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Influence of Lexical and Syntactic Knowledge on L2 Reading Comprehension

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Abstract

Among the various components of reading comprehension, lexical and syntactic knowledge have been widely studied but conflicting perspectives remain on their respective contributions to reading comprehension. The current study aims to address this gap by investigating the contribution of these two components to L2 reading comprehension among Pakistani ESL learners, focusing on whether these contributions differ between learners with high and low reading proficiency. By employing the Component-Skills Approach developed by Carr and Levy (1990) the current study focuses on identifying individual differences in L2 reading comprehension. The study involved 100 gender-balanced undergraduate students enrolled in randomly selected departments of the University of Sargodha and utilized four tests for data collection that helped determine the participants' lexical breadth, depth, syntactic knowledge and L2 reading comprehension. The results indicated that for high-proficiency learners, syntactic knowledge was the stronger predictor, followed by lexical depth and breadth. For low-proficiency learners, a similar pattern was observed, with syntactic knowledge showing the strongest predictive power. The results of the current study have important implications for ESL teaching strategies, highlighting the need to focus on both syntax and vocabulary development to enhance L2 reading comprehension among Pakistani learners.

Keywords: Vocabulary, Reading Skills, Comprehension, Component Skills, Lexical Breadth

Introduction

For decades, reading comprehension and its various components have been the focus of extensive research in the field of L2 learning. Among these components, lexical and syntactic knowledge are known to influence the ability to comprehend texts the most (Bernhardt, 2010; Koda, 2005; Jeon & Yamashita, 2014).

Lexical knowledge involves an individual's understanding of vocabulary and the relationships between words in different contexts (Qian, 1998). It is often divided into two dimensions: lexical breadth, which refers to the number of words a person knows, and lexical depth, which refers to how well a person understands the meaning and use of those words (Taşçı & Turan, 2021). On the other hand, syntactic knowledge refers to an individual's understanding of grammar and sentence structure, which enables them to interpret how words are arranged in sentences to convey meaning (Taşçı & Turan, 2021).

Several studies have explored how lexical and syntactic knowledge contribute to reading comprehension. However, conflicting views exist regarding which of these two components is more significant. Some researchers, like Zhang (2012), Guo (2008), and Brisbois (1995), argue that lexical knowledge plays a larger role, while others, such as Maftoon and Tasnimi (2014), Atai and Nikuinezhad (2012), and Taşçı and Turan (2021), emphasize the greater significance of syntactic knowledge. In the Pakistani context, however, research is limited while studies like Uzair-ul-Hassan et al. (2022) focus on L1 reading comprehension, there is a noticeable gap in examining how lexical and syntactic knowledge influence L2 reading proficiency among Pakistani ESL learners. A study by Zia Ur Rehman (2022) focused on the relationship between L2 reading comprehension and lexical knowledge. However, this study did not address syntactic knowledge. The lack of such studies points out a gap in the existing research.

The current study aims to fill this gap by investigating whether the contribution of these components differs between learners with high and low reading proficiency. The findings of the current study will not only add to the existing body of knowledge but also aid teachers and curriculum developers in designing strategies to improve the ability to understand texts.

The independent variables included lexical breadth, lexical depth and syntactic knowledge. L2 reading comprehension was the dependent variable.

The current study aimed to answer the following research questions:

1. Which one of the independent variables is a stronger predictor of L2 reading comprehension of ESL learners with a high level of reading proficiency?
2. Which one of the independent variables is a stronger predictor of L2 reading comprehension of ESL learners with a low level of reading proficiency?
3. Is there any difference between ESL learners with high reading proficiency and low reading proficiency in terms of the influence of the independent variables?

Literature Review

Among the many components of reading, reading comprehension stands out as a crucial sub-skill. As defined by Grabe and Stoller (2013) and Taşçı and Turan (2021), it is the ability to not only grasp the literal meaning of words but also to comprehend and interpret the deeper meanings and relationships within a text.

The Component Skills approach by Carr and Levy (1990) sheds light on how differences between individuals can lead to differences in reading comprehension (Taşçı & Turan, 2021). Carr & Levy (1990) state that this approach provides a framework for investigating how variations in the elements of reading comprehension including knowledge of vocabulary, syntactic structures and fluency influence overall reading proficiency.

There are several components that constitute reading comprehension such as syntactic knowledge, lexical knowledge, intra-word awareness, recognition of words, orthographic knowledge and metacognition etc (Koda, 2005; Jeon & Yamashita, 2014). Among these components, the most significant are lexical knowledge and syntactic knowledge (Taşçı & Turan, 2021; Koda, 2005; Jeon & Yamashita, 2014; Nassaji, 2003; Bernhardt, 2010).

Several studies have investigated the influence of the knowledge of words. Anderson and Freebody (1981), Qian (1998), and Taşçı and Turan (2021) have greatly emphasized the importance of vocabulary in comprehending texts. However, there is ongoing debate regarding the significance of lexical depth and breadth. While some researchers, such as Meara and Jones (1988) and Binder et al. (2016) argue that lexical breadth is a more significant contributor, others like Ouellette (2006) and Beck et al. (1982) assert that depth is crucial. Qian (1999) and Schmitt (2014) advocate for the equal importance of both dimensions.

Extensive research has also been conducted to look into the relationship between syntactic knowledge and reading comprehension. Kim and Cho (2005), Atai and Nikuinezhad (2012), and Shiotsu and Weir (2007) highlight its significance and state that it is a stronger predictor of reading comprehension than lexical knowledge. Maftoon and Tasnimi (2014), Urquhart and Weir (1998) and Shiotsu and Weir (2007) also share this view.

Studies focusing on the relation of these two components with reading comprehension have revealed that there is variation in the contributions of these components depending on the learners' reading proficiency levels. According to Shiotsu and Weir (2007), learners, whether at high or low proficiency, depend more on their understanding of syntactic structures than on their vocabulary knowledge when interpreting texts. Kim and Cho (2015) also support this idea. Taşçı and Turan (2021) found that among all the components, the knowledge of words has the greatest influence on the ability to understand texts in individuals with lower levels of reading proficiency while syntactic knowledge was the most significant contributor in individuals with higher levels of reading proficiency.

The influence of lexical depth and breadth has also been observed to shift based on proficiency level. For example, Taşçı and Turan (2021) found that in high proficiency learners, the number of words that the participants knew had a greater influence than lexical depth, while in low proficiency learners, the opposite was true. Li and Kirby (2014) also suggest that learners with lower reading proficiency may rely more heavily on the deeper understanding of fewer words (lexical depth) as opposed to knowing many words at a basic level (lexical breadth).

Thus, while research agrees on the importance of both these components, the precise nature of their contribution, and how it varies with proficiency, is an area that requires further exploration.

Methodology

The current study was quantitative in nature and had a quasi-experimental research design. The *Component-skills approach* developed by Carr and Levy (1990) was employed to carry out the study. The study involved 100 gender-balanced students enrolled in randomly selected departments of the University of Sargodha at the undergraduate level. Four tests were utilized to collect data for the current study. Each of these tests focused on one of the variables of the study. The tests included a Reading Comprehension Test (RCT) that had been compiled from a retired TOEFL test, Vocabulary Levels Test (VLT) developed by Webb et al. (2017), Word Associates Test (WAT) developed by Read (1998), and a Syntactic Knowledge Test (SKT) that was based on the grammar section of the Examination for the Certificate of Proficiency in English (ECPE) by Cambridge Michigan Language Assessment. Before the participants took part in the research, they were assured that any information gathered would be used for research purposes only and would not be utilized for any other reasons.

On the basis of their scores in the RCT, two groups of the participants were made on the basis of their reading proficiency levels. The high reading proficiency group had 59 participants. This group included the participants who had scored 15 or more than 15 marks in the RCT. The second group had 41 participants. These participants had scored 14 or less than 14 marks in the RCT. SPSS was used to analyze the data.

Data Analysis

The High Reading Proficiency Group

A Pearson Product Moment correlation analysis was conducted to determine the nature of the relationship between the independent variables and L2 reading comprehension.

Table 1 *Pearson Correlation Analysis (G1)*

	RCT	VLT	WAT	SKT
RCT (G1)		0.389	0.412	0.507
VLT (G1)			0.850	0.454
WAT (G1)				0.585
SKT (G1)				

It was observed that all of the independent variables correlated positively with the dependent variable. The correlation coefficient between VLT and RCT was 0.389, which meant that there was a moderately positive correlation between these two variables. The correlation coefficient between WAT and RCT was 0.412. This showed that the correlation between RCT and WAT was stronger than the one between RCT and VLT. The correlation coefficient between RCT and SKT was 0.507. This meant that the relationship between the dependent variable and syntactic knowledge was strongly positive. Among all three independent variables, syntactic knowledge was observed to have the strongest correlation with the dependent variable. In terms of strength of correlation with the dependent variable, it was followed by lexical depth and then breadth.

The correlation coefficient between the three independent variables was also positive. The correlation coefficient between VLT and WAT was 0.850. The correlation coefficient between VLT and SKT was 0.454 while the correlation coefficient between WAT and SKT was 0.585. This meant that if one of the independent variables increased, then it would also cause an increase in the other independent variables. In other words, if an individual scored well on one test then there was a high possibility that he would score well on the other tests as well.

A bivariate regression analysis was conducted to determine how each independent variable individually influenced the dependent variable.

Table 2 *Bivariate regression analysis (G1)*

Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
Syntactic Knowledge (G1)	0.507	0.257	0.244	2.276
Lexical Knowledge (G1)	0.418	0.175	0.161	2.398

The value of the correlation coefficient R between syntactic knowledge and the dependent variable was 0.507, which indicated that there was a strongly positive correlation between them. The value of R square was 0.257 which meant that syntactic knowledge explained and predicted 25.7% of the variation in the scores of RCT. The adjusted R square value was 0.244. This meant that syntactic knowledge accurately explained 24.4% of the variation in the RCT scores. The value of standard error

of estimate was 2.276, which meant that the actual scores might deviate by approximately 2.276 points from the predicted scores.

The value of R for lexical knowledge was 0.418. This showed that lexical knowledge and the dependent variable were positively correlated. However, this correlation was not as strong as the one between syntactic knowledge and the dependent variable. The R square value was 0.175. This meant that lexical knowledge predicted 17.5% of the variation in the scores of the dependent variable. The adjusted R square value was 0.161. This meant that lexical knowledge accurately explained 16.1% of the variation in the RCT scores. The standard error of estimate was 2.398. This meant that the actual scores might deviate by 2.398 points from the predicted scores.

From the results of the bivariate analysis, it was observed that both syntactic knowledge and lexical knowledge were positively correlated with the dependent variable. However, knowledge of syntactic forms and structures was more strongly correlated with the dependent variable. Moreover, among the independent variables, syntactic knowledge contributed more to the dependent variable. Thus, the individuals in this group depended more on their syntactic knowledge to understand texts.

A multiple regression analysis was conducted in order to see how the three independent variables predicted the RCT scores.

Table 3 *Multiple Regression Analysis (G1)*

Model	R	R Square	Adjusted R Square	Standard Error of Estimate
1	0.538	0.289	0.250	2.267

Note. a. Predictors: (Constant), Syntactic Knowledge, Lexical Breadth, Lexical Depth

The R value was 0.538, which meant that there was a moderately positive correlation between the variables. The R square value was 0.289, which meant that the independent variables predicted 28.9% of the variance in the RCT scores. The adjusted R square was 0.250. Thus, the independent variables accurately predicted 25% of the variance in the scores of the dependent variable. The value of standard error of estimate was 2.267. This indicated that the actual RCT scores might deviate from the predicted scores by 2.267 points.

The standardized beta scores of the independent variables were calculated to determine how each independent variable individually predicted the value of the dependent variable.

Table 4 *Relative contribution of independent variables (G1)*

Model	B	Standard Error	ß
Lexical Breadth (G1)	0.062	0.065	0.206
Lexical Depth (G1)	-0.001	0.024	-0.007
Syntactic Knowledge (G1)	0.124	0.042	0.418

The value of the unstandardized beta value of lexical breadth was B=0.062. This meant that for every one-unit increase in lexical breadth, the RCT score would increase by 0.062 points. The standard error value was 0.065. The standardized beta value was ß=0.206. This meant that lexical breadth did contribute to the dependent variable but its contribution was not quite significant.

The value of the unstandardized beta score of lexical depth was B=-0.001. This meant that for each one-unit increase in lexical depth, the RCT scores would increase by 0.001 points. This effect was not quite significant as compared to the influence of lexical breadth on the dependent variable. The standard error value was 0.024 and the standardized beta value was ß=-0.007. The standardized beta score indicated that lexical depth had an almost negligible contribution to RCT scores.

For syntactic knowledge, the unstandardized beta value was B=0.124, which meant that for each one-unit increase in syntactic knowledge, the RCT scores would increase by 0.124 points. The standard error value was 0.042. The standardized value of beta was ß=0.418 and this indicated that syntactic knowledge had a strong contribution to the dependent variable.

From the beta scores of these three independent variables, it was observed that the knowledge of the rules of syntax contributed the most (B=0.124, ß=0.418). In the aspect of predictive power, syntactic knowledge was followed by lexical breadth (B=0.062, ß=0.206) and then lexical depth (B=-0.001, ß=-0.007).

Table 5 *Bivariate regression models (G1)*

Model	R	R Square	Adjusted R Square	Standard Error of Estimate
Lexical Breadth (G1)	0.389	0.152	0.137	2.432
Lexical Depth (G1)	0.412	0.170	0.155	2.406

For lexical breadth R= 0.389, which indicated that lexical breadth had a moderately strong correlation with the dependent variable. The value of R square was 0.152. This indicated that it

predicted 15.2% of the variation in the scores of RCT scores. The adjusted R square value was 0.137. Thus, lexical breadth predicted 13.7% of the variation in the RCT scores. The standard error of estimate was 2.432, which meant that the actual RCT scores might deviate from the predicted scores by approximately 2.432 points.

The value of the correlation coefficient of lexical depth was R=0.412. This indicated that lexical depth was positively correlated with the dependent variable. Moreover, the correlation between depth and the dependent variable was stronger than that of the correlation between breadth and the dependent variable. The value of R square was 0.170, which meant that lexical depth explained 17% of the variation in the RCT scores. The adjusted R square value was 0.155. Thus, lexical depth accurately explained 15.5% of the variation in the RCT scores. The value of standard error of estimate was 2.406, which meant that the actual RCT scores would deviate from the predicted scores by about 2.406 points.

The results of the bivariate analysis showed that in this group, in terms of the strength of predictive power, lexical depth was followed by breadth.

The Low Reading Proficiency Group

Table 6 *Pearson Correlation Analysis (G2)*

	RCT	**VLT**	**WAT**	**SKT**
RCT (G1)		0.268	0.533	0.647
VLT (G1)			0.066	0.479
WAT (G1)				0.436
SKT (G1)				

It was observed that all of the variables were positively correlated with each other. The correlation coefficient between RCT and VLT was 0.268, which indicated a weak correlation. The correlation coefficient between RCT and WAT was 0.533. This indicated that the correlation between RCT and WAT was stronger than the correlation between RCT and VLT. This was also the case in the participants with high reading proficiency because RCT and WAT (r=0.412) were more strongly correlated as compared to RCT and VLT (r=0.389). This meant that in all of the participants, the correlation between the dependent variable and lexical depth was stronger than that of breadth. The correlation coefficient between RCT and SKT in this group was 0.647, which indicated that these two variables had a strongly positive correlation. The correlation coefficient between VLT and WAT was 0.066, which meant that these two variables were weakly correlated. The correlation coefficient between VLT and SKT was 0.479, which meant that these two variables had a moderately positive correlation. The correlation coefficient between WAT and SKT was 0.436, which indicated that WAT and SKT were moderately correlated. The correlation between VLT and SKT was stronger than the correlation between WAT and SKT. In the case of the other group, the correlation between WAT and SKT (r= 0.585) was stronger than the correlation between VLT and SKT (r=0.454).

From the results of the correlation analysis, it was observed that in the low reading proficiency group, SKT had the strongest correlation with RCT. SKT was followed in the strength of correlation by WAT which was followed by VLT. Thus, in the low reading proficiency group, syntactic knowledge had the strongest correlation with RCT while VLT had the weakest correlation with RCT. A similar pattern of strength of correlations was observed in the high reading proficiency group where RCT and SKT (0.507) had the strongest correlation. RCT and WAT (r=0.412) had the second strongest correlation in the high reading proficiency and this was followed by RCT and VLT (r=0.389). Thus, the knowledge of syntactic forms and structures had the strongest relationship with the dependent variable. This indicated that the participants depended more on syntactic knowledge as compared to lexical knowledge for comprehending texts.

Table 7 *Bivariate regression models (G2)*

Model	**R**	**R Square**	**Adjusted R Square**	**Standard Error of Estimate**
Lexical Knowledge (G2)	0.582	0.338	0.321	2.222
Syntactic Knowledge (G2)	0.647	0.418	0.403	2.083

For lexical knowledge, the value of R was R=0.582, which indicated that it was positively correlated with the dependent variable. The value of R square was 0.338. This indicated that almost 33.8% of the differences in the participants' RCT scores were linked to their lexical knowledge. The adjusted R square value was 0.321. Thus, 32.1% of the variation in the scores of the participants' RCT scores was linked to their lexical knowledge. The value of standard error of estimate of lexical

knowledge was 2.222, which meant that the actual scores of the participants in the reading comprehension tests deviated from the predicted scores by 2.222 points.

The correlation coefficient between syntactic knowledge and L2 reading comprehension was 0.647, which meant that these two variables were strongly correlated. The value of R square was 0.418. This meant that syntactic knowledge predicted 41.8% of the variation in the RCT scores. The adjusted R square value was 0.403. This meant that syntactic knowledge accurately predicted 40.3% of the variation in the RCT scores. The value of standard error of estimate was 2.083. This meant that the actual RCT scores deviated by 2.083 points from the predicted scores.

From the results of the bivariate analysis, it was observed that syntactic knowledge was the most significant contributor to the dependent variable in this group. The contribution of knowledge of words was also significant but it was lesser as compared to the contribution of syntactic knowledge. A similar pattern was also observed in the other group.

Table 8 *Multiple regression analysis (G2)*

Model	R	R Square	Adjusted R Square	Standard Error of Estimate
1	0.704	0.496	0.455	1.991

Note. Predictors: (Constant), Syntactic Knowledge, Lexical Depth, Lexical Breadth

The value of R was 0.704, which meant that the three independent variables had a strongly positive correlation with L2 reading comprehension. The value of R square was 0.496. This entailed that the independent variables predicted 49.6% of the variation in the RCT scores. Thus, almost half of the differences in the participants' RCT scores could be accounted for by these three predictors. The adjusted R square value was 0.455. This meant that they accurately explained 45.5% of the variation in the RCT scores. The value of standard error of estimate was 1.991, which meant that the actual RCT scores deviated from the predicted scores by 1.991 points.

Table 9 *Relative contribution of independent variables (G2)*

Model	B	Standard Error	ß
Lexical Breadth (G2)	0.001	0.032	0.003
Lexical Depth (G2)	0.034	0.014	0.310
Syntactic Knowledge (G2)	0.192	0.057	0.510

The unstandardized beta score for lexical breadth was B=0.001, which meant that for each one-unit increase in lexical breadth, the RCT scores would increase by 0.001 points. The value of standard error was 0.032 and the standardized beta score was ß=0.003, which indicated that the variation caused by lexical breadth was not quite significant.

The unstandardized beta score for lexical depth was B=0.034. This indicated that on every one-unit increase in lexical depth, the RCT scores would increase by 0.034 points. This showed that the influence of lexical depth on the dependent variable was greater than the influence of lexical breadth. The standard error value was 0.014. The standardized beta score was ß=0.310, which meant that it had a substantial influence on L2 reading comprehension.

The unstandardized beta score for syntactic knowledge was B=0.192, which meant that for every one-unit increase in syntactic knowledge, the RCT scores would increase by 0.192 points. The value of the standard error was 0.057. The value of the standardized beta score was ß=0.510. This meant that syntactic knowledge had a very significant influence on L2 reading comprehension.

The beta scores showed that in this group, the knowledge of syntactic forms and structures had the most influence on the dependent variable (B=0.192, ß=0.510). Syntactic knowledge was followed in the strength of predictive power by lexical depth (B=0.034, ß=0.310). Among the three predictors, the weakest one was lexical breadth (B=0.034, ß=0.003).

Table 10 *Bivariate regression models (G2)*

Model	R	R Square	Adjusted R square	Standard Error of Estimate
Lexical Breadth (G2)	0.268	0.072	0.048	2.631
Lexical Depth (G2)	0.533	0.284	0.266	2.311

The value of R for lexical breadth and the dependent variable was 0.268. This meant that these two variables were positively correlated but their correlation was not quite strong. The value of adjusted R square was 0.048. This meant that lexical breadth accurately predicted 4.8% of the variation in the RCT scores. The value of standard error of estimate was 2.631. This meant that the actual scores of RCT deviated from the predicted scores by 2.631 points.

The value of R for lexical depth and the dependent variable was 0.533 and this meant that there was a moderately strong relationship between these two variables. The value of the adjusted R square was 0.266. Thus, lexical depth accurately explained 26.6% of the variation in the RCT. The value of standard error of estimate was 2.311, which meant that the actual RCT scores deviated from the predicted scores by 2.311 points.

From the results of the bivariate regression analysis, it was observed that in the low reading proficiency group, lexical depth had a greater influence on the dependent variable as compared to lexical breadth. A similar pattern was also observed in the other group.

Conclusion

The findings of the study revealed that the contribution of lexical and syntactic knowledge did not change and remained similar in both the high and low reading proficiency groups. In both cases, the knowledge of syntactic structures and forms was observed to be the strongest predictor, followed by lexical depth, with lexical breadth contributing the least.

These results suggest that Pakistani ESL learners regardless of their reading proficiency rely more heavily on the knowledge of syntactic structures and forms than on vocabulary knowledge to comprehend texts. While lexical knowledge still plays a role, particularly lexical depth, it is syntactic competence that most significantly supports the ability to understand texts.

The above insights highlight the importance of syntactic knowledge and lexical knowledge for developing and enhancing the ability to understand texts. Not only do they add to the existing body of knowledge but they also provide useful insights for course and curriculum developers. Based on these findings, teachers and curriculum developers should prioritize improving syntactic knowledge alongside lexical knowledge in order to enhance the reading proficiency of ESL learners in Pakistan.

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