Assessing the effect of Span Limited Tactile Reinforcement on the reading rate of second language learners

by

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Abstract

The present study analyses the English reading rates of second year Japanese junior high school students studying in a mandatory English language course. Each participant in the study completed sixteen readings in two separate conditions over a twelve-week period. In the first condition, participants read texts printed on A4 paper with standard block text formatting. In the second condition, participants read from a small handheld device (iPod Touch) with texts prepared according to guidelines detailed by Schneps et al. (2013b) and referred to as Span Limited Tactile Reinforcement (SLTR). The main features of SLTR include: large font size, short line length, and manual scrolling capability. The purpose of the study was to determine which — if either — of these conditions produced faster reading rates in the sample population, and if the observed effect size varied according to initial reading ability, as measured by the Oral Reading Fluency Test (ORF). Results suggest that the digital presentation of text via a handheld device and formatted according to SLTR produces a small, though statistically significant, effect on the reading rates of Japanese junior high school students.

Key Words: Span Limited Tactile Reinforcement, reading rate, oral reading fluency

1. Introduction

English language education in Japan has been undergoing significant reforms in recent years (Wakita, 2013). Most notably, Japanese students are commencing English language studies at an earlier age, with plans to begin formal instruction from the 3rd grade of elementary school by 2020. At present, however, most students' formal introduction to English reading takes place during the first year of junior high school.

At Seizan Junior High School, where the present research was undertaken, teachers have adopted a phonics-based approach to teaching English language literacy skills. English courses for first year students begin with an introduction to English phonemes and how they map to the letters of the Roman alphabet, known in Japan as *romanji*. Words from the early passages of the textbook serve as examples of the correspondence between phonemes and graphemes. The implicit expectation

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is that the actual process of reading will strengthen the individual's understanding of how letters combine to form sounds which in turn make words.

According to the head teacher involved in administering the study, little or no class time is set aside for specific strategy instruction in English reading. With limited contact hours available, teachers are expected to progress through the textbook as the primary means of fulfilling the curriculum objectives. Although all first year Japanese junior high school students arrive having learned the names of the letters of the alphabet and how to reproduce them on paper, there is considerable variance concerning how well they have mastered the correspondence between letters and sounds. As a result, for many students, the initial stages of English reading are characterized by slow, phoneme-by-phoneme decoding of the text — a process often referred to as "sounding out".

Although not practiced in Seizan Junior High School, a common strategy employed by Japanese English teachers to assist emergent readers is the use of *katakana* in both decoding text and encoding appropriate pronunciation. Unfortunately for learners, this practice fails to achieve either aim and often delays the development of automaticity in reading. While not formally endorsed, the major English Language textbooks used in schools encourage the practice of scaffolding pronunciation with *katakana* by regularly presenting people and place names with *katakana* notations (see, for example, *New Crown English Series 2,* 2014*; Sunshine English Course 2*, 2014).

As they progress through their lessons, junior high school students are expected to increase their repertoire of known words and reduce their reliance on sounding out as a means of accessing lexis. This 'learn by doing' approach to acquiring English literacy, while sufficient in most cases, has the potential to leave a large number of students behind. Most at risk are those who, from an early stage, struggle to grasp the relationships between letters and the sounds they represent. This struggle takes many forms and may involve difficulties distinguishing similar phonemes such as /d/ and /t/, problems blending or segmenting sounds, or difficulties detecting whether or not words rhyme.

Studies conducted in other English as a Second Language (ESL) and English as a Foreign Language (EFL) contexts have reported that some learners who demonstrate no significant difficulties in acquiring literacy in their native languages experience chronic difficulties in becoming proficient English readers (see, for example, Everatt, Smythe, Ocampo, & Gyarmathy, 2004; Kornev, Rakhlin, & Grigorenko, 2010). While there are numerous reasons why this might be the case, those who have studied reading across various language contexts report that it is the opaque nature of English orthography that is the likely culprit (Paulesu et al., 2001). Simply put, the English system of mapping phonemes to graphemes is unusually complex and inconsistent. Consider the example of Italian, which has 25 speech sounds represented by 33 possible letter combinations, and compare it to English, which has 40 phonemes represented by more than 1120 different letter combinations (Helmuth, 2001).

The challenges that reading in English presents for some English language learners is not unlike those faced by native speakers who have been diagnosed with phonological processing disorders, or, in layman's terms, problems processing sound. The link between poor literacy skills and difficulties processing sound was first established by Pennington, van Orden, Smith, Green, & Haith (1990) and confirmed in a subsequent study by Paulesu et al. (2001).

Over the years, a multitude of teaching methods and assistive technologies have been developed and tested in the hope of alleviating the difficulties faced by struggling readers. These range from technical innovations, such as tinted lenses and specially designed fonts to systematic approaches to reading instruction like Orton-Gilligham. Recently, considerable research has been

undertaken investigating the effects of text manipulation on those with underdeveloped reading skills (see, for example, O'Brien, Mansfield, and Legge, 2005; Schneps, Thomson, Sonnert, Pomplun, & Chen, 2013a; Zorzi, Barbiero, Facoetti, Lonciari, Carrozzi, et al., 2012). Many of these studies report beneficial effects of customized text presentation on subsets of the reading population.

Of particular relevance to the present study are the improvements in reading skills reported by Schneps et al. (2013b). In this study, participants used a small handheld device (iPod Touch) to read specially formatted text. The resulting reading method, known as Span Limited Tactile Reinforcement (hereafter SLTR), produced significantly faster reading rates in those with poor phoneme decoding skills and inefficient sight word recognition. The work of Schneps et al. (2013b) was undertaken in an L1 context (i.e., native English speakers reading English texts), and, to date, no results have been published to confirm a similar effect in second language learners. As such, at present the English language teaching community in Japan possesses insufficient knowledge to determine the effectiveness of an intervention such as SLTR.

2. The Study

The research design of the present study is a replication of Schneps et al. (2013b) and attempts to measure the effect of SLTR on the reading rate of Japanese English language learners. Two factors have been identified that could contribute to variance in the variable under investigation. The first has been termed Method of Text Presentation and has two categories (block text and SLTR); the second factor is Reading Level and also has two categories (Standard Reader and Struggling Reader). It is hypothesized that the interaction of these factors may increase or decrease the observed effect size. Two research questions were addressed by the study:

1. Do the reading rates of participants vary according to the Method of Text Presentation?
2. How does the Method of Text Presentation affect participants of different Reading Levels? (e.g., Are Struggling Readers affected to a greater or lesser extent than Standard Readers?)

The purpose of the present study is to determine what effect (if any) the SLTR method has on the reading rates of Japanese English language learners studying in a typical public junior high school.

Participants

For the purpose of the present study, participants were drawn from students in their second year of study at Seizan Junior High School in Kumamoto City, Japan. The decision to target this group as opposed to first year students was made in effort to ensure that the Standard Reader and Struggling Reader designations were not merely the result of the students' level of exposure to English reading before arriving at Seizan Junior High School. By the time the participants' reading levels were assessed, they had been exposed to at least one year of reading instruction and practice in a formal classroom setting, something which cannot be said of students in their first year of junior high school.

To determine Reading Level, an Oral Reading Fluency test was administered to the 38 participants prior to the start of the study. Results indicated that 29 of the participants were Standard Readers while the remaining 9 were Struggling Readers. Under ideal circumstances, a larger population of students would have been tested to establish a local performance norm for the Oral Reading Fluency test. However, time constraints upon both the researcher and the teachers working in the school precluded wider testing.

Research Design

The experiment was designed to investigate the effect of the factor Method of Presentation on the reading rates of participants as measured by words per second (WPS). The study followed the research design laid out in Schneps et al. (2013b) and utilized a repeated measures design to test all participants in all conditions (see Figure 1). The participants were randomly assigned to one of four groups (Group 1, Group 2, Group 3, Group 4). During each of the study's eight sessions, participants read two passages — one printed in block text on standard A4 paper and one formatted in compliance with SLTR and displayed on an iPod Touch. Confounding factors such as order of presentation and differences in the level of difficulty of the two readings were accounted for by the research design. Each participant was provided with a timer and instructed to record the duration required to complete the reading. From these values a WPS reading rate was calculated for each text. Though not factored into the present study, participants were also required to complete comprehension questions related to each reading.

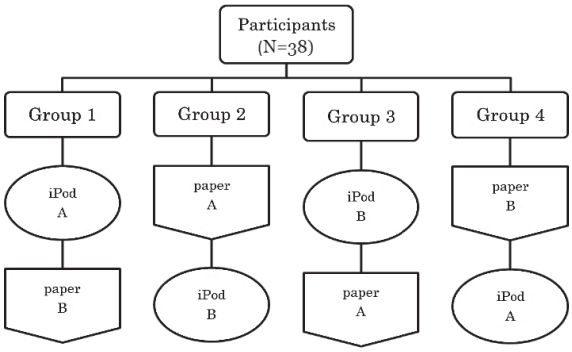

Figure 1. Research design.

Data Analysis

This section details the statistical procedures employed in the course of the present study. In addressing the main research questions, a series of correlated samples *t*-tests was conducted using the data collected over the eight sessions of the study. As only those participants who had completed all of the sessions could be included in the data set, mortality was high, and the total number of participants considered in the analysis was rather low. Although the Standard Reader and Struggling Reader categories were independently analyzed, the small sample size of the Struggling Reader category (n=3) rendered the resulting values meaningless. As such, the Reading Level groupings were abandoned, and a correlated samples *t*-test was performed on the data collected from the remaining participants after mortality.

3. Results

Reading rates from both Methods of Presentation (block text and SLTR) were compared to see which produced the highest value as measured in WPS. Results indicate a significant difference in the mean reading rates, with SLTR producing a slightly higher value than standard block text. Table 1 presents the results of the correlated samples *t*-test.

Table 1. Results of *t*-test and descriptive statistics for reading rate by Method of Presentation

SLTR		Block text			Mean Difference		
M	SD	M	SD	n		*t*	df
1.46	0.39	1.39	0.32	27	0.08	2.16*	26

*results reveal a significant difference between the two methods. $p<.05$

4. Discussion and Conclusion

This replication study set out to investigate whether or not the increases in reading rate observed by Schneps et al. (2013b) could be replicated in an L2 reading context, specifically among second year Japanese junior high school students studying in a mandatory English language course. Of immediate significance is the apparent effect of the SLTR method on the reading rates of

those who took part in the study. As a group, participants read significantly faster when using a handheld reading device configured to display SLTR text. Although the mean difference between the methods was small, an average participant read roughly four extra words for each minute of reading time. Extended over 60 minutes, the increase becomes something like 250 words, or about one page of a printed book aimed at a young adult audience.

Prior to the study, the researcher had hypothesized that the participants categorized as Struggling Readers would benefit from the SLTR reading method to a greater extent than those categorized as Standard Readers. However, the small sample size coupled with the high mortality rate meant that the researcher was unable to establish an interaction between Method of Presentation and Reading Level.

The present study has explored one text presentation method that has proven beneficial for struggling readers in an L1 reading context. Although the method investigated here seems promising, further studies involving larger numbers of participants are required to establish the true extent to which English language learners can benefit from the SLTR reading method.

Acknowledgements

The author would like to acknowledge the Japan Society for the Promotion of Sciences (JSPS) for providing the grant that funded this research. The author also wishes to thank the staff and students of Seizan Junior High School in Kumamoto, Japan, especially Yong Guang, who was primarily responsible for the onsite administration of the study.

References

Everatt, J., Smythe, I., Ocampo, D., & Gyarmathy, E. (2004). Issues in the assessment of literacy-related difficulties across language backgrounds: A cross-linguistic comparison. *Journal of Research in Reading, 27*, 141-151.

Helmuth, L. (2001). Dyslexia: Same brains, different languages. *Science, 291*, 2064-2065.

Kornev, A. N., Rakhlin, N., & Grigorenko, E. L. (2010). Dyslexia from a cross-linguistic and cross-cultural perspective: The case of Russian and Russia. *Learning Disabilities — A Contemporary Journal, 8*, 41-69.

New Crown English series 2. (2014). Tokyo: Sanseido.

O'Brien, B. A., Mansfield, J. S., & Legge, G. E. (2005). The effect of print size on reading in dyslexia. *Journal of Research in Reading, 28*, 332-349.

Paulesu, E., Démonet, J.-F., Fazio, F., McCrory, E., Chanoine, N., Brunswick, S. F., ... Frith, U. (2001). Dyslexia: Cultural Diversity and Biological Unity. *Science, 291*, 2165-2167.

Pennington, B. F., van Orden, G. C., Smith, S. D., Green, P. A., & Haith, M. M. (1990). Phonological processing skills and deficits in adult dyslexics. *Child Development, 61* (6), 1753-1778.

Schneps, M. H., Thomson, J. M., Sonnert, G., Pomplun, M., Chen, C., et al. (2013a) Shorter Lines Facilitate Reading in Those Who Struggle. *PLoS ONE 8* (8): e71161.
doi: 10.1371/journal.pone.0071161

Schneps, M. H., Thomson, J. M., Chen, C., Sonnert, G. & Pomplun, M. (2013b). E-readers are more effective than paper for some with dyslexia. *PLoS ONE, 8* (9): e75634.
doi: 10.1371/journal.pone.0075634

Sunshine English course 2. (2014). Tokyo: Kairyudo.

Wakita, H. (2013). Elementary school English education in Japan: Changing policies, issues and challenges. *国際文化研究*, *17*, 3-10.

Zorzi, M., Barbiero, C., Facoetti, A., Lonciari, I., Carrozzi, M., et al. (2012). Extra-large letter spacing improves reading in dyslexia. *Proceedings of the National Academy of Sciences of the United States of America, 109*, 11455-11459.
doi: 10.1073/pnas.1205566109