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論　　文

Phonological Awareness in EFL Elementary School Students Participating in Foreign- (English-) Language Activities

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Abstract

This study investigated the effects of English-language activities on the short-term phonological awareness of spoken English of Japanese public elementary school students. We administered the Children's Test of English Nonword Repetition (CNRep), which was developed by Gathercole and Baddeley (1996) for third- through sixth-grade elementary school students. The CNRep is regarded as a measure of a child's verbal short-term memory (STM) and is closely associated with phonological awareness and the ability to acquire vocabulary. The stimuli were 40 two- to five-syllable nonwords. The test usually involves asking participants to repeat each English nonword immediately after hearing it spoken, however due to their relatively low level of prior English education, the children in this study were required only to rate their familiarity with each nonword (phonological awareness). The principal findings were as follows. First, low levels of exposure to English did not have a positive effect on phonological recognition. Second, *a language-familiarity effect*, whereby relatively proficient learners of English as a foreign language (EFL) identified more high-wordlikeness nonwords than low-wordlikeness nonwords, was observed, however this was not the case for less proficient EFL learners.

1. Introduction

The goal of elementary school English-language activities in Japan is to familiarize children with spoken English rather than having them master the language (e.g., syntactic and phonological structures or vocabulary) or develop the ability to use English-language expressions perfectly, which is the goal for Japanese junior high school (JHS) students. Additionally, elementary school students in Japan are usually exposed to English-language activities less frequently than are JHS students, and this difference results in considerably less exposure to English in the former group.

The goal of this research was to examine the effects of different levels of exposure to English on features of phonological awareness and English-language listening proficiency among Japanese third- through sixth-grade elementary school students. Phonological awareness was examined using the Children's Test of English Nonword Repetition (CNRep), which measures the phonological awareness required for first-language (L1) vocabulary acquisition and for storing English as a foreign language (EFL) in verbal short-term memory (STM). We analyzed differences between words with high- and low-wordlikeness, focusing on the language familiarity effect as measured by the CNRep.

2. Literature Review

2.1 Children's Test of English Nonword Repetition (CNRep)

The CNRep, which is widely used to measure verbal STM in children (Gathercole & Baddeley, 1996), was developed in the United Kingdom based on the results of a study of 612 children (age range: 4-8 years). It is composed of standardized nonword stimuli and is targeted at children whose L1 is English. The CNRep stimuli comprise 40 nonwords arranged into four groups of 10 nonwords each based on syllable length (two to five syllables). Each nonword is given only once as phonological information, and the task involves repeating each nonword immediately after it is presented.

The CNRep score is closely linked to phonological awareness and the ability of children to acquire L1 vocabulary (Avons, Wragg, Cupples, & Lovegrove, 1998; Gathercole & Baddeley, 1989; Gathercole, Hitch, Service, & Martin, 1997; Michas & Henry, 1994), as well as the ability of elementary school children to learn EFL (Masoura & Gathercole, 1999, 2005; Service & Kohonen, 1995). The relationship between the CNRep and phonological awareness is based on verbal STM. Learners with relatively high levels of phonological awareness and skill in nonword repetition are better able to retain phonological information in verbal STM. Accurate representation of phonological information in verbal STM makes it possible to rehearse this information and transfer it to long-term memory, which leads to effective learning of new vocabulary (Gathercole, 2006).

The primary factor in the CNRep that influences information processing is prosody, which includes patterns of stress, pitch, pauses, speed, rhythm, intonation, and other phonological features that accompany the production of sounds. This feature of nonwords has been shown to influence CNRep scores (Chiat & Roy, 2007; Li, Yuzawa, & Sekiguchi, 2009; Roy & Chiat, 2004; Yuzawa & Saito, 2006; Yuzawa, Yuzawa, Sekiguchi, & Li, 2012). Accordingly, one difficulty for Japanese EFL learners is the negative transfer of different rhythms (mora-timed rhythm in Japanese vs. stress-timed rhythm in English), accents (pitch accent in Japanese vs. stress accent in English), and phonotactics (e.g., consonant clusters to which native Japanese speakers are not accustomed) from Japanese, as the L1, to the novel language (Li, Yuzawa, & Sekiguchi, 2009; Yuzawa et al., 2012; Yamaguchi & Shimizu, 2011; Yamaguchi, Shimizu, Hijikata, & Imai, 2013; Sakuma, 2017, in press).

2.2 CNRep Performance of Japanese Children in International or Immersion School Environments

Some studies have investigated the performance of Japanese EFL students on the CNRep under much greater English exposure than is available in Japanese public schools (Yuzawa et al., 2012; Yamaguchi et al., 2013). Yuzawa et al. (2012) used the CNRep to compare the influence of the native Japanese language on two groups: young children who were attending a private nursery school in a city in Japan that did not introduce English at all and children of essentially the same ages who were exposed to English daily in an international kindergarten in Japan that used spoken English in all curricula all day; 4-year-old children who had been exposed to English daily for at least 1 year and 6-year-old children who had been exposed to English daily for 3 years. They also administered the CNRep to Chinese EFL students of the same age who were attending a nursery school in China, where the children were exposed to English greetings and songs for 30 min per week. The average total proportions of correctly used EFL nonwords among the 4- and 6-year-old children in the international kindergarten (.53 for 4-year-old and .61 for 6-year-old children) were almost the same as those of the L1 children in the study by Gathercole and Baddeley (1996), and they were considerably higher than those of the Japanese children in the private nursery school and the children in the Chinese nursery school. Specifically, the 4- and 6-year-old children in the international kindergarten provided as many perfect responses to the two- to three-syllable nonwords as did native English speakers of the same age. On the other hand, the number of correct responses for five-syllable nonwords among these Japanese children was lower than that among native English speakers of the same age (Gathercole & Baddeley, 1996). These results indicate the effectiveness of considerable early English exposure for the less demanding phonological processing of a limited

number of stimuli; however, even young Japanese children who had considerable exposure to English needed to engage in more demanding phonological processing to facilitate their retention of English nonwords, particularly those with more syllables.

Yamaguchi et al. (2013) administered the English CNRep and the Teaching of English for International Communication-Institutional Program Test to students in the seventh grade, the first year of JHS, who had been exposed to English for approximately 7 years via a Japanese immersion program. In that study, the average total proportion of EFL nonwords that were correctly reproduced was .55, which demonstrates the superiority of immersion education relative to education in a Japanese public school (mean proportion: .34; Yamaguchi and Shimizu, 2011). Furthermore, the score of the JHS immersion students (.55) was lower than that of 6-year-old children whose L1 was English (.63; Gathercole & Baddeley, 1996), demonstrating the inadequacy of EFL immersion education in Japanese JHS students compared to the experience of native speakers of English.

Judging from the poor CNRep performances of the Japanese children from the international kindergarten and immersion school environments, it seems unlikely that the children in the present study who attended a public elementary school, where they received much less exposure to English, would achieve high CNRep scores.

2.3 CNRep Performance of Japanese Public School Students

Research has been performed with children attending a Japanese public school that offered foreign- (English-) language activities organized primarily by homeroom teachers over the course of 3 years (Sakuma, 2017, in press). Sakuma (2017) administered the CNRep to three groups of children who were in the first, third, and fifth grades who regularly engaged in English-language activities during the 3-year study period. In terms of English exposure, the total numbers of lessons over the 3-year period were 75 (20 lessons in the first year, 20 lessons in the second year, and 35 lessons in the third year of the project) for the younger group (i.e., first to third grade); 105 (35 lessons during each of the 3 years) for the middle group (i.e., third to fifth grade); and 175 (35 lessons in the first year, 35 lessons in the second year, and 105 lessons in the third year of the project) for the older group (i.e., fifth to seventh grade). The results showed that total production rates increased from the first to the second year and stabilized between the second and third years. Although the scores of sixth and seventh graders (.45 and .43, respectively) in the older group were much higher than the other two groups, these scores did not exceed those of the 4-year-old children for whom English was L1 (.48) in Gathercole and Baddeley (1996).

Sakuma (in press) also used the CNRep to investigate the phonological features of spoken English words that were stored in verbal STM by Japanese elementary school students attending the first to seventh grades at the school with which Sakuma (2017) was affiliated. The study focused on a cross-section of students who were not only at different stages of cognitive development and had different verbal STM capacities (Sakuma, 2011)[1] but also arrived with different levels of total English exposure[2]. The results showed that, with the exception of second graders, the total production rates of high- and low-wordlikeness words differed according to grade. The data also reflected the language familiarity effects for high- and low-wordlikeness words, which appeared to be related to syllable number. Moreover, all students had difficulty in producing nonwords with more than four syllables, and even seventh graders required repeated training.

Based on the abovementioned Japanese EFL studies using the CNRep, we concluded that producing spoken English nonwords exactly like native speakers was very hard not only for Japanese public elementary or JHS students who attended foreign-language activities or studied English as a subject but also for international or immersion school students who took English lessons under conditions of abundant English exposure. However, it is possible that the participants could have been aware of the phonological characteristics of the nonwords even if they could not pronounce them precisely. As the participants in the present study took English in a public elementary school as a mere activity, and as their level of English exposure was lower than that of the participants in the aforementioned Japanese EFL studies, we hypothesized that the exact production of phonological information

(English nonwords) involved a much heavier burden and that they experienced considerable difficulty performing this task. Therefore, we asked participants to listen to the nonwords and judge whether they had ever heard them. We also examined whether students with different levels of listening proficiency showed different levels of phonological awareness by dividing participants into upper and the lower groups according to their scores on the Eiken Jr. Bronze grade, a listening test for elementary school children (Eiken, e.d.). This study focused on the following research questions (RQs):

RQ1 Do differences in English exposure (school grade) influence phonological awareness (high and low wordlikeness)?
RQ2 Do differences in English listening proficiency influence phonological awareness (high and low wordlikeness)?

3. Method

3.1 Participants

The sample consisted of Japanese EFL students in the third to sixth grades attending an elementary school in Fukushima Prefecture in 2015 who had taken English lessons in elementary school. All participants except the third graders had taken English lessons at this school for 2 years. The number of participants and the total English exposure (the total number of English-language activity lessons) in each grade are presented in Table 1; 95 third graders participated in 10 lessons; 85 fourth graders participated in 20 lessons; 95 fifth graders participated in 45 lessons; and 107 sixth graders participated in 70 lessons.

Table 1
Frequency of English Lessons (English Exposure): Grades 3–6

Grade	*n*	Academic Year		Total Lessons
		2015	2014	
3rd	95	10		10
4th	85	10	10	20
5th	95	35	10	45
6th	107	35	35	70

Note. One lesson in elementary school in Japan lasts 45 minutes.

We divided the participants into an upper group and a lower group based on listening proficiency as measured by Eiken Jr. Bronze scores, as shown in Table 2. The upper group comprised the top 27% of Bronze scores among all participants and the lower group comprised the bottom 27% of Bronze scores among all participants. Based on a *t* test using Welch's correction, we found significant differences between the two groups: $t\ (111.01) = 33.14$, $p < .001$, $d = 4.56$.

Table 2
Descriptive Statistics of English Listening Proficiency

Proficiency	*n*	*M*	*SD*	95% CI
Upper	107	98.49	1.51	[98.20, 98.77]
Lower	106	69.54	8.87	[67.83, 71.25]
Total	213	84.08	15.83	[81.94, 86.22]

Note. CI = Confidence interval.

3.2 Materials

3.2.1 Children's Test of English Nonword Repetition (CNRep)

We prepared the CNRep (Gathercole & Baddeley, 1996), which consists of 40 nonwords arranged into four groups of 10 nonwords each based on syllable length (two to five syllables), and the answer sheet. Each nonword resembled an actual word either strongly (high wordlikeness) or minimally (low wordlikeness) i.e., two-syllable words: high (e.g., *pennel*) and low (e.g., *tafflest*) in wordlikeness; three-syllable words, high (e.g., *commerine*) and low (e.g., *frescovent*) in wordlikeness; four-syllable words, high (e.g., *commeecitate*) and low (e.g., *woogalamic*) in wordlikeness; and five-syllable words, high (e.g., *voltularity*) and low (e.g., *detratapillic*) in wordlikeness.

3.2.2 Eiken Jr. Bronze

Eiken Jr. Bronze, which is a multiple-choice test of listening comprehension for elementary school students, is composed of three main sections: (a) words and phrases, (b) conversations, and (c) sentences.

3.3 Procedures

Participants completed the CNRep in their classroom. They were required to listen to each nonword and record a "○" (circle) when they judged they had heard the phonological information before or a "×" (cross) when they judged they had not heard it before. On another day, participants completed the Eiken Jr. Bronze in their classroom. Participants were required to listen to English and choose the correct answer(s) to each question.

3.4 Scoring

3.4.1 Children's Test of English Nonword Repetition (CNRep)

Based on their responses to this instrument, we calculated participants' *phonological awareness rate*, the percentage of nonwords they had heard before.

3.5 Data Analysis

To answer RQ1, we performed a two-way mixed-design analysis of variance (ANOVA) treating the rate of affirmative responses as the dependent variable, school grade as a between factor (four levels: third, fourth, fifth, and sixth), and wordlikeness as a within-subject factor (two levels: high and low). To answer RQ2, we performed a two-way mixed-design ANOVA treating the rate of affirmative responses as the dependent variable, listening proficiency as a between factor (two levels: upper and lower), and wordlikeness as a within-subject factor (two levels: high and low).

4. Results and Discussion

4.1 RQ1: Do differences in English exposure (school grade) influence phonological awareness (high and low wordlikeness)?

Table 3 presents the descriptive statistics for high and low wordlikeness on the CNRep by grade and level of exposure to English. The ANOVA results did not reflect a significant interaction between grade level and wordlikeness: F (3, 378) = 1.05, p = .369, η^2 = .01, and only the main effects were significant [grade: F (3, 378) = 7.37, p < .001, η^2 = .06; wordlikeness: F (1, 378) = 56.31, p < .001, η^2 = .13]. Additionally, the results for the main effect of grade, corrected for multiple comparisons, were as follows: third grade vs. fourth grade, p < .001, d = .60; third grade vs. fifth grade, p = .003, d = .52; third grade vs. sixth grade, p = .001, d = .56; fourth grade to sixth grade, p > .05, d < .10. With the exception of the comparison between third graders and children in grades four to six, there were no differences according to school grade. Additionally, the interaction of grade and wordlikeness was not significant. Therefore, in terms of RQ1, differences in English exposure (school grade) did not influence

phonological awareness (high and low wordlikeness).

Total English exposure increased as a function of school grade, and low levels of exposure to English (third graders) did not have a positive effect on phonological recognition. Additionally, although the total number of English lessons differed among fourth, fifth, and sixth graders, no differences according to school grade were observed. The results indicate that 2 years of English exposure did not enable elementary school children to match the phonological awareness with regard to nonwords of native English speakers aged 4 or 6 years. We speculated that, as prior studies (Yuzawa et al., 2012; Yamaguchi et al., 2013; Sakuma, 2017, in press) have reported, higher levels of phonological awareness would require much earlier English-language exposure.

Table 3
Descriptive Statistics of High- and Low-wordlikeness on CNRep (School Grade)

		High wordlikeness			Low wordlikeness		
Grade	*n*	*M*	*SD*	95% CI	*M*	*SD*	95% CI
3rd	95	.29	.25	[.24, .35]	.25	.24	[.20, .30]
4th	85	.45	.28	[.40, .51]	.39	.26	[.34, .45]
5th	95	.44	.25	[.38, .49]	.37	.28	[.31, .42]
6th	107	.43	.24	[.39, .48]	.39	.29	[.34, .45]
Total	382	.40	.26	[.38, .43]	.35	.27	[.32, .38]

Note. CI = Confidence interval.

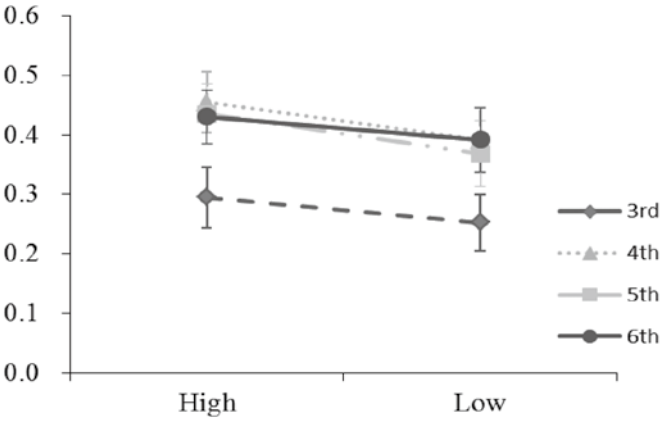

Figure 1. Phonological awareness depending on school grade.

4.2 RQ2 Do differences in English listening proficiency influence phonological awareness (high and low wordlikeness)?

Table 4 presents descriptive statistics for high and low wordlikeness according to the CNRep based on English listening proficiency. The ANOVA results reflected a significant interaction between English language proficiency and wordlikeness: F (1, 211) = 5.16, p = .024, η^2 = .02; the main effects of English language proficiency, F (1, 211) = 29.15, p < .001, η^2 = .14, and wordlikeness, F (1, 211) = 24.71, p < .001, η^2 = .11, were significant. The results of the post hoc test for the interaction showed that the simple effect of wordlikeness was significant among those with relatively high English listening proficiency: high wordlikeness > low wordlikeness, p < .001, r = .43, however the simple main effect of wordlikeness was not significant among those with relatively low English listening proficiency, p = .058, r = .19. Therefore, in terms of RQ2, differences in English listening proficiency did influence phonological awareness (high and low wordlikeness), as the more proficient learners showed greater phonological awareness of high-wordlikeness words than of low-wordlikeness words. In contrast, the less proficient learners did not differ in

their phonological awareness of high- and low-wordlikeness words. Moreover, the more proficient learners showed higher levels of phonological awareness of both types of word than did the less proficient learners.

The higher rate at which the learners with superior listening proficiency identified words as familiar showed that these students could transfer the English phonological knowledge in their long-term memory to their STM to perform a phonological analysis. It also suggested that familiar nonwords (especially those with high wordlikeness) linked to previously learned vocabulary and phonological knowledge were processed much faster and represented more accurately by the more proficient EFL learners. In contrast, the less proficient EFL learners could not distinguish stimuli with high wordlikeness from those with low wordlikeness due to their relative lack of English-language phonological knowledge.

Table 4
Descriptive Statistics of High- and Low-wordlikeness on CNRep (English Listening Proficiency)

		High wordlikeness			Low wordlikeness		
Proficiency	*n*	*M*	*SD*	95% CI	*M*	*SD*	95% CI
Upper	107	.51	.26	[.46, .56]	.44	.30	[.38, .50]
Lower	106	.30	.25	[.25, .35]	.27	.24	[.23, .32]
Total	213	.40	.27	[.37, .44]	.36	.28	[.32, .40]

Note. CI = Confidence interval.

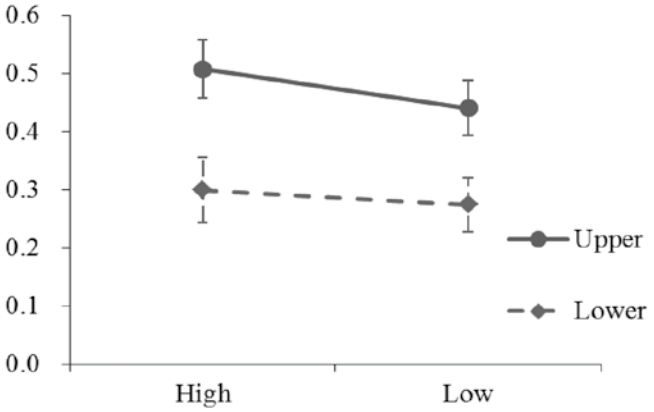

Figure 2. Phonological awareness depending on English listening proficiency.

5. Conclusion

This study investigated the phonological awareness of third graders who had taken English lessons in elementary school for 1 year and of fourth-to-sixth graders who had taken English lessons for 2 years. This study confirmed that differences between high and low wordlikeness were associated with EFL listening proficiency. The following two principal findings emerged from the data. First, low levels of exposure to English for 2 years did not have a positive effect on phonological recognition. Second, the learners who were more proficient in EFL listening identified more high-wordlikeness nonwords than low-wordlikeness nonwords, however this was not the case for the learners who were less proficient in EFL listening.

The following two limitations should be considered when interpreting the findings of this study. First, in terms of research methodology, we asked students to listen to nonwords and determine whether they had ever heard them instead of asking them to repeat each nonword immediately after listening to it. The task used in this study could

not precisely measure the students' phonological awareness. Because the nonwords were not actual English words, participants may have decided that they had never heard them even when they could recognize their phonological features. Therefore, additional research using actual English words that are taught during elementary school foreign-language activities should be performed in the future.

Second, we did not control for students' level and type of English exposure, as participants were taught English by their own homeroom teachers. Thus, the quantity and quality of English exposure may have varied by class. Also, some students had opportunities to study English outside school, which would also affect the quantity and quality of their English exposure. Different levels and types of English exposure may have influenced our sample stratification based on listening proficiency. Thus, additional research should involve controlling the level and type of participants' exposure to English, differences in English proficiency, and differences in cognitive development among school grades through a cross-sequential study.

Notes

1. In an investigation of Japanese and English digit span tests (DSTs) conducted with almost the same sample as that used in this study, Sakuma (2011) found that children in higher grades tended to have greater STM capacities in the two languages. The DST is a sensitive measurement of phonological STM, a function that is supported by phonological knowledge of the language (Thorn & Gathercole, 1999). Each version (Japanese or English) randomly presents a sample of numbers from zero through nine, and each number can appear in a given sequence only once. Participants are asked to repeat the sequence of digits immediately after presentation, and each DST includes two sets.
2. This study analyzed data from the third year of the project. The third to sixth graders had taken English lessons for 3 years as an activity at their elementary school, whereas the seventh graders had taken English lessons for 2 years as an activity at their elementary school and then as a subject in JHS. The first graders had taken English as an activity for only 1 year, and the second graders had taken English as an activity for 2 years. The differences in the durations of English lessons and in school grades reflected different levels of total English exposure, as English exposure increased as a function of school grade. First graders had participated in 20 lessons, second graders in 40, third graders in 75, fourth graders in 90, fifth graders in 105, and sixth graders in 105. Furthermore, as a follow-up survey, tests were administered to 18 seventh graders who had participated in the same project during the previous 2 years for a total of 175 lessons: 35 lessons (45 mins per lesson) each year in the fifth and sixth grades, and 105 lessons (50 mins per lesson) in the seventh grade (the first grade of JHS). The total number of English lessons per grade included all lessons that occurred over the academic year, but excluded lessons in which tests were administered.

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