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Children's Acquisition of Negative-Sensitive Items in Japanese: *hitotu-mo* '(not) even one' and *nani-mo* '(not) anything'*

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1 Introduction

This paper reports the results of our experiment which tested Japanese-speaking children's comprehension of negative sensitive items *hitotu-mo* (one-mo) '(not) even one' and *nani-mo* what-mo '(not) anything.' *Hitotu-mo* is regarded as a minimizer (Watanabe 2004, Ogawa 2022, etc.), and some of its behavior seem to be quite similar to those of other negative sensitive items which consist of *wh*-phrase and the focus particle *mo*, such as *nani-mo* (what-mo) '(not) anything' and *dare-mo* (who-mo) '(not) anybody.'

These *wh+mo* items were previously classified as negative polarity items (NPIs) (see Aoyagi and Ishii 1994, Kato 2000, etc.). However, Watanabe (2004) classifies them as negative concord

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The organization of this paper is as follows. In Section 2, following Watanabe (2004), we will review Vallduví's (1994) criteria which explain differences between NPIs and NCIs. Section 3 presents previous acquisition studies and present our research questions. Section 4 explains details of our experiment. In Section 5, based on the results of the experiment, we will show that even four-year-old children comprehend negative-sensitive items such as *hitotu-mo* and *nani-mo* in an adult-like manner. Section 6 concludes this paper.

2.1 NPIs and NCIs

- (1) a. Have you seen anything?
 b. *Nani-mo mi-mashi-ta ka?
 what-MO see-POL-PST Q (Watanabe 2004: 562)
- (2) a. If John steals anything, he'll be arrested.
 b. *John-ga (moshi) nani-mo nusun-dara, taihos-areru daroo.
 John-NOM if what-MO steal-COND arrest-PASS be-will (Watanabe 2004: 562)

- (3) a. *John didn't eat almost anything.
b. John-wa hotondo nani-mo tabe-nak-atta.
John-TOP almost what-MO eat-NEG-PST
'John ate almost nothing.'
(Watanabe 2004: 564)

- (4) a. Q: What did you see?
A: *Anything.
b. Q: Nani-o mi-ta no?
what-ACC see-PST Q
'What did you see?'

A: Nani-mo.
 what-MO
 'Nothing.'

(Watanabe 2004: 564)

Table 1 shows a summary of the differences between NPIs and NCIs shown above.

	NPIs	NCIs
Ability to appear in nonnegative contexts	✓	×
Ability to be modified by expressions like <i>almost</i>	×	✓
Ability to be used as an elliptical answer	×	✓

Table 1. Summary of the differences between NPIs and NCIs (Adapted from Vallduví (1994))

2.2 *Hitotu-mo* '(not) even one' as a Minimizer in Japanese

The focus of our study is the minimizer *hitotu-mo* '(not) even one.' *Hitotu* is a numeral which means *one*, and *mo* is a focus particle. The behavior of *hitotu-mo* '(not) even one' is quite similar to that of NCIs such as *nani-mo* (what-mo) '(not) anything,' as Watanabe (2004) pointed out. For instance, *hitotu-mo* cannot appear in questions or conditional sentences without a negative marker (See (5a, b)). In the examples below from Watanabe (2004), *hitori-mo* '(not) even one person' is used and *ri* is a classifier used for person. It can also appear alone as an elliptical answer as in (5c).

- (5) a. *Gakusei-ga hitori-mo kouenkai-ni ki-mashi-ta ka?
 student-NOM one.person-MO talk-to come-POLITE-PST Q
 'Did any single student show up at the talk?'
 b. *(Moshi) gakusei-ga hitori-mo taihos-are-tara, kougisuru.
 if student-NOM one.person-MO arrest-PASS-COND protest
 'If any single student is arrested, I will protest.'
 c. Q: Nan-nin-no gakusei-ga kouenkai-ni ki-mashi-ta ka?
 what-CLF.person-GEN student-NOM talk-to come-POLITE-PST Q
 'How many students showed up at the talk?'
 A: Hitori-mo.
 one.person-MO
 'None.'

(Watanabe 2004: 603–604)

Based on Watanabe's (2004) observation, we assume that the behavior of *hitotu-mo* '(not) even one' is quite similar to that of the NCI *nani-mo*, and thus we examine children's comprehension of *hitotu-mo* and *nani-mo* in our experiment. Before going into the details of the experiment, let us review previous acquisition studies, namely, Sano, Shimada and Kato (2009) and Kurokami et al. (2021) in Section 3.

3 Previous Acquisition Studies

3.1 The Acquisition of *nani-mo*: Sano, Shimada and Kato (2009)

Sano, Shimada and Kato (2009) tested Japanese-speaking children's comprehension of *nani-mo* (what-*mo*) '(not) anything' without negation in order to examine whether the children are aware that it is an NCI.

According to Kuno (2008), NPIs consist of an indefinite/indeterminate and a focus element, and NCIs consist of an indefinite/indeterminate, a focus element and a negative element in general. For example, a Hindi NPI *koi bhii* consists of *someone* and *even*, while a Hungarian NCI *s-en-ki* consists of a focus element, negation and *who*. However, Japanese NCIs consist of an indeterminate and a focus particle *mo* on the surface, and negation is not overtly realized. *Nani-mo* is composed of *nani* 'what' and the focus particle *mo* 'also.' In light of Kuno's analysis, Sano et al. (2009) raised a question of whether Japanese-speaking children acquire *nani-mo* (what-*mo*) as an NCI or an NPI.

Sano et al. tested twenty eight Japanese-speaking children (4;3 (four years three months old)–5;11), and they were divided into two groups. One is a group for testing *dore-mo* 'everything,' and the other is a group for testing *nan(n)i-mo* '(not) anything.'

The experimental procedure was as follows. Mickey and Pikachu played a shopping game. Pikachu had a shopping basket. There were a carrot, a strawberry, a tomato and an empty box. Pikachu said what he wanted to buy as a test sentence. Then, Mickey was supposed to put items Pikachu wanted to buy into Pikachu's shopping basket. After that, participants were asked to judge if Mickey's reaction was compatible with Pikachu's request. In every condition, Mickey asked Pikachu a question as in (6).

(6) Pikachu, *nani kau no?*

Pikachu what buy Q

'Pikachu, what will you buy?'

(Sano et al. 2009: 236)

When Pikachu's request to Mickey's question was "*Dore-mo*," the situation in which Mickey put all the items into the basket is compatible with Pikachu's request. On the other hand, the situation in which Mickey put one or no item into the basket is not compatible with it. When Pikachu answered "*Nani-mo*" to Mickey's question, the situation in which Mickey put nothing is compatible with Pikachu's request. In contrast, the situation in which Mickey put one or all the items is not compatible with it. Children's task was to judge whether Mickey's reaction was compatible with Pikachu's request or not.

Table 2 shows the acceptance rate of *nani-mo* '(not) anything' in each situation.

		Four-year-olds	Five-year-olds
What Mickey put into Pikachu's basket	all the items	0% (0/14)	0% (0/14)
	only one item	0% (0/14)	0% (0/14)
	nothing	92.9% (13/14)	92.9% (13/14)

Table 2. Acceptance rate of *nani-mo* (Adapted from Sano et al. 2009: 237)

As a result, almost all the children comprehended *dore-mo* 'everything' or *nani-mo* '(not) anything' correctly. In summary, Sano et al. (2009) revealed that even four-year-old children are able to comprehend *nani-mo* in an adult-like manner. Moreover, they concluded that Japanese-speaking children are aware that *nani-mo* is an NCI, rather than an NPI, since children could correctly comprehend *nani-mo* which was used as an elliptical answer.

3.2 The Acquisition of the Focus Particle *mo*: Kurokami, Goodhue, Hacquard, and Lidz (2021)

In Japanese, the particle *mo* can be used as an additive particle in general. The particle *mo* in *hitotu-mo* or *nani-mo* is focal and it may be different from the additive *mo*, but there may be something related and thus we would like to review Kurokami, Goodhue, Hacquard, and Lidz (2021), which examined children's comprehension of the additive particle *mo*.¹

Kurokami et al. (2021) conducted an experiment to test Japanese-speaking children's comprehension of the object-associated *mo* and English-speaking children's comprehension of *also*. The participants were thirty five Japanese-speaking children (5;4–6;3) and eighteen English-speaking children (4;0–4;9). In addition, eight Japanese-speaking adults and twenty eight English-speaking adults participated as controls.

Children listened to short stories with Charlie. They were supposed to help Charlie learn stories by answering Charlie's questions. In each story, one character performed two actions (e.x., eating an apple and a banana), while two other characters performed only one of those actions as shown in Figure 1. In the first picture, all the characters had an apple and a banana. The second picture shows that Mickey ate an apple and banana, but Minnie only ate an apple and Donald only ate a banana.

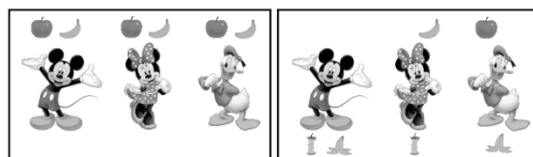


Figure 1. Pictures from the sample story (Kurokami et al. 2021: 453)

¹ Matsuoka (2004) conducted a similar experiment to examine Japanese-speaking children's comprehension of the additive *mo* attached to either subjects or objects. Among sixteen children (5;6 – 6;7) tested, only four children behaved like adults, and the rest of the children had problems with the comprehension of the additive *mo*. See Matsuoka (2004) for the details of the experiment.

At the end of the story, an experimenter asked Charlie, “Who ate the most fruit in this story?” Charlie then tried to remember the story, saying “There were apples and bananas to eat. Donald didn’t eat an apple, but Mickey and Minnie did.” However, since Charlie is forgetful, he cannot remember the whole story. He then asks a *wh*-question like (7a) or (7b). This *wh*-question serves as the test sentence, and (8) is the Japanese counterpart.

- (7) a. Now, who ate a BANANA? (*Also-less* question)
 b. Now, who *also* ate a BANANA? (*Also-question*) (Kurokami et al. 2021: 453)
- (8) Are, dare-ga banana-o/*mo* tabe-ta kana?
 hmm who-NOM banana-ACC/*also* eat-PST Q
 ‘Who (also) ate a BANANA?’ (Kurokami et al. 2021: 453)

Children’s task was to help Charlie answer the experimenter’s questions by responding to his *wh*-questions. After the child responded, Charlie then provided his own answer to the experimenter’s original question.

For *also-less* questions such as (7a), “Mickey,” “Donald,” or “Mickey and Donald” would be correct answers. In contrast, the correct answer to the *also-question* such as (7b) is only “Mickey” because Mickey ate a banana in addition to an apple. If children recognize the additive meaning of *mo* or *also*, they are expected to choose the two-action character more frequently in the *also*-condition than in the *also-less* condition.

The results were as follows. Japanese-speaking children did not perform perfectly, but their response patterns were similar to adults. Children gave two-action character responses more frequently in the *also*-condition than in the *also-less* condition (51.56% vs. 6.25%). The English-speaking children also produced more two-action character responses in the *also*-condition than in the *also-less* condition (40.63% vs. 3.57%). Based on these results, the authors argue that children are sensitive to the additive presupposition triggered by additive particles. However, they also note that the task was probably complicated and suggest that the study may underestimate children’s actual competence.

In this section, we reviewed two previous acquisition studies. Sano, Shimada and Kato (2009) showed that young children recognize *nani-mo* ‘(not) anything’ as an NCI and comprehend it correctly. Kurokami et al. (2021) suggest that children are able to consider the additive presupposition triggered by additive particles. However, the correct response rate of Japanese-speaking children in the *also* condition was 51.56%, which is not very high. The results in Kurokami et al. may have shown that children have some difficulty in interpreting the additive *mo*.

These facts led us to our research questions: (i) Do Japanese-speaking children interpret the meaning of the minimizer *hitotu-mo* (one-mo) ‘(not) even one’ as adults do?, and (ii) Do children ignore *mo* and misinterpret *hitotu-mo* as a numeral *hitotu* ‘one’?

Considering the results of the additive *mo* in Kurokami et al. (2021), it is possible that children have some difficulty comprehending the focus particle *mo* in *hitotu-mo* ‘(not) even one’ and they may interpret *hitotu-mo* as *hitotu* ‘one’ by ignoring *mo*. As for the NCI *nani-mo* ‘(not) anything,’ if a child drops *mo* in it, then a *wh*-phrase *nani* ‘what’ remains. In this case, an elliptical answer “Nani-mo” to a question like “What will you buy?” sounds odd and thus it may help children notice the existence of *mo*. In contrast, if a child drops *mo* in *hitotu-mo*, a numeral *hitotu* ‘one’

remains. In this case, “Hitotu-mo” as an elliptical answer does not sound weird and thus it might be difficult for children to notice the presence of *mo*.²

4 Experiment

To investigate these research questions, we examined fourteen Japanese-speaking children (4;4 – 6;9, mean=5;1) using the Truth Value Judgment Task (Crain and Thornton 1998). In our experiment, a child listened to short stories accompanied with some pictures shown on the computer screen. At the end of each story, the child was asked to judge whether the test sentence given by Miffy matched the story or not.

In the short stories, at the beginning, there were two vegetables and an animal as shown in Picture 1. The animal was going to eat the vegetables. In the stories, the child was told that animals received different kinds of medals depending on the numbers of the vegetables that they ate. The animal received a gold medal when it was able to eat both vegetables. The animal received a blue medal when it only ate one vegetable (i.e. the blue medal condition). And the animal received a black cross medal when it could not eat any vegetables at all (i.e. the black cross medal condition). After Picture 1, the curtain appeared on the screen as shown in Picture 2, and the child could not see how many vegetables the animal was able to eat. Lastly, in Picture 3, the curtain disappeared and the animal with a medal appeared.

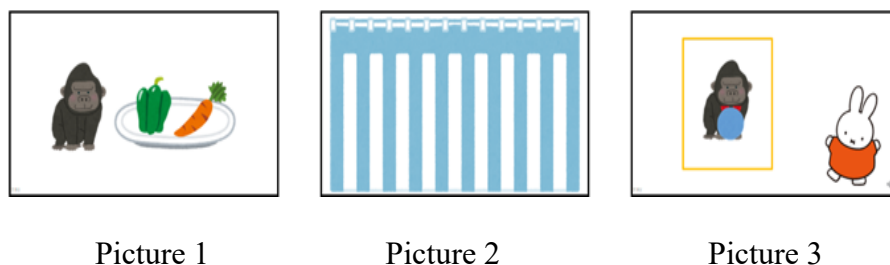


Figure 2. Example of pictures in the short stories

Then, Miffy made a statement about the story like (9):

- (9) Goriras-an-wa hitotu-mo tabe-re-nak-atta-yo.
 Gorilla-TOP one-MO eat-can-NEG-PST-PRT
 ‘The Gorilla could not eat even one.’

The child was then asked to judge whether Miffy’s statement was correct or not. Since the child was not able to see how many vegetables the animal ate, s/he needed to infer the number of vegetables the animal ate based on the color of the medal.

The reason for this setting of guessing with the curtain and the medals is that, if the child watched one vegetable left on the plate, we were concerned that the child was inclined to interpret

² Terunuma (2009) tested children’s comprehension of either *dore-mo* (which-mo) or *hitotu-mo* (one-mo) in negative sentences as the prerequisite for the main test session. See Terunuma (2009) for the details of her experiment.

hitotu-mo ‘(not) even one’ as *hitotu* ‘one,’ and that it might affect children’s interpretation of *hitotu-mo*.

Before the main session of the experiment, there was a practice session to ensure that the child could perform the Truth Value Judgment Task (Crain and Thornton 1998). There was also a medal-awarding session by the children to confirm that they understood the rules of the medals. Children who did not perform well in the practice session and the medal-awarding session were excluded from the analysis. As a result, three out of six four-year-olds and two out of six five-year-olds were excluded, and the data of nine participants were included in the analysis.

There were three types of test sentences as shown in Table 3.

Type	Example
<i>hitotu-mo</i> + negation (4 items)	Kumasan-wa hitotu-mo tabe-re-nakat-ta yo. bear-TOP one-MO eat-can-NEG-PST PRT ‘The bear could not eat even one.’
<i>nani-mo</i> + negation (3 items)	Zousan-wa nani-mo tabe-re-nakat-ta yo. elephant-TOP what-MO eat-can-NEG-PST PRT ‘The elephant could not eat anything.’
Fillers with <i>zenbu</i> ‘all’ (2 items)	Gorirasan-wa zenbu tabe-re-ta yo. gorilla-TOP all eat-can-PST PRT ‘The gorilla could eat all.’

Table 3. Types of the test sentences

Participants were tested individually in a quiet room. The experiment took approximately fifteen minutes per person. The test stories were presented using Microsoft PowerPoint with a laptop display. The test sentences were pre-recorded and played through the laptop speakers to avoid intonation variations. For ten participants, the experiment was conducted in person, and for the other four participants, it was conducted via Zoom, an online conferencing service.

5 Results and Discussion

The results of the experiment are shown in Table 4 below. The table shows children’s correct response rates of *hitotu-mo* ‘(not) even one’ and *nani-mo* ‘(not) anything.’

		<i>Hitotu-mo</i> '(not) even one'		<i>Nani-mo</i> '(not) anything'	
		Blue medal	Black cross	Blue medal	Black cross
Correct answer		False	True	False	True
Four-year-olds	N=3	100% (6/6)	83.3% (5/6)	100% (6/6)	66.7% (2/3)
Five-year-olds	N=4	100% (8/8)	100% (8/8)	100% (8/8)	100% (4/4)
Six-year-olds	N=2	100% (4/4)	100% (4/4)	100% (4/4)	100% (2/2)
Total	N=9	100% (18/18)	94.4% (17/18)	100% (18/18)	88.9% (8/9)

Table 4. Children's correct response rates of *hitotu-mo* and *nani-mo*

In the case of the blue medal condition, the correct response would be 'false' since the blue medal means that the animal ate one of the vegetables. In the case of the black cross medal condition, the correct response would be 'true' since the black cross medal means the animal did not eat two vegetables at all. As for *hitotu-mo*, the correct response rate for the blue medal condition was 100% (18/18), and the correct response rate for the black cross medal condition was 94.4% (17/18). With regard to *nani-mo*, the correct response rate for the blue medal condition was 100% (18/18), and the correct response rate for black cross medal condition was 88.9% (8/9). As for the fillers including *zenbu* 'all' in the positive sentences, children's correct response rate was 100% (18/18).

Our results show that Japanese-speaking children comprehend *hitotu-mo* '(not) even one' and *nani-mo* '(not) anything' in negative sentences well. The children's responses were almost the same as those of adults. Our study also suggests that children do not confuse *hitotu-mo* '(not) even one' with the numeral *hitotu* 'one,' and that they do not ignore the particle *mo*. However, our experiment did not demonstrate whether children treated *hitotu-mo* as a NCI or not since *hitotu-mo* was presented in full sentences containing negation. To address this issue, *hitotu-mo* needs to be tested as an elliptical answer and requires future investigation.

6 Conclusion

In this paper, we examined how Japanese-speaking children acquire negative-sensitive items, focusing on *hitotu-mo* '(not) even one' and *nani-mo* '(not) anything.' We first overviewed previous acquisition studies. Sano et al. (2009) showed that children can interpret *nani-mo* correctly from an early age. Kurokami et al. (2021) suggested that children may sometimes misinterpret the additive particle *mo* in Japanese. Building on these findings, we conducted an experiment to test whether children interpret the minimizer *hitotu-mo* '(not) even one' as adults do, or whether they confuse it with a numeral *hitotu* 'one' or ignore the particle *mo*.

The results of our experiment show that four- to six-year-old Japanese-speaking children comprehend *hitotu-mo* well in negative sentences in an adult-like manner, as well as *nani-mo*. In other words, they did not misinterpret *hitotu-mo* as a numeral *hitotu* 'one,' nor did they ignore the focus marker *mo* in *hitotu-mo*.

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