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DIFFERENCES BETWEEN GRAMMATICAL AND LEXICAL DEVELOPMENT IN JAPANESE SPECIFIC LANGUAGE IMPAIRMENT: A CASE STUDY

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ABSTRACT

Paradis and Gopnik (1997) and Fukuda and Fukuda (2001a,b) suggested that the performance of children with specific language impairment (SLI) could be explained by deficits in their knowledge of grammar, whereas their lexicon appears to be intact. The purpose of this study was to examine this hypothesis with longitudinal data from a Japanese child with SLI from the ages of 9 to 14. Tests with tense, passives, case-marking, demonstrative pronouns and vocabulary were administered during this period. The results were as follows. The participant's lexical age developed rapidly. In contrast, the percent correct of her passives did not increase significantly from the ages of 9 to 14. Moreover, the percent correct on tense was 50% at the age of 14 when nonwords were used. In case-marker production with passives, it was 50% even at the age of 14 when reversed word order was used. However, the percent correct of demonstrative pronouns was 50% at the age of 11, and it increased rapidly to 100% within a year. The results of this study provide further empirical support for the hypothesis that the deficit in children with SLI can be attributed to an impairment in their grammatical knowledge which seems to spare their lexicon.

KEYWORDS: Specific Language Impairment (SLI); Japanese; development; grammar; lexicon.

1. Introduction

Specific language impairment (SLI) has been characterized as a heterogeneous disorder of language acquisition in children who do not have any other apparent cognitive, so-

cial, or neurological deficits that can account for their impairment. Though most children acquire language quickly and easily, individuals with SLI have great difficulty in acquiring their native language. In this study, we use the term SLI to refer to a subgroup of children with SLI who have a primary grammatical impairment according to the criteria of SLI by Tallal et al. (1991), and a number of characteristic grammatical errors.

It has been widely observed that English-speaking children with SLI have significant difficulty with formulating morphological rules for inflections. They often omit grammatical morphemes, such as Tense, Number, and Agreement, in obligatory contexts. Although many studies have focused on inflection (Clahsen 1991; Gopnik 1994; Rice et al. 1995; Gopnik and Goad 1997), recently, there have been many studies which suggest that this deficit affects a broader range of grammatical categories in not only morphology, but also in syntax and phonology (van der Lely 1994, 1997, 2005a,b; Piggott and Kessler Robb 1999; Marshall and van der Lely 2007).

One of the research strategies which might identify and further explain the linguistic properties of SLI is to investigate SLI in a variety of diverse languages. However, almost all of the findings of previous studies have focused on English (e.g. van der Lely 2005a, 2005b). In particular, there have been only a few studies on the linguistic characteristics of Japanese children with SLI (Fukuda and Fukuda 1999, 2001a,b; Fukuda et al. 2007).

It is well known that human memory can be divided into two types, that is, declarative memory and procedural memory. Paradis and Gopnik (1997) hypothesized that grammar was subserved by procedural memory, and that the lexicon was at least in part subserved by declarative memory. They also suggested the possibility that children with SLI had a problem with their grammatical knowledge, but that their lexicon was intact. They argued that such children used their lexicon to compensate for their impaired grammatical knowledge. Fukuda and Fukuda (2001a,b) investigated the acquisition of complex predicates in Japanese children with SLI. Their results suggests that the deficits of SLI affect the ability to construct implicit procedural rules for morphology that are generated outside the lexicon while their lexical operations for morphology that are generated within the domain of the lexicon remain relatively unimpaired. Moreover, they suggested that although these children with SLI may be unable to build appropriate linguistic representations for such complex predicates, using their declarative memory they can access such forms which are assumed to be stored as unanalyzed constituents in the lexicon (Fukuda and Fukuda 2001b: 79).

Paradis and Gopnik (1997: 183) proposed the hypothesis that children with SLI have difficulty in acquiring implicit competence for some parts of their grammar (parts of the phonology and morphology), and therefore must use whatever else is available to them, such as non-grammatical communicative (pragmatic) cues and metalinguistic knowledge.

If this hypothesis is correct, it is expected that, while lexical aspects of language can develop well, grammatical aspects would not in children with SLI. In another words, children with SLI experience great difficulty in acquiring grammatical aspects of language and less difficulty in acquiring lexical aspects.

As is well known, tense and passives are typical grammatical aspects of many languages and vocabulary is a typical lexical aspect. In addition, abstract case is expressed by a case-marker in Japanese. Therefore, the use of Japanese case-markers would involve syntactic and morphological aspects of linguistic knowledge. Meanwhile, Japanese also has demonstrative pronouns which are composed of three types, *kore* 'this', *are* 'that' and *sore* 'its'. Japanese demonstrative pronouns are said to contain both syntactic and lexical aspects of language.

Thus, it is predicted that, in children with SLI, the performance of tense, passives and case-markers would not develop, but that vocabulary would develop well. Nevertheless, their performance with demonstrative pronouns would show intermediate development between that of the syntactic aspects (tense, passives and case-markers) and the lexical aspects (vocabulary).

In this study, we examined the longitudinal data of a Japanese child with SLI from 9 to 14 years of age. There have been no reports of the developmental changes in the performance of Japanese children with SLI to our knowledge. The purpose of this study was to examine whether or not there would be (1) no development with tense, passives and case-markers; (2) strong development with vocabulary; and (3) intermediate development with demonstrative pronouns, compared with the syntactic and lexical aspects.

2. Method

2.1. Participants

The participant was a female Japanese child who was diagnosed as having SLI, according to the criteria of Tallal et al. (1991): (1) WISC-R performance IQ of 85 or better; (2) normal hearing acuity; (3) no motor handicaps or oral structural impairments; (4) not autistic (as defined by DSM III-R, 1985); (5) no history of recurrent Otitis Media; (6) no known neurological disorders; (7) no prominent socio-emotional problems. When she was 9 years old, her non-verbal IQ score was 97 on a standardized test of intelligence.

She also showed characteristic grammatical errors. Examples of her errors with (1) tense, (2) passives, (3) case-markers, and (4) demonstrative pronouns in spontaneous speech were as follows (the correct answer is given in the parentheses).

(1) *Atsu-katta (i)* *toki, ...*
hot-PAST (PRES) when
When it is hot, …

(2) *Ga-tte* *sas-are-nai (sasa-nai)?*
moths-TOP sting-PASS (ACT)-NEG
Moths don't sting?

(3) *Shiiru-ni (o)* *mada* *atsumete-naino*
stickers-DAT (ACC) yet collect-NEG
I haven't collected stickers yet.

(4) *Ano (kono) hito*
That (this) man

As we can see above in (1), she used past tense where non-past tense should have been used. In addition, she used passive voice where the active voice should have been used, as exemplified in (2). Moreover, she used the DATIVE case-marker where the ACCUSATIVE case-marker would have been appropriate, as illustrated in (3). As can be seen in (4), she also used 'that' where 'this' should have been used.

2.2. Materials

Grammaticality judgement

A test of grammaticality judgement was used to examine the developmental changes in the participant's performance with tense, passives and demonstrative pronouns. In the task with tense, two types of verbs were used. One type was real-word verbs. The other was non-word verbs. In addition, two types of adverbial expressions were used. One type was high frequency adverbs, like 'yesterday' or 'tomorrow'. The other type was low frequency adverbial phrases, like 'nine days after today' or 'nine days before today'. In the task with passive constructions and case-marker production, the test sentences were divided into two categories. The first were those with canonical word order, and the second were those with reversed word order. The sentences of each category were randomly distributed.

Elicited production

A sentence completion test was conducted as a kind of elicited production task in this study. The task of passive constructions consisted of both case-marker production and verb production. Moreover, the test sentences were divided into canonical and reversed word-order sentences.

Vocabulary

A Japanese version of the Picture Vocabulary Test was used to evaluate the development of vocabulary.

2.3. Procedure

The child was tested individually in a room at her home by her tutor. The stimulus sentences were presented to the participant in print. A longitudinal study was conducted from 9 to 14 years of age. The grammaticality judgement task, the elicited production test and the Japanese version of the Picture Vocabulary Test were administered once a year during this period. The task of demonstrative pronouns was conducted once a month from the age of 10 to 12.

3. Results

Table 1 shows the percent correct on the task of tense when she was 9 and 14 years of age. The data examined were from the grammaticality judgment task and the elicited production task. As previously mentioned, two types of verbs were used in both tasks: real-word verbs and non-word verbs. Recall that two types of adverbial expressions were also used: high frequency adverbs and low frequency adverbial phrases.

Table 1. Percent correct on tense: comparison between 9 and 14 years of age.

Task	Type of verb	Frequency of adverb or adverbial phrase	9 years of age	14 years of age
Judgement	Real word	High	48/48 (100%)	32/32 (100%)
		Low	34/48 (70.8%)	32/32 (100%)
	Non-word	High	24/48 (50%)	31/32(96.9%)
Production	Real word	High	24/24 (100%)	16/16 (100%)
		Low	5/24 (20.8%)	16/16 (100%)
	Non-word	High	8/16 (50%)	4/16(25%)

When we focus our attention on the development of tense, we find the following results which were in contrast to our prediction in sentences with real words. When she was 9 years old, the percent correct was already 100% on both the production and judgement tasks when high frequency adverbs were used. Moreover, in sentences with real words and low frequency adverbs, the percent correct both in judgement and production tasks significantly increased from the ages of 9 to 14 (judgement task, $p=0.0006$, Fisher's exact test; production task, $p=0.0000006$, Fisher's exact test).

Focusing our attention on the frequency of adverbs or adverbial phrases in sentences with real words, the results were as follows. When she was 9 years old, the percent correct was 100% on both the production and judgement tasks when high frequency adverbs were used (e.g. *kinou* 'yesterday' or *ashita* 'tomorrow'). However, it was 20.8% and 70.8%, respectively, when low frequency adverbial phrases were used (e.g., *imakara kokonokagoni* 'nine days after today').

Meanwhile, focusing our attention on the differences between real words and non-words, we got the following results. In sentences with real words, the percent correct of tense was 100% in both production and judgement tasks at the age of 9. However, it was 50% on both the tasks with non-words. Moreover, it decreased from 50% to 25% on the production task.

Table 2 shows the percent correct on both the judgement and production task of passives when she was 9 and 14 years of age. As described above, two types of word order were used: canonical word order and reversed word order.

Focusing our attention on the development from the ages of 9 to 14, no significant difference in percent correct was observed in all types of sentences. When she was 9 years of age, her percentage correct was more than 80% except on the production task in which the stimulus sentences were presented in reversed word order. The percentage of correct responses was only 50% on that particular task. Even when she was 14 years of age, when reversed word order was used, her performance on the judgement task was 68.8% which was lower than her performance when she was 9 years of age. Furthermore, on the production task it was 62.5%. Her percent correct in sentences with canonical word order tended to be higher than those with reversed word order.

Table 2. Percent correct on passives: comparison between 9 and 14 years of age.

Task	Word order	9 years of age	14 years of age
Judgement	Canonical	14/16 (87.5%)	15/16 (93.8%)
	Reversed	13/16 (81.3%)	11/16 (68.8%)
Production	Canonical	7/8 (87.5%)	7/8 (87.5%)
	Reversed	4/8 (50%)	5/8 (62.5%)

Table 3 shows the percent correct on the case-marker production and verb production task with passives. On the task of case-marker production, the participant was required to insert case-markers into the sentences in which only case-markers were absent. In contrast, in the verb production task, the participant was required to insert verbs into the sentences in which only verbs were absent.

On the verb production task, the percent correct was 100% on both canonical and reversed word order at the age of 9. In contrast, it was under 75% (canonical word order) and 50% (reversed word order) on the case-marker production task even at the age of 14. No significant difference was observed in the correct percent between 9 and 14 years of age, on the case-marker production task.

Table 4 shows the relationship between chronological age and lexical age. Lexical age was calculated by the Japanese version of the Picture Vocabulary Test. When the child was 9;0 and 9;10, the difference between her chronological and lexical age was more than 3 years. However, when she was at 10;10, the difference between her chronological and lexical age was only 5 months.

Table 3. Percent correct on case-marker production and verb production: Comparison between 9 and 14 years of age.

Task	Word order	9 years of age	14 years of age
Case-marker production	Canonical	3/4 (75%)	3/4 (75%)
	Reversed	0/4 (0%)	2/4 (50%)
Verb production	Canonical	4/4 (100%)	4/4 (100%)
	Reversed	4/4 (100%)	3/4 (75%)

Table 4. Chronological age and lexical age: from 9;00 to 10;10.

Chronological age	9;00	9;10	10;10
Lexical age	5;10	6;07	10;05

Table 5. Percent correct on demonstrative pronouns: from 10;11 to 12;3.

	10;11	11;0	11;1	11;2	11;3	11;4	12;3
Judgement task	–	2/4 (50%)	4/8 (50%)	–	–	–	5/5 (100%)
Production task	6/12 (50%)	–	–	–	10/10 (100%)	20/20 (100%)	4/5 (80%)

– : no data available.

Table 5 shows the results of the development of her demonstrative pronouns. The task of demonstrative pronouns was conducted once a month from the age of 10 to 12. On the judgement task, while the percent correct of the demonstrative pronouns was 50% at 11;0 and 11;1, it was 100% at 12;3. In addition, though the percent correct on the production task was 50% at 10;11, it became 100% at 11;3. Thus, on both the judgement and production tasks, the percent correct of the demonstrative pronoun increased rapidly.

4. Discussion

As previously mentioned, Paradis and Gopnik (1997: 183) proposed the hypothesis that children with SLI cannot acquire some parts of their grammar, and therefore must use whatever else is available to them, such as non-grammatical cues or metalinguistic knowledge. If this hypothesis is right, it is expected that, while lexical aspects of language will develop well, grammatical aspects would not in children with SLI. Thus, it is predicted that the performance of tense, passives and case-markers would not develop, but that vocabulary would develop rapidly in Japanese children with SLI. Meanwhile,

the performance of demonstrative pronouns would show intermediate development between the syntactic aspects (tense, passives and case-markers) and the lexical aspects (vocabulary). We examined the longitudinal data of tense, passives, case-markers, demonstrative pronouns and vocabulary in a Japanese child with SLI from 9 to 14 years of age. The purpose of this study was to clarify whether or not (1) tense, passives and case-markers would not develop; (2) vocabulary would develop rapidly; and (3) demonstrative pronouns would show an intermediate development between these two aspects.

Focusing our attention on tense, we had the following results. When real words were used, the percent correct on both the judgement and production tasks significantly increased from the ages of 9 to 14. In addition, when the child was 9 years of age, the percent correct of tense was 100% on both the production and judgement tasks. These results differed from our predictions. Paradis and Gopnik (1997) said that in a testing situation, children with SLI are either unable to give a systematically correct response or consciously construct one by applying some metalinguistic knowledge. Thus the results above, which were different from our predictions, might be due to the fact that they learned correct tense-marking by using compensatory strategies when real words were used.

As for the difference of frequency in adverbs or adverbial phrases on the tense task, we got the following results. When the child was 9 years of age, while the percent correct of tense was 100% on both the production and judgement tasks in sentences with high frequency adverbs, it was only 20.8% and 70.8% in those with low frequency adverbial phrases. However, when she was 14 years of age, the percent correct of tense on both the production and judgement tasks was 100% when low frequency adverbial phrases were used. According to Fukuda and Fukuda (1999: 3), Gopnik (1994: 109) argues "language impaired subjects do not have the intact underlying obligatory syntactic rule for tense, though they do appear to have the semantic notion of 'pastness'". Gopnik (1994) hypothesized that it was not the semantic notion of "pastness" that they lacked, since they do seem to mark events which occurred in the past with lexical items such as temporal adverbials, it is simply the grammatical category of TENSE. However, the results of our study showed that the participant might have had a problem with the semantic notion of "pastness" when she was 9 years of age, and this problem might have dramatically improved between the time she was 9 and 14 years of age.

As for the difference between real words and non-words, the results were as follows. With real words, the percent correct of tense was 100% on both the production and judgement tasks at the age of 9. In contrast, it was only 50% on both the tasks when non-words were used. Moreover, it decreased from 50% to 25% from the ages of 9 to 14 on the production task when non-words were used. Ullman and Gopnik (1994), with data from a production task of past-tense inflectional morphology with regular, irregular and novel verbs, demonstrated that individuals with SLI produced past-tense marked forms when the frequency of past tense was high, relative to the stem, and unmarked forms when the frequency of the stem was high. We can see from this demonstration that the production of past-tense in individuals with SLI is affected by the frequency of

words. The effects of word frequency are considered to be due to the fact that individuals with SLI appear to use their lexicon to produce tense. Therefore, the reason behind the performance of the child in this study in sentences with non-words might be due to her inability to use her lexicon with the non-word sentences.

Taken together, the results of our study on tense suggest that in spite of the significant increase in her percent correct, the impairment in her grammatical knowledge of producing tense might persist between the ages of 9 to 14. It appeared that she used the lexicon to compensate for her problems when her morphological knowledge failed her. In fact, she had severe difficulty when she could not rely on her lexicon. Non-words obviously do not exist in the lexicon, so she had more difficulty with such items when she was presented with them in both the production and judgement tasks.

When we focus our attention on the passives, we got the following results. No significant difference in percent correct was observed between the ages of 9 to14 in all types of sentences. These results indicate, as we expected, that a significant improvement was not observed in passives between 9 and 14 years of age.

Focusing our attention on case-marker production, the results were as follows. No significant difference was observed in the percent correct between 9 and 14 years of age. Moreover, the correct percent was 75% (canonical word order) and 50% (reversed word order) on the case-marker production task even at the age of 14. These results, which were consistent with our prediction, suggest that case-marker production does not develop in children with SLI at least from the ages of 9 to14.

When we look at the development of vocabulary, her receptive vocabulary increased rapidly from 9 to 10 years of age, as we expected. From these results, we can say that lexical vocabulary can increase at quite a rapid pace in children with SLI.

Finally focusing on demonstrative pronouns, on both the judgement and production tasks, the percent correct on the task of demonstrative pronoun was 50% at the age of 10 or 11. However, it increased rapidly to 100% within a year. These results can be said to be consistent with our prediction that demonstrative pronouns would show an intermediate development between the syntactic aspects (tense, passives, case-marker production) and the lexical aspects (vocabulary).

As for grammatical aspects, the results of passives and case-marker production were consistent with our prediction. As we expected, these grammatical aspects did not develop well. With tense, however, the results were different from our prediction. A significant increase in the correct percent was observed between the ages of 9 and 14. Nevertheless, these results could be explained if we assume that the participant's compensatory strategies using her lexicon developed between 9 and 14 years of age. As for lexical aspects, the participant's vocabulary increased rapidly, as we expected. Moreover, demonstrative pronouns showed a stronger development than passives and case-marker production and weaker than vocabulary.

Thus the results of this longitudinal study demonstrated that while lexical aspects of language developed rapidly, grammatical aspects do not in children with SLI. There-

fore, the results of this longitudinal study of a Japanese child with SLI child from 9 to 14 years of age support the following hypothesis by Paradis and Gopnik (1997: 183):

> Children with SLI do not seem to ever acquire the implicit competence for some parts of grammar (parts of the phonology and morphology) and therefore must make use of whatever else is available to them, such as reliance on non-grammatical communicative (pragmatic) cues, and, from school up, metalinguistic knowledge which they learn declaratively, i.e. consciously by focusing attention on the surface facts that they deliberatively memorized and later consciously apply when verbal communication is required.

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