that this problem was partially responsible for the low acceptance rate.

3.2.3 Session 3

Now we move on to the examination of the third and the last session of the experiment, which tested whether the children knew the structural difference between the lexical and the productive causatives. In particular, we look at their interpretation of these two causatives with *zibun* 'self.' Target sentences of each type of causatives used in this session are given in (15) and (16).

(15) Lexical causative

Buta_i-wa kuma_j-ni zibun_{i/*j}-no bousi-o kabuse-ta.
 pig-TOP bear-DAT self-GEN hat-ACC put.on-PAST
 'The pig put self's hat on the bear.' (zibun 'self' = pig, *bear)

(16) Productive causative

Buta_i-wa kuma_j-ni zibun_{i/j}-no bousi-o kabur-ase-ta.
 pig-TOP bear-DAT self-GEN hat-ACC put.on-CAUS-PAST
 'The pig made the bear put self's hat on.' (zibun 'self' = pig, bear)

Recall that the lexical causative in (15) is unambiguous, while the productive causative in (16) is ambiguous. In other words, *zibun* 'self' in (15) can be bound only by the subject, *the pig*, whereas that in (16) can be bound either the matrix subject, *the pig*, or the embedded subject, *the bear*.

We investigated whether the children allowed only one reading for the lexical causative in (15) and two readings for the productive causative in (16). If the children correctly assign a mono-clausal structure to the lexical causative, we would expect them to allow only one reading in which the subject, the pig, is the antecedent for *zibun* 'self.' If, on the other hand, they correctly assign a bi-clausal structure (i.e. two logical subjects in the sentence) to the productive causative, we would predict that they allow *zibun* 'self' to be bound by both the matrix and the embedded subjects. Also, if they treat the productive causative in exactly the same way as the complex sentence with a finite embedded clause, we would also expect them to have a preference of the local antecedent over the long-distance one. A total of 4 scenarios from (A) to (D) were prepared. Two of them correspond to the lexical causative in (15), and the other two to the productive causative in (16). Each scenario has similar beginning: a pig and a bear have their own hats. The pig wants the bear to put on a hat, but the bear won't do it. They differ in how the bear ends up having a hat on his head. The summary of each scenario is given in (17).

(17)

Lexical causative:

Scenario A: The pig put the pig's hat on the bear. (*zibun* = subject) -TRUE
 Scenario B: The pig put the bear's hat on the bear. (*zibun* = dative NP) -FALSE

Productive causative:

Scenario C: The pig made the bear put the pig's hat on. (*zibun* = matrix subject) -TRUE
 Scenario D: The pig made the bear put the bear's hat on. (*zibun* = embedded subject) -TRUE

In scenario A, the pig puts the pig's hat on the bear. The target lexical causative sentence in (15) correctly depicts the situation in this case. In scenario B, on the other hand, the pig puts the bear's hat on the bear, rendering the same sentence wrong, because *zibun* 'self' cannot be bound by the dative marked NP. As for the scenarios corresponding to the productive causative, the sentence in (16) is true in both C and D cases, because both the matrix subject, *the pig*, and the embedded subject, *the bear*, can potentially be an antecedent of *zibun* 'self.'

Let us look at the results of this session. First, Table 4 shows the correct response rates for the lexical causative in (15).

Table 4: Correct response rates of lexical causative (15)

	<i>zibun</i> = subj. (A) TRUE	<i>zibun</i> = dative NP (B) FALSE
4-yrs (N=1)	100% (1/1)	100% (1/1)
5-yrs (N=5)	80% (4/5)	100% (5/5)
6-yrs (N=5)	100% (5/5)	100% (5/5)
7-yrs (N=4)	100% (4/4)	100% (4/4)
Total (N=15)	93.3% (14/15)	100% (15/15)
Adults (N=5)	100% (5/5)	100% (5/5)

Most of the children correctly accepted the sentence when given a scenario in which *zibun* 'self' was bound by the subject. They also correctly rejected the sentence when *zibun* 'self' was bound by the dative case-marked NP in the scenario. Again, this result replicates the results of session 2 that the children knew that the reflexive pronoun *zibun* 'self' cannot be bound by NPs other than a subject.

As for the productive causative, Table 5 shows the results.

Table 5: Correct response rates of productive causative (16)

	<i>zibun</i> = matrix subj. (C) TRUE	<i>zibun</i> = embedded subj. (D) TRUE
4-yrs (N=1)	100% (1/1)	0% (0/1)
5-yrs (N=5)	100% (5/5)	0% (0/5)
6-yrs (N=5)	100% (5/5)	20% (1/5)
7-yrs (N=4)	75% (3/4)	0% (0/4)
Total (N=15)	93.3% (14/15)	6.7% (1/15)
Adults (N=5)	100% (5/5)	80% (4/5)

As is shown in the left-hand column, all of the children except one correctly accepted the productive causative sentence with *zibun* 'self' bound by the matrix subject. On the other hand, the correct response rates shown in the right-hand column show that they failed to accept the sentence, when given the scenario in which the pig, the matrix subject, makes the bear, the embedded subject, put the bear's hat on. In this case they rejected the sentence over 90% of the time, though it is acceptable in adult grammar. In other words, the children did not allow *zibun* 'self' in the productive causative to be bound by the embedded subject, which contrasts with the results of session 2 in Table 3.

4. General discussion

In this section, we discuss what the results reported in the previous section tell us about the children's acquisition of the Japanese causatives.

First, in Experiment I we found that the children even at the age of 4 could distinguish the causative sentences with *-(s)ase* from the benefactive sentences which are assumed to have the same case-marking patterns and a similar structure as the causatives. Since the suffixes for each construction are the only clue to the distinction between them, this experiment shows that all of the children except one 4-year-old had knowledge of the productive causative, i.e., they knew that the subject case-marked with nominative or topic in the productive causative is the Causer and the dative marked NP is the Causee and subject of the embedded verb.

Secondly, in Experiment II it turned out that 15 children out of 20 understood the semantic difference between the lexical causative verb *kabuse-ru* 'put on' and the productive causative verb *kabur-ase-ru* 'make someone put on.' They knew that the lexical causative verb cannot be used in the case of "indirect causation" where one tells or orders the other to do something.

We also found that the same 15 children had already acquired the subject-oriented property of the reflexive pronoun *zibun* 'self' and that they allowed *zibun* 'self' to be bound by the embedded subject of the complex sentences with a finite subordinate clause 66.7% of the time (cf. adult rate 80% in Table 3). Although the children's acceptance rate is not perfect (i.e. is somewhat lower than the adult rate) and there may have been a methodological problem, as mentioned above, the results show that most of the children we tested built a bi-clausal structure for the complex sentences with a finite clause.

Keeping these findings in mind, we now discuss the results of the last session of Experiment II. First, the results of the examination of the lexical causative sentence as in (15) show that none of the children allowed the dative marked NP to be an antecedent of *zibun* 'self,' indicating that they treated the lexical causative as mono-clausal just as adult speakers do. However, the children failed to accept the productive causative sentence in (16) over 90% of the time when *zibun* 'self' referred to the embedded subject, while the adults accepted this 80% of the time (cf. Table 5). This low acceptance rate for the grammatical local antecedent becomes more conspicuous when we compare it to the much higher acceptance rate for the local antecedent of *zibun* 'self' in complex sentences with a finite subordinate clause (66.7% in Table 3). Thus, children do not seem to treat the embedded subject in the productive causative as a potential antecedent of *zibun* 'self.' The children performed differently from adults only in this respect.

There are several possible explanations for this result. One interpretation is that the children were assigning a mono-clausal structure to the productive causative just like the lexical causative. However,

this interpretation is not tenable given that the children knew the semantic difference between the lexical causative verb *kabuse-ru* 'put on' and the productive causative verb *kabur-ase-ru* 'make someone put on.' Given that they knew the subject-oriented property of *zibun* 'self,' and that they treated the complex sentence with a finite embedded clause as bi-clausal, we need to explain why the children are not treating the embedded subject of the productive causative as a potential antecedent as adults do.

Another possibility is that the children have a grammatical constraint that bans *zibun* 'self' from taking a dative-marked NP as its antecedent. Recall that the embedded subject of the complex sentence with a finite clause in (14) above is marked with nominative case, and the children correctly allowed both subjects as antecedents, whereas the embedded subject of the productive causative in (16) has dative case. Thus, it is this constraint that does not allow children to accept the productive causative with *zibun* 'self' bound by the dative-marked embedded subject. On the other hand, since the embedded subject of the complex sentence in (14) is not case-marked with dative, the sentence is not subject to this constraint and children treat this embedded subject as antecedent of *zibun* 'self.' In order to test this hypothesis, we could examine the same productive causative sentence with subject-oriented adverbs such as *quickly* (cf. (6) and (7) in section 2.3). If children show the same dative-subject avoidance with adverbials that they do with *zibun* 'self,' we would know that children have difficulty treating the dative-marked subjects as "subjects" in general. There would in effect be a grammatical constraint.

Yet another possible interpretation is that children have an adult-like bi-clausal structure for the productive causative, but they have such a strong preference for the long-distance antecedent of *zibun* 'self' that they disallow the local antecedent. This explanation might explain why the children did not allow one reading for the productive causative in which the embedded subject is antecedent of *zibun* 'self.' However, this explanation can be rejected based on their responses on the complex sentence such as (14) in session 2 of Experiment II, in which they showed a preference for the local antecedent (66.7%) over the long-distance one (40%).

It is also possible that the choice of the long distance antecedent is simply a strong preference for the nominative *-ga* marked subject for *zibun* 'self.' due either to pragmatic or processing factors. According to this hypothesis, children do not have a grammatical ban on dative marked antecedents but these are less good candidates than *-ga* marked NPs. There is a possible follow-up experiment to test this hypothesis which is to create a scenario in which the matrix subject case-marked with nominative *-ga* is not a possible antecedent in the scenario. We would expect then that children would allow *zibun* 'self' to take the embedded subject case-marked with dative *-ni* as antecedent.⁵

5. Conclusion

To sum up, we found in Experiment I that by the age of four, children acquire the productive causative morpheme *-(s)ase* and they come to know that Causer appears in the matrix subject position and Causee as the embedded subject bearing dative case marker. We also found that the children who could semantically distinguish the productive causative from the lexical causative failed to accept the productive causative with *zibun* 'self' whose antecedent is an embedded subject, although they accepted the complex sentence with *zibun* 'self' bound by an embedded subject. We pointed out there are several possible interpretations for this result, which should be empirically examined in further studies in order to elucidate the reason(s) why the children did not allow *zibun* 'self' in the productive causative to be bound by the embedded subject, though they could interpret the sentence correctly and semantically distinguish it from the lexical causative.

⁵ Okabe (2006) addresses this issue and reports the results of an experiment investigating whether children correctly accepted the productive causative with *zibun* 'self' referring to the embedded subject in a condition in which the matrix subject cannot be a potential antecedent of *zibun* 'self'. When we eliminated the possibility that *zibun* 'self' is bound by the matrix subject in a scenario, the children correctly accepted the embedded *-ni* (dative) marked subject as antecedent of *zibun* 'self' over 90% of the time. The result of this experiment shows that the children assign a bi-clausal structure to the productive causative just as adults do and that their strong bias for the nominative *-ga* marked subject prevents them from allowing the *ni*-marked embedded subject as antecedent of *zibun* 'self' in this study. See Okabe (to appear) for discussion of the further implications of this result.

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