



## **The Role of Textual Lexical Difficulty in L2 Reading Outcomes in an Indonesian EFL Tertiary Setting**

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### **Introduction**

Reading outcomes are the result of the interaction between learner-internal factors and external textual factors (Anderson, 2000; Kintsch, 1998, 2005). In this regard, the contribution toward reading comprehension is determined by both reader's (linguistic) knowledge and text complexity factors. A number of studies have investigated reader knowledge factors contributing to L2 reading outcomes in various EFL settings mainly at tertiary level (e.g., Barrot, 2013; Jeon & Yamashita, 2014; Kweldju, 2000; Laufer, 1992; Muldjani, Koda, & Moates, 1998; Nassaji, 2003; Sahiruddin, 2008). These studies found L2 linguistic knowledge, including primarily vocabulary and grammatical knowledge, that readers brought to a reading text or task, has significant effects on L2 reading. Of interest in this study, reader's lexical competence has been observed to play an essential effect on L2 reading comprehension. For instance, Sahiruddin (2008) reported that the lower the vocabulary size Indonesian learners had, the more it contributed to lower reading performance. This suggests that the level of knowledge and skills the reader brings to a reading task are crucial predictors of reading outcomes. However, what the reader brings to the reading task is only part of the story. The difficulty level of the text (generally known as text complexity or text readability) is also a crucial aspect in determining reading outcomes. Less research has explored the role of variability in text features in affecting this relationship in the L1 or L2. Meanwhile, how reader knowledge relates to text features in predicting L2 reading outcomes has been largely neglected in L2 reading research, particularly in an Indonesian setting.

The construct of text complexity generally consists of both lexical and syntactic complexity (Skehan, 2009). Lexical complexity (or lexical difficulty as this study defines it) focuses on lexical frequency as an index of reader's lexical familiarity (Barrot, 2013, Milton, 2007; Nation, 2001). Lexical frequency approaches to L2 vocabulary learning are based on the assumption that the more frequently used words will be the more easily learned (Milton, 2007). It has even been argued that lexical familiarity has a direct relationship to readers' knowledge about a topic and has a significant impact on comprehension (Ellis, 2002; Kintsch, 1998; Milton, 2009). Syntactic complexity, on the other hand, involves sentence length as an index of complexity and affects L2 reading comprehension (Sahiruddin, 2019). The focus in this paper is on lexical difficulty alone. The few studies on the role of text lexical difficulty on L2 reading are inconclusive. For example, Nation and Snowling (2010) found text lexical difficulty does not play a role in reading, providing support for text syntactic complexity as a factor affecting L2 reading. In contrast, other studies showed the opposite results as observed in Japan and Iran settings (Barrot, 2013; Karami & Salahshoor, 2014) which revealed that the lexical difficulty



of the text did facilitate the comprehension of L2 learners. Previous studies in L2 settings have not explored much about the issue of lexical difficulty and its role in L2 reading outcomes.

Although some studies have scrutinized the impact of text complexity in L2 contexts, the role of text lexical difficulty in L2 settings has not been explored, particularly in an Indonesian setting where English is considered a foreign language. The present study assesses the impact of text lexical difficulty, as indexed by lexical frequency, on reading outcomes in an Indonesian EFL tertiary setting. The difficulty of a text's vocabulary was also assessed against word frequency level, categorizing high-frequency words as easy words and low-frequency words as difficult words in the text. It is hypothesised that text lexical frequency will predict reading comprehension.

The study attempts to answer the two questions: (1) to what extent do lexical difficulty measures affect L2 reading comprehension, and (2) to what extent does lexical difficulty predict L2 performance according to different group proficiency levels? It is hypothesised that lexical difficulty is closely related to reading performance, suggesting that the greater the difficulty of a given text (as measured by high and low lexical frequency levels), the lower the reading performance will be. In more detail, the effect of lexical difficulty is different across group proficiency levels, indicating that the more proficient or skilled readers have better reading performance across different lexical difficulty levels.

## Method

### Participants

The present study examines measures of lexical difficulty and the effect they have on L2 reading outcomes. Indonesian university students at intermediate and advanced levels of ESL proficiency read English passages of low and high lexical difficulty. The participants in this study were students enrolled in the English study program. They were recruited from their English program as volunteer participants. Participation was voluntary and the participants completed reading tests. There were 50 female and 21 male participants aged between 17 and 22 years of age ( $M = 18.9$ ,  $SD = 0.9$ ). At the time of the study, the students had completed an average of six years of formal instruction in English as a foreign language. Participants were from the second year of their English major at an Indonesian university, with intermediate or pre-advanced level proficiency as measured by the Test of English for International Communication (TOEIC) scores ( $M = 526$ ,  $SD = 187$ ) with a 95% confidence interval of [496,556].

### Instruments

Reading comprehension was assessed using material adapted and selected from the reading sections of published TOEFL tests (Davy & Davy, 2002; Duffy & Mahnke, 1998;). These passages were selected from various topics out of fourteen passages taken from published TOEFL reading tests. A total of four texts of approximately 250 to 300 words in length were used in this study. The four texts were systematically varied by lexical frequency levels as follows: two high lexical frequency texts and two low lexical frequency texts as presented in Table 1. After reading each text the participant answered five multiple-choice questions. These targeted the content of the texts and elicited both explicit (direct recall) and implicit (inferential questions) information.

TABLE 1  
*Indices of Lexical Frequency in the Text*

Texts	BNC VocabProfile (1K-2K)
Text 1	89
Text 2	88
Text 3	82
Text 4	84

Notes: BNC: British National Corpus

Lexical difficulty in the text was measured by the levels of lexical frequency (high lexical frequency vs. low lexical frequency) assessed via an online software program called VocabProfile as accessed from [www.lex tutor.ca/vp/eng/](http://www.lex tutor.ca/vp/eng/), which is widely used (Heatley & Nation, 2002). VocabProfile bases its textual lexical profiling on the British National Corpus.

In terms of lexical frequency levels, the VocabProfile tool revealed that texts with high-frequency words showed lower percentages of low-frequency words (Text 1 with 11% low-frequency words and Text 2 with 12% low-frequency words) than texts with low-frequency words which exhibit a higher proportion of low-frequency words (Text 3 with 18% and Text 4 with 16% low-frequency words). The low-frequency proportion was based on the percentage of words from the 3,000 to 10,000 word frequency levels. In the case of lexical frequency, VocabProfile scores below 85 were classified as low lexical frequency, and texts with higher VocabProfile scores (> 85) were categorised as high lexical frequency.

## Procedure

The participants were tested individually in a laboratory using computerized online reading tests. Four texts with five multiple choice questions for each text were used allowing 75 minutes to finish the task. The participants were instructed to read the text on the computer screen and as soon as they finished each text, they continued to the multiple-choice questions. They were warned that they could not go back to the texts once they finished reading. The decision of requiring participants to answer questions without the ability to refer back to the text was made because other studies with 15-year-old students (from Grades 8 and 9) done in Berlin, Germany, found that not allowing students to go back to the text (without text condition) was more sensitive and purer to assess online comprehension as reflected in the quality of the mental representation of the texts (Schroeder, 2011).

## Data Analysis

The lexical frequency scores from the VocabProfile tool were treated as independent variables and reading performance was treated as the dependent variable. Correlation and regression analyses were conducted. This design was used to test for a main effect of lexical frequency levels on reading performance across and by group proficiency levels. The analysis was started by reporting descriptive statistics of reading outcomes of the four texts with varying lexical frequency levels. Then, the effect of text lexical frequency on reading outcomes was described using a Pearson product moment correlation followed by regression analysis. Then, two-way (Group x lexical frequency level) ANOVA was conducted to see the difference in reading performance by two proficiency groups on two lexical frequency level-based readings. Regression analyses was also conducted for both proficiency groups to see the effect of lexical difficulty on their L2 reading performance.

## Findings and Discussion

The descriptive statistics for reading accuracy results for the whole group are presented in Table 2. The normal distribution of the data was assessed through the value of skewness ( $S = 1.33$ ) and kurtosis ( $K =$

-.01) demonstrating that the data was normally distributed since the values were not greater than 1.96 or 2.58 (Field, 2009, p. 139). The reliability of the reading test was at Cronbach's  $\alpha = .90$ . The first research question investigated the role of textual lexical difficulty on L2 reading outcomes. Lexical difficulty was operationalised in terms of the relative frequency of occurrence of the words in the texts. Table 2 presents text lexical frequency scores and mean reading scores.

TABLE 2  
*High (H) versus Low (L) Lexical Frequency Levels in Four Texts*

Texts	Frequency level	Lexical frequency profile	Mean reading score
Text 1	HLF	89	62 ( $SD = 2.5$ )
Text 2	HLF	88	43 ( $SD = 2.6$ )
Text 3	LLF	84	26 ( $SD = 2.4$ )
Text 4	LLF	82	24 ( $SD = 2.1$ )

Note. HLF: high lexical frequency; LLF: low lexical frequency

The table shows that texts with high lexical frequency contained 88–89% of high-frequency words while texts with low lexical frequency consisted of 82–84% of high-frequency words. There were 17 low-frequency words in the high lexical frequency texts and 35 low-frequency words in the low lexical frequency texts.

Table 2 also shows that texts with higher lexical frequency influenced L2 reading outcomes as reflected in higher reading scores, as in Text 1 and Text 2 (Combined  $M = 53$ ,  $SD = 24$ ). On the other hand, a larger proportion of low lexical frequency items resulted in less accurate reading comprehension, as in Text 3 and Text 4 ( $M = 25$ ,  $SD = 19$ ). An independent t-test was computed to see if the mean difference between the combined high lexical frequency texts and low lexical frequency texts was statistically significant. Levene's test of equality of variance indicated that the homogeneity of variance assumption was violated ( $p < .001$ ) so unequal variances were assumed for significance testing. The t-test revealed that reading performance for texts with high lexical frequency was significantly better than low lexical frequency texts,  $t(282) = 10.95$ ,  $p < .001$ . The Cohen's  $d$  effect size was 1.29 reflecting a large effect size.

The correlation between lexical frequency as an index of lexical difficulty and L2 reading outcome was  $r = .57$ ,  $p < .001$ , showing a relatively strong relationship between text lexical difficulty and L2 reading. To determine the predictive value of lexical difficulty on reading comprehension, hierarchical regression analysis was used. It was also found that lexical difficulty accounted for 32% of L2 reading outcomes across participants of this study,  $F(1, 282) = 21.178$ ,  $p = .000$ .

This study confirmed the hypothesis that the role of lexical difficulty as represented by lexical frequency level was dominant in affecting text comprehension in the L2 setting of this study, although other text complexity factors such as syntactic complexity may also have affected text comprehension. It is evident that for the L2 learners in this study, the reading problems experienced by the participants were related to the insufficiency of vocabulary knowledge used when reading the texts rather than other text linguistic factors such as grammatical elements in the texts.

Furthermore, this study also investigated the effect of lexical difficulty in reading texts by group proficiency levels (low, high).

TABLE 3  
*High (H) versus low (L) Lexical Frequency Levels in Four Texts by Proficiency Groups*

Texts	Frequency level	High Proficiency group (n = 35)	Low Proficiency group (n = 36)
Text 1	HLF	77 ( $SD = 15$ )	47 ( $SD = 15$ )
Text 2	HLF	54 ( $SD = 17$ )	31 ( $SD = 20$ )
Text 3	LLF	36 ( $SD = 19$ )	16 ( $SD = 14$ )
Text 4	LLF	26 ( $SD = 16$ )	21 ( $SD = 17$ )

Note. HLF: high lexical frequency; LLF: low lexical frequency

Looking at more details on the group performance (high proficiency group and low proficiency group) on both high lexical frequency-based texts and low lexical frequency, reading accuracy means for the high and low lexical frequency texts discriminates the two group proficiency levels at  $p < .000$ . The means for each group are given in Table 3. The performance on high lexical frequency (low lexical difficulty) text was higher than the one on low lexical frequency (high lexical difficulty) texts. This finding supports the hypothesis that reading comprehension decline is caused by the increase of lexical difficulty level within texts. Regardless of lexical difficulty factors, the high proficiency group outperformed the low proficiency group.

Two-way (Group x lexical frequency level) ANOVA was conducted to see the difference of reading performance by the two proficiency groups on two lexical frequency level-based readings. Group was the between subject factor (High proficiency group x Low proficiency group) and lexical frequency levels become the within subject factor, repeated measure factors (high lexical frequency level x low lexical frequency). The results revealed a main effect of group proficiency level on reading performance,  $F(1, 69) = 49.50, p = .000, \eta^2 = .418$ , and lexical frequency level,  $F(1, 69) = 47.47, p = .000, \eta^2 = .408$ . These main effects were qualified by an interaction between group proficiency and lexical frequency level,  $F(1, 69) = 4.826, p = .031, \eta^2 = .065$ . Pairwise comparison for group and lexical frequency level showed the mean differences were significant at  $p < .05$ , based on a Bonferroni adjustment made for multiple comparison. The presence of the interaction between group proficiency levels and lexical frequency demonstrated that group differences in reading performance were influenced by the effect of lexical difficulty level in the text.

A further set of correlation and regression was also computed in between group proficiency levels. This study demonstrated that lexical difficulty was significantly correlated with reading performance ranging from  $r = .71$  (high proficiency group) to  $r = .49$  (low proficiency group). In terms of predictive value of lexical difficulty toward reading, lexical difficulty accounted for 51% of the variance of reading for high group proficiency and 24% of the variance on the reading test for the low proficiency group. Overall, textual lexical difficulty was strongly predictive on reading performance between two group proficiency levels suggesting the importance of understanding the words in the text to maximize L2 reading performance.

The present study was designed to address two questions of (1) whether textual lexical difficulty level exerts an effect on L2 reading performance in an Indonesian EFL context, and (2) to what extent lexical difficulty predicts L2 reading by group proficiency levels. The results of this experiment provide support for the link between lexical difficulty and L2 reading. It is evident that the level of lexical difficulty in the texts affected the performance of the L2 learners in this context in comprehending the text. In addition, the difference of reading performance for low lexical difficulty and high lexical difficulty was large across and between group proficiency levels. In the other words, this supports the complexity-accuracy framework (Skehan, 2009) in reading, meaning the higher the complexity in the texts, the lower the performance on reading comprehension.

The finding showed that there is a decline in reading comprehension when the texts contain an increasing of lexical difficulty across and between group proficiency levels. Reading performance on texts with low lexical difficulty levels was better than reading accuracy on texts with high lexical difficulty.

Meanwhile, the effect of proficiency levels on L2 reading was pronounced and interacted with the effect of lexical difficulty in which the high proficiency group outperformed the low proficiency group in L2 reading performance. It suggested that L2 proficiency is likely to exert an influence on L2 reading (Bernhardt & Kamil, 1995).

In addition, a moderate correlation was observed between lexical difficulty and reading comprehension overall across all participants. Moreover, a high correlation between lexical difficulty and L2 reading was found for high proficiency group, while a lower correlation was found for low proficiency groups. The evidence that the two correlation values between the two groups were significant also indicated that lexical difficulty had an effect on reading comprehension. Following such a pattern, lexical difficulty was

also predictive to reading comprehension, accounting for 32% of reading variance. This finding supports previous findings about significant effects of lexical difficulty on reading by children (Arya et al., 2011) and L2 adults (Barrot, 2013). Furthermore, this finding is against the finding that lexical difficulty did not contribute significantly to L2 reading in Karami and Salahshoor (2014). It was syntactic complexity that had a more significant effect on L2 reading than lexical difficulty in their study. A previous study found that syntactic complexity accounted for only 5% of L2 reading variance (Sahiruddin, 2019).

The findings can be interpreted in terms of the established link between frequency and difficulty; high-frequency words are more familiar to learners than low-frequency words (Brown, 2012; Ellis, 2002; Milton, 2007), and provides further support for lexical frequency as a robust predictor of language performance (Murray & Forster, 2004; Read, 2000). This study also demonstrates the construct validity of lexical frequency as an index of text difficulty (Laufer, 1989). The difference between high-frequency and low-frequency texts in terms of word frequency levels in this study was only about 5–6%. While the difference is small, even a small increase in the number of difficult words may have had a significant effect on performance in the low-frequency texts (Brown, 2013).

This finding supports previous research about the importance of understanding words in the text or lexical coverage (Anderson, 2000; Hu & Nation, 2000; Laufer, 1992; Schmitt et al., 2011). For instance, Schmitt et al. (2011) found that in order to achieve 60% comprehension, 661 L2 advanced learners from Turkey, China, Spain, Israel, Great Britain, Japan, and Sweden were required to understand 95% of vocabulary coverage. A 98-99% coverage was required to reach 70% comprehension, and 75% comprehension was associated with recognising all of the words in the text. High lexical coverage (98-100%) is critical, but insufficient, for complete reading comprehension. In addition to reading context, the role of lexical knowledge was also evident in facilitating L2 writing performance (Moon et al., 2019).

The result of this study strongly supports the hypothesis about the role of lexical difficulty as a function of text complexity on reading performance. This might have practical implications, particularly for pedagogical purposes, that minimizing the lexical difficulty of the texts may not affect a group's reading comprehension differences significantly. Other variables in text complexity, such as cohesion and coherence complexity, might have another predictive value on L2 reading.

The research in this study shows that the effect of textual features, including lexical knowledge was evident in L2 reading comprehension, along with many studies which put much more attention on the role of reader knowledge in affecting L2 reading outcomes. This study contributes to a larger framework of L2 reading research that textual features do not discriminate on the performance of L2 reading. This generally supports Kintsch's (2005) and Anderson's (2000) claim that reading is affected by both reader knowledge and textual features. This study shows that overall text lexical difficulty plays a crucial role in L2 reading comprehension by different proficiency groups.

The significant role played by text lexical frequency means that reading teachers or material designers should focus on building students' vocabulary and familiarising them with words in the text in order to develop their L2 reading skills.

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