An Investigation into Multi-level Components of Online Reading Fluency

Andrew Atkins[1]

Abstract. This paper provides a discussion of the results of a cross-sectional examination of linguistic and non-linguistic variables that are predicted to influence L2 reading fluency. The study is part of a larger, longitudinal mixed-methods study into reading fluency development using online Timed Reading (TR) with participants from a mid-to-high level private university in western Japan. The larger study will also be briefly explained to provide some background. For the study presented in this paper, participants read two, short, equivalent, graded, online texts against a clock and then answered comprehension questions without recourse to the texts. A custom-made web application was used to administer the readings. The texts used were all 300-words long and graded using tools available on *The Compleat Lexical Tutor* website (Cobb, 2003) to be within the first 1,000 words of English. Data from a battery of tests that included a paper-based vocabulary size test (Nation & Beglar, 2007), and a computer-based word-recognition reaction time test were recorded. These data were triangulated with graded text reading performance data to assess the relative importance of the components assessed. The relationship between the measured variables is explained using correlation and regression analysis, providing insight for reading researchers and teachers.

Keywords: reading fluency, word recognition, reaction time, online reading, vocabulary size.

1. Introduction

The ability of students to read in a fluent and efficient manner is of concern to many educators in English as a Foreign Language (EFL) contexts as the ubiquitous nature of the Internet, at least for the foreseeable future, makes reading a skill

necessary for their lives. This paper is an attempt to investigate reading fluency for a group of first-year students studying at a Japanese university and tries to discover which components from a set of predicted variables have the greatest influence on reading fluency.

The recent interest in Asian classrooms in reading fluency is a backlash against the traditional focus on intensive reading (Gorsuch & Taguchi, 2010). Some of the most promising techniques investigated to date to address this issue have been extensive reading (Day & Bamford, 1998; Waring, 1997), repeated reading (Gorsuch & Taguchi, 2008; Samuels, 1979/1997), and timed reading (Chang, 2010; Underwood, Myskow, & Hattori, 2012). This paper will utilise only timed reading to investigate reading fluency.

Bernhardt (1991, 2005) identifies that the various aspects of vocabulary knowledge may account for 50 per cent of the variability in language ability, and it is interesting to explore to what extent reading fluency is influenced by lexical knowledge, as suggested by Meara's (1996) *dimensions* of lexical knowledge.

The need for research into reading fluency cannot be stressed enough, as expounded by Segalowitz (2010), who explains the notion of fluency gaps. He suggests that L2 learners are often unsatisfied by their deficiency in the L2, as compared to their L1, especially where fluency is concerned. Segalowitz (2010) also discusses another type of fluency gap, a between-individual fluency gap, which is more the focus of this paper. This paper hopes to contribute to the field by providing information about the factors that make for more fluent readers, and why some students are more successful in achieving fluency than others.

2.   Method

2.1.   Participants

A total of 134 participants from 3 intact classes were recruited to take part in this study. The students were from a small national university in western Japan and were taking required English classes as part of their Economics related majors. The participants came from the Economics faculty in the university and had an average age of 19 years. There was a gender bias with 33 female subjects (24.6%) and 101 male subjects (75.4%). Students at the university were not divided in ability-based streams, but rather assigned in a relatively random manner to groups. There were however some scheduling constraints that made assignment not entirely random.

2.2. Materials

2.2.1. Timed reading

The instruments at the backbone of this research were 26 randomly assigned tests of timed reading delivered using a web application. The treatment consisted of two equivalent reading passages, each with 6 comprehension questions. The passages were controlled for vocabulary load (Webb & Nation, 2008) and the questions were designed to test understanding and not memory.

The application was a simple web application, built using PHP, Javascript and a MySQL database. Students' reading time and scores were then recorded in the database (Atkins & Cole, 2011).

2.2.2. Vocabulary size test

Nation and Beglar's (2007) Vocabulary Size Test (VST) was used to provide data for receptive vocabulary knowledge. Only the first five levels of the fourteen-level test were used as these were felt to be the most relevant for the purpose of this investigation. The test consists of ten test items for each one thousand-word level. Timed reading is designed to promote fluency and as a result the lexical load is intentionally low.

2.2.3. Word recognition reaction time test

This test was designed to check students' word recognition skills. Using the Compleat Lexical Tutor website (Cobb, 2003), 40 randomly generated Anglo-Saxon words from the second 1,000 words of English, and randomly generated plausible 20 non-words from Meara's (1996) list of 100 plausible-non-words were made into a reaction time test using the Compleat Reaction Timer v.4 (Cobb, 2003). Reaction times were recorded by the program and sent by email to the researcher.

2.3. Procedures

The first five levels of the VST (Nation & Beglar, 2007) were administered in week four of the school year, taking 40 minutes to administer. In week 20, two randomly assigned timed reading passages were administered, the *word recognition reaction time practice test* was administered, and this was followed by the *word recognition reaction time test*.

2.3.1. Analytical approach

To account for variation in performance and uncontrollable differences in the difficulty of the reading passages the mean adjusted word per minute (WPM) for the 2 passages administered in week 20 was used as the dependent variable. The higher the number the more proficient a reader is assumed to be.

The VST gave raw scores from 10 for each of the five levels tested and a raw total score for all five levels combined. A higher number suggests greater vocabulary knowledge.

The *word recognition reaction time test* provides us with an average reaction time for distinguishing whether a word is known or not. It also provides us with an error score. The reaction time shows how fast a participant can distinguish a word from a non-word.

Multiple correlation was used to examine the relationship between the dependent TR variable and independent variables. Hierarchical linear regression was also used. All analyses were carried out using SPSS 17.0 for Windows.

3.   Discussion

Many of the variables in this study correlate with varying degree with reading fluency. Some of the variables measured also correlate with each other, as in some cases they are measuring the same thing.

The TR passages and tests themselves are another issue that must be considered. The data obtained was from a much larger study of timed reading performance. In this study the metric used is the mean of performance on two randomly assigned passages. Even with the greatest care taken to make the passages equivalent, there are so many factors that it is not possible to control for.

The regression results suggested that receptive vocabulary (VST) accounts for the greatest amount of variance in the criterion variable for reading fluency. This accounted for 21% of the variance, less than in Bernhardt (1991), although both studies found that vocabulary was the most influential predictor. Word recognition reaction time accounted for 6.9% of the variance in the model, but this figure must be interpreted with caution as in some cases fast reaction times came at the expense of a high number of errors, and vocabulary size had a large effect on errors made.

4.   Conclusions

Although the results of this study have suggested that vocabulary size and word recognition account for a significant proportion of reading fluency, the quality of the instruments used dictates the quality of the results. The dependent variable is perhaps not completely valid as it is really comparing apples with oranges as the participants actually read completely different passages on different subjects. This problem will be reduced in the parent study by using mean times for a series of readings. Reading fluency is a very personal thing and influenced by not only the text itself, but also what the reader brings to the text on a particular day. It would be better to assess it over a longer period of time and with a variety of passage themes, and perhaps try to control vocabulary more. It is also conceivable that the controlled nature of the texts reduces the influence of vocabulary size on performance, and this is worthy of further investigation.

Although simplicity is often the best strategy in research design, the complex nature of reading fluency makes simplicity untenable. In this study more than 70% of the variance in the regression model is unaccounted for, which is comparable to Bernhardt (1991). Although, as discussed, the dependent criterion variable in this study may not be truly valid, it is also certain that other variables need to be measured. These should include some measure of grammatical knowledge, some tests of a greater variety of individual differences, and some measure of cultural knowledge and schema for the passages used. Shiotsu (2009) used a more comprehensive battery of tests in his study and this study would benefit from some of those tests, especially the sentence-level reading ability test and a further word recognition exercise. Shiotsu (2009) also makes the recommendation that "future research should employ standardised test scores or proficiency ratings" (p. 36). Although the VST is not standardised, it has been used with thousands of students in Japan and around the world, which at least in part satisfies Shiotsu's (2009) recommendation.

This research provides little in the way of pedagogical implications; however, it has provided some valuable insight and knowledge that will be included in the parent study where some of the data used in this paper was taken from. The parent study is a reading and writing fluency parallel growth study. It is hoped it will provide some much needed information for L2, and especially EFL educators to help them prepare students to use language more fluently and effectively. Further examination of reading fluency and its component parts can only lead to greater understanding of what is needed in the classroom to create students who can use English to make their futures brighter.

References

Atkins, A., & Cole, S. (2011). The development of an online timed reading program. In E. Forsythe, T. Gorham, M. Grogan, D. Jarrell, R. Chartrand, & P. Lewis (Eds.), *CALL: What's your motivation? Collected papers on the cutting edge of language learning practice*. Nagoya, Japan: JALT CALL SIG.

Bernhardt, E. B. (1991). *Reading development in a second language*. Norwood, NJ: Ablex Publishing Corporation.

Bernhardt, E. B. (2005). Progress and procrastination in second language reading. *Annual Review of Applied Linguistics, 25*, 133-150. doi: 10.1017/S0267190505000073

Chang, A. C.-S. (2010). The effect of a timed reading activity on EFL learners: Speed, comprehension, and perception. *Reading in a Foreign Language, 22*(2), 284-303. Retrieved from http://nflrc.hawaii.edu/rfl/October2010/articles/chang.pdf

Cobb, T. (2003). *The Compleat Lexical Tutor* [Website]. Retrieved from http://www.lextutor.ca

Day, R. R., & Bamford, J. (1998). *Extensive reading in the second language classroom*. Cambridge: Cambridge University Press.

Gorsuch, G., & Taguchi, E. (2008). Repeated reading for developing reading fluency and reading comprehension: The case of EFL learners in Vietnam. *System, 36*(2), 253-278.

Gorsuch, G., & Taguchi, E. (2010). Developing reading fluency and comprehension using repeated reading: Evidence from longitudinal student reports. *Language Teaching Research, 14*(1), 27-59. doi: 10.1177/1362168809346494

Meara, P. (1996). The dimensions of lexical competence. In G. Brown, K. Malmkjaer, & J. Williams (Eds.), *Competence and Performance in Language Learning* (pp. 35-53). Cambridge: Cambridge University Press.

Nation, P., & Beglar, D. (2007). A vocabulary size test. *The Language Teacher, 31*(7), 9-13. Retrieved from http://jalt-publications.org/files/pdf/the_language_teacher/07_2007tlt.pdf

Samuels, S. J. (1979/1997). The method of repeated readings. *The Reading Teacher, 50*(5), 376-381.

Segalowitz, N. (2010). *Cognitive bases of second language fluency*. New York: Routledge.

Shiotsu, T. (2009). Reading Ability and Components of Word Recognition Speed: The Case of L1-Japanese EFL Learners. In Z. Han & N. J. Anderson (Eds.), *Second Language Reading Research and Instruction: Crossing the Boundaries* (pp. 15-39). Ann Arbor: University of Michigan Press.

Underwood, P., Myskow, G., & Hattori, T. (2012). The effect of speed reading instruction on Japanese high school students' English reading comprehension. *Journal of International Education Research, 8*(1), 27-39. Retrieved from http://journals.cluteonline.com/index.php/JIER/article/view/6693/6768

Waring, R. (1997). Graded and extensive reading - questions and answers. *The Language Teacher, 21*(5), 9-12. Retrieved from http://jalt-publications.org/files/pdf/the_language_teacher/tlt_21.05.pdf

Webb, S., & Nation, I. S. P. (2008). Evaluating the vocabulary load of written text. *TESOLANZ Journal, 16*, 1-10. Retrieved from http://www.tesolanz.org.nz/includes/download.aspx?ID=106692

20 Years of EUROCALL: Learning from the Past, Looking to the Future.
2013 EUROCALL Conference, Évora, Portugal, Proceedings
Edited by Linda Bradley and Sylvie Thouësny

The moral right of the authors has been asserted