Bootstrapping from Case-marking Morphology in Japanese

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Abstract

Assuming that Japanese native knowledge associates the stativity component of verb meanings [±stative] with case-marking patterns for transitive sentences (i.e., NP-*ga* NP-*o* [–stative] Verb; NP-*ga* NP-*ga* [+stative] Verb), this study investigates children's ability to infer verb meanings from case-marking morphology. Fifty-seven Japanese-speaking children, ranging in age from 3 to 7, were tested in a picture selection task. They were given novel verbs in the two case-marking frames and were asked to select a picture in which either an action event or a stative event was depicted. The results of the experiment show that only older preschool children and school aged children can match case-marking patterns with their corresponding event types. This suggests that syntactic bootstrapping--bootstrapping from case-marking morphology--is not the initial way of learning the stativity component of verb meanings. However, a follow-up experiment in which adults were given the same task shows that their performance is far from perfect and is similar to that of the older children. These results suggest that children by the age of 5 or 6 have reached the adult level in utilizing case-markers to infer verb meanings, but that bootstrapping from case-marking morphology may be a relatively weak operation in Japanese.

1. Introduction

This study explores an aspect of the bootstrapping problem in first language acquisition of Japanese. The central question is whether syntactic bootstrapping operates in children learning Japanese as a first language. Focusing on the cue from case-marking morphology, this study investigates children's ability to infer the stativity component of verb meanings.

The syntactic bootstrapping hypothesis claims that children infer verb meanings by using syntactic information involved in the sentence structures, typically referred to as syntactic frames of some sort (Gleitman, 1990; Landau & Gleitman, 1985; Naigles, 1990; Pinker, 1989, 1994). Syntactic frames may help children narrow down plausible meanings of a new verb they encounter because there are some regularities between verb meanings and sentence structures. For example, the structure of English ditransitive construction represented as NP V NP NP is most likely to be associated with semantic properties represented as X causes Y to have (receive) Z (e.g., Goldberg, 1995; Pinker, 1989). Thus, it is possible to guess that the novel verb 'tooped' in the following sentence must mean a certain kind of intended transfer.

(1) John tooped Bill a ball.

Syntactic information as to the number of arguments and word-order are crucial in English, and there is evidence that children learning English are sensitive to such syntactic information in learning the meanings of verbs in experimental settings (Naigles, 1990; Naigles, Gleitman & Gleitman, 1993; Sethuraman, Goldberg & Goodman, 1997).

Naigles et al. (1993) investigated whether 2- to 4-year old English-speaking children could associate the transitive structure with causative meaning and the intransitive structure with non-causative meaning. The children were asked to act-out the meanings of both transitive and intransitive verbs in their corresponding and non-corresponding frames. For example, intransitive *come* was tested in both (2) and (3).[1]

(2) The elephant comes.
(3) The elephant comes the giraffe.

Naigles et al. were interested in how the child would react to the ungrammatical use of *come* in (3): whether the child could add causative meaning to *come* when acting out the event, since the verb was used in the transitive frame. The overall results suggest that the children complied with the demands of new structures by adding and subtracting a causative component of the given verbs.[2]

In other experiments, Naigles (1990) tested even younger children (1- and 2-year-olds) by adopting the preferential-looking paradigm (e.g., Hirsh-Pasek & Golinkoff, 1996). She measured the child's eye fixation rate for the preferred scene to the given stimuli, and found that the pre-speaking children could differentiate causative and non-causative meanings based on transitive and intransitive sentence structures. A variety of other experimental studies suggest that syntactic bootstrapping operates in English, although there is some controversy among researchers over how crucial syntactic information is and how strongly syntactic information facilitates children's verb learning (e.g., Fisher, Hall, Rakowitz, & Gleitman, 1994; Naigles, 1990; Pinker, 1994; Sethuraman, Goldberg, & Goodman, 1997).

On the other hand, only a few acquisition studies of syntactic bootstrapping are available for languages other than English, and little discussion has been held for cross-linguistic issues (but see Rispoli, 1995). Subsequently, a very important question remains to be answered: Is

[1] In Naigles et al. (1993), 4 types of frames were tested: a) NP V NP PP, b) NP V NP, c) NP V PP, and d) NP V. Both (a) and (b) were treated as transitive and (c) and (d) intransitive.

[2] A replication of Naigles et al. (1993) was conducted by Sethuraman, et al. (1997) by using novel verbs. The results were consistent overall, including the effects of frames (intransitive/transitive), of age group, and of PPs in the frames.

syntactic bootstrapping universal or not? This study focuses on Japanese, a typologically different language. Do Japanese-speaking children also benefit from syntactic information when learning verb meanings? If so, at what age do they demonstrate syntactic bootstrapping, and how strongly or how actively do they use the syntactic information? Focusing on the cue from morphological case-markers, this study examined Japanese-speaking children in an experimental setting.

2. Japanese syntactic frames

Unlike English, Japanese syntactic frames cannot be represented by the combination of a word-order and the number of arguments overtly expressed in a sentence. This is because Japanese allows relatively free word-order and argument ellipsis, for which case-marking particles are crucial to encode grammatical relations. Therefore, it is reasonable to regard Japanese syntactic frames as those consisting of argument NPs marked with case-marking particles and a predicate. The following sentences help illustrate case-marking for an intransitive construction in (4), a transitive construction in (5), a dyadic stative verbal construction in (6), and a triadic verb construction in (7).

(4) Hanako-ga koronda.
Hanako-Nom fell over
'Hanako fell over.'

(5) Hanako-ga gyuunyuu-o nonda.
Hanako-Nom milk-Acc drank
'Hanako drank milk.'

(6) Hanako-ga gyuunyuu-ga sukida.
Hanako-Nom milk-Nom like
Hanako likes milk.'

(7) Hanako-ga koohii-ni gyuunyuu-o ireta.
Hanako-Nom coffee-Dat milk-Acc put
'Hanako put milk into coffee.'

In the above examples, subjects are marked with nominative *ga*, direct objects with accusative *o*, and an indirect object with dative *ni*. An exceptional pattern is observed in (6), where a direct object of a stative verbal is marked with nominative *ga*.[3] Although the sentences in (5) and (6) are both transitive in the sense that they require two arguments, they are different in terms of case-marking and semantic properties of verbs. Only

[3] Following Kuno (1973), I use the term 'verbals' to refer to adjectives and nominal adjectives as well as verbs in Japanese.

stative verbals are compatible with the case-marking pattern shown in (6), where both a subject and a direct object may be marked with nominative *ga* (i.e., double nominative case-marking).[4] On the other hand, verbs used in (5) are typically non-stative action verbs which take a subject marked with nominative *ga* and a direct object with accusative *o* (i.e., nominative-accusative marking). In sum, the following patterns are observed for the association between case-marking and verb stativity (e.g., Kuno, 1973; Shibatani, 1977).

(8) NP-*ga* NP-*o* action verb (nominative-accusative case-marking)
NP-*ga* NP-*ga* stative verb (double nominative case-marking)

It is important to note that the above correspondences are not absolute. That is, there exist quite a few counterexamples. While there are no action verbs that are compatible with the double nominative case-marking, some stative verbs are used with the nominative-accusative case-marking. However, I believe that this fact does not undermine the main thesis. This is because in the experiments of syntactic bootstrapping in English, Naigles (1990) and Naigles et al. (1993) recognized the fact that the syntax-semantics correspondences between transitive and causative, and intransitive and non-causative, were not absolute; nonetheless, they found that English-speaking children were sensitive to these associations.

Assuming that adult native speakers of Japanese have knowledge of the case-marking patterns and their compatibility with verb stativity, Experiment I explores the ability of Japanese-speaking children to make use of morphological case-marking in order to infer [±stative] meanings of novel verbs.

3. Experiment I

3.1. Participants

Fifty-seven children participated in this experiment. The ages of the children ranged from 3;0 to 7;3 (mean age = 5;4). They were divided into three age groups: Group I consisted of nineteen 3- and 4-year olds (mean age = 3;9), Group II of nineteen 5- and 6-year-old preschool children (mean age = 5;7), and Group III of nineteen 6- and 7-year-old first graders (mean age = 6;9). All children had consistent exposure to Japanese from family members at home.

4 For some stative verbals, either nominative *ga* or dative *ni* can be used to mark a subject. All stative verbals that allow a dative subject also allow a nominative subject, but the reverse is not necessarily true. The experiment presented in this paper focuses on nominative subjects, and I will return to the issue of dative subjects in the discussion section.

3.2. Materials and procedure

A picture selection task was adopted. First, the experimenter invited the child to play a game, and a cat toy called *Neko-san* was introduced. Then, it was explained that the cat toy would tell the child a very short story about a girl named *Hanako-tyan*, and that the story would be depicted in one of the pictures shown to the child. When the cat toy told the child the story (i.e., a test sentence), two pictures were shown. The child's task was to point to the picture that matched what *Neko-san* had said. In order to familiarize the child with the task, the following sentence was given with the two pictures shown in Figure 1. Given the sentence in (9), the child was expected to point to the left picture where the girl is running.

(9) Hanako-tyan-ga hasiru yo.
Hanako-miss-Nom run pcl
'Hanako runs.'

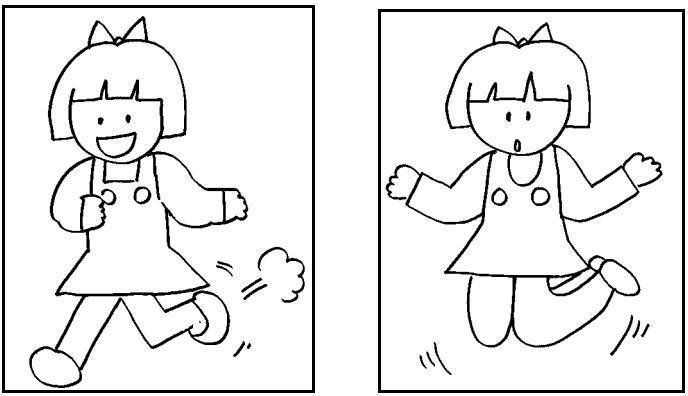

Figure 1. Pictures used for a sentence in (9)

After the child had worked on practice sentences such as (9), the experimenter added a further instruction as follows.

(10) Neko-san-wa ne, amari hito-no kotoba-ga tokui zya nai-n da. Dakara ne, tokidoki Neko-san-no kotoba-o tukattyau kamo sire-nai-n datte. Demo, daizyoobu. Sositara, zibun de kangaete atete-mite-kureru. Neko-san-no kotoba wakaru yo ne.

'Neko-san is not good at speaking human language. So she may sometimes use cat words. But don't worry! If she uses cat words, try to guess what she means. I bet you'll understand.'

This was given for establishing a situation in which the child would be dealing with novel verbs. After the instruction in (10) was provided, the experimenter started testing novel verbs as well. A novel verb was given in one of the two case-marking patterns as illustrated in the following examples.

(11) Hanako-tyan-ga hebi-o kemeru yo.
Hanako-Ms.-Nom snake-Acc verb pcl

(12) Hanako-tyan-ga hebi-ga kemeru yo.
Hanako-Ms.-Nom snake-Nom verb pcl

The sentence in (11) has the nominative-accusative case-marking while the one in (12) has the double nominative case-marking. The former is likely to be associated with non-stative action meaning; therefore, the picture corresponding to it is more likely to be the one on the left in Figure 2, where the girl, *Hanako-tyan*, is hitting a snake with a stick. On the other hand, the sentence in (12) must be associated with a stative meaning whose corresponding picture is more likely to be the one on the right in Figure 2, where *Hanako-tyan* and the snake have no physical contact and no action is depicted.

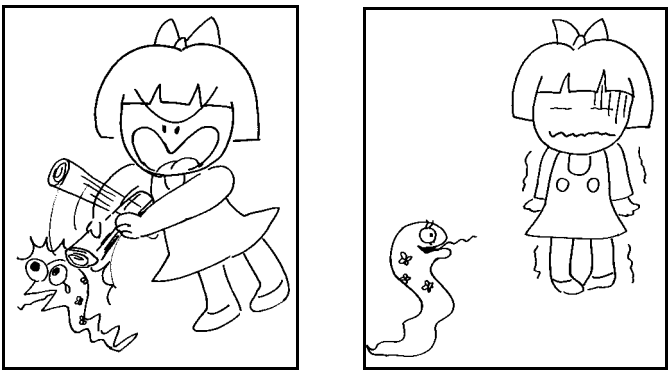

Figure 2. Pictures used for sentences in (11) and (12)

The verb morphology was controlled for transitivity because there are so-called paired verbs in Japanese, where a transitive-intransitive distinction is made by semi-productive verb morphology with the same roots. For example, both *nig-e-ru* 'escape' and *sim-ar-u* 'shut' are intransitive verbs, and their transitive counterparts are *nig-as-u* 'let escape' and *sim-e-ru* 'shut', respectively. As can be seen in these examples, *-e-* is often used to indicate both intransitive and transitive in such verb pairs (for a list of paired verbs

see Jacobsen, 1992, pp. 258-269). In order to minimize any cues of verb morphology with regard to transitivity, all novel verbs included the *-e-* morpheme as in (13).

(13) hiheru yoneru suheru noteru kemeru rakeru
temeru naneru muteru sokeru

These 10 novel verbs were used in the present tense either with the nominative-accusative case-marking or the double nominative case-marking. The verbs were randomly assigned to one of the case-marking patterns. Each set of pictures was used twice: once for the nominative-accusative pattern and once for the double nominative pattern. The events depicted in the sets of pictures are described in Table 1. The order of the test sentences was randomized. A total of 24 sentences were tested in the experiment, among which 10 sentences were relevant for the present purpose: 5 for the nominative-accusative and 5 for the double nominative case-marking. The remaining sentences were fillers for this experiment and contained existing verbs.

Table 1. Events stimuli for novel verbs

	Action event	Stative event
1	A girl is tearing a book by hand.	A girl is looking at a book which is a little away from her.
2	A girl is throwing an alarm clock away.	A girl recognizes the sound of an alarm clock which is a little away from her.
3	A girl is hitting a snake with a stick.	A girl is shuddering, with a snake being close to her.
4	A girl is eating a piece of cake with her hand.	A girl is looking at a cake near her, with her mouth watering.
5	A girl is climbing up a mountain.	A girl is looking at a distant mountain.

The rationale here is that if the children can associate case-marking patterns with the event types depicted in the pictures, we should observe that the children select stative event pictures for the double nominative pattern more frequently than for the nominative-accusative case-marking pattern. Also, the children should select action event pictures for the nominative-accusative case-marking pattern more frequently than for the double nominative case-marking pattern. If, on the other hand, the children randomly associate case-marking patterns with event types, the chance for the matching patterns would be about 50%. If the children associate a particular novel verb with a particular event--either stative or non-stative--the first time they see a set of pictures, and then associate another novel

verb with the other event in the same set of pictures, the results should either both be matched or both be non-matched. Overall, this gives a 50% chance of matching.

3.3. Results

The results are shown in Table 2, where group means and type means were calculated on the basis of the children's selection of picture events.

Table 2. Selection of event types for the two case-marking patterns

Case-marking	Double nominative		Nominative-accusative	
Selected events	Stative event	Action event	Stative event	Action event
Group I	56.8%	43.2%	56.8%	43.2%
Group II	55.8%	44.2%	35.8%	64.2%
Group III	69.4%	30.6%	35.8%	64.2%
Mean	60.8%	39.2%	42.8%	57.2%

For inferential statistics, a two-way repeated measures ANOVA was computed. The children's selection of stative event pictures was taken to be a dependent variable. There were two independent variables. The within-subject factor was case-marking with two levels (Double nominative/Nominative-accusative), and the between-subject factor was age group with three levels (Group I/Group II/Group III).

A main effect of case-marking was significant, $F(1, 54) = 24.615$, $p < .001$. This indicates that the children selected stative event pictures for the double nominative case-marking more frequently than for the nominative-accusative case-marking. Since the selection of stative event pictures is appropriate only for the double nominative case-marking, these results suggest that overall the children could differentiate two case-marking patterns for event types. A main effect of age group was not significant, $F(2, 54) = 2.525$, $p > .05$. However, there was a significant two-way interaction between case-marking and age group, $F(2, 54) = 7.353$, $p < .01$. This suggests that age group plays a role for the main effect of case-marking. In other words, the children's sensitivity to case-marking patterns in the selection of the corresponding pictures is different depending on the age groups. A post-hoc test, the Scheffé shows no significant difference ($p > .05$) among groups for the double nominative case-marking, but significant differences were found between Group I and every other group ($p < .05$) for the nominative-accusative case-marking. As visually shown in Figure 3, this indicates that Groups II and III performed significantly better than Group I for the selection of action events for the nominative-accusative case-marking.

Overall, the children in Group I performed at chance level. They selected stative event pictures 56.8% of the time for the double nominative case-marking, and action event pictures 43.2% of the time for the nominative-accusative case-marking. This averages 50% for matching event types with

their corresponding case-marking patterns. On the other hand, the results of one-sample *t*-tests show that the older children did not perform at chance level (Group II: $t(18) = 3.376$, $p < .01$; Group III: $t(18) = 6.334$, $p < .001$). Figure 4 shows that the children's ability to match event types with their appropriate case-marking patterns increases with age.

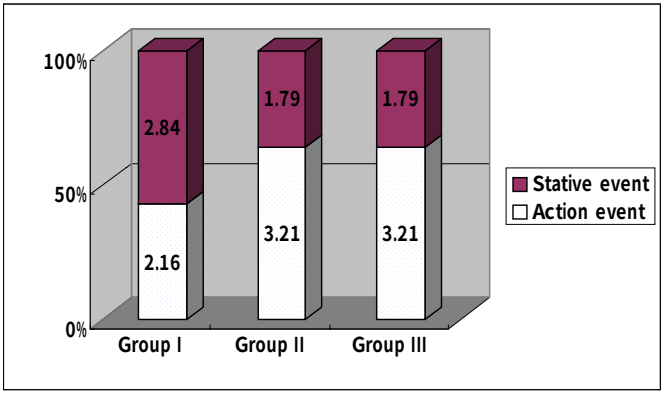

Figure 3. Selection of event types for the Nom-Acc stimuli

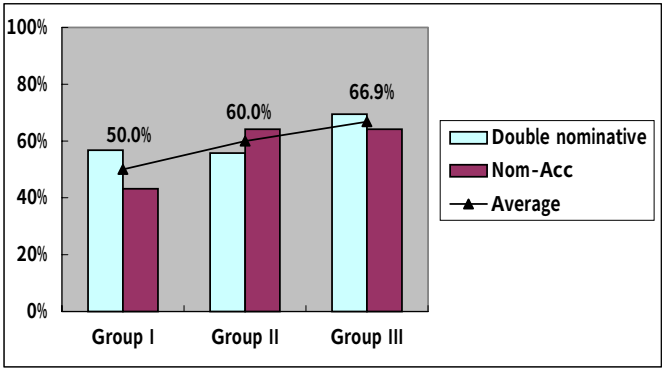

Figure 4. Percentages of the matching by age groups

The results of the experiment suggest that bootstrapping from case-marking morphology in Japanese may not take place, at least at younger ages. Compared with the studies in first language acquisition of English, the results of the present experiment appear to suggest that syntactic bootstrapping is late as well as weak in Japanese, even if it may occur as a verb learning strategy. For example, Naigles (1990) observes that even 1- and 2-year old children are sensitive to intransitive and transitive syntactic

frames to determine [±causative] meanings in English. On the other hand, the present experiment on Japanese reveals that 3- and 4-year-olds are not sensitive to the frame cues for guessing the [±stative] meanings of new verbs in an experimental setting. Although the two studies are not directly comparable as they examine different aspects of syntax-semantics correspondences, they seem to disclose huge differences in the age that children become sensitive to syntactic information.

In the act-out task adopted by Sethuraman et al. (1997), 2- and 3-year old English-speaking children were asked to demonstrate the meanings of novel verbs in two types of syntactic frames. They investigated whether the children could infer [±causative] meanings for the novel verbs used in transitive and intransitive frames.[5] The results indicate that the frame compliance (i.e., meaning-frame matched pattern) for an intransitive structure reached 97%. Surprisingly, however, the frame compliance for a transitive structure was only 54% for 2-year olds and 61% for 3-year olds. These low scores are somewhat similar to the Japanese data (50% for Group I and 60% for Group II), although there are differences in age groups between the two studies.

For the weak bootstrapping from the transitive structure, Sethuraman et al. (1997) posit that syntactic bootstrapping involves developmental factors: the ability to use syntactic frames develops as age increases. In their experiment, an adult control group demonstrated more than 80% frame compliance for the transitive structure; therefore, it is natural to assume that the children's ability reaches the adult level after age 3. On the other hand, for the present study on Japanese-speaking children, adult performance was assumed to be consistent with the linguistic analysis presented in section 2, and adults' data were not collected at the time of this experiment. Thus, we do not know whether adult native speakers of Japanese perform well enough to be compatible with the linguistic analysis. If, as in the case of Sethuraman et al. (1997), adult speakers performed significantly better than the older children, the operation of bootstrapping from case-marking morphology would develop during school ages, in which case we could claim that the bootstrapping from case-marking morphology is late in Japanese. On the other hand, if adults' performance is similar to that of older children, it would mean that the children have already reached the adult level. In this case, the syntactic bootstrapping in Japanese may not be late, but rather it may just be weak. Therefore, in order to compare the performance of adults and children, I decided to extend the study by adding an experiment in which a group of adults performed the same task.

[5] Sethuraman et al. (1997) tested intransitive and transitive frames involving PPs (NP V PP, NP V NP PP) as well as those without PPs (NP V, NP V NP). Here, I focus on the structures without PPs.

4. Experiment II

4.1. Participants

Nineteen native-speakers of Japanese participated in this experiment. They were all freshmen enrolled in undergraduate programs in a Japanese university at the time of the experiment.

4.2. Materials and procedure

The adult participants were tested on the same materials that were used for the children in Experiment I. However, unlike the children, the adult participants were tested on answer sheet. Each participant was asked to circle either "left" or "right" for the pictures shown with the stimulus sentences orally given by an experimenter. The participants were informed in advance that some non-existing words would be used, and they were asked to guess the best answer.

4.3. Results

Unexpected results were obtained. As shown in Table 3, the adult participants selected stative event pictures 64.2% of the time for the double nominative case-marking, and action event pictures 67.4% of the time for the nominative-accusative case-marking, an average of 65.8% matching patterns. Thus, adult performance was far from perfect and was rather similar to the performance of the older children in Experiment I. A two-way repeated measures ANOVA was computed for purposes of comparison to child groups in Experiment I. Independent variables were case-marking with two levels (Double nominative/Nominative-accusative) and group with four levels (Group I/Group II/Group III/Adults), and a dependent variable was the selection of stative event pictures. The results show that only an interaction effect between case-marking and group was significant, $F(3, 72) = 4.182$, $p < .01$. A post-hoc Scheffé revealed once again that the difference lies in Group I and other groups on the nominative-accusative case-marking ($p < .05$). Namely, the children in Group I performed significantly worse on the nominative-accusative case-marking than any other groups: no other significant difference was found among the other groups.

Table 3. Selection of event types for the two case-marking patterns by adult participants

Case-marking	Double nominative		Nominative-accusative	
Selected events	Stative event	Action event	Stative event	Action event
Adult participants	64.2%	35.8%	32.6%	67.4%

5. Discussion

While Group I performed at chance level, the other groups demonstrated some sensitivity to the syntactic frames. More important, the results of

Experiment II suggest that the children's performance is similar to that of adults. Two things must be articulated based on these results. First, bootstrapping from case-marking morphology may not be late in Japanese compared to the English data provided by Sethuraman et al. (1997). Second, the bootstrapping, if it contributes to verb learning in Japanese, may be a relatively weak operation in the acquisition processes.

For the first point, I have suggested that bootstrapping from case-marking morphology may not take place at younger ages because even school aged children did not perform well in Experiment I. However, it was then found in Experiment II that adult native speakers also performed at about 65% level on the same picture selection task. This means that the children--at least those in Groups II and III--had already reached the adult level in terms of their ability to guess [±stative] meanings for newly given verbs in two different case-marking patterns. In the experiment of Sethuraman et al. (1997), 3-year-old English-speaking children failed to associate a transitive frame with causative meaning in an act-out task, and therefore it was assumed that the ability develops later, probably around age 4 or 5. In comparison to the English data, therefore, the ages of Group II (5- and 6-year-olds) in the Japanese experiment may not be late in starting to show the sensitivity to frame meanings.[6]

However, I would like to maintain that bootstrapping from case-marking morphology is not the initial way of learning verb meanings in Japanese. A bootstrapping problem in the acquisition literature is a problem as to how learning language starts: the way to break into the system at the very outset of language acquisition (e.g., Grimshaw, 1981; Pinker, 1984, 1989, 1994). In this original sense, bootstrapping operations that begin at the age of 5 or 6 must be too late because children at these ages have already learned much about verb meanings including their syntactic properties. Thus, bootstrapping from case-marking morphology may be at best a supplemental process for verb learning.[7]

This is closely related to the second point: bootstrapping from case-marking morphology is a weak operation. Even adult native speakers of Japanese matched event types with their corresponding case-marking patterns about 65% of the time in the experimental setting. Therefore, there is a huge gap between linguistic analysis and non-linguists' performance. This may be attributed to the fact that the correspondences between case-marking

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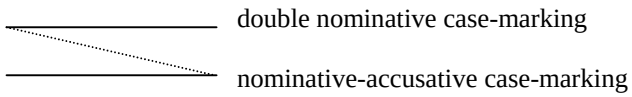
[6] For the double nominative case-marking and the stative event, there is no statistically significant difference ($p > .05$) between Group I and other groups.

[7] It may be possible to suggest that syntactic bootstrapping in English is also a supplemental process, based on the data provided by Sethuraman et al. (1997) on transitive frames. However, in their study, the children performed well enough on intransitive frames, and other studies examining younger children (e.g., Naigles, 1990) show the children's early sensitivity to syntactic frames in English.

and verb stativity is not absolute. As mentioned above, some stative verbals are used with the nominative-accusative case-marking, which is indicated by a broken line in (14).

(14) 

For instance, the direct object of *suki* 'like' is marked with either nominative *ga* or accusative *o*, and that of *aisuru* 'love' is marked only with accusative *o*. Even these semantically similar stative verbals can take different object-markers. This fact may weaken the main correspondences between case-marking and verb stativity, and may have affected people's performance in the experiments.[8]

In fact, there is a possibility that the performance by Group I children might have been affected by these asymmetric correspondences. As shown in Table 2, the children in Group I selected stative event pictures 56.8% of the time and action event pictures 43.2% of the time, regardless of the case-marking patterns. They might have simply preferred to choose stative event pictures for any novel verbs. However, another interpretation of the results would be that they were less accurate on the nominative-accusative case-marking than on the double nominative case-marking because the nominative-accusative case-marking is used not only with action verbs, but also with some stative verbals (e.g., *Hanako-ga ongaku-o aisiteru* 'Hanako loves music'). However, this interpretation is only plausible if the children initially attended to case-marking and then looked for the corresponding event types, because from a different point of view, it is the action event that has exclusive correspondence with the nominative-accusative case-marking, which predicts that the children would perform better on this pattern.

A more sensible prediction made on the schema in (14) would be the order of corresponding patterns. We have examined only the most likely patterns so far: stative events with the double nominative, and action events with the nominative-accusative. But as shown in (14), the next likely correspondence is the association between the stative event and the nominative-accusative case-marking, and the least likely correspondence is the action event with the double nominative case-marking since the latter never occurs for real verbs in Japanese. Therefore, if children are sensitive to the likely order of the asymmetric correspondences, their performance would show the following order for the matching rate.

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[8] However, intransitive/transitive frames and [±causative] is not absolute in English, either. For example, change of state verbs, which involve causative meaning, such as *break* and *open* (Levin & Rappaport Hovav, 1995) are used in both intransitive and transitive structures.

(15) Stative and Double-Nom; Action and Nom-Acc >
Stative and Nom-Acc > Action and Double-Nom

Reexamining the results along this line, we found that in Experiment I, Groups I and II were inconsistent with this order (see Table 2). Similarly, in Experiment II the adults' performance was not compatible with the predicted order: they associated action event pictures with the double nominative case-marking more often than stative event pictures with the nominative-accusative case-marking (see Table 3). In sum, among the four groups, only Group III showed the predicted patterns. But even in this case, the children's preference of the stative event with the nominative-accusative (35.8%) to the action event with the double nominative (30.6%) is subtle. Therefore, the asymmetric correspondences do not predict the exact order of matching in the two experiments.

There must be other types of difficulty, at least for younger children. In colloquial Japanese, argument ellipsis happens very frequently, and case-marking particles are often dropped from arguments. Interestingly, these phenomena are typically observed in child-directed speech as simplifications (e.g., Clancy, 1985; Rispoli, 1991). Therefore, it may be natural to believe that, due to the input factor, Japanese-speaking children do not find regularities between verb meanings and case-marking patterns, and that they do not learn verb meanings based on syntactic frames. In contrast, this kind of modification is not observed in the child-directed speech of English (see, Owens, 2001, p. 215-21, for the properties of English Motherese). Argument NPs are almost always overt and grammatical relations are explicit thanks to the word-order constraint, which may help children establish syntax-semantics correspondences in English. These cross-linguistic differences in parental input may account for the difference between Japanese- and English-speaking children.

Rispoli (1995) convincingly argues the input factor by presenting input data available to Japanese-speaking children. His speech sample collected from 9 Japanese caregivers to their children show scant use of case-marking particles in parental speech (Rispoli, 1989, 1991). For example, sentences involving nominative case particles constitute only 8% of all intransitive sentences. In transitive sentences, nominative case particles were used 4% of the time, accusative particles 7%, and both nominative and accusative particles were used only 1%. In discussing syntactic bootstrapping in general with these data, Rispoli (1995) maintains that "[i]t is highly doubtful that 2-year-old Japanese children find sentences with *o* and *ga* informative for syntactic bootstrapping" (p. 343). It is very unfortunate that stative verbals were excluded from Rispoli's analysis, since we do not know how case-marking particles were used for the stative verbals. Nonetheless, we could naturally assume that Japanese-speaking children receive very little information about the morphological case-marking, and this may be part of

the reason why younger children, such as those in Group I, failed to demonstrate their sensitivity to case-markers.[9]

Even though the input factor is involved in the weak bootstrapping for Japanese-speaking children, this should have no effect on the adults' performance. But the typological fact--the elliptical features of Japanese--is not particular to the child-directed speech. In adult discourse, argument ellipsis and case-drop are frequently observed, and Japanese-speakers seem to depend heavily on contextual information so that they can do without case-markers and arguments. They may not be so conscious of case-marking morphology in natural discourse, and this fact may cause difficulty in utilizing it for the purpose of guessing verb meanings in experimental situations. However, it is important to stress that the two typical correspondences--stative and the double-nominative, and action and the nominative-accusative--were clearly demonstrated by adults, which suggests that they are not totally unconscious of case-marking information to infer verb meanings. Moreover, the children in Groups II and III performed almost as well as the adults did. Despite all the typological difficulties involved in bootstrapping from case-marking morphology, the performance by the Japanese-speaking children may suggest powerful verb learning.

Lastly, for further investigation of syntactic bootstrapping in Japanese, I would like to present two possibilities not assessed in this study.[10] One is that for learning verb meanings children may rely more on verb morphology than on case-markers. A candidate in this view is tense and aspect markers.[11] One piece of evidence comes from Shirai (1993) who analyzed a speech sample of a child between 1;11 and 2;2, focusing on progressive/continuative morphology *-tei* in Japanese. Although *-tei* is compatible with both stative verbs and non-stative action verbs, it was never used by the child for stative verbs. This finding suggests that we may need to investigate bootstrapping based on the cues from verb morphology as well.

Another possibility is that children do rely on case-marking

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[9] Suzuki (2000b) shows that even 5- and 6-year old Japanese-speaking children frequently make case-marking errors in experimental settings. This seems to suggest that children are likely to learn verb meanings before morphological case-marking.

[10] What has not been discussed includes the possibility of experimental artifacts. In the experiments, static pictures were used for a picture selection task, and they might have caused a difficulty in understanding event types. This type of problems may be solved by using moving pictures on a computer screen. Also, as in the case of Naigles (1990), the preferential-looking paradigm makes it possible to test younger children.

[11] Rispoli (1995) briefly mentions this possibility as well. In this case, it is more appropriate to call the learning procedure morphological bootstrapping since it is based on inflectional morphology (see Behrend, Harris, & Cartwright, 1995, for an experimental study on English).

morphology but not on the ones tested in this study. This includes the dative case-marker *ni* which may be used for the subject of some stative verbals. As in the following example, the subject of *dekiru* 'can do' can be marked by either *ni* or *ga*.

(16) Hanako-ni/-ga tenisu-ga dekiru.
Hanako-Dat/-Nom tennis-Nom can do
'Hanako can play tennis.'

Note that all stative verbals that allow dative *ni* for subjects also allow nominative *ga*, but the reverse is not necessarily true. I think that the subject marked with *ni* may offer a more salient cue for verb stativity than the double nominative case-marking. This is because subjects are more likely to retain case-marking particles than direct objects (e.g., Kuno, 1973; Takezawa, 1987), and Japanese-speaking children are sensitive to this asymmetry (e.g., Otsu, 1994, Suzuki, 2000a). When object-markers are dropped from the direct object, we can rely only on the subject-marker. But if the subject-marker is nominative *ga*, it is impossible to determine whether the verb is stative or not, because the nominative case-marker is used for the subjects of both action and stative verbals. If, on the other hand, what is left on the subject is the dative case-marker, one can guess that the verb is stative because the dative subject is never used for verbs that are not stative. Thus, the cue for verb stativity may be the dative case-marker on subjects, but this possibility was not tested in the present study.

6. Conclusion

The results of Experiment I show that only older preschool children and school aged children could match [±stative] meanings of novel verbs with the corresponding case-marking patterns. This suggests that bootstrapping from case-marking morphology is not the initial way of learning the stativity component of verb meanings in Japanese. However, it was also found that in Experiment II, the performance of adults was also far from perfect and was in fact similar to that of the older children. These results suggest that children by the age of 5 or 6 (Groups II and III in Experiment I) reach the adult level in utilizing case-markers to infer verb meanings, but that bootstrapping from case-marking morphology, as a verb learning process, may be a relatively weak operation. The factors for the weak bootstrapping were discussed in two respects: no absolute correspondences between the case-marking patterns and the event types, and input deficiency of case-marking information in parental speech. But future research is needed to see how these typological features of Japanese might account for the cross-linguistic differences in syntactic bootstrapping between Japanese and English.

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References

Behrend, D., Harris, L., & K. Cartwright. (1995). Morphological cues to verb meaning: Verb inflections and the initial mapping of verb meanings. *Journal of Child Language, 22,* 89-106.

Clancy, P. (1985). The acquisition of Japanese. In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition: The data* (pp. 373-524). Hillsdale, NJ: Lawrence Erlbaum.

Fisher, C., Hall, G., Rakowitz, S., & L. Gleitman. (1994). When it is better to receive than to give: Syntactic and conceptual constraints on vocabulary growth. *Lingua, 92,* 333-375.

Gleitman, L. (1990). The structural sources of verb meanings. *Language Acquisition, 1,* 3-55.

Goldberg, A. (1995). *Constructions: A construction grammar approach to argument structure.* Chicago, IL: The University of Chicago Press.

Grimshaw, J. (1981). Form, function, and the language acquisition device. In C. L. Baker, & J. J. McCarthy (Eds.), *The logical problem of language acquisition* (pp. 165-182). Cambridge, MA: MIT Press.

Hirsh-Pasek, K., & R. Golinkoff. (1996). *The origins of grammar.* Cambridge, MA: MIT Press.

Jacobsen, W. (1992). *The transitive structure of events in Japanese.* Tokyo: Kuroshio Publishers.

Kuno, S. (1973). *The structure of the Japanese language.* Cambridge, MA: MIT Press.

Landau, B., & L. Gleitman. (1985). *Language and experience: Evidence from the blind child.* Cambridge, MA: Harvard University Press.

Levin, B., & Rappaport Hovav, M. (1995). *Unaccusativity: At the syntax-lexical semantics interface.* Cambridge, MA: MIT Press.

Naigles, L. (1990). Children use syntax to learn verb meanings. *Journal of Child Language, 17,* 357-374.

Naigles, L., Gleitman, H., & L. Gleitman. (1993). Children acquire word meaning components from syntactic evidence. In E. Dromi (Ed.), *Language and cognition: A developmental perspective* (pp. 104-140). Norwood, NJ: Ablex Publishing Corporation.

Otsu, Y. (1994). Case-marking particles and phrase structure in early Japanese acquisition. In B. Lust, M. Suñer & J. Whitman (Eds.), *Syntactic theory and first language acquisition: Cross-linguistic perspectives Vol. 1* (pp. 159-169). Hillsdale, NJ: Lawrence Erlbaum.

Owens, R. (2001). *Language development: An introduction (5th ed.).* Columbus: Merrill.

Pinker, S. (1984). *Language learnability and language development.* Cambridge, MA: Harvard University Press.

Pinker, S. (1989). *Learnability and cognition: The acquisition of argument structure.* Cambridge, MA: MIT Press.

Pinker, S. (1994). How could a child use verb syntax to learn verb semantics? *Lingua, 92,* 377-410.

Rispoli, M. (1989). Encounters with Japanese verbs: Caregiver sentences and the categorization of transitive and intransitive action verbs. *First Language, 9,* 57-80.

Rispoli, M. (1991). The acquisition of verb subcategorization in a functionalist framework. *First Language, 11,* 41-63.

Rispoli, M. (1995). Missing arguments and the acquisition of predicate meanings. In M. Tomasello & W. E. Merriman (Eds.), *Beyond names for things: Young children's acquisition of verbs* (pp. 331-352). Hillsdale, NJ: Lawrence Erlbaum.

Sethuraman, N., Goldberg, A., & J. Goodman. (1997). Using the semantics associates with syntactic frames for interpretation without the aid of context. In E. Clark (Ed.), *The proceedings of the twenty-eighths annual child language research forum* (pp. 283-294). Center for the Study of Language and Information.

Shibatani, M. (1977). Grammatical relations and surface cases. *Language, 53,* 789-809.

Shirai, Y. (1993). Inherent aspect and the acquisition of tense/aspect morphology in Japanese. In H. Nakajima & Y. Otsu (Eds.), *Argument structure: Its syntax and acquisition* (pp. 185-211). Tokyo: Kaitakusha.

Suzuki, T. (2000a). A subject-object asymmetry in the first language acquisition of Japanese: The omissibility and retention of case-marking particles. *Chicago Linguistic Society: The panels 36-2,* 499-510.

Suzuki, T. (2000b). Multiple factors in morphological case-marking errors. In Oshima-Takane, Y., Shirai, Y., & H. Shirai. (Eds.), *Studies in Language Sciences, 1,* 123-134.

Takezawa, K. (1987). *A configurational approach to case-marking in Japanese.* Unpublished doctoral dissertation, University of Washington.

日本語獲得における格マーキングからの立ち上げについて

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動詞の状態性に関する意味の獲得において、格マーキングとの対応関係（NP-が NP-を 非状態動詞、NP-が NP-が 状態動詞）が子供の言語獲得に統語的な立ち上げとしての役割を果たすのかどうかを調査した。３歳から７歳までの５９人の幼児を対象に絵画選択法による実験を行った。実験では「NP-が NP-を」と「NP-が NP-が」の構文において造語動詞を使用し、これらの構文で使われる格マーキングのパターンから造語動詞の状態性に関する意味を子供が推測することができるかどうかを調べた。結果は５、６歳以上の年長の子供のみがある程度の能力を発揮するに留まるというものであった。これは日本語獲得において格マーキングからの立ち上げは、動詞の状態性を学習する際の主要な方略ではないということを示しているようである。しかしながら、追加実験においては大人の被験者も年長児の子供とあまり変わりない結果に終わったことから、子供が動詞の意味を推測するために格マーキングを使用する能力は５、６歳で大人と同程度の一定レベルに達するということ、またこの立ち上げ操作は比較的弱いものであるということが考えられる。