A-chains and Unaccusative-Unnergative Distinction in the Child Grammar: The Acquisition of Japanese *Te-iru* Constructions

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1. Introduction

In this paper we demonstrate that Japanese-speaking children can structurally distinguish unaccusatives from unergatives and thus argue against the A-chain Maturation Hypothesis (Borer&Wexler 1987). According to the A-chain Maturation Hypothesis, children at first cannot form an A-chain in unaccusatives. To explain the fact that young children successfully produce and comprehend unaccusatives, Borer&Wexler (1992) and Babyonyshev et al. (2001) claim that young children utilize the structure of unergatives to interpret unaccusatives (the Unergative Misanalysis Hypothesis). Moreover, Machida et al. (2004) argue that the Unergative Misanalysis Hypothesis can be extended to Japanese acquisition. We argue against their claims by showing that Japanese-speaking children can comprehend unaccusatives in a way which crucially utilizes an A-chain in interpretation.

According to Takezawa (1991), the meaning of Japanese aspect construction *te-iru* is roughly classified into the progressive reading and the resultative reading, and *te-iru* allows the resultative reading only when a sentence involves an A-binding relation (between the subject and the object). Thus, the resultative reading is possible with an unaccusative but not with an unergative.

The Unergative Misanalysis predicts that children reject the resultative reading. However, contrary to the prediction, even 3-year-old children accept the resultative reading with unaccusatives but disallow it with unergatives in our experiment. This result indicates that children can structurally distinguish unaccusatives from unergatives and form an A-chain.

2. Syntactic Backgrounds

It has been argued that in English passives and unaccusatives, the object is moved to the subject position and this movement constructs an A-chain. Let us see examples of English passives and unaccusatives given in (1) and (2).

(1) A-chains in English passives (cf. Jaeggli 1986)
   
   [The pig]i was kicked t by the elephant.

(2) A-chains in English unaccusatives
   
   [Three students]i arrived t.

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Next, let us consider Japanese passives and unaccusatives. It is well-known that, roughly speaking, there are two types of passive constructions in Japanese, commonly called direct passives and indirect passives (cf. Kuno 1973). Both types of passives are formed by attaching the passive affix -[*are*] to a verb. An example of an active transitive sentence is given in (3) and its direct passive counterpart is given in (4). In direct passives such as (4), we assume that the object is moved to the subject position and this movement constructs an A-chain like English passives, following Sugisaki (1999), Minai (2000), and Machida et al. (2004). (5) is an example of indirect passives. It has been argued that in indirect passives such as (5), the subject is base-generated in the subject position, and it does not involve an A-chain.

(3) Transitives
Buta-san-ga  neko-san-o  ket-ta
pig-NOM  cat-ACC  kick-PAST
‘The pig kicked the cat.’

(4) Direct passives (cf. Kuno (1973))
Neko-san-ga  buta-san-ni  ti  ker-are-ta
cat-NOM  pig by  kick-PASS-PAST
‘The cat was kicked by the pig.’

(5) Indirect passives
Gakusei-ga  ame-ni  fur-are-ta
student-NOM  rain by  fall-PASS-PAST
‘Student(s) was/were rained on.’

Miyagawa (1989) argues for the existence of A-chains in direct passives and unaccusatives, and we assume his analysis. First, let us take a look at the sentences given in (6).

(6) Floating quantifier
a. Gakusei -ga  3(san)-satu  no  hon-o  katta (transitives)
student-NOM  3-CL  GEN  books-ACC  buy-PAST
‘Student(s) bought three books.’

b. Gakusei-ga  hon-o  3(san)-satu  katta (transitives)
student-NOM  books-ACC  3-CL  buy-PAST
‘Student(s) bought three books.’

(Sano et al. 2001)

c.* Gakusei-ga  hon-o  2(futa)-ri  katta (transitives)
student-NOM  books-ACC  2-CL  buy-PAST
‘Two students bought books.’

(Miyagawa 1989)

In Japanese, a numeral quantifier consists of a numeral and a classifier like *San-satu*, three with the classifier for books or *Futa-ri*, two with the classifier for people. In (6a), a numeral quantifier *3-satu* appears in the modifier position, and in (6b), it appears in the floated position. (6b) indicates that the floating quantifier *3-satu* within the VP can modify the direct object. In contrast, (6c) shows that the quantifier *2-ri* within the VP cannot modify the subject. To account for the contrast between (6b) and

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1 There is another analysis for direct passives. The analysis is that direct passives do not involve movement, that is, the subject is base-generated in the subject position. In this study, we adopt the movement analysis, following Machida et al. (2004), Sugisaki (1999), and Minai (2000).
(6c), Miyagawa (1989) proposes the Mutual C-command Requirement, which is given in (7).

(7) Mutual C-command Requirement:
For a predicate to predicate of a NP, the NP or its trace and the predicate or its trace must c-command each other.

(Miyagawa 1989)

In (6b), the direct object and the numeral quantifier can c-command each other within the VP, but in (6c), the numeral quantifier cannot c-command the subject. Therefore, the Mutual C-command Requirement is not satisfied in (6c). Next, let us consider the case of passives, unaccusatives, and unergatives.

(8) Floating quantifier test in passives, unaccusatives, and unergatives

a. Yuube, kuruma-ga doroboo-ni 2(ni)-dai nusum-are-ta (direct passives)
   last night car-NOM thief by 2-CL steal-PASS-PAST
   ‘Last night, two cars were stolen by a thief.’

b. Kyaku-ga ryokan-ni 2(futa)-ri tui-ta (unaccusatives)
   guests-NOM inn to 2-CL arrive-PAST
   ‘Two guests arrived at the inn’

c. *Kodomo-ga ame-ni 2(futa)-ri fur-are-ta (indirect passives)
   children-NOM rain by 2-CL fall-PASS-PAST
   ‘Two children were rained on.’

d.*Gakusei-ga jibun-no kane-de 2(futa)-ri denwasi-ta (unergatives)
   students-NOM self-GEN money by 2-CL telephone-PAST
   ‘Two students telephoned by their own money.’

(Miyagawa 1989)

The subject in direct passives and unaccusatives leaves its trace in the object position and the numeral quantifier within the VP and the trace can c-command each other. Thus, the Mutual C-command Requirement is satisfied in both (8a) and (8b). In contrast, (8c) and (8d), namely indirect passives and unergatives, cannot satisfy the Mutual C-command Requirement because there is no trace in the object position and the numeral quantifier within the VP cannot c-command the subject. Based on this analysis, Miyagawa (1989) argues that both direct passives and unaccusatives involve an A-chain but indirect passives and unergatives do not; and we assume his analysis.

3. Backgrounds of the Acquisition of Passives and Unaccusatives

It is well-known that the development of passives is late compared with their active counterparts. To account for the fact, Borer and Wexler (1987) propose the A-chain Maturation Hypothesis, which is given in (9).

(9) The A-chain Maturation Hypothesis:
Since the ability to form an A-chain undergoes maturation, children cannot form an A-chain until a certain age.

As to the acquisition of Japanese passives, Sugisaki (1999) and Minai (2000) experimentally show that the acquisition of indirect passives, which do not involve an A-chain, is earlier than that of direct passives, which involve an A-chain. Consequently, they support the A-chain Maturation Hypothesis. However, Sano et al (2001) argue against the A-chain Maturation Hypothesis for Japanese passives. Let us take a look at (10a) and (10b).
Floating quantifier test in “unaccusatives”

a. Usagi-san-ga buta-san-ni 2-hiki tukamat-ta ("unaccusatives")
   rabbit-NOM pig by 2-CL catch-PAST
   ‘Two rabbits were caught by the pig.’

b. Usagi-san-ga buta-san-ni 2-hiki tukamae-rare-ta (direct passives)
   rabbit-NOM pig by 2-CL catch-PASS-PAST
   ‘Two rabbits were caught by the pig.’

(10a) and (10b) are thematically the same, but (10a) lacks the passive morpheme -rare, unlike (10b). (10a) is called “full unaccusatives” in Sano et al. (2001). Sano et al. (2001) argue that (10a) and (10b) are equivalent regarding the existence of A-chains because the numeral quantifier 2-hiki can float from the surface subject usagi-san (‘rabbits’) equally in (10a) and (10b). Target sentences in Sano et al. (2001)’s study are given in (11).

(11) Target sentences in Sano et al. (2001)

a. Usagi-san-ga buta-san-ni tukamat-ta ("unaccusatives")
   rabbit-NOM pig by catch-PAST
   ‘The rabbit was caught by the pig.’

b. Usagi-san-ga buta-san-ni tukamae-rare-ta (direct passives)
   rabbit-NOM pig by catch-PASS-PAST
   ‘The rabbit was caught by the pig.’

The A-chain Maturation Hypothesis predicts that children’s performance would be equivalent for unaccusatives and direct passives because they equally involve A-chains. However, Sano et al. (2001) experimentally show that Japanese children perform much better with unaccusatives (11a) than with direct passives (11b). Based on this result, Sano et al. (2001) argue against the A-chain Maturation Hypothesis for Japanese passives.

However, Machida et al. (2004) propose an alternative account for the result of the experiment conducted by Sano et al. (2001). Machida et al.’s main claim is that children utilize the structure of unergatives to interpret unaccusatives because they cannot form an A-chain. In other words, children interpret “unaccusatives” such as (11a) without an A-chain, according to Machida et al. (2004). This is known as the Unergative Misanalysis Hypothesis, as shown in (12).

(12) The Unergative Misanalysis Hypothesis:
   Children utilize the structure of unergatives to interpret unaccusatives.

Given this hypothesis, the result of the experiment in Sano et al. (2001) may not be incompatible with the A-chain Maturation Hypothesis for Japanese passives, according to Machida et al. (2004).

4. Japanese Aspect Te-iru Constructions and Prediction

In this section, we discuss the Japanese aspect construction te-iru in order to evaluate the A-chain Maturation Hypothesis and the Unergative Misanalysis Hypothesis. According to Takezawa (1991), the Japanese aspect te-iru can be roughly classified into two meanings: one is the progressive meaning, which is the Japanese counterpart of -ing in English, and the other is the resultative meaning, where the resulting state of an event is expressed.

Examples of the te-iru constructions are given in (13). (13a) involves an unergative verb, (13b) involves an unaccusative verb, and (13c) involves a passivized verb. The reading of (13a) is only the progressive one, and the resultative reading is impossible for (13a). In contrast, (13b) and (13c) can have both the progressive reading and the resultative reading.
(13) *Te-iru* constructions

   pig-NOM run-TEIRU-PRES  
   ‘The pig is running.’  
   (* resultative)

b. Buta-san-ga agat-te-iru  
   pig-NOM rise-TEIRU-PRES  
   ‘The pig has risen.’ or ‘The pig is rising’  
   (OK resultative)

c. Buta-san-ga ager-arare-teiru  
   pig-NOM rise-PASS-TEIRU  
   ‘The pig has been raised.’ or ‘The pig is being raised.’  
   (OK resultative)

To account for the contrast between (13a) on the other hand, (13b) and (13c) on the other, Takezawa (1991) points out that there is a generalization of the resultative reading of *te-iru*, as shown in (14).

(14) Takezawa’s generalization:

The resultative reading is possible only when the subject binds the object of an affective verb.²

The resultative reading is possible only when the subject binds the object of an affective verb. In other words, Takezawa’s generalization states that an A-binding relation is required to have the resultative interpretation. Because (13a) involves an unergative verb, it does not involve an A-binding relation. Thus, it cannot have the resultative reading. On the other hand, because (13b) and (13c) involve an A-chain, both (13b) and (13c) can have the resultative reading.

Based on Takezawa’s generalization, the Unergative Misanalysis Hypothesis makes a prediction as given in (15).

(15) Prediction of the Unergative Misanalysis Hypothesis:

According to the Unergative Misanalysis Hypothesis, children before A-chain Maturation do not form an A-chain to interpret unaccusatives. Then, given Takezawa’s analysis, the Unergative Misanalysis Hypothesis predicts that children disallow the resultative reading in unaccusatives with the *te-iru* form.

5. Experiment

To test this prediction, we examined 29 Japanese monolingual children aged 3;6-6;4 with the Truth-Value-Judgment-Task (Crain and McKee 1985, Crain and Thornton 1998). The detailed information of the subjects is shown in (16). Sample stimulus sentences are shown in (17).

(16) Subjects

a. Child: N=29 (age=3;6-6;4, mean 5;1)  
   3-year-olds: N= 6 (age=3;6-3;11, mean=3;8)  
   5-year-olds: N=10 (age=5;0-5;11, mean=5;6)  
   6-year-olds: N=3 (age=6;3-6;4, mean=6;4)

b. Adult: N=11

(17) Stimulus Sentences

a. Unergatives with *te-iru*  
   Buta-san-ga ima hasit-teiru-yo  
   pig-NOM now run-TEIRU-PRES  
   ‘The pig is now running.’  
   (OK progressive / * resultative)

² Takezawa (1991) argues that the generalization covers the inalienable possession constructions and the distributions of Japanese anaphoric expression “zibun”.
b. Unaccusatives with te-iru (OK progressive / OK resultative)

Kaeru-san-ga ima umat-te-iru-yo
frog-NOM now bury-TEIRU-PRES
‘The frog is (has been) buried now.

We used three unaccusative verbs, *taoreru* (‘fall down’), *umaru* (‘be buried’), and *agaru* (‘rise’) and three unergative verbs, *odoru* (‘dance’), *hasiru* (‘run’), and *tobu* (‘jump’). The procedure is as follows. Two experimenters, who are Japanese native speakers, participated in experimental sessions with each child. In each session, one experimenter acted-out scenarios with one or two animal puppet(s) in front of a subject. After that, the experimenter hid the animal puppet(s) from the subject with a paper-crafted curtain. Behind the curtain, the animal puppet(s) did or were doing something but the subject could not see it. Then, the experimenter took away the curtain and showed the subject the resulting state of the acted-out event or the animal puppet(s)’ on-going action. Then, the experimenter asked the other experimenter, who played the role of a puppet (named *Wanchan*), “What is going on now?” The experimenter pretending to be the puppet uttered a stimulus sentence that described the situation either correctly or incorrectly. The subject was required to judge whether the puppet’s statement is correct or not as the description of the given scenario. If the subject judged that the puppet’s utterance is correct, s/he gave an ice cream to the puppet in reward. If the subject judged that the puppet’s utterance is incorrect, s/he gave broccoli to the puppet. To make children understand the task, all the children underwent easy practice sessions before they attended the main sessions. Let us take a look at the sample scenarios given in (18). (18a) was given for unergatives with te-iru and (18b) was given for unaccusatives with te-iru.

(18a)

Participants are experimenter 1, the puppet *Wanchan* (experimenter 2 played the role of it) and a pig.
Experimenter 1 is talking to the pig. “Hey, please show us your running.”
Pig says: “OK.” (Then, the pig starts to run and keeps running.)
Then, experimenter 1 hid the pig with the paper-crafted curtain. In one case, behind the curtain, the pig was running while leaving its footprints. In the other case, behind the curtain, the pig stopped running and was being out of breath and its footprints were left as the resulting state of running. After a while, the curtain was removed by experimenter 1. In one case, when the curtain was removed, the pig kept running while leaving its footprints. This is a progressive matching situation. In the other case, when the curtain was removed, the pig stopped running and was being out of breath and its footprints were left as the resulting state of running. This is a resultative mismatching situation.
Experimenter 1 says: “Now, Wanchan, please tell us what is going on now.”
Wanchan (experimenter 2) says: “OK, Buta-san-ga ima hasit-te-iru yo”
‘The pig is now running.’

Correct Answer
Matching (progressive) situation: accept
Mismatching (resultative) situation: reject

(18b) Participants are experimenter 1, the puppet named *Wanchan* (experimenter 2 plays the role of it), a frog, and a cow
Experimenter 1 says: “A frog and a cow came to a huge sandbox.”
Frog says: “Wow, what a huge sandbox this is! I want to be buried inside this sandbox.”
Cow says: “OK. I will help you.”
The cow started to bury the frog. Then, experimenter 1 hid them with the paper-crafted curtain. In one case, behind the curtain, the cow was burying the frog. In the other case, behind the curtain, the frog was completely buried as the resulting state of burying. After a while, the curtain was removed by experimenter 1. In one case, when the curtain was removed, the cow
kept burying the frog. This is a progressive matching situation. In the other case, when the
curtain was removed, the frog was completely buried as the resulting state of burying. This is a
resultative matching situation.

Experimenter 1 says: “Now, Wanchan, please tell us what is going on now.”
Wanchan (experimenter 2) says: “OK, Kaeru-san-ga ima umat-teiru-yo”
‘The frog is (has been) buried now.’

Correct Answer
Matching (progressive) situation: accept
Matching (resultative) situation: accept

Let us see the result of this experiment. The data is given in (19).

(19) Data
a. The correct acceptance rates of unaccusatives with-\textit{te-iru} for the resultative reading
(Adult: acceptance rate=33/33, percentage=100.0%)

<table>
<thead>
<tr>
<th></th>
<th>3-year-olds</th>
<th>4-year-olds</th>
<th>5-year-olds</th>
<th>6-year-olds</th>
</tr>
</thead>
<tbody>
<tr>
<td>acceptance</td>
<td>18/18</td>
<td>29/30</td>
<td>30/30</td>
<td>9/9</td>
</tr>
<tr>
<td>percentage</td>
<td>100.0%</td>
<td>96.7%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

b. The correct rejection rates of unergatives with-\textit{te-iru} for the resultative reading
(Adult: rejection rate=33/33, percentage=100.0%)

<table>
<thead>
<tr>
<th></th>
<th>3-year-olds</th>
<th>4-year-olds</th>
<th>5-year-olds</th>
<th>6-year-olds</th>
</tr>
</thead>
<tbody>
<tr>
<td>rejection</td>
<td>16/18</td>
<td>30/30</td>
<td>29/30</td>
<td>9/9</td>
</tr>
<tr>
<td>percentage</td>
<td>88.9%</td>
<td>100.0%</td>
<td>96.7%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

c. The correct acceptance rates of unergatives with \textit{te-iru} for the progressive reading
(Adult: acceptance rate=33/33, percentage=100.0%)

<table>
<thead>
<tr>
<th></th>
<th>3-year-olds</th>
<th>4-year-olds</th>
<th>5-year-olds</th>
<th>6-year-olds</th>
</tr>
</thead>
<tbody>
<tr>
<td>acceptance</td>
<td>18/18</td>
<td>29/30</td>
<td>30/30</td>
<td>9/9</td>
</tr>
<tr>
<td>percentage</td>
<td>100.0%</td>
<td>96.7%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

d. The correct acceptance rates of unaccusatives with \textit{te-iru} for the progressive reading
(Adult: acceptance rate=29/33, percentage=87.9%)

<table>
<thead>
<tr>
<th></th>
<th>3-year-olds</th>
<th>4-year-olds</th>
<th>5-year-olds</th>
<th>6-year-olds</th>
</tr>
</thead>
<tbody>
<tr>
<td>acceptance</td>
<td>16/18</td>
<td>24/30</td>
<td>24/30</td>
<td>6/9</td>
</tr>
<tr>
<td>percentage</td>
<td>88.9%</td>
<td>80.0%</td>
<td>80.0%</td>
<td>66.7%</td>
</tr>
</tbody>
</table>

(19a) shows the correct acceptance rates of unaccusatives with \textit{te-iru} for the resultative reading, and
(19b) shows the correct rejection rates of unergatives with \textit{te-iru}. Contrary to the prediction of the
Unergative Misanalysis Hypothesis, even 3-year-old children, who should not have undergone
maturation of A-chains according to Borer and Wexler (1987), treat unaccusatives very differently
from unergatives in interpreting the \textit{te-iru} form with the resultative reading. They accept the resultative
reading in unaccusatives with \textit{te-iru}, while they reject it in unergatives with \textit{te-iru}. In addition, they
correctly accept the progressive reading in unergatives with \textit{te-iru} as shown in (19c). The correct
acceptance rates of unaccusatives with \textit{te-iru} shown in (19d) are not so good as that of unergatives
with \textit{te-iru}, but the rates are not so different from adult’s control. The data in (19d) guarantees that the
possible interpretation of unaccusatives with \textit{te-iru} for children is not only the resultative interpretation.
In other words, children accept the resultative reading not because the progressive reading is
impossible for unaccusatives with \textit{te-iru}.

Before concluding, we would like to discuss an implication of our findings. As discussed in
Babonynshev et al. (2001), the Unergative Misanalysis Hypothesis suggests that children may violate
the Uniformity of Theta Assignment Hypothesis, commonly called the UTAH. Under the UTAH, an
argument assigned the theta-role of “theme” by transitive verbs or unaccusative verbs should be base-generated in the complement of a verb. However, the Unergative Misanalysis Hypothesis implies that “theme” argument is base-generated in the subject position. Thus, the assignment of the “theme” theta-role violates the UTAH under the Unergative Misanalysis Hypothesis. This is not desirable because it may leave the theta assignment in child grammars unrestricted. In contrast, the result of our experiment implies that Japanese children obey the UTAH. This is desirable because it allows us to maintain UTAH’s restrictions of the range of possible grammars.

6. Conclusion

To conclude, our result contradicts the Unergative Misanalysis Hypothesis. Our observation indicates that the surface subject in unaccusative sentences is base-generated in the complement of a verb and it is moved to the subject position via A-movement. Thus, there should be an A-chain in Japanese children’s unaccusatives before age 4. Therefore, we claim that children at an early stage can distinguish unaccusatives from unergatives and can form an A-chain.

References


