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A PRELIMINARY STUDY ON TEACHING WRITTEN JAPANESE TO DEAF CHILDREN

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Abstract

The "wall at the age of nine" is used to refer to the difficulty teaching deaf children Japanese case particles. As existing research has focused on verbs with which subjects and objects are symmetrical or interchangeable, it is difficult to grasp whether the children failed to understand the underlying deep cases or the surface cases (i.e., surface forms or case particles). In this study, we therefore conducted a test asking deaf children to choose the illustration that matched the sentence shown to them in their first language: Japanese Sign Language (JSL). The participants were deaf children aged 6 to 15 from Grade 1 of a deaf Elementary School to Grade 3 of Junior High School in Tokyo. The results show that until Elementary School Grades 3 and 4 (children aged 9–10), their encyclopedic knowledge and recognition of deep cases were not clearly separate, while older children became able to distinguish between the two. We concluded that deaf children have a fair understanding of deep cases and consider that, by utilizing the method of teaching Japanese as a second language to adults, we can develop teaching materials that allow deaf children to match the deep structure to the surface structure.

Key words: deaf children, Japanese Sign Language (JSL), deep cases, surface cases, teaching Japanese as a second language

I. *Introduction*

When learning the use of case marking particles in the Japanese language, Japanese deaf children often face a wall at the age of 9.[1] Such particles are considered to be one of the most difficult grammatical items for deaf children to learn.[2] However, no specific research has been conducted to investigate the acquisition or usage of particles by Japanese deaf children. Existing test questions often have interchangeable subjects and objects to make the questions

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[1] With regard to the deaf education, Asagorou Hagiwara, the then principal of the deaf school attached to Tokyo Education University first mentioned the term "wall at the age of nine" in the July issue of the Journal of Deaf Education in 1964. Recently, Wakinaka (2013) argued that "the 9 year old wall" still remains an unsolved difficulty.

[2] According to Sasaki and Oka (2015), the particles most often misused are O, NI, and GA, in that order. Examples of errors found in free compositions are "Sansetto O mienakatta", "Kengaku O iku", "Okasi O suki", "Fune O noru", "Puuru NI asobu", "Tomodati NI fueta", "Boku NI mane sinai hou ga ii", "Misu GA yatte simatta", "Mou hitotu GA aru" and "Me GA samasite toki".

more confusing and difficult. However, this method tends to obscure that deaf children have difficulty understanding surface cases (case markers as grammatical forms) or deep cases (semantic roles such as agents, patients, locations, and instruments). If Japanese deaf children have a fair grasp of deep cases, the task of introducing surface cases (*-ga*, *-o*, and *-ni*) should be no more difficult than it is for adult learners of Japanese as a second language (refer to Moriyama, 2010). In this paper, we present the tests we designed and conducted, the results obtained, and our next steps.

II. *Aim of the Research*

This research project investigates whether the mistakes made by deaf children when using Japanese particles are caused by (a) their inability to understand deep cases or (b) their inability to match their understanding of deep cases to surface cases. Based on our findings, we develop an appropriate teaching method for these students. This paper presents the results obtained from tests using the students' knowledge of Japanese Sign Language (JSL) to determine whether they have an understanding of deep cases.

III. *Outline of the Research*

1. Participants

Forty deaf children aged 6-15 (Grade 1 of Elementary School to Grade 3 of Junior High School) from deaf schools in Tokyo participated in this research project. Their first language is JSL. The first test was conducted March 10-18, 2015, and follow-up tests were conducted July 16-24, 2015. As one participant had moved to another school and two had graduated during that time, only 37 students participated in the follow-up test.

TABLE 1. THE PARTICIPANTS

	Elementary 1–2	Elementary 3–4	Elementary 5–6	Junior High School 1–3
1st test	11 students	12 students	9 students	8 students
2nd test	11 students	11 students	9 students	6 students

2. Method

Twelve questions (and one example question) were signed by a native JSL signer and shown to the participants on a single computer screen. The participants were given four illustrations on a piece of paper and asked to choose the one that matched the sentence presented by the signer. The participants answered the questions individually at their own pace.

The test questions were chosen according to the criteria shown in the three categories below and arranged so that two questions from a single category would not be presented sequentially.

(Category 1) According to encyclopedic knowledge, the subject must be the agent.

The object cannot be the agent except in the context of science fiction. For example, the sentence "A boy is licking an ice-cream" cannot be changed, in normal contexts, to "An ice-cream is licking a boy."

(Category 2) According to encyclopedic knowledge, the subject is ordinarily the agent of the sentence, although the object can also be the agent.

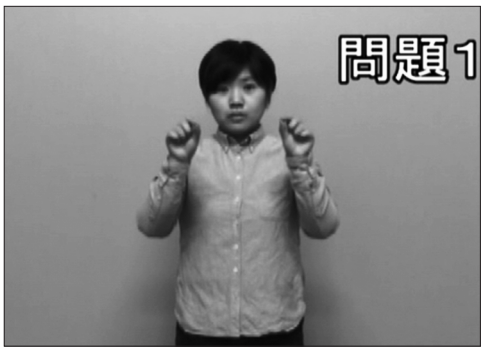
For example, the sentences "A cat is chasing a mouse." and "A mouse is chasing a cat." are both possible though the mouse is less likely to be the agent.

(Category 3) According to encyclopedic knowledge, the subject and the object are symmetrical and interchangeable.

For example, the sentences "A boy is waking an old man." and "An old man is waking a boy." are equally possible.

The following sentences were used in the first test.

Ex. A cat is chasing a mouse.
Q1. A dog is biting a kitten.
Q2. A boy is waking an old man.
Q3. A boy is pushing an old man
Q4. A boy is licking an ice-cream
Q5. A girl is looking at a dresser.
Q6. A mouse is chasing a cat.
Q7. A kitten is biting a dog.
Q8. An old man is waking a boy.
Q9. An old man is pushing a boy.
Q10. An ice-cream is licking a boy.
Q11. A dresser is looking at a girl.
Q12.A cat is chasing a mouse.
(Ex.=Example sentence)



The test sentences were carefully produced so that the children would not be able to utilize the information on the answer sheet, such as the location of the mouse and the cat. For example, for Q6 "A mouse is chasing a cat," if the answer sheet showed the mouse on the right and the cat on the left, we made sure that the sentence shown in JSL would not indicate the movement from right to left and would instead produce signs toward the front of the signer's body.

When reflecting upon the results of the first test, the following two points required further examination:

(A) While we considered "a boy" and "an old man" symmetrical and interchangeable as the subject and object, the participants may not have considered them to be

symmetrical because of the large age difference between the old man and the boy.

(B) Sentences that defy encyclopedic knowledge, such as "A dresser is looking at a girl" and "A mouse is chasing a cat" are used in ordinary conversation with modality markers that express possibility/probability. Without such modal expressions, the participants may not have been able to understand the sentences correctly, or they may have thought the sentences were ill-formed.

In consideration of these points, we replaced "an old man" with "a girl" and added the verb "to pat (on the shoulder)" and "to stroke (the head)" to create four additional sentences in the follow-up test. We also added two modal expressions in JSL at the end of the sentences < exits?> or <over!>" to those sentences contrary to encyclopedic knowledge. So the Q6 "A mouse is chasing a cat." has a modality expression <exits?> added at the end of the sentence and presented as "A mouse is chasing a cat + M <exits?>."

IV. *Results*

This section presents the results of our research.

1. First Test

Table 2 shows the results of the first test. The upper part shows the number of correct answers and the lower part shows the percentage of correct answers for each sentence.

In Table 2, the test sentences are categorized into three different types:
(Category 1) The subject and the object are asymmetrical (the object cannot be the agent, except in science fiction; (Category 2) The subject and object are mostly asymmetrical (the subject is a likely agent, but the reverse may be possible, as in the cartoon "Tom and Jerry"); and (Category 3) The subject and the object are symmetrical (either can be the agent).

If the participants failed to understand the deep cases presented in the three categories, their understanding of the test sentences would not have been affected by the replacement of the subject with the object, and vice versa. They will rely on their encyclopedic knowledge over grammatical cases. Conversely, if they understood the deep cases, the rate of correct answers should be higher for the sentences in categories 1 and 2 that have unlikely agents based on their encyclopedic knowledge (such as Q10 Ice cream is licking a boy, and Q6 A mouse is chasing a cat) , and in category 3 the difference is predicted to be smaller.

Based on that assumption, we developed Table 3.

In Table 3, by comparing the two rows in the same category according to age group, there is a large difference, particularly where shown in italics (For E 3-4, 100% vs. 33.3%, and for E1-2 90.0% vs. 31.8%). To prove this, we performed a 2x2 direct probability calculation of correct answers versus incorrect answers and the upper cell and the lower cell in each category.[3] The results are;

1) A significant difference in the one-tailed test, except for Junior High School students in Grades 1–3 (Elementary Grades 5–6 are at 1% and other age groups are at 0.1%).

[3] For direct probability calculation, we used js-STAR (http://www.kisnet.or.jp/nappa/software/star/)

TABLE 2. CORRECT ANSWERS TO THE FIRST TEST BY AGE GROUP (FIRST TEST)

	JH1-3	E5-6	E3-4	E1-2
Q4. A boy is licking ice cream.	7 (/8)	8 (/9)	12 (/12)	10 (/11)
Q5. A girl is looking at a dresser.	7	9	12	10
Q10. Ice cream is licking a boy.	7	6	7	5
Q11. A dresser is looking at a girl.	5	4	1	2
Q1. A dog is biting a kitten.	6	7	7	7
Q12. A cat is chasing a mouse.	5	7	5	7
Q7. A kitten is biting a dog.	5	3	3	6
Q6. A mouse is chasing a cat.	6	3	5	3
Q2. A boy is waking an old man.	4	4	5	4
Q3. A boy is pushing an old man	6	5	9	4
Q8. An old man is waking a boy.	7	7	7	4
Q9. An old man is pushing a boy.	5	6	6	7
The percentage of correct answers	JH1-3	E5-6	E3-4	E1-2
Q4. A boy is licking ice cream.	87.5	88.9	100.0	90.9
Q5. A girl is looking at a dresser.	87.5	100.0	100.0	90.9
Q10. Ice cream is licking a boy.	87.5	66.7	58.3	45.5
Q11. A dresser is looking at a girl.	62.5	44.4	8.3	18.2
Q1. A dog is biting a kitten.	75.0	77.8	58.3	63.6
Q12. A cat is chasing a mouse.	62.5	77.8	41.7	63.6
Q7. A kitten is biting a dog.	62.5	33.3	25.0	54.5
Q6. A mouse is chasing a cat.	75.0	33.3	41.7	27.3
Q2. A boy is waking an old man.	50.0	44.4	41.7	36.4
Q3. A boy is pushing an old man	75.0	55.6	75.0	36.4
Q8. An old man is waking a boy.	87.5	77.8	58.3	36.4
Q9. An old man is pushing a boy.	62.5	66.7	50.0	63.6

TABLE 3. CORRECT ANSWERS TO THE FIRST TEST BY CATEGORY

Correct Answers	JH1-3	E5-6	E3-4	E1-2	
Q4, 5	14	17	24	20	←1)
Q10, 11	12	10	8	7	
Q1, 12	11	14	12	14	←2)
Q6, 7	11	6	8	9	
Q2, 3	10	9	14	8	←3)
Q8, 9	12	13	13	11	
Percentage	JH1-3	E5-6	E3-4	E1-2	
Q4, 5	87.5	94.4	100.0	90.9	←1)
Q10, 11	75.0	55.6	*33.3*	*31.8*	
Q1, 12	68.8	77.8	50.0	63.6	←2)
Q6, 7	68.8	33.3	33.3	40.9	
Q2, 3	62.5	50.0	58.3	36.4	←3)
Q8, 9	75.0	72.2	54.2	50.0	

2) A significant difference of 1% exists for Elementary Grades 5–6, while no significant difference was found for all other age groups (one-tailed test).
3) There is no significant difference across all age groups (two-tailed test).

The following conclusions can be drawn from the above results.

Based on their encyclopedic knowledge, children have a sound understanding of the agent in category 1 sentences from as early as Elementary Grades 1–2. That tendency carries on to category 2 sentences, which contain a certain amount of asymmetry can be detected. However, where encyclopedic knowledge goes against the ordinary understanding of the subject-object relationship, students up to Elementary Grades 5–6 have difficulty understanding the sentences.

2. Follow-up Test

Based on our reflections of the first test, we conducted a follow-up test to examine the two points (A and B) presented in Section 2. The following sentences were used in the follow-up

NQ1. A boy is waking an old man. =Q2	NQ9. A boy is tapping a girl's shoulder. Cf. Q2
NQ2. A boy is pushing an old man. =Q3	NQ10. A boy is stroking a girl's head. Cf. Q3
NQ3. A mouse is chasing a cat. =Q6+M	NQ11. A girl is tapping a boy's shoulder. Cf. Q8
NQ4. A kitten is biting a dog. =Q7+M	NQ12. A girl is stroking a boy's head. Cf. Q9
NQ5. An old man is waking a boy. =Q8	
NQ6. An old man is pushing a boy. =Q9	
NQ7. An ice-cream is licking a boy. =Q10+M	
NQ8. A dresser is looking at a girl. =Q11+M	

TABLE 4. CORRECT ANSWERS TO THE FOLLOW-UP TEST BY AGE GROUP

Number of correct answers 2nd Test	**JH2-3**	**E6, JH1**	**E4-5**	**E2-3**
Number of correct answers 1st Test	**JH1-3**	**E5-6**	**E3-4**	**E1-2**
NQ7. Ice cream is licking a boy. +M	6 (/6)	9 (/9)	11 (/11)	10 (/10)
NQ8. A dresser is looking at a girl. +M	6	5	7	2
NQ3. A mouse is chasing a cat. +M	6	8	4	6
NQ4. A kitten is biting a dog. +M	5	5	6	6
NQ9. A boy is tapping on a girl's shoulder.	5	7	9	8
NQ10. A boy is stroking a girl's head.	6	8	9	11
NQ11. A girl is tapping a boy's shoulder.	6	8	10	7
NQ12. A girl is stroking a boy's head.	6	8	10	10
Percentage of correct answers 2nd Test	**JH2-3**	**E6, JH1**	**E4-5**	**E2-3**
Percentage of correct answers 1st Test	**JH1-3**	**E5-6**	**E3-4**	**E1-2**
NQ7. Ice cream is licking a boy. +M	100.0	100.0	100.0	90.9
NQ8. A dresser is looking at a girl. +M	100.0	55.6	63.6	18.2
NQ3. A mouse is chasing a cat. +M	100.0	88.9	36.4	54.5
NQ4. A kitten is biting a dog. +M	83.3	55.6	54.5	54.5
NQ9. A boy is tapping on a girl's shoulder.	83.3	77.8	81.8	72.7
NQ10. A boy is stroking a girl's head.	100.0	88.9	81.8	100.0
NQ11. A girl is tapping a boy's shoulder.	100.0	88.9	90.9	63.6
NQ12. A girl is stroking a boy's head.	100.0	88.9	90.9	90.9

test (Q: 1st test; NQ: 2nd test; +M means modal expressions added.):

3. Results

The results are as follows (the ones relevant to the argument):

The results from NQs 9-12 show that, across all age groups, even when the subjects and objects are symmetrical (Category 3), the participants understood the semantic roles of the deep cases.

Next, we examine the effects of the modality expressions, which were added to the sentences where the objects cannot be the agents (Category 1) and the objects are unlikely (Category 2).

With Table 5, we did the direct probability calculation of 2x2 with the number of correct answers versus incorrect answers and two rows (NQ and Q). There was a significant difference where the modal expressions were added which are marked * or **.[4] We can thus conclude that the addition of modality expressions caused significant increase in the understanding of deep cases. However, Q11 showed varying distributions according to age group in the Elementary School children, which may be because the verb "to look at" has a weaker transitivity than other verbs such as to lick, chase, bite, and pat. The acquisition of such less physical verbs may occur later as they grow older.

TABLE 5. WITH OR WITHOUT MODAL EXPRESSIONS

The Rate of Correct Answers 2nd Test	**JH2-3**	**E6, JH1**	**E4-5**	**E2-3**
The Rate of Correct Answers 1st Test	**JH1-3**	**E5-6**	**E3-4**	**E1-2**
NQ7. Ice cream is licking a boy. +M	100.0	100.0	100.0*	90.9*
Q10. Ice cream is licking a boy.	87.5	66.7	58.3	45.5
NQ8. A dresser is looking at a girl. +M	100.0	55.6	63.6**	18.2
Q11. A dresser is looking at a girl.	62.5	44.4	8.3	18.2
NQ3. A mouse is chasing a cat. +M	100.0	88.9*	36.4	54.5
Q6. A mouse is chasing a cat.	75.0	33.3	41.7	27.3
NQ4. A kitten is biting a dog. +M	83.3	55.6	54.5	54.5
Q7. A kitten is biting a dog.	62.5	33.3	25.0	54.5

Note：* at the 5% level, ** at the 1% level

V. *Conclusion*

This study demonstrates that deaf participants have a similar basic understanding of deep cases to that of hearing children. We can therefore safely start developing teaching materials for deaf children based on the method of matching deep to surface cases, which is used to teach Japanese as a second language.

[4] * is at 5% level, and ** is 1% level. (Both used one tailed test.)

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