Development of word fluency and expressive vocabulary in Japanese kindergarten children

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Objective: To examine expressive vocabulary of children, we investigated the development of word fluency and expressive vocabulary among middle- and senior-year children, 5- and 6-year-olds, respectively, in Japanese kindergartens.

Methods: A total of 116 Japanese kindergarten children answered the Initial Sound Fluency (ISF) tasks. The /a/, /o/, /ka/, /ma/, /yo/, and /ha/ sounds were used to initiate the recall of the words.

Results: The total number of words expressed and the size of the vocabulary differed significantly between the two kindergarten years. A significant gender difference in the number of expressed words was also found for senior-year children. Comparing results with earlier studies conducted approximately 30 years ago, the same words remain the most frequently recalled words by 5- and 6-year-old children. They can be called core words. Nouns were the part of speech most frequently used.

Conclusions: The number and type of words are developing rapidly in children between the ages of 5 and 6 years old. Most of the core words in the vocabulary of children of those ages have not changed for approximately 30 years. This study contributes important data to develop an assessment of expressive vocabulary especially for children with language and developmental disorders.

Key words: word fluency, expressive vocabulary, ISF method, kindergarten children

Introduction

Previous studies have employed a variety of methods to examine vocabulary development among young children. For example, vocabulary development among Japanese children has been measured with a picture vocabulary test revised for children 3－12 years and 3 months old,[1] a standardized comprehension test for the development of abstract words among children 8 years and older,[2] and a Japanese test for comprehension of syntax and semantics.[3] All these tests are comprehension tests, a small number of studies have been conducted on children's development of expressive vocabulary. For example, in the studies about expressive vocabulary development among 1-year-olds[4] and among 2-year-olds,[5] the mothers completed expressive vocabulary checklists and the researchers then analyzed the total number of observed words along with the parts of speech, e.g., noun vs. verb. The researchers point out that there was variability in the data reported by the mothers. Although there was a Japanese pilot study in 2006,[6] to our knowledge, standardized tests have not yet been developed in Japan to investigate this type of vocabulary acquisition. Therefore, we were unable to assess children with developmental language disorders. Thus, to develop an assessment of expressive vocabulary acquisition in young Japanese children remains an important and urgent issue.

One method often used to study children's vocabulary expression in English speaking countries is initial sound fluency (ISF) tasks.[7] These tasks are also known as letter word fluency and phonemic verbal fluency tasks. This method provides sound prompts and asks children to think of words that begin with those sounds. The Japanese children's game called shiritori is similar to these ISF tasks. And it has been used as one of the phonological awareness tasks for preschool children in order to predict reading skills.[8,9] Several studies have conducted comparative analysis on the number of recalled words among children according to age, years of education, and whether or not the children had any disabilities. These studies found that older children without disabilities who have had more years of education are able to recall more words than other children.

In the area of Japanese vocabulary research, studies using ISF tasks have analyzed vocabulary from the perspective of language development. For example, vocabulary development among 100 children who were 5 years old was investigated in 1970.[10] The National Institute for Japanese Language and Linguistics (NIJLL) conducted a study in 1978 of recalled words among children in the second and fourth grades, and the researchers also produced a list of associated words along with the recalled words.[11] The same task was then conducted among 10 younger children (1 child was 5 years and 8 months old, while the other children's ages ranged from 6 years and 1－5 months old) to compare the results. That study provided a full analysis of vocabulary development from multiple perspectives by examining the frequency of occurrence for the observed words, and by providing a comparative analysis of the type of vocabulary words for each grade as well as the common vocabulary words. In this way, the NIJLL study still provides valuable insight into understanding young children's vocabulary development. Additionally, ISF tasks with three initial sounds among 151 children in first, third, and fifth grades, revealed that the number of recalled words increased with each grade level, and they did not find any gender difference.[12] These studies provide a fuller understanding of vocabulary development from the perspective of the number of recalled words.

There is a need, in Japan, to collect and analyze more current data on young children's development of expressive vocabulary. It is also urgently necessary to develop an assessment of expressive vocabulary of young Japanese children. Despite its usefulness, the ISF method has not been applied to a study of vocabulary development among Japanese kindergarten children for approximately 30 years. Therefore, this current study addresses this empirical gap in the field of language development by applying the ISF method to examine vocabulary, specifically the acquisition of expressive words, among healthy young Japanese children.

Methods

Participants
The participants for this study were 116 children who attended two kindergartens in the same general area in southern Japan, in Kitakyushu and Yamaguchi. Of those 116 children, 58 were in the middle year (28 boys, 30 girls; mean age, 5 years 2 months) and 58 children were in the senior year (31 boys, 27 girls; mean age, 6 years 2 months). None of the participants in this study had any intellectual or language development disorders, as

determined by assessments made by the children's teachers. The children, their parents or guardians, and their teachers were informed of the study. Informed consent was obtained, and approval was given by the headmasters of the kindergartens.

Procedures
After obtaining informed consent from the children's parents or guardians, the ISF tasks were administered individually during the children's playtime. In order to ease the children's burden, we limited the test to the 6 sounds that generated a large number of recalled words, as reported in the study conducted by the NIJLL: /a/, /o/, /ka/, /ma/, /yo/, and /ha/, in order of ranking.[11] We asked the children individually to recall as many words as possible that begin with each sound and wrote down their responses. The children were presented with these sounds randomly. After a sound was presented, the child recalled as many words as he or she could that began with that sound for 1 minute, after which we moved on to the next sound. Thus, the total time required to administer the test to a child was approximately 10 minutes.

The participants' responses were entered into a computer and tabulated using the same criteria for sorting word responses used in the NIJLL study.[11] Compound words and inflected forms of the same verb or adjective were considered as two separate words. For example, *akai majikku* (red marker) was recorded as *akai* (red) and *majikku* (marker). Words with a suffix and baby words were considered single words. For example, *ari-nko* (baby word for ant) was recorded as the single word *ari* (ant). In addition, we excluded from the data any words that violated the rules, repeated words, made-up words, and words that were unclear.

We defined "total number of words" as the total number of words that a child recalled for all 6 initial sounds. We used the ANOVA4 test[13] in order to statistically analyze and compare the average by grades and gender. In addition, we defined "size of observed vocabulary" as the size of vocabulary observed for each initial sound, and we determined the size for both the middle and senior years in order to provide a comparison. Finally, for the children in the middle year, the words that more than 10% of the children recalled for each sound were listed in order of their frequencies and then compared to the data of the 1981 NIJLL study.[11]

Results

Total number of words
Table 1 shows the results of "total number of words."

The ANOVA4 test[13] revealed that the children's vocabulary was different for the two years, and that this difference was significant at the level of 1% (F [1, 112] = 28.70, P < 0.001). Further analyses revealed that the difference between the years by gender was significant between the boys and girls (F [1, 112] = 28.95, P < 0.001; F [1, 112] = 4.47, P < 0.05), respectively. There was no significant difference in the number of word by gender among the students in the middle year; however, there was a significant difference by gender among the students in the senior year (F [1,112] = 4.81, P < 0.05).

Size of observed vocabulary
Table 2 shows the results for "size of observed vocabulary." The results for "size of observed vocabulary" for each initial sound among children in the middle year were: 32 for /a/, 46 for /o/, 38 for /ka/, 32 for /ma/, 20 for /yo/, and 28 for /ha/, with an average of 32.67. For the children in the senior year, the results were as follows: 72 for /a/, 82 for /o/, 68 for /ka/, 68 for /ma/, 52 for /yo/, and 65 for /ha/, with an average of 67.83. Since we observed the main effect only in terms of the difference in "total number of words" between grades, a two-sample t-test was performed on the average "size of observed vocabulary" between grades. The

results revealed that there was a difference at a significance level of 1% (t = 6.54, df = 10, P < 0.01).

In terms of parts of speech, nouns accounted for 85.7% of the words recalled by children in the middle year and 83.5% by children in the senior year. Verbs accounted for 7.6% and 8.3%, adjectives accounted for 3.0% and 1.9%, respectively.

Table 3 shows frequencies for the words that more than 10% of the children in the middle year recalled for each sound. The frequencies for these words were compared with the words identified in the studies of Obunai (1970)[10] and the NIJLL (1981).[11] In Table 3, the words marked with an asterisk (*) are also found in the word list in the NIJLL study.[11]

Discussion

Development of expressive vocabulary among 5- and 6-year-old children
This study used the ISF method and compared "total number of words" and "size of observed vocabulary" between children in the middle and senior years of

Table 1. Total number of words

Kindergarten year	Middle		Senior	
Gender (n)	Boys (28)	Girls (30)	Boys (31)	Girls (27)
Mean	8.54	10.90	19.71	15.22
SD	5.25	6.47	10.35	7.27

Table 2. Size of observed vocabulary

Sound	Middle year	Senior year
/a/	32	72
/o/	46	82
/ka/	38	68
/ma/	32	68
/yo/	20	52
/ha/	28	65
Total	196	407
Mean	32.67	67.83*
SD	8.82	9.77

*Significant difference between years (P < 0.01)

Table 3. List of recalled words sorted by frequency and percent of children who recalled them

Sound	Vocabulary	Frequency	% of children
/a/	Ahiru* (duck)	26	44.9
	Ari* (ant)	19	32.8
	Ame* (rain)	15	25.9
	Aka* (red)	7	12.1
/o/	Oni* (devil)	18	31.0
	Onigiri* (rice ball)	9	15.5
	Ohkami (wolf)	6	10.3
/ka/	Kani* (crab)	18	31.0
	Kaeru* (frog)	14	24.1
	Kaki * (persimmon)	14	24.1
	Kame* (turtle)	14	24.1
	Kasa* (umbrella)	13	22.4
	Karasu* (crow)	11	19.0
/ma/	Makura* (pillow)	24	41.4
	Mama* (mom)	8	13.8
	Mame* (bean)	6	10.3
/yo/	Yotto* (yacht)	15	25.9
	Yoru* (night)	13	22.4
	Yohfuku (cloths)	7	12.1
/ha/	Hasami* (scissors)	13	22.4
	Ha* (tooth)	9	15.5
	Hana* (flower)	8	13.8
	Hamigaki* (brushing teeth)	7	12.1
	Haru (spring)	7	12.1
	Haburashi (toothbrush)	6	10.3

*Word found in the 1981 NIJLL study word list

kindergarten. Results show that the totals for both items were significantly higher for children in the senior year. These findings suggest that a critical period exists between the ages of 5 and 6 years old where children display growth in their expressive vocabulary.

In addition, while a gender difference in "total number of words" has been reported in English-speaking countries,[7] this difference was observed in this study only among children in the senior year. A previous study of elementary school children in Japan did not discuss gender difference.[11] In order to fully investigate gender differences in vocabulary development among children in Japan, further studies on wider ranges of age groups are needed.

Type of vocabulary words

In terms of the types of words children recalled in this study, each sound had several words that were also found on the word lists reported in previous studies. This finding indicates that these words make up the core vocabulary for young children. Therefore, this study provides invaluable data to develop an assessment of language acquisition.

This is also an important result to help develop an assessment tool for children with language and developmental disorders. For example, the average number of words in ISF tasks is important to assess children with language disorders because they typically show lower scores than the norm. Another example is that the list of vocabulary words is effective to assess children with an autism spectrum disorder who have their own special vocabularies.[14]

The word *kaki* (persimmon) for the sound /ka/ was observed more frequently among children in both the middle and senior years compared to the word lists of the previous studies. This finding likely has to do with the fact that the study was conducted from late November to early December, and *kaki* was recalled frequently most likely because it is an autumnal fruit.

Occurrence rate by parts of speech and influence of the game shiritori

The majority of words recalled by the participants were nouns. We checked these against the vocabulary checklist.[5] We found that nouns appeared more frequently than the standard occurrence rate, which ranges from 69.8% to 56.1%. Word recall generated by using the ISF method is likely to generate more nouns because there is a well-known children's game called *shiritori* in Japan for which there is an implicit rule understood by its players that the game is played using names of things. Therefore,

it is not surprising that most of the response words produced by children during the ISF tasks were nouns. Moreover, it is interesting that a particular word that is seldom used in everyday life was frequently recalled in these ISF tasks. In point of fact, 30 years ago, the word *mari* (ball) was recalled by 80% of the children in the NIJLL study; nowadays the Japanese word for "ball" is usually *boru*, as in tennis ball, golf ball, ping-pong ball, etc. But it is still a so-called typical word in the game *shiritori*, because 13.8% of the senior-year kindergarten children in this study recalled the word *mari* for the initiative sound /ma/. This suggests the influence of shiritori on the ISF testing method in Japan.

Limitations of this study

The subjects of this study were only from two kindergartens. These kindergartens were situated in urban cities, their curricula were under the jurisdiction of the Course of Study for Kindergarten by the Japanese Ministry of Education, Culture, Sports, Science, and Technology. Although they can be regarded as typical kindergartens, these results do not reflect the characteristics of all parts of Japan. Moreover, the ISF tasks were limited to 6 sounds to ease the children's burden; therefore, further studies are warranted with more sounds. In the near future, we plan to perform a larger study.

Conclusions

This study examined the expressive vocabulary of young children in Japan in the middle and senior years of kindergarten by using the ISF method. Results show a difference between 5- and 6-year-olds in terms of the number of words expressed and the size of the observed vocabulary. Nouns were the most common type of word recalled by the children. By comparing these results with those of two earlier studies conducted approximately 30 years ago in Japan, our findings indicated that many of the same words are still the most frequently recalled words by young children. These results provide invaluable data on children's language acquisition and further our understanding of how young and healthy children acquire different types of vocabulary items. Results also provide possible implications for work in other areas, such as developing an assessment for children with language and developmental disorders.

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