THE ROLE OF L2 LEXICAL AND SYNTACTIC KNOWLEDGE IN L2 READING COMPREHENSION OF TURKISH EFL LEARNERS

PhD DISSERTATION

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Eskişehir 2019

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May 2019

JÜRİ VE ENSTİTÜ ONAYI

Samet TAŞÇI'nın "The Role of L2 Lexical and Syntactic Knowledge in L2 Reading Comprehension of Turkish EFL Learners" başlıklı tezi 19.04.2019 tarihinde aşağıdaki jüri tarafından değerlendirilerek "Anadolu Üniversitesi Lisansüstü Eğitim-Öğretim ve Sınav Yönetmeliği"nin ilgili maddeleri uyarınca Yabancı Diller Eğitimi Anabilim Dalı İngilizce Öğretmenliği Programında, Doktora tezi olarak kabul edilmiştir.

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ABSTRACT

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Anadolu University, Graduate School of Educational Sciences, May 2019
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The primary objective of the current study is to investigate the role of L2 lexical (breadth and depth) and syntactic knowledge in L2 reading comprehension of adult Turkish EFL learners. Moreover, the study aims to find out the contribution of L2 lexical and syntactic knowledge to L2 reading comprehension of Turkish EFL students having different L2 reading proficiency levels. With these purposes, the data of the study were collected through a Reading Comprehension Test compiled from TOEFL, Vocabulary Levels Test, Word Associates Test, and Syntactic Knowledge Test from 254 Turkish university students learning English as a foreign language. After the data gathered from the whole sample were analyzed, the participants were divided into two groups based on their reading comprehension test scores. The results of the study showed that although vocabulary breadth, depth and syntactic knowledge positively and significantly correlated with L2 reading comprehension, only vocabulary breadth and syntactic knowledge predicted L2 reading comprehension of the whole sample. Moreover, the predictive power of syntactic knowledge was found to be higher than that of vocabulary breadth. Similarly, syntactic knowledge outperformed in terms of predictive power in L2 reading comprehension of the participants having high reading comprehension level. On the other hand, only vocabulary breadth made the largest and significant contribution to L2 reading comprehension of the participants with low reading comprehension level.

Keywords: L2 reading comprehension, Lexical knowledge, Syntactic knowledge, Turkish EFL learners.

ÖZET

İNGİLİZCEYİ YABANCI DİL OLARAK ÖĞRENEN TÜRK ÖĞRENCİLERİN İNGİLİZCE OKUDUĞUNU ANLAMA BECERİSİNDE İNGİLİZCE SÖZCÜK VE YAPI BİLGİSİNİN ROLÜ

SAMET TAŞÇI

Yabacı Diller Eğitimi Anabilim Dalı
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Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Mayıs 2019
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Bu çalışmanın amacı İngilizce öğrenen Türk öğrencilerin sözcük bilgisinin (sözcük dağarcığı ve derinliği) ve yapı bilgisinin İngilizce okuma becerisine katkısını ortaya çıkarmaktır. Bunun yanı sıra, bu çalışma farklı okuduğunu anlama düzeylerine sahip İngilizceyi öğrenen Türk öğrencilerin okuma becerisinde İngilizce sözcük ve yapı bilgisinin katkısını bulmayı amaçlamaktadır. Bu çalışmanın verisi İngilizce Okuduğunu Anlama, Sözcük Düzey, Sözcük İlişkilendirme, ve Yapı Bilgisi Testleri kullanılarak toplanmıştır. Bu çalışmaya Anadolu Üniversitesi İngilizce Öğretmenliği Bölümünde okuyan 254 öğrenci katılmıştır. Toplanan veri çözümlendikten sonra katılımcılar İngilizce okuduğunu anlama test sonuçlarına göre üst ve düşük düzey olarak iki gruba ayrılmıştır. Bu çalışma, İngilizce sözcük dağarcığı, sözcük derinliği ve İngilizce yapı bilgisi ile İngilizce okuduğunu anlama becerisi arasında anlamlı ve olumlu bir ilişki olmasına rağmen, sadece İngilizce sözcük dağarcığı ve İngilizce yapı bilgisinin İngilizce okuduğunu anlama becerisine katkı sağladığını ortaya çıkarmıştır. Benzer şekilde, İyi düzeyde anlayan öğrenciler için İngilizce yapı bilgisi okuma becerisine katkısı sözcük dağarcığından daha fazla olduğu ortaya çıkmıştır. Okuduğunu düşük düzeyde anlayan öğrencilerin İngilizce okuma becerisinde sadece İngilizce sözcük dağarcığının daha fazla ve anlamlı katkı sağladığı ortaya çıkmıştır. Ayrıca, bu çalışmanın katılımcıları için İngilizce sözcük derinliğinin İngilizce okuduğunu anlama yetisinde önemli katkısı olan bir bileşen olmadığı saptanmıştır.

Anahtar Kelimeler: İngilizce okuduğunu anlama becerisi, Sözcük bilgisi, Yapı bilgisi, İngilizceyi yabancı dil olarak öğrenen yetişkin Türk öğrenciler.

ACKNOWLEDGEMENTS

I would like to sincerely express appreciation all the people around me, without whom this thesis would not have been written.

First of all, I would like to thank my supervisor, Prof. Dr. Ümit Deniz TURAN, for her continuous support, fruitful guidance, constant encouragement, and conscientious feedback throughout this process. She always supported and motivated me when I felt hopeless. Without hesitation, and with great patience, she answered all my questions and led me during this process. I am absolutely honored to be her student and to have learned from her. This thesis would not have been completed without her invaluable guidance and persistent help.

I would like to extend my gratitude to my thesis committee members, Assoc. Prof. Dr. Zehra GÜLMÜŞ, Assist. Prof. Dr. Gonca SUBAŞI, Prof. Dr. Gülsev PAKKAN, and Assist. Prof. Dr. Elif ARICA AKKÖK for their feedback, comments, and contributions to this thesis.

I would like to offer my special thanks to Assoc. Prof. Dr. Özgür YILDIRIM for his help in the statistical analysis process of this thesis. I also owe many thanks to Prof. Dr. Gül DURMUŞOĞLU KÖSE and Prof. Dr. Zülal BALPINAR for their constrictive criticism. Also, I want to thank all my teachers at Anadolu University Graduate School of Educational Sciences, Department of Foreign Language Education, English Language Teaching Program, who have helped me so far to gain knowledge and awareness into teaching English as a foreign language throughout my graduate study. It has been a great opportunity for me to have studied and worked at this privileged department for about four years. Special thanks are also extended to all the staff at ELT Department of Anadolu University

I also owe many thanks to my dear friends, Res. Asst. Tuncay KARALIK, Res. Asst. Musa TÖMEN, Asst. Prof. Dr. Yusuf ÖZTÜRK, Asst. Prof Dr. Muhammet Bahadır AYAS, Inst. Barış DİNÇER, Inst. Çağlar ARİZ, and Inst. Fatma AKSOY AYDIN for their help, cooperation, and encouragement in many stages of this work. I would like to thank Jacqueline PETERSON for her help in proofreading

Besides, I am very thankful to students of ELT departments at Anadolu University and Nevşehir Hacı Bektaş Veli University for their contributions. I also would like to thank all my colleagues at Nevşehir Hacı Bektaş Veli University.

Above all, I wish to express my deepest gratitude to my parents, Edibe TAŞÇI and Cihad TAŞÇI. Your support and unconditional love has given me the confidence to succeed. Most importantly, I would like to thank my beloved wife, Buket DEVECİ TAŞÇI because this thesis would not be possible without her love, patience and understanding. Thank you for being in my life and giving meaning to it!

Finally, I have to present my sincere thanks to the Scientific and Technological Research Council of Turkey (TÜBİTAK) for their contribution to the improvement of science by funding the future scientists.

Samet TAŞÇI

Eskişehir 2019

08/05/2019

STATEMENT OF COMPLIANCE WITH ETHICAL PRINCIPLES AND RULES

I hereby truthfully declare that this thesis is an original work prepared by me; that I have behaved in accordance with the scientific ethical principles and rules throughout the stages of preparation, data collection, analysis and presentation of my work; that I have cited the sources of all the data and information that could be obtained within the scope of this study, and included these sources in the references section; and that this study has been scanned for plagiarism with "scientific plagiarism detection program" used by Anadolu University, and that "it does not have any plagiarism" whatsoever. I also declare that, if a case contrary to my declaration is detected in my work at any time, I hereby express my consent to all the ethical and legal consequences that are involved.

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LIST OF ABBREVIATIONS

AERT	: The Advanced English Reading Test
CET	: College English Test
EAP	: English for Academic Purpose
ECPE	: The Examination for the Certificate of Proficiency in English)
EFL	: English as a Foreign Language
ESL	: English as a Second Language
FCE	: First Certificate in English
GEPT	: General English Proficiency Test
GMRT	: Gates-MacGinite Reading Test
HR	: High Reading Group
IR	: Intermediate Reading Group
L1	: First Language
L2	: Second Language
LR	: Low Reading Group
OSYM	: Student Selection and Placement Center
PET	: Preliminary English Test
Q1	: First Quartile
Q3	: Third Quartile
RCT	: Reading Comprehension Test
SEM	: Structural Equation Modelling
SKT	: Syntactic Knowledge Test
TEEP	: Test of English for Educational Purpose
TOEFL	: Test of English as a Foreign Language
VLT	: Vocabulary Levels Test
WAT	: Word Associates Test
WRAT	: Wide Range Achievement Test

1. INTRODUCTION

1.1. Background to the Study

Reading in a foreign language is accepted as crucial for various reasons such as education, professional success, and personal development (Oakhill, Cain, and Elbro, 2015). In particular, it is an important skill not only for learning or academic achievement, but also for language proficiency in general because inadequate reading proficiency prevents students from attaining essential tools for further reading which, in turn, causes them to suffer academically (Koda and Zehler, 2008). Various studies have even suggested that reading is the most important skill needed by L2 students for academic success (Chen, 2014; Ostler, 1980; Robertson, 1983). Being such an important skill, second language reading has grasped the attention of researchers in the field of second language acquisition and linguistics for many years.

Although many studies have been conducted, and significant progress has been made over the last decades, there is not yet a comprehensive theory that allows us to understand the nature of second language reading in its entirely. This is due to the complexity of reading as a skill and the fact that it requires various sub-skills, and requires the operation of multiple cognitive processes working together at the same time (Koda, 2005; Grabe, 2009; Jeon and Yamashita, 2014). This complexity has led researchers to investigate and analyze the nature of these components in reading comprehension, separately. The *component-skill approach* (Carr and Levy, 1990) provides a clear picture of the building blocks of reading comprehension and is also essential for understanding the fluent reading process (Grabe, 2009; Koda, 2005; Perfetti, 1999; Stanovich, 2000). The Component-skill approach has been used in the field to find out the contribution of each component to L2 reading comprehension. Among these components, the sources of linguistic knowledge, namely lexical and syntactic knowledge, have been commonly studied as the components of L2 reading comprehension and found to be essential in second language reading comprehension. In other words, in order to comprehend a text, second language learners must show mastery of linguistic knowledge (Carrell, 1998; Shiotsu, 2010; Shiotsu and Weir, 2007; Yalin and Wei, 2011; Zhang, 2012).

Among the sources of linguistic knowledge, lexical knowledge seems to be a vital component for L2 reading comprehension (Koda 1989; Laufer, 1997; Qian, 1999; Richard and Rodgers, 2001;). Moreover, some second language researchers accept lexical knowledge as a prerequisite for the improvement of other language skills (Gass and

Selinker, 2008; Nation, 2006; Read, 2000). Laufer (1997, p. 20) stated "no text comprehension is possible, either in one's native language or in a foreign language without understanding the text's vocabulary". In other words, without knowing the meaning of words, readers would have difficulty in comprehending a text. Researchers have therefore become concerned with the measuring the vocabulary breadth (size) required to achieve various levels of reading comprehension in L2 learners. Laufer (1992) measured L2 vocabulary knowledge of first year university students and found out that knowing at least 3000-word families (5000 lexical items) are necessary to read in a second language in a satisfactory manner. Hirsh and Nation (1992) analyzed three unsimplified short novels to reveal the required L2 vocabulary size for pleasure reading and they concluded that 5000-word families would be needed to achieve this task. Nation (2006) stated that in order to comprehend a wide range of authentic written texts without the help of dictionary or other sources, 8000-9000-word families would be needed. Thus, these studies showed that vocabulary size is a crucial component for L2 reading comprehension.

The aforementioned studies primarily focused on how big the vocabulary size of L2 learners is rather than how well they know and use vocabulary. Accordingly, this quantity-based approach neglected the other dimension of vocabulary knowledge (i.e., vocabulary depth) that L2 learners should be equipped with. According to Qian (2002), although the two dimensions of vocabulary knowledge are conceptually and empirically interrelated and operate interdependently, the measure of vocabulary depth also plays an important role in the level of one's L2 reading comprehension abilities. Therefore, these two dimensions should be treated equally in exploring the role of vocabulary knowledge in reading comprehension. Qian (1999) investigated the relationship between vocabulary breadth and depth and their contribution to L2 reading comprehension. The study showed that both vocabulary depth and breadth highly correlated with L2 reading comprehension, with vocabulary depth specifically making a unique contribution in its ability to predict L2 reading comprehension. Emphasizing the importance of vocabulary depth in the process of L2 reading comprehension, Qian (2002) suggested that vocabulary depth is as important as vocabulary breadth in predicting the performance of L2 academic reading comprehension.

Although vocabulary size and vocabulary depth are essential components of L2 reading comprehension, they still do not exclusively guarantee success in L2 reading

comprehension. Thus Read (2000, p. 83) noted that "scholars who carry out research on vocabulary size are not claiming that learners can meet their language needs simply by increasing the number of words they know". There is another important component of L2 reading comprehension, i.e., syntactic (grammatical) knowledge. According to Grabe (2009, p. 199), low-proficiency readers, especially L2 students, have problems in sentence level comprehension if they do not have grammatical knowledge and stated, "grammar-knowledge resources are critical even at very advanced levels of comprehension". In other words, fluent readers almost always use their grammatical knowledge in the process of parsing clauses for structural information but they are not generally aware of it. However, poor L2 readers are aware of the process when they do not have grammatical knowledge resources. According to Koda (2005, p. 258) "syntactic knowledge is a major element, explaining performance differences in L2 reading, and can cause serious comprehension problems". The findings of these studies show that syntactic knowledge is also a vital component for L2 reading comprehension irrespective of L2 learners' proficiency level.

Jeon and Yamashita (2014) conducted a meta-analysis and examined 10 components of L2 reading comprehension (L2 grammar knowledge, L2 vocabulary knowledge, L2 decoding, L1 reading comprehension, L2 phonological awareness, L2 orthographic knowledge, L2 morphological knowledge, L2 listening comprehension, working memory, and metacognition). The study revealed that L2 grammar and vocabulary knowledge are equally important components and the most important predictors of L2 reading comprehension, reflecting the significance of these two variables. However, there are two opposing views regarding the importance of lexical vs. syntactic knowledge in the literature. Although some studies comparing the importance of lexical and syntactic knowledge found that syntactic knowledge is a more important component for L2 reading comprehension (Alderson, 1984; Dwaik, 1997; Shiotsu, 2010; Shiotsu and Weir, 2007; Yalin and Wei, 2011), others maintain that lexical knowledge is a more important predictor (Alderson, 2000; Brisbois, 1995; Chen, 2009; Daneman, 1991; Guo, 2008; Nassaji, 2003; Shin and Kim, 2012; Zhang, 2012). Therefore, this study will show an attempt to explore the relationship among EFL learners' vocabulary knowledge (breadth and depth) and syntactic knowledge and their reading comprehension.

1.2. Definitions of the Key Constructs

In this section, the definitions of the key constructs will be given briefly. The constructs will further be elaborated in the literature review section.

Lexical knowledge is an incremental process in which learners add information about words (the knowledge of spoken, written, use, morphological, meaning, collocation, specific use, register, and social context of a word) to their mental lexicon (Cronbach, 1942; Richards, 1976; Nation 1990, 2001). The tests applied to measure lexical knowledge depend upon the definition of the term. Lexical knowledge and vocabulary knowledge have been used interchangeably in the current study.

Vocabulary breadth is the knowledge of learners' total vocabulary. Vocabulary breadth pertains to how big the vocabulary knowledge of a learner is. Generally, the Vocabulary Levels Test (Schmitt, Schmitt and Claphan, 2001) is applied to measure the vocabulary size of learners.

Vocabulary depth is a measurement on how well a learner knows a word or the quality of word knowledge. Generally, the Word Associates Test (Read, 1998) is used to measure the knowledge of a word.

Syntactic knowledge has been defined in many different ways in the literature. For the purpose of this study, syntactic knowledge has been defined as the way words are put together to form meaningful sentences. Therefore, syntactic knowledge in this study is related to the knowledge of some set of rules that enable readers to construct meaning from a written text. The definition here shows that syntactic knowledge is related to the ability to distinguish well-formed structures from ill-formed ones and to construct meaning from written texts. In the present study, syntactic knowledge is used interchangeably with grammatical knowledge. Detailed explanations about syntactic knowledge and the components of syntactic knowledge will be presented in the literature review section.

1.3. Statement of the Problems

The rationale of the present study is built upon three considerations. First of all, L2 reading comprehension is essential for academic achievement or language proficiency in general and L2 learners need to maintain fluency and accuracy in L2 reading comprehension. However, it is not an easy skill for many EFL learners because L2 reading comprehension is multifaceted and involves the interaction of various cognitive

sub-skills. Among these various cognitive sub-skills, L2 linguistic knowledge, i.e., lexical and syntactic knowledge, was found to be the best predictor of L2 reading comprehension (Jeon and Yamashita, 2014). Most researchers believe that deficiencies in lexical and syntactic knowledge cause difficulty in understanding L2 texts (Gass and Selinker, 2008; Laufer, 1997; Nation, 2006; Richard and Rodgers, 2001). Even learners with high lexical or syntactic knowledge may have difficulty in understanding L2 texts. Despite such significance, the role of lexical and syntactic knowledge in L2 reading comprehension seems to be inconclusive. Hence, second language teachers and researchers seek ways to overcome the problems learners face in the process of L2 reading comprehension. As knowing the relative contribution of these important components to L2 reading comprehension can provide practical implications for instructors to better address L2 learners' needs and adjust teaching materials and techniques according to their role in L2 reading comprehension (Koda, 2007).

The second consideration underlying the current study is the role of the different dimensions of lexical knowledge. Although lexical knowledge was stated to be crucial in L2 reading and have close relationship with L2 reading comprehension (Hu and Nation, 2000; Laufer, 1992), it is not an easy and unidimensional construct. Lexical knowledge includes breadth and depth dimensions. However, previous studies generally focused only on the breadth dimension of lexical knowledge. Without disentangling the effects of the subcomponents of lexical knowledge with more refined construct definition, it is difficult to develop a clear understanding of how the two dimensions of lexical knowledge are deployed in L2 reading comprehension (Zhang, 2012).

The last consideration is the interaction between the reader and the text that L2 reading comprehension requires (Meyer and Freedle, 1984), as achievement in reading comprehension is affected by reader-based and text-based variables. Text-based variables affecting L2 reading comprehension are "the structural complexity, the semantic and/or pragmatic content, the rhetorical organization, the literary genre of the text, and level of formality" (Kaya-Carton and Carton, 1986). Although these variables may affect L2 reading comprehension, meaning cannot be constructed without the reader. In other words, the reader, not the text, possesses and uses required knowledge to understand a written text. According to the Construction-Integration model (Kintsch, 1988), lexical and syntactic knowledge is very important in the construction phase, where text-based propositions are built to eventually support the integration phase. If readers generate

inaccurate and/or incomplete propositions, the integration phase would be severely impaired (Koda, 2007). In other words, the quality of the propositions depends on the syntactic and lexical knowledge of the readers. Consequently, examining reader-based variables, such as lexical and syntactic knowledge, independent of text-based variables will contribute to develop a more cohesive view of reading comprehension (Bernhardt, 1991). To determine the extent of syntactic and lexical knowledge of the learners who possess different degrees of L2 reading comprehension will thus help to better explain their role in L2 reading comprehension.

1.4. Aims and Research Questions

The current study aims to find out the predictive power of lexical knowledge and syntactic knowledge in the L2 reading comprehension of adult Turkish EFL learners. This study then subsequently aims to reveal the contribution of these variables to L2 reading comprehension of learners with different L2 reading proficiency levels, namely high reading proficiency and low reading proficiency. The lexical knowledge was divided into two aspects: lexical depth and lexical breadth. Lastly, this study will also seek unique contribution of depth and breadth of vocabulary knowledge in one's L2 reading comprehension capabilities. The research questions addressed in this study are as follows:

1. What is the role of lexical and syntactic knowledge in L2 reading comprehension of EFL learners?
    a. What is the relationship among vocabulary breadth, depth, syntactic knowledge, and L2 reading comprehension of EFL learners?
    b. Which one of the variables, namely lexical or syntactic knowledge, is a stronger predictor of L2 reading comprehension of EFL learners?
    c. Which one of the variables, namely vocabulary breadth, depth or syntactic knowledge, is a stronger predictor of L2 reading comprehension of EFL learners?
2. What is the role of lexical and syntactic knowledge in L2 reading comprehension of EFL learners with high level reading proficiency?
    a. What is the relationship among vocabulary breadth, depth, syntactic knowledge, and L2 reading comprehension of EFL learners with high-level reading proficiency?

b. Which one of the variables, namely lexical or syntactic knowledge, is a stronger predictor of L2 reading comprehension of EFL learners with high-level reading proficiency?
c. Which one of the variables, namely vocabulary breadth, depth or syntactic knowledge, is a stronger predictor of L2 reading comprehension of EFL learners with high-level reading proficiency?

3. What is the role of lexical and syntactic knowledge in L2 reading comprehension of EFL learners with low level reading proficiency?
   a. What is the relationship among vocabulary breadth, depth, syntactic knowledge, and L2 reading comprehension of EFL learners with low level reading proficiency?
   b. Which one of the variables, namely lexical or syntactic knowledge, is a stronger predictor of L2 reading comprehension of EFL learners with low level reading proficiency?
   c. Which one of the variables, vocabulary breadth, depth or syntactic knowledge, is a stronger predictor of L2 reading comprehension of EFL learners with low level reading proficiency?

4. Is there any difference between the learners with high reading proficiency and low reading proficiency in terms of contribution of lexical and syntactic knowledge?

1.5. Significance of the Study

This study is thought to be significant and essential for several reasons. First of all, the majority of the studies in the literature focused on the contribution of either syntactic knowledge or lexical knowledge to L2 reading comprehension (Laufer, 1992), or many of the previous studies investigated the role of L2 proficiency or L2 linguistic knowledge in L2 reading comprehension by incorporating lexical and syntactic knowledge as an index of students' L2 proficiency (Lee and Schallert 1997). The number of the studies focusing on the independent contribution of syntactic and lexical knowledge to L2 reading comprehension however is limited. Therefore, it is necessary to examine the contribution of both variables independently to L2 reading comprehension. Moreover, most studies investigating the contribution of lexical knowledge are superficial, focusing on lexical knowledge overall rather than the two dimensions; depth and breadth specifically. Thus, the present study is also significant for its treatment of vocabulary

depth and breadth as individual components to get a more in-depth understanding about the nature of L2 reading comprehension.

Furthermore, the previous studies investigating the role of lexical and syntactic knowledge in L2 reading comprehension do not provide consistent results. These mixed findings do not offer clear evidence to support the superiority of syntactic or lexical knowledge in L2 reading comprehension of any particular group of L2 learners. There might be a number of reasons of this inconsistency such as various L1 backgrounds, sample sizes, different methods or analysis used in these studies, L2 proficiency or other variables affecting the results. Thus, the results of the previous studies may fail to be generalizable to other L1 contexts.

It is also worth mentioning that in the literature, the studies focusing on the relationship of lexical and syntactic knowledge, and different levels of L2 reading proficiency are very limited. As L2 reading proficiency of the learners change, the contribution of lexical and syntactic knowledge may also change. This study also investigates the predictive power of lexical and syntactic knowledge in L2 reading comprehension of students which have different L2 reading proficiency levels.

Last but not least, although conducted in different L1 backgrounds, the studies focusing on the role of lexical and syntactic knowledge in a Turkish context is extremely limited. Thus, it is believed that this study will fill a gap in the literature in terms of understanding the nature of lexical knowledge and syntactic knowledge and their contribution to L2 reading comprehension.

2. REVIEW OF THE LITERATURE

This chapter falls into four parts. The first part of the chapter gives the definitions and theories of L2 reading and L2 reading comprehension. The second part of this chapter examines the relationship between L2 lexical knowledge and L2 reading comprehension. The third part investigates the border of syntactic knowledge and deals with the contributions of syntactic knowledge to L2 reading comprehension. The last part gives a historical overview of research literature concerning the contribution of syntactic knowledge to L2 reading comprehension.

2.1. The Nature of Reading Comprehension

Reading is a complex cognitive process and involves many sub-skills. Therefore, it does not have a single, complete definition. Reading has been defined in many different ways in the literature; however, in the basic sense reading is "dealing with the language messages in written or printed form" (Urquhart and Weir, 1998, p. 14). The definition of Urquhart and Weir (1998) seems to be narrow because while dealing with the language messages in written form, readers make use of many different sub-skills and components of reading such as processing or decoding. In another definition of reading, Perfetti (1985, p. 16) noted that reading is "the skill of transforming printed words into spoken words". Accordingly, Perfetti emphasized the role of *decoding* in the reading process. As one may decode a text perfectly without comprehending it, this definition restricts the components and the scope of reading. Here, we can conclude that decoding may be an important component of reading but not the whole process of it.

Some other definitions of reading have emphasized the necessity of comprehending the messages of a text and focused on the cognitive processes carried out by the reader interacting with a text. For example, Widdowson (1979, p. 17) has defined reading as "the process of getting linguistic information via print". The definition of Widdowson is also problematic because the reader does not only get linguistic information, namely syntax, lexis, and morphology, but the messages or information carried out by linguistic messages via print. Thus, reading can be defined as getting the message of the text by using linguistic information such as syntactic, lexical, and morphological knowledge of the reader. Comparing the definitions of Perfetti and Widdowson, it can be seen that there has been a shift from decoding to the importance of how a reader receives and interprets the reading text.

In a similar manner, Nuttall (1996, p. 3) focused on meaning and explained reading as the process of extracting meaning from a text and "the transfer of messages from writer to the reader". Urquhart and Weir (1998, p. 22) indicated that reading is "the process of receiving and interpreting information encoded in language form via the medium of print. According to Koda (2005, p. 4) "comprehension occurs when the reader extracts and integrates various information from the text and combines it with what is already known". Koda emphasized the meaning construction process of the reader by using the information found in the text and the integration process of this knowledge with background knowledge of the reader.

Lately, not only comprehension but the interactive processes, including the features of readers, texts and tasks, have been the center of focus in understanding the nature of reading comprehension. For example, Grabe (2009, p. 15) noted that in the reading process, the reader "actively constructs the meaning of the text by comprehending what the writer intends and by interpreting it in terms of the background knowledge activated by the reader". Thus, reading is no longer regarded as the decoding of a script or a series of written symbols but rather as an interactive process between the writer and the reader to construct meaning. In this meaning construction process, Urquhart and Weir (1998, p. 18) listed the required cognitive aspects such as "reading strategies, inferencing, memory, relating text to background knowledge, as well as decoding, and obvious language aspects as syntax and lexical knowledge". As there are different purposes of reading and different processes have roles in reading comprehension, no single definition of reading can capture the complexity of reading. Grabe (2014) explained the processes of reading in a more comprehensive way as follows:

> "Reading comprehension involves abilities to recognize words rapidly and efficiently, develop and use a very large recognition vocabulary, process sentences in order to build comprehension, engage a range of strategic processes and underlying cognitive skills (e.g., setting goals, changing goals flexibly, monitoring comprehension), interpret meaning in relation to background knowledge, interpret and evaluate texts in line with reader goals and purposes, and process texts fluently over an extended period of time" (Grabe, 2014, p.8).

The definitions given here might provide an idea of how learners process information in reading, but in order to understand the complex nature of reading comprehension more profoundly, the next section will review several models used in L2 reading.

2.1.1. L2 Reading models

As stated by Carrell and Grabe (2002, p. 233), "reading, as is true of all aspects of language knowledge and use, is complex and the development of fluent reading abilities by L2 students is a challenging undertaking". This is the reason why L2 reading comprehension gets the attention of many researchers in the field of second language teaching and linguistics. In order to understand and explain the process of reading, factors involved in reading, and the complex nature of L2 reading, researchers have attempted to develop many reading models. "Models characterize theories of reading, providing ways to represent a theory or a part of theory; they explain what reading involves, and in more detailed versions, how reading works (Sadoski and Paivio, 2007, as cited in Grabe, 2009, p. 83). In other words, reading models try to explain what happens in readers' mind during reading and which variables contribute to reading comprehension. These models have generally been developed for reading in one's first language (L1), with a handful having been applied to L2 reading as well. Reading models are broadly classified into two categories: 1) process models, and 2) componential models. While process models aim to explain the process of reading as a cognitive activity operation in real time (Weir, Huizhong, and Yun, 2000, p. 15), the componential models try to find out the required components that contribute to the reading process. In other words, while process models aim to describe the operation of factors in the process of reading, componential models aim to identify the explanatory components of L2 reading comprehension.

2.1.1.1.Process models

Process models of reading combine the most important research findings to explain the process of reading, and the process in the mind of the reader, hypothetically. Process models, which are also called as metaphorical models, attempted to define "how words are recognized, how long they are kept in working memory, when syntactic parsing begins, and so on" (Urquhart and Weir, 1998, p. 39). Process models try to explain the reading process as a series of phases, each of which is accomplished before the next begins or they try to explain the reading process based on the simultaneous operation of knowledge sources. Process models are generally asserted as bottom-up, top-down, and interactive compensatory models of reading. In Gough's (1972) bottom-up model of reading, the reader starts the reading process with letters and decodes these letters into sounds. The reader combines these sounds, uses his lexicon, and then the combination of

sounds is recognized as a word. The same procedure is applied to all the words of the sentence. After processing all of the words of the sentence, syntactic and semantic operations occur to assign meaning to the sentence. According to the bottom-up processes, the reader starts from the part and tries to reach the whole in a sequential order. In other words, in the bottom-up model, reading passes through a series of phrases, each of which is accomplished before the next begins. Therefore, in the bottom up model, "all reading follows a mechanical pattern in which the reader creates a piece-by-piece mental translation of the information in the text, with little interference from the reader's own background knowledge" (Grabe and Stoller, 2011, p. 25). Moreover, the bottom-up model follows a linear process and "if all the words in a sentence had to be recognized before syntactic processing began, then the model would not appear to have any way of knowing when to stop processing words and move to processing sentences" (Urquhart and Weir, 1998, p. 41).

In top-down models of reading, in contrast, the reader focuses on the whole text and tries to reach the most useful information in the text by using his background knowledge. The expectations, goals, and background knowledge of the reader have a crucial role in top-down models. In top-down models, the reader generates a set of expectations by using background knowledge and confirms or refutes these expectations by gathering the required information from the text (Grabe and Stoller, 2011, p. 26). In other words, the reader establishes hypotheses in line with his predictions and tests these hypotheses by looking at the necessary places in the text to gather useful information. As with bottom-up models, top-down models also have some drawbacks. The model may not be convenient for poor readers, as poor readers were found to be more dependent on the context compared to good readers, who decode rapidly and accurately, while good readers seem to have been affected by practice effect (Urquhart and Weir, 1998, p. 44).

Because of the limitations of bottom-up and top-down models, interactive models of reading were proposed. The basic idea behind the interactive model of reading is to synthesize the useful parts of the bottom-up and top down models. This model requires automatic word recognition and fast syntactic parsing which contributes to reading comprehension as well as context and background knowledge of the reader that helps him make predictions about the text (Grabe, 2009, p. 89). The interactive model requires readers to make predictions and use context to improve the efficiency of word recognition and syntactic parsing. However, key aspects of the bottom up model, such as automatic

word recognition, does not conform with strong top-down controls such as inferencing or background knowledge. In other words, automatic word recognition should operate without significant interference of inferencing or background knowledge (Grabe, 2009, p. 90). Therefore, modified versions of interactive models of reading such as the Interactive Compensatory Model (Stanovich, 1980), Psycholinguistic Guessing Game (Goodman, 1967), and so on have been developed.

As stated in Stanovich's paper, some reading models (1980, p. 35) assume the reading process as "a pattern which is synthesized based on information provided simultaneously from several knowledge sources." rejecting the notion that reading passes through a series of sequential phrases. That's to say, the initiation of higher-level processes does not necessarily wait for the completion of lower level processes. Specifically, a deficiency in higher level process can be compensated by a strength in other areas in the Interactive Compensatory Model. Stanovich (1980) proposed that readers with poor word recognition tend to use contextual cues to compensate for their deficiency in word recognition.

The Psycholinguistic Guessing Game of Goodman (1967), on the other hand, characterizes the reading comprehension process as "*hypothesizing*, *sampling*, and *confirming hypothesis"* based on background knowledge, expectations, and contextual cues. The emphasis on readers' knowledge, hypothesizing, and expecting in the Psycholinguistic Guessing Game makes it a strong view of the top-down model. Moreover, Goodman (1967) claims that reading is universally the same for readers of different proficiencies across all languages and maintains that L1 reading abilities are automatically transferable across languages. Whereas Grabe and Stoller (2011, p. 30) noted that "it is clear that reading development is not universally the same across languages or proficiency levels, nor are all reading abilities easily transferred from one language to another.".

The process models of reading attempted to explain the real time cognitive activities in the process of reading. Although they are valuable in modelling the actual process of reading, they are criticized as being premature for the reading process as a whole (Urquhart and Weir, 1998) and they were proposed to "obscure important details, ignore critical distinctions, and typically do not accurately reflect more current views of reading" (Grabe, 2009, p. 89).

2.1.1.2.Componential models

Componential model of reading or the component skills approach, on the other hand, investigates the sub-skills required for reading comprehension. As we know, reading is complex and requires the operation of sub-skills in the process of comprehension, the component approach of reading might be necessary to reveal the required sub-skills for reading comprehension to take place. Shiotsu and Weir (2007, p.99) conceptualize the component model as being "concerned with identifying possible explanatory factors or components involved in the reading process". According to Hoover and Tunmer (1993, p. 4) the componential model attempts to "understand reading as a set of theoretically distinct and empirically separable constituents". Urquhart and Weir (1998, p. 91) report that "if reading itself is a skill, it must be possible to break this down into different levels of component skills categories.". Accordingly, the component skills approach aims to find out the skills required for reading comprehension and to reveal their contribution to reading comprehension. Carr and Levy (1990) expressed the aim of "componential analysis" or "component process analysis" as a type of research that will reveal individual differences in reading by analyzing large and multi-measure databases. In other words, the component model attempts to find out individual differences affecting reading comprehension by examining factors and their inter-relations, and in so doing, find out their predictive power in reading abilities. Based on the statement of Carr and Levy (1990), it can be interpreted that the differences in L2 reading performance result from the variation in the contribution of the components to reading. Carr and Levy (1990, p. xi) also stated the importance of the component skills approach as "the only way to get an accurate picture of reading ability, how it changes developmentally, and what creates individual differences among readers who are otherwise roughly the same in developmental level.". Likewise, Grabe and Stoller (2011) emphasized the importance of the component skills approach by asserting that by analyzing it as a set of components, the nature of fluent reading can be better understood. Grabe and Stoller (2011, p. 14) also stated that the components needed for reading comprehension are lower level and higher-level processes. In their categorization, while lower-level components consist of automatic linguistic processes, higher-level processes represent comprehension processes related to background knowledge and inferencing. The components of reading based on the proposition by Grabe and Stoller (2011) are as shown in the following figure:

Table 2.1. *Components needed for reading comprehension (Grabe and Stoller, 2011, p.14)*

Lower-level processes	Higher-level processes
• Lexical Access • Syntactic parsing • Semantic proposition formation	• Text modal of comprehension • Situation modal of reader interpretation • Background knowledge use and inferencing • Executive control processing

The component skills approach or componential analysis is seen as key by Koda (2005, p. 194) "to deal with the intricacies lies in dissecting and unraveling closely interwoven competency elements inherent in reading ability". Therefore, it can be concluded that the skill of reading is composed of closely related competency elements and the component skills approach is used to understand the complexity and inter-relationship of these elements. Furthermore, Koda (2005, p. 195) noted that the componential approach is an opportunity to define the place of L2 knowledge in L2 reading comprehension, ascertaining that the "multidimensionality of neither [the componential approach nor L2 knowledge] has been adequately addressed in L2 reading research"

2.1.2. Components of L2 reading comprehension

L2 reading comprehension has a number of essential components. According to Koda (2005), word recognition, vocabulary knowledge, intra-word awareness and word knowledge, information integration in sentence processing, discourse processing and text structure are among the important components of L2 reading comprehension. Nassaji (2003) examined higher–level syntactic and semantic processes and lower–level word recognition and graphophonic processes as the components of L2 reading of adult English learners. In their meta-analysis, Jeon and Yamashita (2014) investigated the role of 10 key components of L2 reading comprehension. These components were L2 grammatical knowledge, L2 vocabulary knowledge, L2 decoding, L1 reading comprehension, L2 phonological awareness, L2 orthographic knowledge, L2 morphological knowledge, L2 listening comprehension, working memory, and metacognition. The study revealed that L2 grammatical knowledge and lexical knowledge were equally important components and the most important predictors of L2 reading comprehension, thus reflecting the importance of these two variables. In a similar manner Bernhardt (2011, p. 63) stated that

among these elements or components, language knowledge seems to contribute the most to second-language readers' performance.

Among these important components of L2 reading comprehension, linguistic knowledge, namely, lexical knowledge and syntactic knowledge will be discussed below, as they are the most important components of L2 reading comprehension and the most appropriate ones for the purpose of the current study.

2.2. Lexical Knowledge

It is well documented that lexical knowledge is one of the most important components of reading comprehension not only in L1 but also in L2 reading (Laufer,1992; Laufer and Ravenhorst-Kalovski, 2010; Perfetti, 2007). Koda (2005) asserted that lexical knowledge correlates more highly with reading comprehension than any other language skill. Research on L1 and L2 reading shows that lexical knowledge and reading comprehension are very closely associated with each other. However, the association between lexical knowledge and reading comprehension is complex (Anderson and Freebody, 1981). Before explaining the complexity of the relationship between lexical knowledge and reading comprehension, what a word is and what knowing a word means are explained below.

"What is a word?" is a frequent question that attracts the attention of many linguists on a theoretical level. Read (2000, p. 16) noted that vocabulary is an individual word associated with meaning; therefore, for many second language learners, it is enough to memorize a long list of second language words and their L1 equivalents to achieve success in second language learning. However, Read (2000, p. 17) deduced that "the word is not an easy concept to define either in theoretical terms or for various applied purposes" because words are not always discrete items out of the language but an important piece of a complex system. The definition of a word is essential especially in testing the vocabulary knowledge of learners. Thus, measuring the lexical knowledge of learners is a very difficult task because there are different definitions of a word. The problem in this context stands as, 'what do we count as a word?'. Sometimes some words may have more than one meaning. For example: the word 'bank' has the meaning of 'financial institution' or 'the land alongside a river'. Or, do we count 'bank' and 'banks' as one word? Or, do we count function words such as *the, a, to*, and, *in* as vocabulary items? because, function words provide links within the sentences, give grammatical information, and they are

generally accepted as more of grammatical items than vocabulary items. Hence, as pointed out by Nation and Meara (2002, p. 34) there are a variety of definitions of 'word' "depending on the reasons for asking the question".

As stated above, it is hard and complex to define a 'word' because its definition changes depending on why we need to define it. It is also complex to explain 'what is meant by knowing a word'. Traditionally, knowing a word means recognizing the form and understanding the meaning of it when encountered. However, Nation (2000, p. 36) wrote that "there are many things to know about any particular word and there are many degrees of knowing". Researchers have proposed various explanations about what is meant by knowing a word (Cronbach, 1942; Richards, 1976; Nation, 1990; Nation, 2000).

Cronbach (1942) proposed 5 aspects of knowing a word. These aspects are: *generalization, application, breadth, precision*, and *availability*. *Generalization* refers to the ability to define a word; *application* refers to the recognition of the form; *breadth* refers to the knowledge of different meanings of a word in different contexts; *precision* refers to the application of a word to all possible situations; and *availability* refers to the ability to use a word in discourse. The weakness of Cronbach's (1942) principles is that he did not take into account the other principles of vocabulary knowledge such as pronunciation, collocation, and syntactic functions of a word. Then, Richards (1976) proposed 8 assumptions about knowing a word. Richards's 8 assumptions about vocabulary knowledge have been accepted as a general framework for vocabulary knowledge because the assumptions were more concise and clear compared to Cronbach's principles. Richards (1976) included both syntactic and semantic features as well as the frequency of vocabulary in these assumptions. However, he did not touch on pronunciation and collocational characteristics of vocabulary knowledge. Later on, Nation (1990) integrated the framework of Richards (1976) and developed a new framework for knowing a word.

Nation (1990) stated that knowing a word involves knowing form (spoken form, written form), position (grammatical patterns and collocation), function (frequency and appropriateness), and meaning (concept and associations). Then, Nation realized that knowing a word not only consists of form, meaning, position, and function of a word, but also the use of a word, and revised his earlier framework. Nation (2000) proposed a set of questions under the headings of form, meaning, and use and noted the receptive and productive aspects of each. Within the framework, Nation provided comprehensive

vocabulary assessment criteria for the researchers. Components of knowing a word is shown in table 2.2. below.

Table 2.2. *Components of knowing a word (Nation, 2000, p. 40-41)*

Form	Spoken	R	What does the word sound like?
		P	How is the word pronounced?
	Written	R	What does the word look like?
		P	How is the word written and spelled?
	Word Parts	R	What parts are recognizable in this word?
		P	What words parts are needed to express meaning?
	Form and Meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
Meaning	Concepts and referents	R	What is included in the concept?
		P	What items can the concept refer to?
	Associations	R	What others words does this word make us think of?
		P	What other words could we use instead of this one?
Use	Grammatical functions	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	Collocations	R	What words or types of word occur with this one?
		P	What words or types of words must we use with this one?
	Constraints on use	R	Where, when and how often would we meet this word?
		P	Where, when and how often can we use this word?

Looking at the complexities in the definitions of knowing a word, vocabulary specialists developed many descriptive frameworks in order to measure the lexical knowledge of the learners. Among these frameworks, one of the most known is the distinction between breadth and depth of lexical knowledge. While breadth refers to the number of known words, depth refers to the quality of knowing a word. Anderson and Freebody (1981) explained the two dimensions of lexical knowledge as follows:

> "It is useful to distinguish between two aspects of an individual's vocabulary knowledge. The first may be called 'breadth' of knowledge, by which we mean the number of words for which the person knows at least. some of the significant aspects of meaning. …There is a second dimension of vocabulary knowledge, namely the quality or 'depth' of understanding. We shall assume that, for most purposes, a person has a sufficiently deep understanding of a word if it conveys to him or her all of the distinctions that would be understood by an ordinary adult under normal circumstances. (Anderson and Freebody, 1981, p. 92-93)"

Lexical knowledge has two important dimensions; breadth and depth. As stated before, the relation between lexical depth, lexical breadth and reading comprehension is complicated. Additionally, the association between lexical knowledge and reading comprehension is not unidirectional. To understand this complexity, it is a necessity to elaborate on the hypotheses proposed for causal relation between lexical knowledge and reading comprehension.

Labeled by Anderson and Freebody (1981), *the Instrumentalist Hypothesis* proposes that there is a causal relation between vocabulary size and reading comprehension. The hypothesis suggests that the more words a reader knows, the better the reader comprehends the text. A number of empirical studies also support the hypothesis; however, Nagy (2005, p. 31) noted that although the hypothesis seems perfectly reasonable, it is incomplete because the association between lexical knowledge and reading comprehension may be the result of other factors.

A supplementary to instrumentalist hypothesis is also proposed by Anderson and Freebody (1981), which is called *the Knowledge Hypothesis*. According to the hypothesis, success in lexical knowledge is attributed to exposure to culture. In other words, readers' background knowledge is emphasized in the knowledge hypothesis. The knowledge hypothesis proposes that success in reading comprehension is caused by the knowledge of the reader about the topic of a reading text and knowing the specific meaning of the words found in a reading text is an indication that the reader has the required background knowledge for the reading. Therefore, the knowledge hypothesis emphasizes the contribution of knowledge required for reading and lexical knowledge is only a dimension of that knowledge.

The Aptitude Hypothesis (Anderson and Freebody, 1981) explains the correlation between lexical knowledge and reading comprehension with a third factor. According to the hypothesis, lexical knowledge is strongly correlated with a third factor which may be verbal IQ (Sattler, 2001) or inferencing skill (Sternberg, 1987) similarly, reading comprehension can be also strongly associated with verbal IQ (Woodcock, McGrew, and Mather, 2007) or inferencing skill. This hypothesis posits that there is a non-causal connection between lexical knowledge and reading comprehension via a third factor.

Another hypothesis proposed by Mezynski (1983) is *the Access Hypothesis*, which proposes that the words required for comprehension should be known well enough to be accessed quickly and easily. Thus, this hypothesis puts into play the depth dimension of

lexical knowledge as well as breadth in reading comprehension. The studies show that there is significant correlation between depth and breadth and the students who know a number of words also tend to know more about these words (Milton, 2013). Therefore, according to the access hypothesis, it is the access to these words, or fluency that contributes to reading comprehension.

These hypotheses reflect the causal and non-causal relations between lexical knowledge and reading comprehension but as stated by Anderson and Freebody (1981, p. 82) "it would be naive, indeed. to assume that one of the positions will turn out to be entirely right and the others entirely wrong". There are also two more aspects concerning lexical knowledge and reading comprehension. These are the reciprocal relations and indirect relation between lexical knowledge and reading comprehension (Nagy, 2005; Eskey, 2005). Nagy (2005) states that the causal relation between lexical knowledge and reading comprehension is reciprocal. To make it clear, having a big lexical size contributes to reading comprehension, reading comprehension also increases lexical size of the readers, and the one who has big lexical size reads more. The reciprocal relation between lexical knowledge and reading comprehension is shown in figure 2.1. below:

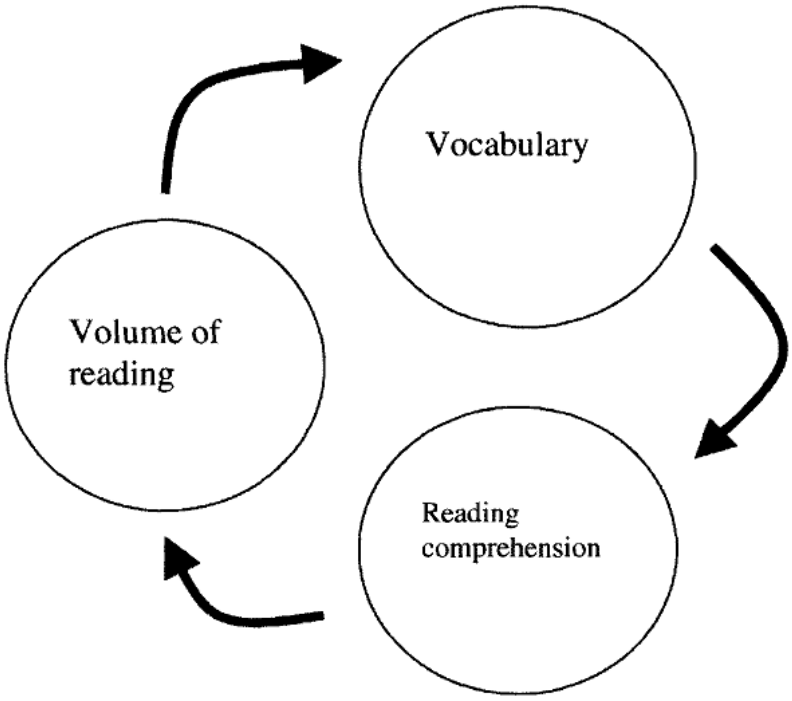

Figure 2.1. *A reciprocal model of vocabulary and reading comprehension (Nagy, 2005, p.34)*

Stanovich (2009) explained the unidirectional relation between lexical knowledge and reading comprehension as follows:

> "If the development of vocabulary knowledge substantially facilitates reading comprehension, and if reading itself is a major mechanism leading to vocabulary growth - which in turn will enable more efficient reading-then we truly have a reciprocal relationship that should continue to drive further growth in reading throughout a person's development." (Stanovich, 2009, p. 36)

Another hypothesis relates to the indirect causal links between lexical knowledge and reading comprehension. In other words, lexical knowledge may contribute to another ability which in turn contributes to reading comprehension directly (Nagy, 2005). According to some hypothesized causal links proposed by Nagy (2005) shown in figure 2.2. below, there is a reciprocal relationship between vocabulary knowledge and metalinguistic awareness. There is also a reciprocal relation between metalinguistic awareness and word recognition. Both metalinguistic awareness and word recognition contribute to reading comprehension. In conclusion, vocabulary knowledge contributes to reading comprehension both directly and indirectly via metalinguistic awareness and word recognition.

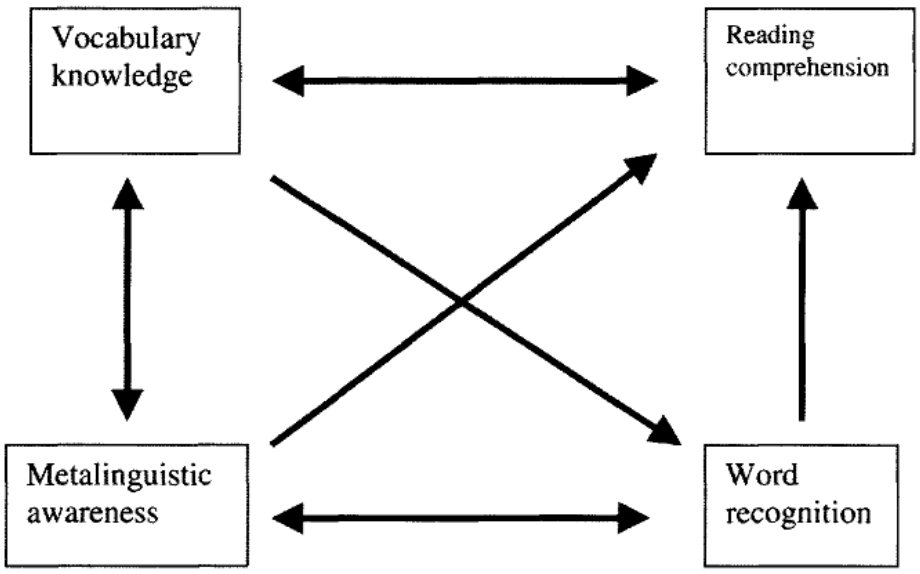

Figure 2.2. *Some hypothesized causal links between metalinguistic awareness, vocabulary knowledge, word recognition, and reading comprehension. (Nagy, 2005, p.36)*

None of these hypotheses are conclusive because as stated before, the relation between lexical knowledge and reading comprehension is complex. Although all the stated hypotheses aim to explain the relationship between lexical knowledge and reading

comprehension, it is not possible to test all these hypotheses since the scope of the current study is limited to lexical breadth and depth dimensions of lexical knowledge

2.2.1. Lexical knowledge and L2 reading comprehension

Lexical knowledge is widely accepted as an essential component for reading comprehension. Studies both in L1 (Tannenbaum, Torgesen and Wagner, 2006; Ouellette, 2006) and in L2 (Laufer, 1992; Laufer and Ravenhorst-Kalovski, 2010; Nassaji, 2003; Qian, 1998) have found lexical knowledge to be a vital predictor of reading comprehension. However, the amount of the contribution that lexical knowledge provides has not been constant across studies. In addition, the dimensions of lexical knowledge, namely lexical breadth and depth, were proposed to have varying contributions to L2 reading comprehension. Moreover, there is no consensus among the researchers over the usefulness of lexical depth. Because lexical breadth is highly correlated with lexical depth, some researchers suggested that there is no conceptual difference between these two dimensions (Vermeer, 2001) while some others proposed that lexical depth has a unique predictive power in reading comprehension and should be accepted as a separate construct (Qian, 2002). Nevertheless, in measuring lexical knowledge of learners and exploring the contribution of lexical knowledge to reading comprehension, most reading researchers focused largely on the dimension of lexical breadth (Schmitt, 2014; Zhang, 2012). As a consequence, there is a consensus to a large extent on the testing instruments used for lexical breadth. On the other hand, there are a large number of different conceptualizations of lexical depth which overlap a great extent (Schmitt, 2014). These conceptualizations are knowledge of multiple words, knowledge of polysemous meaning, knowledge of derivative forms, knowledge of collocation, lexical organization, and lexical fluency (Schmitt, 2014). Because of the widespread conceptualizations of depth, it is difficult to measure the aspect of depth with a single test (Schmitt, 2014). This is why a number of lexical depth measures have been suggested such as the Word Associate Test (Read, 1993); Vocabulary Knowledge Scale (Paribakht and Wesche, 1993), Vocabulary Receptive Speed Test (Laufer and Nation, 2001) collocation test, knowledge of morphology test etc.

By using these measures, research has demonstrated that lexical knowledge is a crucial component for reading comprehension both in L1 and L2 contexts. For example, regarding the relationship of lexical knowledge and reading comprehension in L1

contexts, Tannenbaum, et. al. (2006) indicated that a two-factor model of breadth and depth/fluency provided the best fit to the data and these two factors significantly explained 50 percent of variance in reading comprehension of 250 3rd grade students ranged in age from 8 to 11. Moreover, the researchers stated that the contribution of lexical breadth was higher compared to that of lexical depth/fluency dimension. In a similar vein, Ouellette (2006) purported that controlling for age, decoding, nonverbal IQ and word recognition, lexical knowledge explained significant variance in reading comprehension of 4th grade students. The researcher also suggested that, contrary to Tannenbaum, et. al.'s (2006) findings, the contribution of lexical depth to reading comprehension was higher than that of breadth.

Similarly, in L1 contexts but with adults, Binder, Cote, Lee, Bessette, and Vu, (2017) investigated the role of lexical breadth and depth in reading comprehension of 107 participants. The researchers reported high and significant correlation between the measures of breadth, depth, and reading comprehension. The study also showed that both lexical breadth and lexical depth have unique contributions to reading comprehension, albeit, the contribution of depth was smaller than that of breadth. The study also showed that two measures of vocabulary depth were not significantly correlated with each other. The researcher concluded that both lexical breadth and lexical depth are important components of reading comprehension even for college-level skilled students. The researchers also concluded that vocabulary depth is a multifaceted variable.

As for the relationship between lexical knowledge and reading comprehension in L2 contexts, some researchers aimed to find out the threshold level necessary for effective reading comprehension. For example, Laufer (1992) investigated the contribution of L2 lexical breadth and learners' general ability to read in English. The participants of the study were 64 first-year university students from different departments. Lexical knowledge of the participants was measured by VLT (Nation, 1983). L2 reading comprehension and general academic ability scores were taken from the psychometric entrance exam, which is a national, standardized exam in Israel. The test consisted of general knowledge, figural reasoning, verbal reasoning, reading in L1, mathematical reasoning, and English. The English test measured the comprehension of the students. General ability scores were calculated by extracting English test scores from the total scores of the students. The result of the study revealed that L2 lexical knowledge was a better predictor of L2 reading comprehension than learners' general ability. The study

also found that general ability knowledge contributed to L2 reading comprehension only when the vocabulary knowledge was below a 3000-word level. Accordingly, the researcher suggested that learners need to know at least 3000-word families to comprehend L2 texts, which was accepted as a lexical threshold by the researcher.

Laufer and Ravenhorst-Kalovski (2010) revisited the lexical threshold required for L2 reading comprehension and examined the relationship between the factors of lexical threshold, text coverage and vocabulary size of the learners, and L2 reading comprehension. 745 students studying at different departments with different L1 backgrounds participated in the study. In order to measure the reading comprehension levels of the participants, the researchers utilized a reading section of the Psychometric University Entrance Test. The test had 60 multiple-choice items and focused on the comprehension of English academic texts. Students' lexical breadth was measured by the revised version of VLT (Schmitt et al., 2001). Lexical coverage of the participants was measured by a test, based on the BNC corpus. A strong correlation was found to be among the three variables of the study. Moreover, the study showed that even a slight improvement in the lexical coverage of the participants resulted in a positive improvement in the reading comprehension score. The researchers proposed two different lexical thresholds to better comprehend a text. According to the researchers, *the optimal threshold* consists of 8000-word families, with the coverage of 98%, and *the minimal threshold* consists of 4000-5000-word families with the coverage of 95%.

The lexical threshold studies did not take into account the depth dimension of lexical knowledge. Regarding the relationship between lexical breadth, depth, and L2 reading comprehension in an ESL context, Qian (1998) administered VLT (Nation, 1983, 1990) and a modified version of WAT (Read, 1993) to measure lexical size and depth of 74 adult Chinese and Korean ESL learners. A 20-item-multiple-choice test adopted from TOEFL was utilized to measure L2 reading comprehension level of the participants. In addition to WAT, a morphological knowledge test developed by the researcher was employed to measure morphological aspects of vocabulary knowledge. The results showed that there were high and positive inter-correlations among the four tests. The researcher concluded that vocabulary depth knowledge specifically had a fundamental role and significant contribution to L2 reading comprehension test scores. In a similar manner, Qian (2002) conducted a study to investigate the contribution of lexical breadth and some factors of depth, namely synonym, polysemy, and collocation, to L2 basic

reading of 217 participants who were attending to an intensive ESL program. The participants of the study came from 19 different L1 backgrounds and had 85 different academic fields. The researcher used an undisclosed version of TOEFL to measure the basic reading comprehension level of the students. The test consisted of five passages and a total of 30 multiple choice questions. Lexical breadth of the participants was measured by VLT (Nation, 1983). Lexical depth of the students was measured by an adapted version of WAT (Read, 1993) and TOEFL Vocabulary Item Measure (TOEFL-VIM). WAT contains 40 items, 32 of which were original items of WAT, and 8 of which were developed by the researcher. TOEFL-VIM consisted of 30 multiple choice items and measured the knowledge of English synonyms. The results of the study revealed that lexical depth and breadth were closely and positively associated with each other and with L2 reading comprehension. The researcher concluded that lexical depth is as important as vocabulary breadth for university level ESL students and in academic setting.

Similarly conducted in an ESL context, Li and Kirby (2014) aimed to investigate the unique contribution of lexical breadth and depth to different L2 reading measures. The researchers used two different reading comprehension tests to investigate whether different reading comprehension tests require different cognitive skills. The participants of the study were 248 8th grade immersion classes students. The study of Li and Kirby (2014) found that both lexical depth and lexical breadth predicted reading comprehension however, these two aspects of lexical knowledge contributed differently to two different reading measures. According to the study, when lexical depth was controlled, only lexical breadth predicted L2 reading comprehension while lexical depth significantly contributed to summary writing of Chinese middle school students studying at English immersion programs. The researchers concluded that lexical breadth may be adequate to comprehend general ideas of a text and many more specific details; however, it may not be adequate for comprehending more complicated L2 reading texts.

As for the relationship between lexical knowledge and reading comprehension in an EFL context, Horiba (2012) conducted a study with 50 Chinese, 20 Korean and 40 native speakers of Japanese. A Japanese version of a vocabulary levels test and words associates test was given to the participants to measure their lexical knowledge. Reading comprehension was also assessed by a recall and summary completion test. Correlation analysis showed that reading comprehension moderately and significantly correlated with both breadth and depth for the Chinese and Korean groups. As for the contribution of

lexical breadth and depth to L2 reading comprehension, the results suggested that these two dimensions had differing contributions to the Chinese and Korean speakers. Moreover, the relative contribution of knowledge type of word association differed between Chinese and Koreans. The study showed that while paradigmatic word associations were the best contributor of L2 reading comprehension for Chinese group, the knowledge of syntagmatic associations was as strong as knowledge of the other types of association for Korean group. This indicates that lexical breadth and lexical depth have differing contribution to different L1 groups.

Some other studies aimed at comparing the relative contribution of lexical knowledge to that of syntactic knowledge in the prediction of L2 reading comprehension. Nassaji (2003), for example, investigated the role of higher level (semantic and syntactic) processes and lower level (word recognition, graphophonic) processes in adult L2 reading comprehension. The study also examined the extent to which these processes could discriminate skilled from less-skilled readers. 60 adult Iranian students participated in the study. The participants were all native speakers of Farsi and had been living in Canada for 3 to 6 years and completed their bachelor's degree in their country. The Nelson-Denny Reading test was applied to measure the reading levels of the participants. The vocabulary section of the test and Wide Range Achievement Test (WRAT-3) were administered respectively to measure lexical knowledge of the participants. The Pseudo-word matching test was used to assess the participants' phonological processing skills. Syntactic skills of the participants were measured by a syntactic judgement test. The participants were divided into two groups based on their reading comprehension test scores. The results of the study revealed that all the components of the study contributed significantly to the discrimination between skilled and less-skilled readers. However, vocabulary knowledge played the most important role in this discrimination. The second most important variable was found to be word recognition. The third variable that helped distinguish skilled from less-skilled readers was found to be syntactic knowledge. Therefore, the study showed that there was a strong relationship between lexical knowledge and reading comprehension.

Guo (2008) investigated the role of vocabulary knowledge, syntactic awareness, and metacognitive awareness in L2 reading comprehension of 278 undergraduate adult Chinese students. Reading comprehension of the participants was assessed by reading part of TOEFL. The VLT and Depth of Vocabulary Knowledge Measure were used to

assess lexical knowledge of the participants. The syntactic awareness questionnaire and sentence combination test were applied to measure syntactic awareness of the participants. The metacognitive reading strategies questionnaire and metacognitive reading awareness inventory were administered to assess the readers' metacognitive awareness. The participants were divided into two groups as good and poor readers based on their reading scores. The results indicated that these three components explained 87% of variance in L2 reading comprehension of the participants. Among these variables, vocabulary knowledge and syntactic awareness contributed more to L2 reading comprehension than metacognitive awareness. The results of the study also revealed that vocabulary knowledge, syntactic awareness and metacognitive awareness are not completely distinguishable from one another because the performance on syntactic awareness might partially depend on vocabulary knowledge. The researcher concluded that deficient vocabulary knowledge was a significant reason for difficulty in reading.

In a similar vein, Zhang (2012) aimed at finding the contribution of vocabulary knowledge and grammatical knowledge to the L2 reading comprehension of adult Chinese students. Moreover, he examined the importance of implicit and explicit grammatical knowledge in L2 reading comprehension. 190 adult EFL learners studying at engineering department participated in the study. VLT and WAT were utilized to measure vocabulary knowledge of the participants. A timed grammatical judgement task covering a wide range of English grammatical structures was applied to assess implicit grammatical knowledge of the participants. A grammatical error correction task was applied to measure the explicit grammatical knowledge of the participants. A reading comprehension test consisting of 6 passages and 18 questions was applied to measure reading comprehension levels of the participants. The Structural Equation Model (SEM) analysis showed that vocabulary knowledge was more strongly predictive of participants' reading comprehension than grammatical knowledge. Controlling for grammatical knowledge, the unique contribution of vocabulary knowledge was found to be significant but not vice versa. The study also showed that the contribution of implicit grammatical knowledge was higher than the contribution of explicit grammatical knowledge.

These findings indicate that the contribution of lexical knowledge to reading comprehension may be affected by many factors such as different L1 backgrounds, age, testing instruments, and the context of the study. A summary is shown in table 2.3. below.

Table 2.3. *Empirical studies investigating the contribution of lexical knowledge to reading comprehension*

Study	Participants	Instruments	Results
Tannenbaum, Torgesen and Wagner (2006)	• 250 3rd grade students in L1 context	• Peabody Picture Vocabulary Test • Wechsler Intelligence Scale for Children • Multiple Meanings • Attributes test • The Word Use Fluency • Semantic Category Fluency • The Florida Comprehensive Assessment Test	The researchers suggested that two factor model of breadth and depth/fluency provided the best fit to the data and these two factors significantly explained 50 percent of variance in reading comprehension and the contribution of lexical breadth was higher compared to that of lexical depth/fluency dimension
Ouellette (2006)	• 60 4th grade students in L1 context	• Nonverbal Intelligence • Oral vocabulary measures • Decoding • Visual word recognition • Reading comprehension	The researcher suggested that controlling for age, decoding, nonverbal IQ and word recognition, lexical knowledge explained significant variance in reading comprehension of 4th grade students. The researcher also suggested that, contrary to Tannenbaum, et. al.'s (2006) findings, the contribution of lexical depth to reading comprehension was higher than that of breadth.
Binder, Cote, Lee, Bessette, and Vu (2017)	• 107 female college students in L1 context	• The Nelson-Denny Reading Test (form H) of Vocabulary, Comprehension, and Reading rate	The study showed that both lexical breadth and lexical depth have unique contribution to reading comprehension, albeit, the contribution of depth was smaller than that of breadth. The researcher concluded that both lexical breadth and lexical depth are important components of reading comprehension even for college-level students.
Laufer (1992)	• 64 first-year university students from different departments.	• The Psychometric Entrance exam • L2 Reading Comprehension test • General Academic Ability Test, • VLT (Nation, 1983).	The result of the study revealed that L2 lexical knowledge was a better predictor of L2 reading comprehension than learners' general ability. The researcher suggested that learners need to know at least 3000-word families, which was accepted as lexical threshold by the researcher, to comprehend in L2.

Table 2.3. (Continued) *Empirical studies investigating the contribution of lexical knowledge to reading comprehension*

Study	Participants	Instruments	Results
Laufer and Ravenhorst-Kalovski (2010)	• 745 students studying at different departments and having different L1 backgrounds. •	• The Psychometric Entrance exam • VLT (Schmitt et al 2001) • Lexical coverage test based on the BNC corpus	A strong correlation was found to be among lexical coverage, vocabulary size, and L2 reading comprehension. The researchers proposed two different lexical thresholds to better comprehend a text; *the optimal threshold* consisting of 8000-word families, and *the minimal threshold* consisting of 4000-5000-word families.
Qian (1998)	• 74 adult Chinese and Korean ESL learners.	• TOEFL • VLT (Nation, 1983). • WAT (Read, 1993,) • Morphological Knowledge Test	The result showed that there were high and positive inter-correlations among the four tests. The researcher concluded that especially vocabulary depth knowledge had a fundamental role and significant contribution to reading comprehension test scores.
Qian (2002)	• 217 intensive ESL program students	• TOEFL • VLT (Nation, 1983). • WAT (Read, 1993,) • TOEFL-VIM	Lexical depth and breadth were closely and positively associated with each other and with L2 reading comprehension. Lexical depth is as important as lexical breadth in explaining the variance of L2 reading comprehension.
Li and Kirby (2014)	• 246 Chinese high school students in EFL context •	• Non-verbal ability test • Chinese reading comprehension • Depth of vocabulary knowledge • Morphological awareness test • English reading comprehension • Summary writing	The study showed that the two dimensions of vocabulary knowledge, breadth and depth, are correlated with and predict different aspects of reading. The study also suggested that when lexical depth was controlled, only lexical breadth predicted L2 reading comprehension while lexical depth significantly contributed to summary writing of Chinese middle school students studying at English immersion programs.

Table 2.3. (Continued) *Empirical studies investigating the contribution of lexical knowledge to reading comprehension*

Study	Participants	Instruments	Results
Horiba (2012)	• 50 Chinese speaking L2 learners • 20 Korean speaking L2 learners • 40 native speakers of Japanese	• Japanese version of VLT • Japanese version of WAT • Recall and summary completion test	Reading comprehension moderately and significantly correlated with both breadth and depth for Chinese and Korean group. Lexical breadth and depth had differing contributions to the Chinese and Korean speakers. The relative contribution of knowledge type of word association differed between Chinese and Koreans.
Nassaji (2003)	• 60 adult Iranian students living in Canada for 3 to 6 years and completed their bachelor's degree in their country.	• Nelson-Denny Reading test • Vocabulary knowledge part of Nelson-Denny • Word recognition test • A syntactic Judgement test	The results of the study revealed that all the components of the study contributed significantly to the discrimination between skilled and less-skilled readers. However, vocabulary knowledge played the most important role in this discrimination. The second most important variable was found to be word recognition. The third variable that helped distinguish skilled from less-skilled readers was found to be syntactic knowledge.
Guo (2008)	• 278 undergraduate adult Chinese students	• Vocabulary Levels Test • Depth of vocabulary knowledge • Sentence combination test • Syntactic awareness questionnaire • Metacognitive awareness • TOEFL reading comprehension	The contribution of vocabulary knowledge and syntactic awareness was found to be more than metacognitive awareness. Vocabulary knowledge, syntactic awareness and metacognitive awareness are not completely distinguishable from one another. Deficient vocabulary knowledge was a significant reason for difficulty in reading.
Zhang (2012)	• 190 adult Chinese EFL learners	• Reading Comprehension Test • VLT • WAT • A Timed Grammatical Judgement • A Grammatical Error Correction	Vocabulary knowledge was more strongly predictive of participants' reading comprehension than grammatical knowledge. Controlling for grammatical knowledge, the unique contribution of vocabulary knowledge was found to be significant but not vice versa.

2.3. Syntactic Knowledge

Syntactic knowledge has been defined in various ways in the literature; however, these definitions do not reflect the concept fully because there are some divergences in the scope of syntactic knowledge. While some researchers have made a distinction between grammatical and syntactic knowledge (Tallerman, 2014), others have proposed that grammatical and syntactic knowledge cover largely the same ground (Richards and Schmidt, 2002). In the dictionary of Language Teaching and Applied Linguistics, Richards and Schmidt (2002) define syntax and grammar in a similar sense. While they defined grammar as "the way in which linguistic units such as words and phrases are combined to produce sentences in the language" (p. 230), syntax was defined as "the ways in which words combine to form sentences and the rules which govern the formation of sentences, making some sentences possible and others not possible within a particular language" (p. 535). Similarly, Greenbaum and Nelson (2002, p. 1) defined grammar as "the set of rules that allow us to combine words in our language into larger units" and added that "another term for grammar in this sense is syntax". The similarities of these definitions show that the primary concern of these researchers is the well-formedness (or ill-formedness) of the structures or sentences used in a language. Following Urquhart and Weir (1998), syntactic knowledge has been defined as grammatical knowledge in the traditional sense and the terms 'syntactic knowledge' and 'grammatical knowledge' have been used interchangeably to refer to syntax or grammar in this study.

Gottardo, Mirza, Koh, Ferreira, and Javier (2018) state that syntactic knowledge is associated with reading comprehension because readers need to know the structures of sentences in order to comprehend a reading text. Pinpointing the importance of syntactic knowledge, Urquhart and Weir (1998, p. 60) stated that "to claim that syntactic knowledge is not necessary (for reading) is frankly unbelievable". Similarly, Grabe (2009, p. 29) noted that "it should be obvious to anyone who reflects on sentences in a text that syntactic processing is essential to comprehension". Accordingly, Jung (2009, p. 33) stressed the significance of syntactic knowledge in reading comprehension by stating that "the abilities to identify syntactic roles of words, dissect sentences into meaningful chunks, and recognize the syntactic structure of a sentence seem to contribute to the construction of meaning from the text."

The process of syntactic parsing that contributes to reading comprehension occurs almost every moment of fluent reading (Grabe, 2009). The fluent readers are not, in most

cases, aware of this process; on the other hand, non-proficient readers, especially L2 readers, are more aware that something is not working in the clause or sentence level when they do not have the necessary syntactic knowledge required for L2 reading comprehension.

Syntactic knowledge is necessary in L2 reading comprehension because the readers can identify the subject-verb-object structures within sentences through the help of syntactic knowledge, which in turn, enables them to determine the topic and general meaning of the sentences (Gottardo et. al., 2018). In other words, syntactic knowledge allows the reader to combine words and sentences or identify relations, and hence; helps them make sense out of sentences. Syntactic knowledge not only allows the readers combine sentences, it also provides coherence building of a text (Givón, 1995). As Givón (ibid) suggests, grammatical knowledge provides readers with basic cuing information in comprehending a text. In addition to coherence building, it provides phrasal or clausal units that supports the construction of semantic proposition (Fender, 2001; Kintsch, 1998). In other words, an article in a sentence signals that a noun or noun phrase will follow it or the verb "*eat"* sets up the syntactic expectation that the verb will be followed by an object which is a noun phrase, or an adverbial phrase that modifies the verb. This type of information helps the reader comprehend a text.

In the reading process, syntactic processing begins when words are recognized and the meaning of sentences or clauses are also being constructed (Kintsch, 1998). The reader combines the meaning of words and syntactic information to establish meaning units. In this ongoing process, in addition to establishing the meaning unit of sentences, semantic propositional units define the most important referents, and predicates and events. Kintsch (2001) suggests that syntactic knowledge of the readers signals the most important meaning-based components of a sentence. Through this, the integration of words with syntactic knowledge provides the information required for reading comprehension. According to Grabe (2009, p. 201) "syntactic processing provides many discrete sets of information and contributes to ongoing discourse understanding". Therefore, it is evident that syntactic knowledge, in a way, contributes to reading comprehension and helps the reader to establish connection between the words of sentences. Grabe (2009) lists how syntactic knowledge contributes to reading comprehension as follows:

Table 2.4. *Contribution of syntactic knowledge to reading comprehension (Grabe, 2009, p. 204)*

1. Grammatical word order constraints alternative meaning potential.
2. Grammatical structure identifies parts-of-speech categories for words, the semantic roles of noun phrases in relation to verb, and relations between phrasal and clausal units for comprehension processing.
3. Grammatical structure distinguishes main from subordinate information (stressing relative importance of information) and signals given and new information in the sentence.
4. Grammatical information helps us identify (a) major referents in the text (via demonstrative determiners, relative clauses, and focusing construction); (b) the continuity and reappearance of referents; and (c) the continuation or shift of events and ideas via tense, aspect, modality, and location information.
5. Grammatical information specifies and sharpens the information being communicated; it strongly constraints ambiguity of interpretation.
6. Grammatical information indicates the author's attitudes towards events and ideas through prepositional phrases, adverbial phrases, and assorted lexical choices.

In spite of its considerable contribution to reading comprehension, syntactic knowledge is often overlooked (Grabe, 2009; Shiotsu and Weir, 2007). The reason for this might be the strong correlation between syntactic knowledge and lexical knowledge which has caused an overemphasis of lexical knowledge in reading research (Shiotsu and Weir, 2007; Shiotsu, 2010). Eskey (2005) pointed out the failure of researchers to separate syntactic knowledge from other sources of knowledge, especially lexical knowledge while determining its contribution to reading comprehension. Moreover, Alderson (1993) revealed a very high and strong correlation between reading tests and syntactic knowledge tests and stated that sometimes a syntactic knowledge test was more closely related to reading test than the reading test was related to another parallel reading test. Alderson (ibid) concluded that a syntactic knowledge test should be as separate as possible from a reading test. In a similar manner, Urquhart and Weir (1998) referred to the problem of separating the measure of syntax from other sources of knowledge and advised to take "formal" "structuralism" model of syntactic knowledge with little emphasis on "meaning" or "communicative value" while measuring it.

2.3.1. Syntactic knowledge and L2 reading comprehension

Results from a small number of research studies investigating the role of syntactic knowledge in L2 reading comprehension is contradictory. Some studies on L2 reading comprehension have supported that reading fluently and comprehensively requires readers to know some degree of language structures (Atai and Nikuinezhad, 2012; Chen, 2014; Maftoon and Tasnimi, 2014; Nergis, 2013; Shiotsu and Weir, 2007), and syntactic simplification has a considerable effect on L2 reading comprehension (Berman, 1984;

Yano, Long and Ross, 1994). On the other hand, some others proposed that syntactic knowledge did not explain variance or explained limited variance in L2 reading comprehension of students and syntactic simplification did not have effect in L2 reading comprehension (Brisbois, 1995; Lopez, 2008; Ulijn and Strother, 1990).

Nergis (2013), for example, aimed to investigate the role of vocabulary depth, syntactic awareness and metacognitive awareness in the academic reading comprehension of Turkish undergraduate EAP learners. The participants of the study were 45 advanced level Turkish students. The researcher measured reading comprehension of the participants with the TOEFL Reading for Basic Comprehension test. The Depth of Vocabulary Knowledge (DVK) test, which has 40 items, was used to measure lexical depth of the learners. A-30-item Sentence Combination Subtest of Test of Adolescent and Adult Language (TOAL) was used to measure syntactic abilities of the participants. A Likert type questionnaire was used to measure metacognitive awareness of the participants. The results of the study showed that morphological awareness was the best contributor of academic reading comprehension, followed by syntactic awareness. DVK was not found to contribute to the academic reading success of Turkish participants. The researcher suggested that as the participants of the study was above a certain threshold level of L2 proficiency, they relied more on their metalinguistic awareness in L2 reading. Nergis (2103) concluded that when L2 proficiency levels and L1 backgrounds of the participants were held constant, metacognitive and syntactic awareness are strongly correlated with L2 reading comprehension.

In a similar vein, Maftoon and Tasnimi (2014) conducted a study to discover the predictive power of syntactic knowledge, lexical breadth, and metacognitive awareness of reading strategies in L2 reading comprehension of EFL learners. 149 Iranian EFL students studying at university participated in the study. To measure L2 reading comprehension levels and syntactic knowledge of the participants, reading comprehension and structure and written expression parts of the paper-based TOEFL were administered. Lexical breadth of the participants was measured by VLT version 2. The Metacognitive Awareness of Reading Strategies Inventory (MARSI) was used to measure participants perceived use of reading strategies. Linear regression analyses showed that syntactic knowledge had the largest predictive power followed by vocabulary breadth and metacognitive strategies in L2 reading comprehension of the participants. Syntactic knowledge, on its own, accounted for 48 % of the variance while vocabulary

breadth explained 10% of the variance in L2 reading comprehension of the participants. The researchers supported the superiority of syntactic knowledge over lexical breadth and metacognitive awareness in predicting L2 reading comprehension of Iranian EFL learners.

In a similar context, Atai and Nikuinezhad, (2012) carried out a study to reveal the relationship between EFL learners' syntactic knowledge, breadth and depth of vocabulary knowledge and reading comprehension performance. The participants of the study were 159 Iranian intermediate level high school students. The researchers implemented the Preliminary English Test (PET) to measure L2 reading comprehension of the participants. The reading comprehension section consisted of 35 items. VLT version 2 was administered to assess vocabulary breadth of the participants. Vocabulary depth was measured by WAT. A reduced and validated version of the Test of English for Educational Purpose (TEEP) was utilized to measure syntactic knowledge of the participants. The TEEP consisted of 32 multiple choice items which required participants to fill in the blanks with appropriate structures. Correlation analysis showed that there were positive and significant relationships between the variables of the study. To discover the extent of relationship of vocabulary knowledge, syntactic knowledge and reading comprehension, hierarchical multiple regression analyses were conducted. The results demonstrated that all of the variables contributed to L2 reading comprehension of the participants; however, syntax explained more variance in L2 reading comprehension than vocabulary knowledge. Syntactic knowledge was found to be a better predictor of reading comprehension. The study also showed that the correlation between syntactic knowledge and lexical knowledge was significant and high. Atai and Nikuinezhad, (2012, p. 14) noted that "syntactic knowledge is equally, if not more, significantly related to reading and vocabulary knowledge."

Chen (2014) carried out a study to examine the correlation among lexical knowledge, syntactic knowledge and L2 reading comprehension. 138 Taiwanese 2nd year students from different academic majors learning English as a foreign language participated in the study. The VLT Version 1 (Schmitt, 2000) was utilized to measure students' general vocabulary size and academic vocabulary. A 20-item-syntactic knowledge test adapted from the TOEFL and General English Proficiency Test (GEPT) was presented to measure basic and general grammatical knowledge of the students. To measure the reading comprehension level of the students, an-intermediate-level reading

comprehension test consisting of 20 multiple choice items was adopted from the TOEFL and the GEPT. The Pearson correlation coefficient analysis revealed that lexical and syntactic knowledge had a positive effect on L2 reading comprehension. The study reached the conclusion that both lexical and syntactic knowledge have positive and equal importance in predicting L2 reading comprehension.

Some studies aimed to find out the role of syntactic knowledge in L2 reading comprehension across different L2 reading proficiency levels. Shiotsu and Weir (2007), for example, conducted a componential analysis in two different contexts as three main experiments concerning the role of syntactic knowledge in L2 reading comprehension. 107 English for Academic Purpose (EAP) students from different L1 backgrounds participated in the first experiment. The researchers applied The Advanced English Reading Test (AERT) which has six sections based on four academic passages ranging from 600 to 1000 words in order to measure reading comprehension of the participants. In order to measure lexical knowledge, the researchers used a vocabulary knowledge test which required students to understand contextualized meaning of academic words and to fill in the blanks appropriately from a given word bank. To measure syntactic knowledge of the participants, a validated version of a knowledge of syntax test was used. The result of the first experiment showed that syntactic knowledge was the strongest predictor of L2 text reading comprehension. The second experiment was conducted with 182 L1 Japanese EFL learners from different three universities. To measure reading comprehension, four different passages, two of which were taken from the reading part of College English Test (CET) and the other two of which were adapted from the Lee and Schallert (1997) test. Lexical knowledge was measured by VLT of Nation, (1990) and Schmitt et al. (2001) and a renewed version of the test used in experiment 1 was utilized to measure syntactic knowledge. Similarly, the results showed that syntactic knowledge outperformed other variables in terms of predicting L2 text reading comprehension. A total of 624 L1 Japanese EFL learners participated in the main experiment. The same instruments used in experiment 2 were applied to measure the variables of the main experiment. The results showed that syntactic knowledge was a stronger predictor of L2 reading comprehension. Even in the subgroup analysis, syntactic knowledge was found to be the best predictor of L2 reading comprehension irrespective of the reading ability of the students.

Comparing the role of syntactic knowledge and lexical breadth in L2 reading comprehension, Yalin and Wei (2011) conducted a componential analysis with 68 non-

English major Chinese sophomores with different proficiency levels. The researchers used four reading passages of different styles and registers adapted from CET Band 4. To measure the vocabulary breath of the students, an adapted version of the VLT (Nation, 1990; Schmitt et al., 2001) was utilized. 30 words selected randomly from the reading passages of CET Band 4 were used in the VLT of the study. 30 multiple-choice questions consisting of 11 syntactic structures found in the CET Band 4 were applied to find out the syntactic knowledge of the participants. Multiple regression analysis revealed that there were positive and statistically significant contributions of syntactic and lexical knowledge to the L2 reading comprehension of the participants. Between the two variables, syntactic knowledge was found to be a stronger predictor of L2 reading comprehension and the predictive power of syntactic knowledge in L2 reading comprehension did not change across the different proficiency groups. The researchers emphasized the significance of syntactic knowledge in L2 reading comprehension and concluded that if the learners do not know the syntactic structures of the sentences, they fail to understand L2 reading texts.

In a correlational analysis with Hungarian high school students, Morvay (2009) conducted a study to probe the role of L2 syntactic knowledge, L1 syntactic knowledge, and L1 reading comprehension to L2 reading comprehension. She also intended to determine the relative contribution of syntactic knowledge to L2 reading comprehension across different language proficiency levels. Moreover, she tried to find out the effects of various complex L2 syntactic structures such as passives, adverbials, and relative clauses to L2 reading comprehension of the participants. Morvay used the Michigan Listening Comprehension Test to measure the general language proficiency of the participants. The Gates-MacGinitie Reading Test (GMRT) was used to assess reading achievement and lexical knowledge of the participants. The Hungarian National Reading Competency Measure (OKM) was administered to assess L1 reading comprehension of the participants. The Test of Syntactic Processing in Hungarian and its English translation were administered to find out L1 and L2 syntactic knowledge of the participants of the study. The results of the study showed that L2 syntactic knowledge had the second highest correlation with L2 reading comprehension. The study also demonstrated that L2 syntax significantly contributed to L2 reading comprehension and explained about 21 percent of the variance in L2 reading comprehension. L1 syntactic knowledge was found to have a weaker effect compared to L2 syntax. The study also revealed that syntactic knowledge

contributed equally to the L2 reading comprehension of the participants from different reading proficiency groups. Moreover, temporal adjectives were found to have the largest effect while passive structures had the smallest effect on L2 reading comprehension of the participants among the complex syntactic structures.

Kim and Cho (2015) examined the relative contribution of lexical knowledge and syntactic knowledge to L2 reading comprehension by Korean EFL learners. Two hundred Korean high school students participated in the study. The students were divided into three groups: a high reading group (HR), a low reading group (LR), and an intermediate reading group (IR) based on their reading comprehension test scores. A 20-item-reading comprehension test was adapted from two high school English textbooks. The test consisted of four passages and the vocabulary and readability of each passages was checked through the VocabProfile (Cobb, 2002) and Readability test tools. The VLT was employed to measure the lexical knowledge of the students. As for the grammar test, a-50-item grammar test consisting of two sections was compiled from the Preliminary English Test (PET), First Certificate in English (FCE), and IELTS exam. The first section of the grammar test included 25 multiple choice questions which required students to find the missing element of the sentence and another section which required students to locate an ungrammatical part among four underlined sections of a sentence. The Pearson correlation coefficient analysis results showed that both lexical and syntactic knowledge had a positive and significant contribution to the reading comprehension of the HR and IR groups. While syntactic knowledge was a stronger predictor of L2 reading comprehension in the HR group, lexical knowledge was a better predictor of L2 reading comprehension within the IR group.

In addition to the role of syntactic knowledge in L2 reading comprehension across different proficiency groups, other studies have focused on the effects of syntactic simplification on L2 reading comprehension of learners. For example, Berman (1984) aimed to find out the effects of syntactic simplification on L2 reading comprehension of native Hebrew speaking college students learning English as a foreign language. The researcher gave a syntactically simplified version and an original version of a reading text without changing any words to an experimental group and a control group, respectively. The researcher assessed L2 reading comprehension of the experiment and control groups by a set of 30 questions. The results showed that the group reading the syntactically simplified version did consistently better than the control group in L2 reading

comprehension test questions. Furthermore, the results of the study showed that the group reading the original version of the text made more errors on the specific information questions compared to general knowledge questions. The researcher deduced that syntactic knowledge may not be an important component for general understanding of the text; however, it is necessary to know each syntactic structure to acquire specific information about the text. Such a result shows the potential connection between syntactic knowledge and L2 reading comprehension, and suggests that higher syntactic knowledge may provide more precise comprehension in L2.

In a similar manner, Yano, Long and Ross (1994) asked 483 Japanese learners of English from different L2 proficiency levels to read one of 13 reading texts. The L2 reading texts had three versions: simplified, original, and elaborated. The results of the study revealed that students who read the linguistically simplified texts scored significantly higher in L2 reading comprehension test than the students who read the original ones. This result indicates that comprehending texts with less complex grammatical structures tends to be easier than comprehending texts with more complex grammatical structures. In other words, an interpretation for such a result may be that an L2 reader who has sufficient syntactic knowledge may not have any problem in comprehending structures of original L2 texts.

On the other hand, other studies have proposed that syntactic knowledge does not have effect on L2 reading comprehension of the learners. Lopez (2008), for example, investigated the predictive power of syntactic knowledge in L2 reading comprehension of 186 Spanish university students. To measure reading comprehension levels of the participants, two different reading tests were applied to the students. The reading comprehension tests consisted of multiple-choice questions, identifying referents, and semantic explanation questions. To measure grammatical knowledge of the participants two different grammar knowledge tests composed of questions related to grammar correction, substitution with similar structures, and completion with the correct verb forms were applied. The results of the study showed that there was statistically significant correlation between grammar knowledge and L2 reading comprehension; however, grammar knowledge accounted for only 0.22 percent of the variance in L2 reading comprehension of the university students. The researcher concluded that the scores in L2 reading comprehension cannot be predicted by the scores of grammar knowledge. The researcher also indicated that although grammar is essential, it remained limited in

explaining all the processes of L2 reading comprehension. The researcher rejected the hypothesis that students who have good syntactic knowledge will perform well in the reading tests.

Brisbois (1995) tested the effects of L1 reading, L2 vocabulary, and L2 grammatical knowledge on L2 reading comprehension of 131 native English students learning French, who had two different proficiency levels: beginners and upper levels. Two separate reading instruments were used in testing L1 reading comprehension: The Nelson-Denny Reading Test and a recall protocol based on L1 reading texts. A recall protocol was administered based on three L2 texts to measure L2 reading comprehension. L2 grammatical knowledge of the learners was measured by multiple choice and cloze items found in the grammar part of L2 placement test. L2 vocabulary knowledge was measured by 50 vocabulary items chosen from L2 reading comprehension test. The researcher asserted that L2 vocabulary knowledge contributed more than that of L2 grammatical knowledge, which in most cases contributes the least, to L2 reading comprehension of the participants. Moreover, the researcher stated that L2 grammatical knowledge did not significantly contribute to L2 reading comprehension scores of either beginners or upper levels.

Contrary to Berman (1984) and Yano, Long and Ross (1994), some studies claimed a minor role of syntactic simplification in L2 reading comprehension. Ulijn and Strother (1990), for example, investigated the role of syntactic simplification and background knowledge on L2 reading comprehension of four groups of participants: 24 native computer science majors, 24 native humanities majors, 24 non-native computer science majors, and 24 non-native humanities majors. A computer science article and its syntactically simplified version without changing any vocabulary was applied to the experimental and control groups. The result of the study displayed that there were not significant differences in the reading comprehension test scores of those who read the original text and the syntactically simplified version. The researchers asserted that the syntactically simplified version of the English computer science text did not really help the students to comprehend better or to read more quickly, either for the natives or for the non-natives. The researchers implicated that syntactic knowledge plays a minor role in reading comprehension of native and non-native advanced readers.

Table 2.5. *Empirical studies on L2 syntactic knowledge and L2 reading comprehension*

Study	Participants	Instruments	Results
Nergis (2013)	• 45 Turkish EFL students studying at university	• TOEFL RBC Reading part • Sentence Combination of TOAL 4 • Depth of Vocabulary knowledge • Metacognitive Awareness questionnaire	The predictive power of metacognitive awareness was found to be the largest followed by syntactic awareness in academic reading of the participants. Vocabulary depth was not found to be a contributive factor in academic reading of Turkish participants.
Maftoon and Tasnimi (2014)	• 149 Iranian EFL students studying at university	• TOEFL PBT Reading part • Structure and Written Expression part of TOEFL PBT • VLT version 2 • Metacognitive Awareness of Reading Strategies Inventory (MARSI)	The predictive power of syntactic knowledge was found to be the largest followed by vocabulary breadth and metacognitive strategies in L2 reading comprehension of Iranian EFL students.
Atai and Nikuinezhad (2012)	• 159 Iranian intermediate level high school students	• Preliminary English Test (PET) • VLT version 2 and WAT • Test of English for Educational Purpose (TEEP)	There was positive and significant relationship between the variables of the study. all the variables contributed to L2 reading comprehension of the participants; however, syntactic knowledge was found to be a better predictor of reading comprehension.
Chen (2014)	• 138 Taiwanese 2nd year EFL students from different academic majors	• 20 multiple choice items adopted from the TOEFL and the GEPT. • VLT Version 1 • A 20-item-syntactic knowledge test compiled from the TOEFL and the GEPT	Both lexical and syntactic knowledge have positive and equal importance in predicting L2 reading comprehension.

Table 2.5. (Continued) *Empirical studies on L2 syntactic knowledge and L2 reading comprehension*

Study	Participants	Instruments	Results
Shiotsu and Weir (2007)	• 107 EAP students from different L1 backgrounds • 182 L1 Japanese EFL learners • 624 L1 Japanese EFL learners	• The Advanced English Reading Test • CET vocabulary knowledge test. • a Syntactic Knowledge Test	Syntactic knowledge was a stronger predictor of L2 reading comprehension. Syntactic knowledge outperformed other variables in terms of predicting L2 text reading comprehension. Even in the subgroup analysis, syntactic knowledge was found to be the best predictor of L2 reading comprehension irrespective of the reading ability of the students.
Yalin and Wei (2011)	• 68 non-English major sophomores.	• CET Band 4 reading test • VLT • 30 multiple-choice questions found in the CET Band 4	Syntactic and lexical knowledge positively and significantly contributed to L2 reading comprehension. The contribution of syntactic knowledge was found to be a stronger than lexical knowledge
Morvay (2009)	• 65 Hungarian 12th grade high school students.	• Michigan Comprehension Test • Gates-MacGinitie Reading Test • Hungarian National Reading Competency Measure • Syntactic Processing in Hungarian • Syntactic Processing in English	The results of the study showed that L2 syntactic knowledge significantly contributed to L2 reading comprehension and explained 24 percent of the variance in L2 reading comprehension. L1 syntactic knowledge was found to have a weaker effect compared to L2 syntax. The study also revealed that syntactic knowledge contributed equally to the L2 reading comprehension of the participants from different reading proficiency groups.
Kim and Cho (2015)	• 200 Korean high school students • high reading group (HR) • low reading group (LR) • intermediate reading group (IR)	• A 20-item reading test based on the English textbooks • VLT • a-50-item grammar test compiled from (PET), (FCE), and IELTS.	The results showed that both lexical and syntactic knowledge had a positive and significant contribution to the reading comprehension of the HR and IR groups. While syntactic knowledge was a stronger predictor of L2 reading comprehension in the HR group, lexical knowledge was a better predictor of L2 reading comprehension within the IR group.

Table 2.5. (Continued) *Empirical studies on L2 syntactic knowledge and L2 reading comprehension*

Study	Participants	Instruments	Results
Berman (1984)	• Native Hebrew speaking college students learning English	• authentic reading text and comprehension questions • syntactically simplified reading text and comprehension questions	The group reading syntactically simplified version did consistently better than the control group in L2 reading test questions. The researcher deduced that syntactic knowledge is an important component to acquire specific information about the text.
Yano, Long and Ross (1994)	• 483 Japanese learners of English from different L2 proficiency level	• 13 reading passages of various length • Syntactically simplified, and elaborated versions of these passages • 30 reading comprehension questions.	The result of the study revealed that students who read the linguistically simplified texts scored significantly higher in reading comprehension test than the students who read the original ones.
Lopez (2008)	• 186 Spanish university students	• Two reading comprehension tests • Two grammar tests each of which consists of 30 form focused items	Although there was significant and positive correlation between grammar and reading, grammar knowledge accounted for only 0.22 percent of variance in L2 reading comprehension of the university students.
Brisbois (1995)	• 131 native English students: beginners and upper levels.	• L1 reading comprehension test • L2 reading comprehension test • Grammatical skill test • Vocabulary knowledge test	L2 vocabulary scores contributed more than L2 grammatical skills, which in most cases contribute the least, to L2 reading comprehension of the participants. LI reading scores consistently contributed to the L2 reading scores.
Ulijn and Strother (190)	• 24 native computer science majors • 24 native humanities majors • 24 non-native (Dutch) computer science majors • 24 non-native (Dutch) humanities majors.	• A computer science article and its syntactically simplified version without changing any vocabulary, followed by ten true-false statements	There was not significant difference in the reading comprehension test scores of those who answered original reading text and the syntactically simplified version. The researchers asserted that syntactically simplified version of English computer science text did not really help the students to comprehend better either for the natives or for the nonnatives.

In conclusion, previous research findings have shown that the role of lexical and syntactic knowledge in L2 reading comprehension of students is unclear. Some studies have proposed that lexical knowledge was the best predictor of L2 reading comprehension (Zhang, 2012; Guo, 2008; Brisbois, 1995), while others have suggested that syntactic knowledge was the best predictor of L2 reading comprehension of the learners (Maftoon and Tasnimi, 2014; Shiotsu and Weir, 2007; Yalin and Wei, 2011; Berman, 1984). As already stated above, the participants, methodologies, contexts, and testing measures they employed differed considerably in those studies. With the aim of exploring the best contributing factor to L2 reading comprehension in the case of adult Turkish EFL learners, and within the light of the previous research, this study aimed at employing rigorous methodology and appropriate testing measures, which is introduced in the following chapter.

3. METHODOLOGY

3.1. Introduction

This chapter presents the research design, the participants, data collection tools, data analysis methods and the pilot study. First of all, the research design used in this study is described. Thereafter, the details about the participants and setting are provided. Then, the instruments used in the current study and the steps of the data collection and analysis procedures are explained in detail. Finally, data collection process of the pilot study and the preliminary results of the pilot study are presented.

3.2. The Research Design

Previous studies have regarded reading comprehension as consisting of a set of subskills and have investigated the contribution of these subskills to L2 reading comprehension (Yalin and Wei, 2011; Shiotsu and Weir, 2007). Accordingly, reading comprehension can be divided into smaller components and the contribution of these components can be investigated individually. Therefore, the current study employed the *component-skill approach* (Carr and Levy, 1990), which aims at finding contributing components in the explanation of L2 reading comprehension rather than explaining how these components operate in the reading comprehension process (Yalin and Wei, 2011). Among these smaller components, syntactic and lexical knowledge have been found to be the most important predictors of L2 reading comprehension in the previous componential analyses (Jeon and Yamashita, 2014; Kim and Cho, 2015; Atai and Nikuinezhad, 2012). Therefore, the first aim of the current study was to uncover the contribution of lexical knowledge and syntactic knowledge to L2 reading comprehension. Two aspects of lexical knowledge, depth and breadth, have been investigated in the current study. The second aim of the study was to reveal whether the role of lexical and syntactic knowledge changes when the reading comprehension proficiency of the participants changes. Therefore, students were divided into two groups based on their reading comprehension test scores in the second phase of the study. L2 reading comprehension is a dependent variable of the current study, and the independent variables are lexical breadth, depth, and syntactic knowledge as shown in figure 3.1. below. In line with the aim of the current study, a quantitative research design in which the researcher collects numeric data from the participants and analyzes them using statistics, was used.

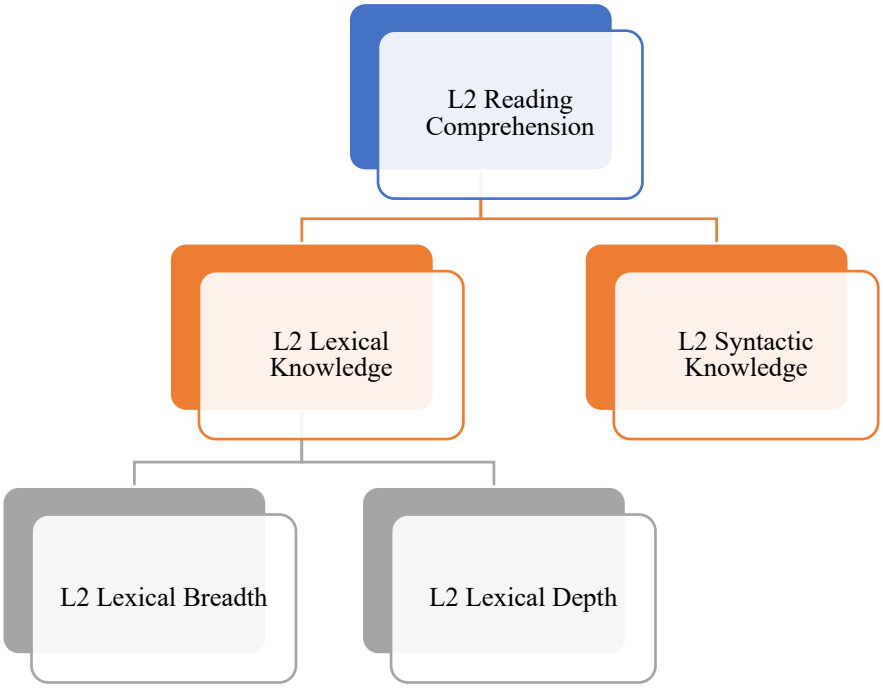

Figure 3.1. *Dependent and independent variables of the present study*

3.3. The Setting and Participants

Two hundred and eighty-nine Turkish university students learning English as a foreign language participated in the current study. However, only the data from two hundred and fifty-four participants were used for the data analysis. Thirty-five of the students were left out of the study because these students did not complete all the tasks required for the study or they were outliers. The participants were 2nd and 3rd grade students studying at the Department of English Language Teaching at Anadolu University in Eskisehir, Turkey.

The participants were required to achieve sufficient scores from a standardized national examination administered by Student Selection and Placement Center (OSYM) to enroll the ELT program. The standardized exam conducted by OSYM consisted of 80 multiple-choice questions mainly dealing with English vocabulary, grammar, and reading comprehension (sentence completion, Turkish-English translation, locating the irrelevant sentence in a paragraph, paragraph completion, restatement, reading comprehension and dialogue completion). Moreover, students had to pass a proficiency exam conducted by the Anadolu University School of Foreign Languages. The proficiency exam conducted by Anadolu university consists of 100 multiple-choice questions (30 lexical knowledge, 40 language use and 30 reading comprehension). All participants took two reading classes

(academic reading and critical reading) and two grammar classes (contextual grammar) in their first year. Although there was not a specific lesson focusing on vocabulary through their education, the medium of instruction was English and the participants were expected to improve their vocabulary knowledge through listening and reading classes.

In the selection of the participants, a non-probabilistic sampling method was used. In a non-probabilistic sampling method, researchers select individuals because they are available, convenient and represent targeted characteristics that the researcher seeks to study (Creswell, 2012, p.145). Since the first aim of the study was to reveal the contribution of the lexical and syntactic knowledge to L2 reading comprehension, all of the data collection tools were applied to all participants. As the second aim was to find out the role of lexical and syntactic knowledge in L2 reading comprehension of the participants with high and low reading proficiency levels, the participants were divided into two groups either as the high reading proficiency group or the low reading proficiency group based on their RCT scores. The first 25 % of the participants formed the low reading proficiency group and the last 25 % of the participants formed the high reading proficiency group. In order to have clear cut level differences in terms of L2 reading proficiency levels, the intermediate proficiency group was excluded from the study.

3.4. Instruments

The specific aim of the study is to explore the contribution of lexical and syntactic knowledge to L2 reading comprehension levels of the participants. Thus, each variable is under investigation. Before measuring the lexical and syntactic knowledge levels of the participants, a reading comprehension test compiled from the TOEFL test was applied to students to find out the L2 reading proficiency levels of the students. In the second phase of the study, the same reading comprehension test was also used to form different reading proficiency groups. In total, there were four instruments used in the current study. The instruments used in this study were a Reading Comprehension Test compiled from retired TOEFL tests, Vocabulary Levels Test developed by Schmitt, Schmitt and Clapham (2001), Word Associates Test developed by Read (2000), and a Syntactic Knowledge part of The Examination for the Certificate of Proficiency in English (ECPE). The instruments used in the study, required time for the application of the tests, number of the items found in the tests and their reliability scores are briefly shown in table 3.1. below.

Table 3.1. *The instruments used in the present study*

	Instruments	Dimensions to be measured	Number of the items	Required time	Reliability
LEXICAL KNOWLEDGE	Vocabulary Levels Test (Schmitt et. al., 2001)	Size of lexical knowledge	150	30 min.	-
	Word Associates Test (Read, 2000)	Depth of lexical knowledge	40	25 min.	-
SYNTACTIC KNOWLEDGE	Grammar part of ECPE (The Examination for the Certificate of Proficiency in English)	Syntactic knowledge	40	25 min	.86
L2 READING	L2 Reading Comprehension part of TOEFL	L2 reading comprehension skills of the participants	31	75 min	.77

3.4.1. Reading comprehension test

The reading comprehension levels of the students was measured by a reading comprehension section of retired TOEFL tests. TOEFL is an international standardized test designed by Educational Testing Services and applied in many countries to measure L2 proficiency levels of the students.

In the compilation process of the Reading Comprehension Test, the titles of the reading texts and short summaries of the texts found in the reading comprehension part of the TOEFL were given as a small-scale questionnaire to the students. The students were asked to check the most interesting topics and they were asked whether they had read anything about the topics of the texts or not. Among 12 TOEFL reading texts, three reading texts *"Orientation and Navigation, Biological Clocks, and Transition to Sound in Film,"* that were the least known and rated highest for interest by participants. Through this procedure researchers were attempting to control for topic familiarity, another important variable of reading comprehension. In the original TOEFL test, each of the

texts consists of 14 multiple-choice questions. An RCT booklet composing of the three texts and 42 multiple-choice questions were sent to field experts to define whether the questions measured reading comprehension or not. With three expert opinions, 11 questions were excluded from the RCT on account of the fact that they measured lexical knowledge. Thereby, it was ensured that the RCT measured learners' ability to comprehend academic passages written in English. In total, there were three texts and 31 multiple-choice questions in the RCT of the current study. The participants were asked to choose the best suitable answer from the options given. The test consisted of factual information questions, reference and inference questions, rhetorical purpose questions, insert text questions and fill in the table questions. Each correct answer was worth one point except the fill in the table questions. In the RCT, there were three fill in the table questions, each of which was worth three points. The possible maximum score that the participants could achieve on the RCT was 37. The internal consistency of the test was calculated through *Cronbach's Alpha*, which turn out to be reliable (α=.77).

Before application of the test, a lexical frequency profile of the passages were calculated through VocabProfile software (Cobb, 2002), and readability scores were determined through the Readability website (http://www.readabilityformulas.com). A lexical frequency profile gives the number of the words used in a text and the number of the words a text contains from a list of the most frequent 1000-word families, the second 1000, an academic word list and words that do not appear in any of these lists. Laufer and Nation (1995) noted that the lexical frequency profile is reliable and valid as it correlates well with an independent measure of vocabulary size. Readability, on the other hand, uses a type of readability formula and allows us to score the difficulty of a text. The Gunning FOG readability index was used to calculate the readability score of the texts. Readability index compares syllables and sentence lengths. A Fog score of 5 is readable, 10 is hard, 15 is difficult, and 20 is very difficult.

Table 3.2. *Lexical frequency profile and readability scores of the reading texts of the study*

	K1 Words (1-1000)	**K2 Words (1001-2000)**	**Academic Word List Words**	**Readability Score**
Orientation and Navigation	81.51%	3.13%	7.68%	13.3
Biological Clocks	66.57%	3.95%	15.09%	19.5
Transition to Sound in Film	71.75%	8.13%	9.42%	19.7

3.4.2. The vocabulary levels test

The Vocabulary Levels Test (VLT) first designed by Nation (1983, 1990) was applied to measure the lexical size of the learners in English. Although the only validation study of the test is that which was conducted by Read (1988), the VLT was found to be reliable and it has been internationally used in various studies for measuring students' vocabulary sizes. Nation (1993) developed different versions of the test (B, C, D versions). According to Nation (2000, p. 31) the test was designed "to be quick to take, to be easy to mark, and to be easy to interpret". Later on, Schmitt, Schmitt and Clapham (2001) developed a new version of the Vocabulary Levels Test and conducted a validation study with 801 subjects from different countries with different L1 backgrounds and of different learning contexts. The VLT version 2 designed by Schmitt et. al. (2001) was employed to measure the lexical size of the participants in the present study.

As stated by Schmitt et. al. (2001, p. 58) the VLT defines the word knowledge of learners "from a number of distinct frequency levels, which provides a profile of a learner's vocabulary, rather than just a single-figure estimation of overall vocabulary size". The test consists of vocabulary from 2000, 3000, 5000, 10000 frequency levels, and an academic vocabulary section. There are 10 questions for each frequency levels and each question contains six words with three definitions. Learners are expected to match vocabulary with three definitions using the following form.

1 clerk	
2 frame	*6* a drink
3 noise	*1* office worker
4 respect	*3* unwanted sound
5 theater	
6 wine	

Figure 3.2. *A sample question from the Vocabulary Levels Test*

Schmitt et. al. (2001) considered the following criteria while designing the VLT: in VLT, the definitions are short with minimum reading which allows more items to be taken within a given period of time. The definitions used in the clusters are always more frequent than the target words and the target words are in alphabetical order and randomly chosen with similar definition length in order to minimize wild guessing

3.4.3. The word associates test

In order to measure the quality of word knowledge, The Word Associate Test developed by Read (1993, 1998) was applied to the participants. The test consists of a target word and eight other words. Half of them are distractors while the other half are words associated with the target word. According to Read (1998), the association between the target word and the other options are *analytic* (one of the options represents one aspect of the target word), *paradigmatic* (one of the options is synonym of the target word or two words have similar meanings), or *syntagmatic* (there is a collocational association between the target and option and they tend to occur together in a sentence).

In the design of the WAT, Read (1998) took some criteria into consideration. For example, Read (1998) used only adjectives as target words in order to provide consistency in the relationship of the target and its associates. Rather than random selection, Read (1998) used purposeful selection of the adjectives which test takes have at least familiarity. Furthermore, the researchers used adjectives with more than one meaning or a range of use in the test. Below a sample question from WAT is demonstrated:

Broad

full	moving	quiet	wide	night	rivers	shoulders	smile

Figure 3.3. *A sample question from the Word Associates Test*

In the item above, the adjective (broad) has a synonym or near synonym (wide) while there are three possible collocations (broad rivers, broad shoulders, broad smile). In order to minimize potential wild guessing, the correct answers are distributed as one on the left and three on the right, one on the right and three on the left, or two on the left and two on the right. The WAT consists of 40 items, each of which has 4 correct answers and each correct answer is one point, so the maximum score of the test is 160. The required time to complete the WAT was about 25 minutes for the participants of the current study.

According to Read (1998), the WAT is a very efficient instrument to test different aspects of vocabulary. Qian and Schedl (2004) noted that the WAT items would be an alternative to traditional multiple-choice items within the vocabulary section of the TOEFL.

3.4.4. Syntactic knowledge test

In order to measure the syntactic knowledge of the participants, the grammar section of the Examination for the Certificate of Proficiency in English (ECPE) by Cambridge Michigan Language Assessment was utilized. The ECPE is a standardized proficiency test accepted as official proof of advanced proficiency in the English language. The ECPE is a general language proficiency exam consisting of a combination of tasks in listening, reading, writing, grammar, and speaking. The test is aimed at the C2 level of the Common European Framework of Reference (CEFR). The grammar section of the ECPE consists of 40 multiple-choice grammar items. The internal consistency of the test was calculated through *Cronbach's Alpha* and found to be reliable (α=.86).

Since there is not a comprehensive list of the types of grammatical knowledge (Urquhart and Weir, 1998), the items were checked one by one to determine if it contained a sufficient variation of essential grammatical constructs. Some of the items of the test measured more than one type of grammatical knowledge. The grammatical knowledge items found in the test are shown in the following table.

Table 3.3. *Essential types of grammatical knowledge items found in the syntactic knowledge test*

Grammatical Structures	Number of the items
Infinitive or Gerund Complements	**3**
Modals and Phrasal Modals	**4**
Subordinating and Coordinating Conjunctions	**2**
Prepositions and Prepositional Phrases	**3**
Comparatives and Superlatives	**1**
Adverbials	**1**
Adverbial Clauses	**2**
Pronouns and Reference	**3**
Passive Voice	**2**
Relative Clauses	**4**
Non-referential *it* and *there*	**2**
Word order	**3**
Adjectives and Adjective Phrases	**4**
Tense and Aspect	**3**
Noun Clauses	**3**
TOTAL	**40**

Alderson (1993) noted that a grammar test should be decontextualized; therefore, too much dependency on other constructs in a grammar test will decrease the construct validity of the test. Therefore, the decontextualized nature of the items ensures validity of the test. Thus, it became important that all items on the test only measure the syntactic knowledge of the participants rather than reading comprehension or lexical knowledge.

To provide validity of the test, the level of the vocabulary used on the test was checked through VocabProfile software (Cobb, 2002). According to VocabProfile software, 87% of the lexical items used in the test were between 1-1000 frequency level, which ensures that the syntactic knowledge test measured only the syntactic knowledge of the participants rather than lexical knowledge or reading comprehension.

3.5. Data Collection Procedures

3.5.1. Pilot study

A month before the actual data collection procedure, a pilot study was conducted to check data collection instruments and to define potential problems regarding data collection and analysis procedures. A total of 32 ELT students studying at Nevşehir Hacı Bektaş Veli University, Nevşehir participated in the pilot study. Data collection instruments were applied to the students to determine the required time for the tests. First, the Reading Comprehension Test was applied to the participants of the pilot study and it was ensured that 75 minutes would be enough for the students to complete Reading Comprehension Test. A week after the RCT, the Lexical and Syntactic Knowledge Test in the same booklet was given to the participants of the pilot study. 80 minutes was found to be enough time to answer all the questions of the data collection instruments.

3.5.2. Actual data collection and analysis

The participants were asked to take the four tests over two separate weeks in the order of RCT, WLT, WAT, and SKT. The tests were conducted in the regular English classes of the participants. First, the RCT was given to students and the average time required was 75 minutes. A week after the RCT, WLT, WAT and SKT were administered to the participants and the average time required for these were 80 minutes. Before the distribution of the tests, the aim of the study and the instructions of the tests were explained in detail. In the process of administering the test, students were warned to give sincere answers for the questions.

After application of the instruments, the data was analyzed using SPSS. Both skewness and kurtosis of the participants were checked and the outliers were excluded from the study. In the process of data analysis, the Pearson-product moment correlation analysis was conducted to reveal the relationship between vocabulary depth, vocabulary size, syntactic knowledge and L2 reading comprehension. In addition, a simple bivariate

and multiple regression analysis was conducted to find out the unique contribution of each variable to L2 reading comprehension. Simple bivariate regression is used to predict scores on one variable on the basis of scores on the second (Brantmeier, 2004). A multiple regression analysis is used to find out which of many variables, or which combination of variables, allows us to make the best prediction (Hatch and Lazaraton, 1991). In other words, a multiple regression analysis allows us to find out the unique variance of independent variables accounted for in the dependent variable. After the first step of data analysis, in order to find out the contribution of lexical and syntactic knowledge to L2 reading comprehension of participants with different reading proficiency levels, two new groups were formed based on the Q1 and Q3 of RCT scores of the participants. After the participants' scores from the RCT were listed from the lowest to the highest, Q1 refers to the 25 percent of the whole sample from the bottom, whereas Q3 refers to the 25 percent from the top. Next, in order to have clear cut distinctions between the reading levels of these two groups, the students scoring an intermediate level of reading comprehension were excluded from the study. The Pearson-product moment correlation and multiple regression analyses were conducted to find out the unique contribution of each variable to L2 reading comprehension of the participants with high and low reading proficiency levels.

3.5.3. Preliminary results

The results of the pilot study are presented in this section. Table 3.4 below shows the minimum and maximum scores of the participants in RCT, VLT, WAT, and SKT along with the mean scores, standard deviations and standard errors. As shown in the table, while the lowest score taken from the reading comprehension test is 7 out of 37, the highest score is 25 out of 35. The standard deviation of the participants in RCT is 4.256, which indicates that the participants do not show variability in their reading comprehension scores. Similarly, SKT scores of the participants do not show variability (min. 12, max. 31, SD=4.256). On the other hand, the minimum scores of the participants in VLT and WAT are 79 and 77, while the maximum scores are 126 and 128 with 13.813 and 11.946 SD respectively, which shows that there is variability in the VLT and WAT score of the participants.

Table 3.4. *Descriptive Statistics of the pilot study*

	Number of participants	Minimum	Maximum	Optimal score	Mean	Standard Deviation	Standard Error
RCT	32	7	25	37	16.38	4.256	.752
VLT	32	79	126	150	101.28	13.813	2.442
WAT	32	77	128	160	102.06	11.946	2.112
SKT	32	12	31	40	21.22	4.675	.826

RCT= Reading Comprehension Test
VLT= Vocabulary Levels Test
WAT= Word Associates Test
SKT= Syntactic Knowledge Test

In order to find out whether there is any relationship between the participants' scores from RCT, VLT, WAT, and SKT in the pilot study, a Pearson Product Moment Correlation analysis was conducted. Table 3.5 below shows the correlation matrix of the variables in the pilot study. According to Table 3.5, all the variables of the pilot study positively and significantly correlated with each other. In other words, participants obtaining high scores from a test were likely obtain high scores from the other tests. First of all, RCT scores (M=16.38, SD=4.256) and VLT scores (M=101.28, SD=13.813) were found to be highly, positively, and significantly correlated (r=.760, p<.01), indicating that RCT and VLT scores tended to be parallel to each other among the participants of the pilot study.

Table 3.5. *Pearson Product Moment Correlation Analysis of the variables*

	RCT	VLT	WAT	SKT
RCT	1	.760*	.604*	.716*
VLT			.727*	.596*
WAT				.472*
SKT				1

RCT= Reading Comprehension Test
VLT= Vocabulary Levels Test
WAT= Word Associates Test
SKT= Syntactic Knowledge Test

*Correlation is significant at the 0.01 level (2 tailed).

Another significant, positive and high correlation appears to be between SKT (M=21.22, SD=4.675) and RCT scores (r=.716, p<.01), displaying that while RCT scores of the participants are increasing, their SKT scores are increasing as well. The correlation between WAT (M=102.06, SD=11.946) and RCT is also positive and significant but moderate (r=.604, p<.01) meaning that RCT and WAT scores are congruent with each other among the ELT students. The correlation between VLT and WAT is also high,

positive, and significant (r=.727, p<.01). The participants obtaining high scores from the VLT were likely obtain high scores from the WAT as well.

In order to explore whether significant correlation scores between the independent variables and dependent variable of the pilot could predict a dependent variable namely, the RCT scores, bivariate and multivariate regression analyses were conducted. Each independent variable was entered into the regression model separately, and then together to determine how much unique variance in the dependent variable each of the independent variables explains. Before conducting regression analyses, a number of assumptions such as multicollinearity for the predictor variables, normality, linearity, and uncorrelated residual terms were checked to have reliable results. As Multicollinearity between dependent and independent variables makes it difficult to assess the individual importance of a predictor (Field, 2009, p.223). Multicollinearity was checked through Variance Inflation Factor scores (VIF) and tolerance values of the variables. According to Pallant (2010) multiple regression is very sensitive to outliers (p.151), so normality and linearity was tested with scatterplots. Uncorrelated residuals are tested with Q-Q-Plot and it was found that none of these assumptions constituted a problem for this analysis. Tables below display the result of bivariate and multivariate regression analysis between the dependent variable reading comprehension and the independent variables of word associates scores, vocabulary levels scores, and syntactic knowledge scores. Firstly, the scores of lexical and syntactic knowledge entered the model separately then together. The results of the regression model between syntactic knowledge scores and reading comprehension are presented in Table 3.6 below. According to the table, syntactic knowledge significantly accounted for 51 percent of the variance in L2 reading comprehension of the participants of the pilot study (R^2=.512, F (1, 30) = 31.491, p<.01). This means that syntactic knowledge made a large and significant contribution to L2 reading comprehension of the participants.

Table 3.6. *Bivariate regression model for syntactic knowledge and reading comprehension*

	Model Summary					Change Statistics		
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
Syntactic Knowledge	.716	.512	.496	3.022	31.491	1	30	.001
Lexical Knowledge	.764	.584	.555	2.839	20.339	2	29	.001

a. Predictors: (Constant), Syntactic Knowledge Test
b. Predictors: (Constant), Word Associates Test, Vocabulary Levels Test

A similar procedure was followed for lexical knowledge (vocabulary depth and breadth). Table 3.6 demonstrates that lexical knowledge explained 58 percent of the variance in L2 reading comprehension of the participants (R^2=.584, F (2, 29) = 20.339). The contribution of lexical knowledge to L2 reading comprehension of the participants was found to be significant (p<.01). Comparing the bivariate regression scores, it can be proposed that lexical knowledge has more predictive power than syntactic knowledge in L2 reading comprehension of the participants. In order to find out which dimension of the lexical knowledge contributed more to L2 reading comprehension of the participants, VLT and WAT scores entered the model separately.

Table 3.7. *Bivariate regression model for vocabulary breadth, depth and reading comprehension*

	Model Summary				Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
Breadth	.760	.578	.564	2.810	41.112	1	30	.001
Depth	.604	.365	.344	3.447	17.248	1	30	.001

a. Predictors: (Constant), Vocabulary Levels Test
b. Predictors: (Constant), Word Associates Test

According to Table 3.7 above, vocabulary breadth accounted for 57 percent of the variance in L2 reading comprehension of the participants and vocabulary breadth was found to be a significant predictor of L2 reading comprehension (R^2= .578, F (1,30) = 41.112, p <.01). Similarly, vocabulary depth scores significantly contributed to L2 reading compression of the participants and accounted for 36 percent of the variance in L2 reading comprehension (R^2= .365, F (1,30) = 17.248, p <.01). Comparing vocabulary breadth and depths scores, vocabulary breadth was found to have more predictive power in L2 reading comprehension scores in the pilot study. A linear multiple regression analysis was conducted to find out contribution of all and unique contribution of each independent variables to the dependent variable. Table 3.8 below presents the result of the multiple regression analysis.

Table 3.8. *Multiple regression model for syntactic and lexical knowledge and reading comprehension*

	Model Summary				Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
1	.829	.688	.654	2.503	20.552	3	28	.001

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

The table shows that VLT, WAT, and SKT all together accounted for 69 percent of the variance in L2 reading comprehension of the participants (R^2= .688, F (3,28) = 20.552). Together all of the variables contributed to L2 reading scores of the participants significantly (p <.01). Standardized Beta scores gives us the unique contribution of each variable. Of these three variables, VLT made significant and the largest unique contribution to L2 reading comprehension (β= .465, p =.01). Similarly, SKT made a significant unique contribution to L2 reading comprehension of the participants (p <.01). However, the predictive power of the SKT was found to be less than the VLT score (β= .402). In the model, the WAT score was not found to contribute to L2 reading comprehension of the participants (β= .076, p =.625). In other words, while syntactic knowledge and vocabulary breadth positively and significantly predicted L2 reading comprehension of the participants; vocabulary breadth having slightly more effect size, vocabulary depth did not make a significant unique contribution to L2 reading comprehension of the participants.

When WAT score entered the model on its own, it made a significant contribution to L2 reading comprehension. However, it did not make a significant contribution with VLT and WAT scores. The total R square value in table 3.8 includes the unique variance explained by each variable and also shared variance. Besides, looking at the correlation coefficient table, there was found to be a significant, positive and high correlation between VLT and WAT (r=.727, p<.01). Therefore, there might be a lot of shared variance when VLT and WAT entered the model together. Thus, this could possibly be explained with the overlap between VLT and WAT. Another reason might be related to the number of the participants involved in the pilot study (N=32). In the main data analysis, there is a larger sample and WAT scores may yield a significant contribution to L2 reading comprehension of the participants.

4. RESULTS AND DISCUSSIONS

The previous chapter described the design, procedure, and instruments of the current study while this chapter provides the findings and presents the statistical results in relation to each research question. The descriptive statistics and the results of correlation analysis and regression analyses are presented and discussed, respectively. The primary goal of the study –as stated in the previous chapters- was to find out the role of lexical and syntactic knowledge in L2 reading comprehension of adult EFL learners. Another purpose of the current study was to reveal the relative contribution of lexical and syntactic knowledge to L2 reading comprehension of the participants with low and high levels of reading proficiency. Therefore, the present study was also conducted to investigate if there was a change in the contribution of lexical and syntactic knowledge when the reading proficiency of the participants changed.

4.1. The Whole Sample

Before presenting the role of lexical and syntactic knowledge in L2 reading comprehension, the descriptive statistics of the participants' scores in reading comprehension, vocabulary levels, word associates, and syntactic knowledge tests of the study are illustrated in Table 4.1. below.

Table 4.1. *Descriptive Statistics of the study*

	Number of participants	Minimum	Maximum	Optimal Score	Mean	Standard Deviation	Standard Error
RCT	254	5	35	37	19.96	6.254	.392
VLT	254	65	145	150	104.83	16.258	1.020
WAT	254	55	142	160	100.83	18.665	1.171
SKT	254	10	38	40	23.91	5.527	.347

RCT= Reading Comprehension Test Scores of the whole sample
VLT= Vocabulary Levels Test Scores of the whole sample
WAT= Word Associates Test Scores of the whole sample
SKT= Syntactic Knowledge Test Scores of the whole sample

According to the table above, while the lowest score taken from the reading comprehension test was 5 out of 37, the highest score was 35. The standard deviation of the participants in the RCT was 6.254, which indicates that the participants did not show great variability in their reading comprehension scores. Similarly, SKT scores of the participants did not show extreme variability (min. 10, max. 38, SD=5.527). On the other hand, the minimum scores of the participants on the VLT and WAT were 65 and 55 while

the maximum scores were 145 and 142 with standard deviations of 16.258 and 18.665, respectively, which shows that there was some variability in the VLT and WAT score of the participants. This was caused by the number of the items found on the tests. While the possible highest score that can be taken from the VLT and WAT were 150 and 160 respectively, it was 37 and 40 for the RCT and SKT, respectively, so it is natural that variability in the scores of VLT and WAT occurred.

4.1.1. Inter-relationship of the variables for the whole sample

The research question 1a of the current study investigated the relationship among vocabulary breadth, depth, syntactic knowledge and L2 reading comprehension. In order to find out whether there was a relationship between the participants' scores from the RCT, VLT, WAT, and SKT, a Pearson Product Moment Correlation analysis was conducted. Table 4.2 below shows the correlation matrix of the variables in the study.

According to Table 4.2 below, all of the variables of the study positively and significantly correlated with each other. In other words, participants obtaining high scores from a test were likely to obtain high scores from the other tests. First of all, the RCT scores (M=19.96, SD=6.254) and VLT scores (M=104.83, SD=16.258) were found to be highly, positively, and significantly correlated (r=.598, p<.01), indicating that RCT and VLT scores tend to be parallel to each other among the participants of the study.

Table 4.2. *Pearson Product Moment Correlation Analysis of the variables*

	RCT	VLT	WAT	SKT
RCT	1	.598**	.446**	.614**
VLT		1	.565**	.612**
WAT			1	.529**
SKT				1

RCT= Reading Comprehension Test Scores of the whole sample
VLT= Vocabulary Levels Test Scores of the whole sample
WAT= Word Associates Test Scores of the whole sample
SKT= Syntactic Knowledge Test Scores of the whole sample

**Correlation is significant at the 0.01 level (2 tailed).

Another significant, positive and high correlation appears to be between SKT (M=23.91, SD=5.527) and RCT scores (r=.614, p<.01), as can be seen from the fact that when RCT scores of the participants increased, their SKT scores increased as well. The correlation between WAT (M=100.83, SD=18.665) and RCT was also positive and significant but moderate (r=.446, p<.01) meaning that RCT and WAT scores were

congruent with each other among the participants. The correlation between VLT and WAT scores was found to be high, positive, and significant (r=.565, p<.01). The participants obtaining high scores from VLT were likely obtain high scores from WAT as well.

Looking at our data, we can note that all of the independent variables namely vocabulary breadth, vocabulary depth, and syntactic knowledge significantly correlated with L2 reading comprehension. The most highly correlated variable with L2 reading comprehension was syntactic knowledge followed by vocabulary breadth and vocabulary depth. The significant correlations of the measures with L2 reading comprehension are reasonable considering that reading requires the operation of multiple cognitive processes and the highly complex interaction of sub-skills, such as vocabulary and syntax (Grabe, 2009). The result of the current study is consistent with the result of previously related correlational studies (Atai and Nikuinezhad, 2012; Barnett 1986; Binder et. al., 2017; Bowey, 1986; Gascoigne, 2005; Horiba, 2012; Li and Kirby, 2014; Ouellette, 2006; Tannenbaum et. al., 2006).

Previous research has shown that there is a strong correlation between lexical knowledge and reading comprehension both in L1 (Binder et. al., 2017; Ouellette, 2006; Tannenbaum et. al., 2006) and in L2 contexts (Horiba, 2012; Li and Kirby, 2014). Regarding L1 contexts, Ouellette (2006) investigated the role of a number of variables including breadth and depth of lexical knowledge in the reading comprehension of 4th grade children whose ages ranged from 9 years 10 months to 10 years 10 months. Ouellette (2006) found that vocabulary breadth and depth significantly correlated with reading comprehension, and stated that reading comprehension is related to both vocabulary breadth and vocabulary depth. In a similar vein, Tannenbaum et. al. (2006) examined the relationship between three dimensions of lexical knowledge (breadth, depth, and fluency) and reading comprehension of 203 3rd grade students. The researchers pointed out high correlations among the measures of lexical breadth, depth, fluency, and reading comprehension. In the same context (L1) with 107 adult college students, Binder et. al. (2017) investigated the relationship between breadth, depth and reading comprehension. The researchers reported high and significant correlation between the measures of breadth, depth, and reading comprehension, and they stated that both lexical breadth and lexical depth were important components of reading comprehension even for college-level L1 students.

As for the relationship between lexical knowledge and reading comprehension in L2 contexts, Horiba (2012) conducted a study with fifty Chinese and 20 Korean speaking L2 learners (Japanese) who had intermediate to advanced L2 proficiency. The correlation coefficient showed that for Chinese and Korean students, reading comprehension had a moderate and significant relation to both vocabulary breadth and depth. Similarly, Li and Kirby (2014) explored the relationship between lexical breadth, lexical depth, and L2 reading comprehension of Chinese high school students learning English. Li and Kirby (2014) noted that four vocabulary tests measuring lexical breadth and depth significantly correlated with L2 reading comprehension measures. All of these studies showed that there is significant relationship between lexical breadth, depth, and reading comprehension of children or adults both in L1 contexts and in L2 contexts. In other words, performance in lexical knowledge affected reading comprehension.

As with lexical knowledge, syntactic knowledge was also found to be correlated with L2 reading comprehension in this study. Previous correlation research findings also supported the relationship between syntactic knowledge and reading comprehension both in L1 (Bowey, 1986) and L2 contexts (Atai and Nikuinezhad, 2012; Barnett 1986; Gascoigne, 2005). In L1 contexts, for example, Bowey (1986) investigated the role of syntactic knowledge in the reading comprehension of 48 4th and 5th grade monolingual students, and noted that syntactic knowledge is significantly related to reading comprehension by suggesting that children's ability to correct grammatically incorrect sentences correlates with reading comprehension.

As for L2 studies on the relationship between syntactic knowledge and reading comprehension, Gascoigne (2005) examined the relationship between form-focused grammar activities and meaning driven reading comprehension abilities in beginning L2 learners. The aim of the researcher was to confirm or deny the existence of a negative correlation between performance on two divergent task types: form-focused grammar and meaning driven reading ability. The study showed that there was positive relationship between these two tasks types, which suggested that the success in form focused grammar activities was congruent with meaning driven reading comprehension tasks. Similarly, Atai and Nikuinezhad (2012) showed a significant relationship between the measures of lexical and syntactic knowledge and L2 reading comprehension of intermediate high school students in an Iranian context. In the same vein, Barnett (1986) investigated the relative importance of lexical and syntactic knowledge in the reading comprehension

abilities of English speakers in French and noted that "both syntactic and lexical analysis skills proved to be related to comprehension" (p.346). Alderson (1993) also implied the close relationship between the ability to use grammar and the ability to read for academic purposes.

This study also showed that there was a significant and high correlation between the independent variables of the study which can be justified on some grounds. This result is not surprising considering that lexical knowledge and syntactic knowledge are fundamentally interconnected. In this context, Schmitt (2000; p. 14) pointed out that "much of what was previously considered grammar is actually constrained by lexical choices" emphasizing the difficulty to think of vocabulary and grammar as separate entities (ibid) and suggested the necessity to address the connection between grammar and vocabulary while studying the nature of grammar and vocabulary acquisition. As for the high and positive correlation between lexical depth and breadth, Qian (2002, p. 517) expressed that "the more words a learner knows, the more likely it is that he or she will have a greater depth of knowledge for these words.", consequently, these two variables are not completely separate from each other. The high correlation between these two dimensions of lexical knowledge has led some researchers to contend that there is no conceptual difference between depth and breadth of vocabulary knowledge (Vermeer, 2001, p. 231). The significant and positive correlation between lexical breadth and lexical depth may be explained by the overlap between these two variables.

4.1.2. Lexical knowledge or syntactic knowledge

The research question 1b asked whether lexical knowledge or syntactic knowledge was a stronger predictor of L2 reading comprehension. As the correlation analysis shows only the relationship between the variables, it does not provide assistance in predicting the dependent variable. In order to explore whether significant correlation scores between the variables predict the dependent variable namely, RCT scores, bivariate and multivariate regression analyses were conducted. Firstly, each independent variable was entered into the regression model separately, and then together to find out their unique and shared variance in L2 reading comprehension. Before conducting regression analyses, a number of assumptions such as multicollinearity for the predictor variables, normality, linearity, and uncorrelated residual terms were checked to have reliable results. Table 4.3 below displays the result of bivariate regression analysis between the dependent

variable reading comprehension and the independent variables lexical and syntactic knowledge scores.

Table 4.3. *Bivariate regression models for syntactic and lexical knowledge and reading comprehension*

	Model Summary				Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
Syntactic Knowledge	.614	.377	.375	4.945	152.700	1	252	.001
Lexical Knowledge	.612	.375	.370	4.964	75.275	2	251	.001

a. Predictors: (Constant), Syntactic Knowledge Test
b. Predictors: (Constant), Word Associates Test, Vocabulary Levels Test

R square tells us how much of the variance in the dependent variables is explained by the independent variables. According to the table, R square of syntactic knowledge is .377. This means that syntactic knowledge significantly accounted for about 38 percent of the variance in L2 reading comprehension of the participants of the study (R^2=.377, F (1, 252) = 152.700, p<.01). Therefore, syntactic knowledge made a large and significant contribution to L2 reading comprehension of the participants. A similar procedure was followed for lexical knowledge (vocabulary depth and breadth). Table 4.3 demonstrates that R square of lexical knowledge is .375; therefore, lexical knowledge explained about 37 percent of the variance in L2 reading comprehension of the participants (R^2=.375, F (2, 251) = 75.275). The contribution of lexical knowledge to L2 reading comprehension of the participants was found to be significant (p<.01). Comparing the bivariate regression scores, lexical knowledge (together breadth and depth) can be proposed to have a predictive power that is similar to that of syntactic knowledge which was found to have a slightly bigger effect size in L2 reading comprehension of the participants.

Lexical knowledge and syntactic knowledge were considered to be the most important contributors of reading comprehension (Jeon and Yamashita, 2014; Yalin and Wei, 2011). Therefore, it is not uncommon to find lexical knowledge and syntactic knowledge significantly predicting L2 reading comprehension. As reading texts are composed of some words, knowing the meaning of these words are required to understand the text. Even some second language researchers accepted a certain amount of lexical knowledge as a prerequisite for good comprehension (Hirsh and Nation, 1992; Laufer, 1992). Laufer (1992) proposed that knowing 3000-word families (5000 lexical items) would be necessary to achieve success in L2 reading comprehension of first year

university students. Similarly, Hirsh and Nation (1992) contended that knowing 5000-word families would be needed for pleasure reading. Although, adequate lexical knowledge is necessary, it may not entail good comprehension skills. In this regard, Alderson (2000) pointed out the importance of knowing particular syntactic structures, or the ability to process them and stated that "the ability to parse sentences into their correct syntactic structure appears to be an important element in understanding text." (p.37). To that end, syntactic knowledge may have been employed by the participants of our study in comprehending the texts. Considering the reading comprehension texts used in the current study, the length of the sentences might be a reason for syntactic knowledge to be a slightly stronger predictor of L2 reading comprehension. In other words, looking at the lexical profile of the texts, most of the vocabularies are between 1 to 1000 frequency. Even though The Gunning Fox readability indices showed the texts are difficult to read, The Gunning Fox readability formula calculates the readability of the texts based on the distribution of the total number of the words by the number of the sentences. Thus, the sentences of the texts are long with frequent words. This may be a reason for our participants to depend more on their syntactic knowledge while making sense of the sentences.

4.1.3. Lexical breadth, depth, or syntactic knowledge

In order to answer the research question 1c which asked the best predictor of L2 reading comprehension of the participants among the variables of breadth, depth and syntactic knowledge, a linear multiple regression analysis was conducted. The Multiple regression analysis shows the shared contribution of each independent variable to the dependent variable (Pallant 2010). Table 4.4 below presents the results of the multiple regression analysis.

Table 4.4. *Multiple regression for lexical breadth, depth, syntactic knowledge and L2 reading comprehension*

Model Summary					Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
1	.677	.458	.452	4.631	70.479	3	250	.001

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

Table 4.4 above shows how well this set of variables; namely, lexical breadth, depth and syntactic knowledge (together) are able to predict L2 reading comprehension of the

participants. R square tells us how much of the variance in L2 reading comprehension is explained by this set of variables. R square was found to be .458; therefore, lexical breadth, depth, and syntax all together accounted for about 46 percent of the variance in L2 reading comprehension of the participants (R^2= .458, F (3,250) = 70.479). All of the variables together contributed significantly to L2 reading scores of the participants (p <.01).

Table 4.5. below, tells us how much unique variance each of the independent variables (lexical breadth, depth and syntactic knowledge) explains in L2 reading comprehension. In order to compare the relative contribution of each variable, we will use Standardized Beta scores. The highest beta score indicates the best predictor of L2 reading comprehension.

Table 4.5. *Relative contribution of lexical breadth, depth, and syntactic knowledge to L2 reading comprehension*

Variables	B	Standard Error	ß	*t*	*Sig.*
Lexical breadth	.128	.024	.334	5.287	.001
Lexical depth	.019	.020	.056	.958	.339
Syntactic Knowledge	.430	.069	.380	6.200	.001
a. Dependent Variable: Reading Comprehension R^2 = .458, p < .01					

Of these three variables, syntactic knowledge made a significant and the largest unique contribution to L2 reading comprehension (β= .380, p <.01). Similarly, breadth made a significant unique contribution to L2 reading comprehension of the participants (β= .334, p <.01). However, the predictive power of lexical breadth was found to be less than that of syntactic knowledge. In the model, lexical depth was not found to contribute to L2 reading comprehension of the participants (β= .056, p >.05). In other words, while syntactic knowledge and vocabulary breadth positively and significantly predicted L2 reading comprehension of the participants, with syntactic knowledge having slightly more of an effect size, vocabulary depth did not make any significant unique contribution to L2 reading comprehension of the participants.

Our findings appear to be supported by a handful of the previous studies (Shiotsu and Weir, 2007; Yalin and Wei, 2011), albeit not all of them (Brisbois, 1995; Haynes and Carr, 1990; Ulijn and Strother, 1990). Shiotsu and Weir (2007) employed structural equation modelling analysis to find out the relative contribution of lexical breadth and syntactic knowledge in L2 reading comprehension in different contexts; tertiary level

students with relatively heterogeneous L1 background studying in the UK, a homogeneous Japanese group, and a follow up study with a bigger homogeneous Japanese learner group. All three studies showed that lexical breadth significantly contributed to L2 reading comprehension but not as much as syntactic knowledge. The relative contribution of syntactic knowledge was found to be bigger than that of lexical breadth in predicting L2 reading performance. Based on the findings, Shiotsu and Weir (2007) noted the role of vocabulary is overstated while that of grammar is understated. The researchers also implied the necessity to develop syntactic knowledge to enhance reading ability. Yalin and Wei (2011) investigated the relative weight of vocabulary breadth and syntactic knowledge in L2 reading comprehension of 68 Chinese university students. In their study, Yalin and Wei utilized 11 syntactic structures and 30 words that were found in reading passages. Regression analysis showed significant contributions of both lexical breadth and syntactic knowledge. The relative contribution of syntactic knowledge to L2 reading comprehension was stated to be bigger however.

Not all of the previous research findings supported the superiority of syntactic knowledge over vocabulary breadth (Brisbois, 1995; Haynes and Carr, 1990; Ulijn and Strother, 1990). Testing the effects of syntactic simplification and background knowledge, Ulijn and Strother (1990) applied a syntactically simplified version and original version of a reading comprehension test, which was about computer science to four groups: native computer science majors, native humanities majors, non-native (Dutch) computer science majors, non-native (Dutch) humanities majors. The result showed no statistically significant difference between the groups reading syntactically simplified and unsimplified versions. Such a result led the researchers to propose that poor L2 reading is caused not by a deficiency in syntactic knowledge but rather inadequate lexical breadth. However, in the study of Ulijn and Strother (1990), the reading comprehension score of natives and non-natives was very high for simplified and original texts, and the researchers warned against the generalization of the results by asserting that reading tests might not be sensitive enough to show the effect of syntactic knowledge

Brisbois (1995) and Haynes and Carr (1990) also supported the superiority of lexical breadth over syntactic knowledge in L2 reading comprehension. Brisbois (1995) investigated the role of L1 reading, L2 lexical breadth and L2 syntactic knowledge to L2 reading comprehension of 131 students that enrolled in French at the U.S. air force

academy. The hierarchical regression analysis of the study concluded that L2 lexical breadth consistently contributed more to L2 reading comprehension of the participants than did the L2 grammar scores, which contributed less. Similarly, Haynes and Carr (1990) proposed that the correlation between vocabulary and L2 reading comprehension was higher than that between grammar and L2 reading comprehension for Chinese readers of English; however, the multiple regression result with timed L2 reading measures as dependent variable in Haynes and Carr's study revealed significant contribution of syntactic knowledge to L2 reading. Thus, contradicting the argument of Ulijn and Strother (1990) that L2 reading comprehension depends more on lexical knowledge and little on syntactic knowledge.

In the studies of Brisbois (1995) and Haynes and Carr (1990), there were some methodological problems. In these studies, while syntactic knowledge was measured by the items taken from standardized tests that measure general proficiency of learners, lexical breadth was measured by asking the meaning of the words found in the provided reading passages. Therefore, these studies measured general levels of syntax of the participants but specific word knowledge. In addition to that, Brisbois (1995) always entered L2 grammar after L1 reading and L2 lexical breadth to hierarchical model on the grounds that they contributed more to reading. As the order in hierarchical model matters, the results of Brisbois may be misleading. In sum, Brisbois (1995) and Haynes and Carr's (1990) studies cannot be interpreted as clear evidence of superiority of lexical knowledge unless the studies are replicated by a more rigorous methodology.

The potential reasons for the superiority of syntactic knowledge over lexical breadth in L2 reading comprehension of adult ELT learners could be due to the syntactic structures found in the passages, measures of reading comprehension of the current study, and reading proficiency levels of the students. First of all, if the syntactic structures of the passages were the ones for which students already have well-developed knowledge, they might compensate comprehension losses by depending more on their syntactic knowledge. That is, if the participants do not know the meaning of each word found in the reading passages, to some extent they may use other sources of information such as syntactic knowledge. Moreover, Givón (1995) suggested that syntactic knowledge provides readers basic cuing information in comprehending a text and stated that "overt grammatical signals -syntactic constructions, morphology, intonation- cue the text

processor, they guide [the comprehender] in the construction of a coherent mental representation of the text; and this is a vital cognitive boost." (p. 343).

Reading comprehension levels of the participants was measured by multiple choice questions. By answering multiple choice questions, the participants might have used syntactic ques found in the reading texts such as articles, tense/aspect, conjunctions, to aid comprehension. For example, in the following sentence of Pearson and Johnson (1978, p. 11) "The argle zoolked the bordiddy in the ershent because the bordiddy larped the argle.", the readers can identify syntactic categories by using syntactic cues without knowing the meaning of "The argle", "ersent", "zoolk" or "larp". The readers can identify the noun phrase functioning as the subject of the sentence because the sentence begins with an article. The tense marker in the verb signals that the event happened in the past. The noun phrase following the verb signals that the verb of the sentence is a transitive one. The adverbial subordinator signals that there is cause-effect relationship between those two clauses.

Another possible explanation for the superiority of syntax over breadth in L2 reading comprehension might be the L2 reading proficiency level of the participants. Shiotsu and Weir (2007) noted that syntactic knowledge remains one of the deciding factors in the performance on text reading comprehension for learners up to a certain level. Although L2 proficiency level of the participants was not measured, participants were 2nd and 3rd grade students of the ELT department and they had a proficiency exam before enrolling the faculty. Thus, they have a certain level of proficiency. In addition to the statement of Shiotsu and Weir (2007), some studies focused on the effect of syntactic simplification of text on L2 reading comprehension of the learners. For example, applying a syntactically simplified and original version of a reading text to an experiment and control group of EFL learners respectively, Berman (1984) found that the group reading syntactically simplified version did consistently better than the control group in reading comprehension test questions. The researcher concluded that "efficient FL readers must rely in part on syntactic devices to get at text meaning" (p. 153). In a similar manner, Yano, Long and Ross (1994) asked 483 Japanese learners of English from different L2 proficiency levels to read one of 13 reading texts. The reading texts had three versions: simplified, original, and elaborated. The results of the study revealed that students who read the linguistically simplified texts scored significantly higher in reading comprehension test than the students who read the original ones. Looking at the results

of these studies, it can be proposed that syntactic knowledge is one of the most important factors affecting and affected by the reading proficiency of the learners.

Although vocabulary depth was not found to contribute L2 reading comprehension of the participants in the multiple regression analysis of the current study, a bivariate regression analysis was conducted to reveal whether shared variance of depth contributes to L2 reading comprehension and to compare shared variance of two dimensions of lexical knowledge namely vocabulary depth and breadth. Therefore, VLT and WAT scores were entered into the regression separately.

Table 4.6. *Bivariate regression models for vocabulary breadth, depth and reading comprehension*

	Model Summary				Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
Breadth	.598	.358	.355	5.022	140.398	1	252	.001
Depth	.446	.199	.196	5.608	62.578	1	252	.001

a. Predictors: (Constant), Vocabulary Levels Test
b. Predictors: (Constant), Word Associates Test

According to table 4.6 above, the R square of lexical breadth is .358; therefore, lexical breadth accounted for about 36 percent of the variance in L2 reading comprehension of the participants and lexical breadth was found to be a significant predictor of L2 reading comprehension (R^2= .358, F (1,252) = 140.398, p <.01). Similarly, lexical depth significantly contributed to L2 reading compression of the participants and accounted for about 20 percent of the variance in L2 reading comprehension (R^2= .199, F (1,252) = 62.578, p <.01). Comparing vocabulary breadth and depths scores, vocabulary breadth was found to have more predictive power in L2 reading comprehension scores in the study.

When vocabulary depth score was entered to the model on its own, it made a significant contribution to L2 reading comprehension. However, it did not make a significant contribution along with breadth and syntax scores seen in table 4.5. The total R square value in table 4.5 includes the unique variance explained by each variable and also shared variance. Besides, the correlation coefficient in table 4.2, there was a significant, high correlation between lexical breadth and depth (r=.565, p<.01). Therefore, there might be a lot of shared variance when breadth and depth were entered into the model together. This might be explained by the overlap between breadth and depth. This finding seems to be consistent with related studies (Nurweni and Read, 1999;

Tannenbaum, et. al., 2006; Vermeer, 2001). Nurweni and Read (1999) estimated the vocabulary knowledge of Indonesian first year university students and expressed that depth and breadth may overlap when learners have advanced level of proficiency but may diverge when the learners have lower level of proficiency. Investigating the relationship between vocabulary knowledge and reading comprehension of 3rd grade native students, Tannenbaum et al. (2006) reported that breadth had a higher relationship to reading comprehension than did depth in primary school students and these two dimensions had significant overlapping variance. On the other hand, Vermeer (2001) specified vocabulary breadth tests as being a good a measure of lexical knowledge as a depth test for both L1 and L2 students as long as the breadth test contained words from various domains and frequency levels. Accordingly, in our study, the vocabulary breadth test included words from various domains and frequency levels. Therefore, words from various domains and frequency levels found in the VLT might have overlapped with the words found in the WAT and prevented the depth factor from attaining significance

4.2. High Reading Proficiency Group

This study also aimed to discover the role of vocabulary breadth, depth, and syntactic knowledge in good readers and poor readers. As L2 reading proficiency levels of the participants change, the contribution of each independent variable to L2 reading comprehension may change. The participants of the study were divided into two groups based on their RCT scores. When RCT scores are listed from the lowest to the highest, the first 25 percent (first quartile) of the whole sample represents low proficient readers and the last 25 percent (third quartile) constitutes high proficient readers. First, the contribution of each independent variable was uncovered for those with the highest reading comprehension scores.

Table 4.7. *Descriptive statistics of the participants with high reading proficiency (Q3)*

	Number of Participants	Minimum	Maximum	Optimal score	Mean	Standard Deviation	Standard Error
Q3-RCT	63	25	35	37	28.25	2.527	.318
Q3-VLT	63	85	145	150	116.98	13.129	1.654
Q3-WAT	63	66	142	160	112.22	17.083	2.152
Q3-SKT	63	17	38	40	28.03	4.512	.568

Q3-RCT= Reading Comprehension Test Scores of the third quartile of the whole sample
Q3-VLT= Vocabulary Levels Test Scores of the third quartile of the whole sample
Q3-WAT= Word Associates Test Scores of the third quartile of the whole sample
Q3-SKT= Syntactic Knowledge Test Scores of the third quartile of the whole sample

The descriptive statistics for the third quartile (Q3) group are presented in Table 4.7 above. The participants who obtained 25 or higher from in the reading comprehension test constituted the high reading proficiency group of the current study. 63 participants scored 25 or above on the RCT. The high proficiency reader group makes up about 22 percent of the whole sample of the current study. According to table 4.7 above, the minimum score achieved on the RCT is 25 while the maximum score is 35 for the high reading proficiency group. As for the VLT score, the lowest score was 85 while the highest score was 145 with a standard deviation of 13.1. The WAT score of the participants with high reading comprehension proficiency varied from 66 to 124 with the standard deviation of 17. The standard deviation of the WAT score was higher than that of the VLT score for the high reading comprehension proficiency group indicating that participants showed more variability in their WAT scores. The SKT scores of the participants with high reading comprehension proficiency ranged from 17 to 38 with a standard deviation of 4.5. Comparing the mean scores of good readers with the whole sample, not only the mean score of RCT, but the mean scores of VLT, WAT and SKT showed a substantial increase. While the mean score of RCT was about 20 for the whole sample, it was about 28 for the good readers. The mean score of VLT, which was about 105 for the whole sample, increased to 117 for the participants with high reading proficiency. Similarly, the mean score of WAT increased from 101 to 112. It can be said that the participants with high reading proficiency also had high levels of lexical and syntactic knowledge.

4.2.1. Inter-relationship of the variables for high reading proficiency group

As has been stated above, the mean scores of the group were higher than that of the whole sample. In order to find whether a relationship existed among breadth, depth, syntactic knowledge and L2 reading comprehension scores of the good readers, a Pearson Product Moment Correlation analysis was conducted. Table 4.8 below presents the inter-relationship of the variables of the participants with high level reading proficiency group.

According to Table 4.8 below, RCT scores and VLT scores moderately and significantly correlated (r= .434, n=63, p< .05). Therefore, high scores obtained from RCT associated with high scores obtained from VLT. In a similar way, RCT scores and SKT scores moderately, and significantly correlated (r= .459, n=63, p< .05), indicating that the participants getting high scores onthe SKT tended to get high scores on the RCT. The correlation analysis demonstrated that the relationship between RCT scores and

WAT scores was very weak and not significant (r= .141, n=63, p> .05), revealing that RCT and WAT scores were not compatible with each other for the high reading proficiency group.

Table 4.8. *Pearson Product Moment Correlation Analysis of the variables for high reading proficiency group (Q3*

	RCT	VLT	WAT	SKT
Q3-RCT	1	.434**	.141	.459**
Q3-VLT		1	.273*	.418**
Q3-WAT			1	.422**
Q3-SKT				1

Q3-RCT= Reading Comprehension Test Scores of the third quartile of the whole sample
Q3-VLT= Vocabulary Levels Test Scores of the third quartile of the whole sample
Q3-WAT= Word Associates Test Scores of the third quartile of the whole sample
Q3-SKT= Syntactic Knowledge Test Scores of the third quartile of the whole sample

*Correlation is significant at the 0.05 level (2 tailed).
**Correlation is significant at the 0.01 level (2 tailed).

The correlation table showed that while reading comprehension test scores associated moderately with vocabulary breadth and syntactic knowledge, reading comprehension had a weak association for vocabulary depth for the high reading proficiency group. The relationship between vocabulary breadth and L2 reading comprehension was found to be higher than that of vocabulary depth and L2 reading comprehension of the participants with high reading proficiency. In line with this result, Tannenbaum et. al. (2006) evaluated the relationship between dimensions of vocabulary knowledge, breadth, depth, and fluency, and reading comprehension in an L1 context to reveal which dimension most highly associated with reading comprehension of third-grade students, and stated that vocabulary breadth had the strongest relationship to reading comprehension and concluded that reading comprehension performance increased the most as the level of vocabulary breadth increased. Other studies have also demonstrated higher relationship between vocabulary breadth and reading comprehension compared to vocabulary depth and L2 reading comprehension (Binder et. al., 2017; Li and Kirby, 2014).

The weak relationship between depth and reading comprehension might be attributed to the nature of reading comprehension. More precisely, measuring reading comprehension with multiple choice items, which assess general understanding of passages and some specific details, may not demand knowing different aspects of vocabulary knowledge such as depth. Knowing other dimensions of words would

undoubtedly help comprehension but familiarity with word meanings may be adequate for receptive purposes.

4.2.2. Lexical or syntactic knowledge of high reading proficiency group

The correlation among the variables does not show the degree of prediction of lexical and syntactic knowledge in L2 reading comprehension. To answer research question 2b which asked the contribution of each variable to L2 reading comprehension of good readers, Bivariate regression analyses were conducted. Table 4.9 below introduces bivariate regression analyses between syntactic knowledge and reading, and lexical knowledge (breadth and depth together) and reading. When entered into the model separately, syntactic knowledge significantly accounted for about 21 percent of the variance in L2 reading comprehension of the participants with a high level of reading proficiency (R^2=.211, F (1, 61) = 16.287, p<.01), meaning that syntactic knowledge made a considerable contribution to reading comprehension of good readers. Lexical knowledge accounted for about 19 percent of the variance in L2 reading comprehension of good readers (R^2=.189, F (2, 60) = 6.997). As shown in table 4.9., the contribution of lexical knowledge to L2 reading comprehension of participants within the high reading proficiency group was found to be significant (p<.01). Comparing the bivariate regression scores, syntactic knowledge seems to have more predictive power than lexical knowledge for the participants with high reading proficiency levels.

Table 4.9. *Bivariate regression models of lexical knowledge syntactic knowledge and reading comprehension for high reading proficiency group (Q3)*

	Model Summary					Change Statistics		
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
Syntactic Knowledge	.459	.211	.198	2.263	16.287	1	61	.001
Lexical Knowledge	.435	.189	.162	2.313	6.997	2	60	.002

a. Predictors: (Constant), Syntactic Knowledge Test
b. Predictors: (Constant), Word Associates Test, Vocabulary Levels Test

Since the related literature about the relative contribution of lexical and syntactic knowledge in L2 reading comprehension of participants with high level reading proficiency was limited, it was not possible to make a direct comparison between the result of the current study and those of previous ones. Of the studies examining the role

of lexical and syntactic knowledge in L2 reading comprehension, only a few took L2 reading comprehension levels of the participants into consideration. Among these studies, the findings of Shiotsu (2010), Shiotsu and Weir (2007), and Kim and Cho (2015) were in line with our findings. A structural equation model analysis of Shiotsu (2010) with Japanese L1 participants showed that among 17 variables such as L2 reading speed, vocabulary breadth, word recognition, L2 phonological awareness, L2 working memory, L2 syntactic knowledge, L2 listening comprehension, and metacognitive knowledge, syntactic knowledge was found to be the best predictor of passage reading comprehension of higher ability subgroups followed by lexical knowledge. Shiotsu (2010, p.171) stated that "syntactic knowledge is the most significant and consistent predictor of passage reading ability among higher ability subgroups". Similarly, Kim and Cho (2015) revealed that syntactic knowledge made a greater contribution to L2 reading comprehension of a high reading comprehension group of Korean participants and stated that the participants getting higher grades from the grammar test were likely to obtain higher scores from the reading test. However, vocabulary knowledge did not contribute significantly to L2 reading comprehension test scores of the high reading ability group of Kim and Cho (2015).

On the other hand, the findings of Nassaji (2003), Zhang (2012), and Yamashita (1999) conflicted with the findings of the current study. For example, Nassaji (2003) stated that vocabulary knowledge played the most important role in discriminating skilled readers from less-skilled readers of fairly advanced Farsi ESL readers studying at Canadian university. Similarly, Zhang (2012) conducted a study with 190 advanced level adult Chinese learners to find out the contribution of lexical and syntactic knowledge in L2 reading comprehension. Zhang (2012) measured lexical knowledge by using a VLT and WAT and syntactic knowledge by using an implicit knowledge of grammar and explicit knowledge of grammar test. The SEM analysis of the study showed that vocabulary knowledge was a better predictor of L2 reading comprehension than syntactic knowledge for advanced level Chinese students. Yamashita (1999) also stated that syntactic knowledge was weaker than lexical knowledge in the prediction of L2 reading comprehension of top-level Japanese participants; on the other hand, the opposite was supported by Shioutsu and Weir (2007) and Shiotsu (2010) for higher ability subgroup of Japanese participants.

The inconsistency between the findings of these studies and ours might be caused due to several reasons. First of all, the measures of lexical and syntactic knowledge in explaining L2 reading comprehension varied widely, and a number of different instruments were used in the previous studies. This might be a vital factor in explaining the inconsistency between the findings of previous studies and the current study. For example, Nassaji (2003) used the vocabulary section of the Nelson-Danny test to measure lexical breadth and a grammatical judgement test to measure syntactic knowledge. Although vocabulary knowledge played the most important role in discriminating skilled readers from less-skilled ones in Nassaji's study, syntactic knowledge also contributed significantly to the discrimination of skilled readers from less-skilled ones. Consequently, at least, syntactic knowledge made a considerable contribution to L2 reading comprehension of advanced Farsi ESL students. On the other hand, Zhang (2012) used two different constructs to measure syntactic knowledge: implicit knowledge and explicit knowledge. In the study of Zhang (2012) implicit grammatical knowledge accounted for a significant proportion in L2 reading comprehension of Chinese students. While multiple choice items were used to measure vocabulary size, vocabulary depth and implicit grammatical knowledge, participants had to first identify the ungrammatical part of the sentences and then correct them to get full points for the explicit knowledge of grammar test. This task may have placed an extra burden on the participants thus preventing explicit grammatical knowledge from attaining significance.

Second, the differences in the findings might also be attributed to differences in learners' backgrounds. For example, Nassaji (2003) conducted his study with 60 advanced Iranian participants in an ESL context. Zhang (2012) conducted his study with 190 adult Chinese learners in an EFL context. Yamashita (1999), on the other hand, carried out her study with 241 adult Japanese learners in an EFL context. Considering that these different languages have different word order and different alphabetical characteristics, L1 backgrounds of the participants may have had an effect on the contribution of these constructs. As it is beyond the scope of the present study to investigate the role of L1 in the contribution lexical and syntactic knowledge to L2 reading comprehension, it can be better investigated with a comprehensive cross-linguistic study.

4.2.3. Lexical breadth, depth, or syntactic knowledge of high reading proficiency group

As research question 2c asked the better predictor of L2 reading comprehension of the participants with high reading comprehension levels, a linear multiple regression analysis was conducted. The analysis reveals the contribution of all of the independent variables to L2 reading comprehension and shows the predictive power of each independent variable in L2 reading comprehension of good readers. Table 4.10 below presents the results of the multiple regression analysis.

As seen in table 4.10. below, in the multiple regression analysis, the R square is .290 which indicates that 29 percent of the variance in L2 reading comprehension can be explained by vocabulary size, vocabulary depth, and syntactic knowledge of the participants with high reading proficiency (R^2= .290, F (3,59) = 8.034). Together all variables significantly contributed to L2 reading comprehension scores of the good readers (p <.01).

Table 4.10. *Multiple Regression for vocabulary depth, breadth, syntactic knowledge and reading comprehension of participants with high reading proficiency*

Model Summary					Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
1	.539	.290	.254	2.183	8.034	3	59	.001
a. Predictors: (Constant), Breadth, Depth, Syntax								

Table 4.11 below gives us the unique contribution of each variable to L2 reading comprehension. Standardized Beta scores gives us the effect size of each variable. The highest beta score indicates the best predictor of L2 reading comprehension. According to the table, the Beta score of syntactic knowledge is higher compared to lexical depth and lexical breadth. Therefore, syntactic knowledge significantly predicted L2 reading comprehension of good readers (β= .374, p <.01). Similarly, vocabulary breadth significantly contributed to L2 reading comprehension of good readers (β= .305, p <.05), but not as much as syntactic knowledge. However, vocabulary depth did not provide any significant contribution to L2 reading comprehension of the good readers. In other words, while syntactic knowledge and vocabulary breadth significantly predicted L2 reading comprehension, vocabulary depth did not predict L2 reading comprehension of the good readers.

Table 4.11. *Relative contribution of lexical breadth, depth, and syntactic knowledge to L2 reading comprehension of participants with high reading proficiency*

Variables	B	Standard Error	ß	*t*	*Sig.*
Lexical breadth of high reading proficiency group	.059	.023	.305	2.511	.015
Lexical depth of high reading proficiency group	-.015	.018	-.100	-.821	.415
Syntactic Knowledge of high reading proficiency group	.209	.072	.374	2. 896	.005

a. Dependent Variable: Reading Comprehension
$R^2 = .290$, $p < .01$

In the multiple regression analysis, depth was not found to predict L2 reading comprehension of the good readers. In order to discover whether shared variance of depth contributes to L2 reading comprehension of this group, a bivariate regression analysis was performed.

Table 4.12. *Bivariate regression models for vocabulary breadth, depth and reading comprehension of participants with high reading comprehension proficiency*

Model Summary					Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
Breadth	.434	.189	.175	2.295	14.176	1	61	.001
Depth	.141	.020	.004	2.522	1.238	1	61	.270

a. Predictors: (Constant), Vocabulary Levels Test
b. Predictors: (Constant), Word Associates Test

According to Table 4.12 above, vocabulary breadth explained about 19 percent of the variance in L2 reading comprehension of the participants and vocabulary breadth was found to be a significant predictor of L2 reading comprehension of good readers (R^2= .189, F (1,61) = 14.176, p <.01). On the other hand, vocabulary depth scores did not significantly contribute to L2 reading comprehension and accounted for only 0.4 percent of the variance in L2 reading comprehension of good readers (R^2= .004, F (1,61) = 1.283, p >.01). In sum, while syntactic knowledge and vocabulary size significantly and consistently contributed to L2 reading comprehension, both in multiple regression and bivariate regression analyses, vocabulary depth did not predict L2 reading comprehension of the good readers. Accordingly, there appears to be weak correlation between vocabulary depth and L2 reading comprehension of the participants within the high reading proficiency group. Looking at the descriptive statistics of the high proficient readers in table 4.7, the mean score of vocabulary depth (112.22) was found to be slightly higher than that of the whole sample (100.83). Although there was a substantial increase

in the mean score of vocabulary depth for the high proficient readers, it was not found to be in line with L2 reading scores of the high proficient readers.

Considering vocabulary depth, our findings appear to be supported or partly supported by some of the previous studies (Binder et. al, 2017; Kaivanpanah and Zandi, 2009; Li and Kirby, 2014; Nergis, 2013), albeit not all of them (Horiba, 2012; Qian, 2002). For example, aiming to find out the most predictive variables namely lexical depth, syntactic awareness and metacognitive awareness in academic reading comprehension of fairly advanced EAP students in Turkish context, Nergis (2013) indicated that lexical depth was not a significant predictor of academic reading comprehension. The study showed that academic reading comprehension in L2 with a homogeneous Turkish sample can be explained by syntactic awareness and metacognitive awareness but not by lexical depth. Similarly, Li and Kirby (2014) carried out a study to discover the effects vocabulary breadth and depth on L2 reading comprehension of Chinese middle school students studying at English immersion programs and found that while only lexical breadth significantly predicted L2 reading comprehension of the participants, only lexical depth predicted L2 summary writing. In a similar vein, some previous finding partly supported our findings. For example, Binder et. al. (2017) investigated the contribution of depth and breadth to the reading comprehension of L1 college students. The study disclosed significant unique variance of vocabulary depth in reading comprehension when lexical breadth was controlled but the contribution was very small (R^2=.06). Correspondingly, in an Iranian EFL context, Kaivanpanah and Zandi (2009) revealed that vocabulary depth significantly correlated with L2 reading comprehension; however, the predictive power of lexical depth in L2 reading comprehension was very small and not significant.

On the other hand, the findings of the current study differ from the findings of Horiba (2012) and Qian (2002) regarding the contribution of lexical depth to L2 reading comprehension. For example, Horiba (2012) examined the role of lexical breadth and depth in reading comprehension which was measured by recall and summary completion of three groups; 50 Chinese L2 learners, 20 Korean L2 learners who had intermediate to advanced L2 level, and 40 native speakers of Japanese. The results showed that the contribution of lexical depth and breadth differed across Chinese, Korean, and L1 speakers. The researcher stated that syntagmatic associations seems to be particularly important to Chinese speakers but not to that of Korean and L1 speakers. Similarly,

exploring the relationship between the two dimensions of vocabulary knowledge and L2 reading comprehension of young adult ESL learners from mixed L1 backgrounds, Qian (2002) ascertained that vocabulary depth significantly correlated with L2 reading comprehension and had a unique variance in predicting L2 reading comprehension and stated that "vocabulary size and depth measures are similarly powerful in predicting reading performance." (p. 533).

There might be many different reasons for the inconsistency between the findings of the current study and the previous ones such as conceptualization of vocabulary depth, the nature of reading comprehension, L1 backgrounds of the participants or the contexts of the studies. First of all, conceptualizing vocabulary breadth is basically counting known meaning-form relations. Accordingly, calculating known lexical items is uncomplicated but difficult. In addition, most of the related studies focused on the vocabulary size. On the other hand, there are many overlapping ways to measure vocabulary depth. Therefore, it is difficult to conceptualize vocabulary depth. In his review article, Schmitt (2014, p. 915) stated that "the diversity of depth conceptualizations makes it extremely difficult to know how to approach depth from a theoretical perspective.". The conceptualizations of depth related to the measures used in the studies. For example, Kaivanpanah and Zandi (2009) used a synonymous and collocation test to measure vocabulary depth whereas Binder et. al. (2017) measured depth by using a derivation and word usage in different contexts test and Li and Kirby (2014) utilized a multiple meaning test in context to measure vocabulary depth. Therefore, the variability in measures of depth might have resulted in inconsistency between the results of the current study and related studies. The WAT employed in the current study designed to measure syntagmatic, paradigmatic and analytic associations of stimulus words might have been insufficiently sensitive and might have not captured the true quality of high proficient participants' overall lexical network.

The nature of reading comprehension might be another reason for the contradicting results. In other words, reading comprehension is a receptive skill and simply knowing the meaning of lexical items might be sufficient to comprehend the text for good readers. Similarly, Schmitt (2014, p. 919) noted that "for receptive purposes, knowing the form–meaning link may be enough. All of the rest of the word knowledge information (part of speech, derivative forms, collocations, etc.) are already provided in the context.". Thus, getting the right answer from a multiple choice L2 reading comprehension test seems to

be more related to familiarity with word meanings rather than associations for good readers. In Horiba's study (2012), lexical depth was stated to be very important in L2 reading comprehension; however, L2 reading was measured by a summary completion test, which is a writing task. In this regard, Li and Kirby (2014) noted that vocabulary depth was the stronger predictor of summary writing. Consequently, lexical depth might predict productive skills such as writing and speaking. To verify such a claim; however, further studies are needed on the role of depth in L2 writing or speaking.

L1 backgrounds of the participants or the contexts of the studies might be other possible reasons of the divergence between the findings. It is worth noting that the study of Nergis (2013) and the current study are similar in their contexts. Both of the studies were conducted in an EFL context with adult Turkish participants who have advanced levels of reading comprehension and the findings of these two studies are similar. On the other hand, the participants of Qian (2002) were adult learners from heterogeneous L1 backgrounds who were learning English in an ESL context. Similarly, reporting significant contribution of lexical depth to L2 reading comprehension, Horiba (2012) conducted the study with Chinese and Korean participants learning Japanese as a foreign language. The researcher (2012, p.117) suggested that "L2 word knowledge and its relation to text comprehension is influenced in a complex way by some L1-related factors.". Considering the differences in these studies, L1 backgrounds of the participants or the context of these studies might be playing a role in the contribution of lexical depth to L2 reading comprehension of good readers.

4.3. Low Reading Proficiency Group

The same statistical analyses were applied to the data of the low reading proficiency group to reveal whether the contribution of each variable changed. Table 4.13 below shows the descriptive statistics for the group with low RCT scores. 77 participants who obtained 16 or less from the RCT were the participants with low reading proficiency. The low reading proficiency group makes up about 30 percent of the whole sample of the current study.

According to table 4.13 below, the minimum score taken from the RCT was 5 while the maximum score was 16 for the poor readers. As for the VLT score, the lowest score was 70 while the highest score was 119 with a standard deviation of 12.7. WAT scores of the participants with low reading comprehension proficiency varied from 55 to 124

with a standard deviation of 16. The standard deviation of the WAT scores was higher than that of the VLT scores for the low reading comprehension proficiency group indicating that participants showed more variability in their WAT scores.

Table 4.13. *Descriptive Statistics of the participants with low reading proficiency (Q1)*

	Number of participants	Minimum	Maximum	Optimal Score	Mean	Standard Deviation	Standard Error
Q1-RCT	77	5	16	37	12.87	3.071	.350
Q1-VLT	77	70	119	150	94.86	12.758	1.454
Q1-WAT	77	55	124	160	91.10	16.014	1.825
Q1-SKT	77	11	29	40	19.99	4.438	.506

Q1-RCT= Reading Comprehension Test Scores of the first quartile of the whole sample
Q1-VLT= Vocabulary Levels Test Scores of the first quartile of the whole sample
Q1-WAT= Word Associates Test Scores of the first quartile of the whole sample
Q1-SKT= Syntactic Knowledge Test Scores of the first quartile of the whole sample

The SKT scores of the participants with low reading comprehension proficiency ranged from 11 to 29 with a standard deviation of 4. Comparing the mean scores of the participants with low reading comprehension and the whole sample, not only the mean score of the RCT but also the mean scores of the VLT, WAT, and SKT showed a substantial decrease. While the mean was about 20 for the whole sample, it was about 13 for the poor readers. The mean of the VLT which was approximately 105 for the whole sample, was only 95 for the poor readers. Similarly, the mean score of the WAT decreased from 101 to 91. The mean score of the SKT was about 24 for the whole sample and decreased to 20 in the low reading proficiency group. Looking at the mean scores of the tests, it can be deduced that the participants with low reading comprehension also had low levels of lexical and syntactic knowledge.

4.3.1. Inter-relationship of the variables for low reading proficiency group

To reveal the inter-relationship of the variables a Pearson Product Moment Correlation analysis was conducted. Table 4.14 below shows the inter-relationship of the variables for the participants with low reading proficiency.

According to the table below, all of the variables significantly and positively correlated with each other. In other words, while the scores of a variable increased, the scores of other variables inclined to increase as well. The correlation between vocabulary size and the L2 reading comprehension scores of the participants with low reading proficiency was significant and moderate (r= .478, n=77, p< .01). So, high scores on the

RCT associated with high scores on the VLT. The table also shows that there was a weak but significant correlation between vocabulary depth and reading comprehension (r= .281, n=77, p< .05). On the other hand, syntactic knowledge scores and L2 reading comprehension scores of the poor readers were found to be moderately and significantly correlated (r= .382, n=77, p< .01), indicating that the SKT and RCT scores tend to be compatible with each other among the participants with low reading proficiency. This result suggested that vocabulary size appeared to have a stronger relationship with L2 reading comprehension compared to that of syntactic knowledge within the participants of the low reading proficiency level group.

Table 4.14. *Pearson Product Moment Correlation Analysis of the variables for low reading proficiency group (Q1)*

	RCT	VLT	WAT	SKT
Q1-RCT	1	.478**	.281*	.382**
Q1-VLT		1	.556**	.524**
Q1-WAT			1	.348**
Q1-SKT				1

Q1-RCT= Reading Comprehension Test Scores of the first quartile of the whole sample
Q1-VLT= Vocabulary Levels Test Scores of the first quartile of the whole sample
Q1-WAT= Word Associates Test Scores of the first quartile of the whole sample
Q1-SKT= Syntactic Knowledge Test Scores of the first quartile of the whole sample

*Correlation is significant at the 0.05 level (2 tailed).
**Correlation is significant at the 0.01 level (2 tailed).

Previous studies have also stated a significant correlation between vocabulary knowledge and L2 reading comprehension (Laufer and Ravenhorst-Kalovski, 2010; Nation, 2006; Nation, 2001). A certain amount of vocabulary size was found to be necessary to comprehend a reading text irrespective of reading comprehension levels of the students. In other words, regardless of the students' reading comprehension levels, students should know at least the meaning of core vocabulary for reading comprehension to take place. In fact, the association between vocabulary size and reading comprehension is reciprocal; vocabulary knowledge facilitates reading comprehension and similarly, reading comprehension increases vocabulary knowledge. (Eskey, 2005; Nation, 2000; Nation, 2001). Eskey (2005, p. 567) stated that "the best way to acquire the extensive vocabulary required for reading widely in a second language is reading itself, and it is equally well understood that a prerequisite for such reading is an extensive vocabulary."

In a similar vein, Grabe and Stoller (2011, p. 74) noted "vocabulary is an essential, if not the most basic, component skill for reading comprehension abilities.". Similarly,

Barnett (1986) expressed the association between syntactic knowledge, lexical knowledge and L2 reading comprehension. Therefore, the performance of the students in syntactic and lexical knowledge associated with the performance of the students in L2 reading comprehension.

Looking at table 4.14, the highest correlation appeared to be between size and depth which was positive, significant and moderate (r= .556, n=77, p< .01). Li and Kirby (2014) , in trying to find out the relationship between depth and breadth and answering the question whether they form one construct or separate, found .51 correlations between depth and size and stated that there is substantial overlap between depth and breadth. Syntax and size also positively, significantly, and moderately correlated (r= .524, n=77, p< .01). As stated by Schmitt (2000, p. 14) "it is difficult to think of vocabulary and grammar as separate entities.". Thus, the significant correlation between syntax and lexical size might be justified by the overlap between these concepts.

4.3.2. Lexical or syntactic knowledge of low reading proficiency group

Bivariate and multivariate regression analyses were conducted to reveal to what extent vocabulary size, depth, and syntactic knowledge contribute to predicting the performance of reading comprehension of the participants with low reading comprehension proficiency levels, which answered research questions 3b and 3c. Table 4.15 below displays the result of the bivariate regression analysis between the dependent variable reading comprehension and the independent variables lexical (breadth and depth) and syntactic knowledge scores of the poor readers.

Table 4.15. *Bivariate regression models of lexical knowledge, syntactic knowledge and reading comprehension for low reading proficiency group (Q1)*

	Model Summary				Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
Syntactic Knowledge	.382	.146	.135	2.857	12.829	1	75	.001
Lexical Knowledge	.478	.229	.208	2.733	10.965	2	74	.001

a. Predictors: (Constant), Syntactic Knowledge Test
b. Predictors: (Constant), Word Associates Test, Vocabulary Levels Test

Table 4.15 above shows that only when syntactic knowledge entered the model, did it significantly explain 15 percent of the variance in L2 reading comprehension of the

participants with low reading comprehension proficiency levels (R^2=.146, F (1, 75) = 12.829, p<.01). This means that syntactic knowledge made a notable contribution to L2 reading comprehension of poor readers. Table 4.15 above also displays that lexical knowledge (vocabulary depth and breadth together) accounted for about 23 percent of the variance in L2 reading comprehension of poor readers (R^2=.229, F (2, 74) = 10.965). The contribution of lexical knowledge to the L2 reading comprehension of participants with low reading proficiencies was found to be significant (p<.01). The result revealed that both lexical and syntactic knowledge predicted L2 reading comprehension, however, lexical knowledge seems to have a more predictive power in L2 reading comprehension of poor readers.

As discussed before, many studies showed the importance of lexical and syntactic knowledge in L2 reading comprehension and these two constructs generally explain the high variance in L2 reading comprehension. In the current study, lexical and syntactic knowledge were found to significantly explain L2 reading comprehension of poor readers. The contribution of lexical knowledge was found to be more significant to the L2 reading comprehension of poor readers.

This finding partly corresponds to the findings of Kim and Cho (2015). Kim and Cho (2015) found that only breadth significantly predicted L2 reading comprehension of intermediate levels of readers. Bernhardt (2011, p. 59) stated that "the studies suggest that lexical processes often compensate for grammatical deficiencies, or that readers ignore grammatical deficiencies by drawing on other knowledge sources". In accordance with the Bernhardt's (2011) statement, a possible explanation for this finding might be that the poor readers in the current study might have encountered difficulty because of their inadequate syntactic knowledge and focused more on lexical items disregarding syntactic structures of the text.

4.3.3. Lexical breadth, depth, or syntactic knowledge of low reading proficiency group

A linear multiple regression analysis was performed to find out the contribution of all and as well as the unique contribution of each independent variable to L2 reading comprehension of poor readers. Table 4.16 below presents the result of the multiple regression analysis.

Table 4.16. *Multiple regression for vocabulary depth, breadth, syntactic knowledge and reading comprehension of participants with low reading proficiency*

Model Summary					Change Statistics			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
1	.502	.252	.222	2.710	8.208	3	73	.001

a. Predictors: (Constant), Breadth, Depth, Syntax

According to the table above, R square was 25.2, which indicated that the VLT, WAT, and SKT together accounted for about 25 percent of the variance in L2 reading comprehension of poor readers (R2= .252, F (3,73) = 8.208). All of the variables, together, significantly contributed to the L2 reading scores of the participants (p <.01).

Standardized Beta scores in the coefficient table below shows the unique effect size of each variable. According to table 4. 17, of these three variables, only vocabulary size made a significant and the largest unique contribution to L2 reading comprehension of poor readers (*β*= .379, *p* <.01). While syntax significantly accounted for 15 percent of the reading comprehension of poor readers in bivariate analysis (see table 4.15), it did not contribute to L2 reading comprehension of poor readers in the multiple regression analysis (*β*= .181, *p* >.01). Similarly, when entered with vocabulary breadth and syntactic knowledge, vocabulary depth did not predict the L2 reading performance of poor readers (*β*= .007, *p* >.01). To put it differently, of the three variables only vocabulary size predicted the reading comprehension performance of the poor readers.

Table 4.17. *Relative contribution of lexical breadth, depth, and syntactic knowledge to L2 reading comprehension of participants with low reading proficiency*

Variables	**B**	**Standard Error**	**ß**	***t***	***Sig.***
Lexical breadth of low reading proficiency group	.091	.032	.379	2.818	.006
Lexical depth of low reading proficiency group	.001	.023	.007	.058	.954
Syntactic Knowledge of low reading proficiency group	.125	.082	.181	1. 519	.133

a. Dependent Variable: Reading Comprehension
R^2 = .252, *p* < .01

The results showed that although syntax correlated significantly with L2 reading comprehension (*r*= .348, *p* >.01) and significantly explained 15 percent of the variance in bivariate analysis, it did not predict L2 reading comprehension of the poor readers when entered with breadth and depth into the equation. As a number of studies in L2 reading comprehension supported the contribution of syntactic knowledge in L2 reading

comprehension (Atai and Nikuinezhad, 2012; Shiotsu, 2010; Yalin and Wei, 2011), this was an unexpected finding. However, this unexpected finding was in line with the findings of some previous studies (Kim and Cho, 2015) and might be explained in many ways.

First of all, the reason for such a finding might be the overlap between vocabulary size and syntactic knowledge. Although it was minimum, the syntactic knowledge test was composed of various words and the participants had to understand the meaning of these words to choose the correct answers. Shiotsu and Weir (2007) stated that most syntactic knowledge tests are composed of texts and these texts may be judged as a kind of reading. Therefore, it is quite difficult to separate the concepts of vocabulary, syntax, and reading. Besides, syntactic knowledge was a significant contributor to L2 reading comprehension in the bivariate regression and ceased to contribute when size was included in the regression. So, there might be a substantial shared variance between size and syntax. Guo, Roehrig and Williams (2011) noted that success or failure in syntactic knowledge might partially be connected with the success or failure in vocabulary knowledge. Similarly, Schmitt (2000, p. 14) pointed out the difficulty in separating vocabulary and syntax. Thus, the syntactic knowledge test consisted of words that might have overlapped with vocabulary size and this might have prevented syntax from contributing significantly to the L2 reading comprehension of the poor readers.

Second, the unexpected result might be explained by the "floor effect" which prevents syntactic knowledge from taking part in comprehension. In other words, the reading comprehension test utilized in the current study was difficult for poor readers and this difficulty might have prevented the participants from engaging in the reading process and led them to focus more on lexical knowledge.

In order to find out whether depth contributed to the L2 reading comprehension of poor readers when entered alone, a bivariate regression analysis was conducted. Table 4.18 below shows the bivariate regression analysis of vocabulary breadth, depth and reading comprehension of poor readers.

Table 4.18 below displays that vocabulary breadth accounted for about 23 percent of the variance in L2 reading comprehension of the participants and vocabulary breadth was found to be a significant predictor of L2 reading comprehension of poor readers (R^2= .228, F (1,75) = 22.185, p <.01). Similarly, vocabulary depth scores significantly contributed to L2 reading compression of the participants and accounted for 8 percent of

the variance in L2 reading comprehension of the poor readers (R^2= .079, F (1,75) = 6.141, p >.05). Comparing vocabulary breadth and depths scores, both of them significantly contributed to L2 reading comprehension of the poor readers, but vocabulary breadth was found to have more predictive power.

Table 4.18. *Bivariate regression models for vocabulary breadth, depth and reading comprehension of participants with low reading comprehension proficiency*

	Model Summary				*Change Statistics*			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**F Change**	**Df1**	**Df2**	**Sig**
Breadth	.478	.228	.218	2.716	22.185	1	75	.001
Depth	.281	.079	.066	2.967	6.414	1	75	.013

a. Predictors: (Constant), Vocabulary Levels Test
b. Predictors: (Constant), Word Associates Test

Significantly predicted L2 reading comprehension of poor readers in bivariate regression analysis, vocabulary depth did not contribute to the L2 reading comprehension of poor readers when entered with size and syntax into the multivariate regression analysis. Therefore, syntax, depth and size shared a substantial variance in L2 reading comprehension of poor readers. As stated before, these concepts have many connections and it is quite difficult to separate these concepts.

4.4. The Differences Between High and Low Reading Proficiency Groups

Research question 4 focused on the differences between good readers and poor readers in terms of the contribution of lexical and syntactic knowledge to L2 reading comprehension. Considering the inter-relationship and contributions of the variables, it can be said that there were substantial differences between those two groups. First of all, while the variable which most highly correlated with L2 reading comprehension of the high reading proficiency group was syntactic knowledge (r= 459), for the poor reading proficiency group, the variable which most highly correlated was vocabulary size (r=478). Second, while the contribution of syntactic knowledge was bigger than lexical knowledge in the bivariate regression analysis of the high reading proficiency group, the contribution of lexical knowledge was bigger than syntactic knowledge in the bivariate regression analysis of the poor reading proficiency group. Such a finding partially corroborates with the findings of Shioutsu and Weir (2007) and Shiotsu (2010). In a study with Japanese EFL learners, Shioutsu and Weir (2007) revealed that syntactic knowledge was consistently a better predictor of L2 reading comprehension of EFL learners and their

subgroup analysis indicated that syntactic knowledge contributed to L2 reading comprehension not only in high proficient learners, but also in low proficient learners. However, the contribution of syntactic knowledge decreased and the contribution of lexical knowledge increased in the low proficient learners. One interpretation for such a result might be that in the L2 reading comprehension process there is a certain level of proficiency above which students rely more heavily on their syntactic knowledge and below which students rely more heavily on their lexical knowledge. Similarly, Shiotsu and Weir (2007) concluded that "syntactic knowledge remains one of the deciding factors in the performance on text reading comprehension for learners up to a certain level.". Shiotsu (2010, p. 137) stated that "one may suspect that vocabulary breadth tends to be more strongly related to the passage reading skills of learners below a certain ability level.".

Another difference between the high reading proficiency group and the low reading proficiency group appeared to be in the correlation between vocabulary size and depth. While vocabulary depth significantly correlated with vocabulary size in both groups, the correlation between size and depth was greater in the low reading proficiency group (r= 556, p<.01) compared to the high reading proficiency group (r= 273, p<.05). This finding was in agreement with the findings of some studies comparing the relationship between vocabulary size and depth across different L2 proficiency levels. For example, Henriksen (2008) found a significant correlation between size and depth of Danish EFL students across three different grade levels. However, the size of the correlation changed across the grade levels. The correlations between size and depth decreased as the grade of the students increased. This result indicates that the relationship between lexical size and depth is stronger at lower knowledge of lexical size, and weaker at higher knowledge of lexical size. In a similar manner, Noro (2002) investigated the relationship between vocabulary size and depth of Japanese EFL university students. Noro constituted two groups based on their knowledge of vocabulary size. The participants knowing beyond 2500 word families formed the higher group and the participants knowing below 2500 word families formed the lower group. The correlation between size and depth was greater in the lower group compared to the higher group. It can therefore be concluded that as the vocabulary size of the learners increased, their vocabulary depth did not increase in the same proportion. Correspondingly, Schmitt (2014, p. 913) asserted that "for higher frequency words and for learners with smaller vocabulary sizes, there is often

little difference between size and a variety of depth measures.". The small gap between lexical size and depth of the participants in the low reading proficiency group might be the reason for the greater correlation between the size and depth observed in the study.

Another difference between the high reading proficiency group and the low reading proficiency group appeared to be in the contribution of vocabulary depth. In the bivariate regression analyses, while vocabulary depth significantly contributed to L2 reading comprehension of the low reading proficiency group, it did not predict L2 reading comprehension of the high reading proficiency group. This was an unexpected result because in various studies vocabulary depth was found to contribute to L2 reading comprehension of the participants irrespective of the proficiency levels of the learners (Nurwani and Read, 1999; Qian, 1998; Vermeer, 2001). The reason for this inconsistency might be due to the nature of reading comprehension. Reading comprehension is a receptive skill and knowing form-meaning relations might be adequate for the high reading proficiency group to comprehend the reading text. Schmitt (2014; p.919) noted that "part of speech, derivative forms, collocations, etc. are already provided in the context.". Therefore, the high reading proficiency group might have depended more on their vocabulary size and syntactic knowledge to comprehend logical relations between the sentences. On the other hand, the low reading proficiency group might try to use lexical cues in order to comprehend the texts. In a similar manner, Hosenfeld (1977) found that low proficient readers translated sentences word for word, rarely skipped unimportant words, and used a dictionary for each unknown word.

4.5. General Discussions of the Findings

To start the general discussions of the findings, it is necessary to remind the reader about the aim in order to link it the findings of the current study. The purpose of the study was to determine the most important independent variables among lexical knowledge and syntactic knowledge that contribute to L2 reading comprehension of Turkish adult EFL learners. Further, this study aimed to reveal whether the contribution of these variables changed when reading comprehension levels of the participants changed. Two dimensions of lexical knowledge were under investigation, namely lexical breadth and lexical depth. The participants of the study were 2nd and 3rd grade ELT students. A summary of the regression analyses used in this study is presented in Table 4.19. below.

Table 4.19. *Summary of the regression analyses of this study*

Par.	Variables	R	R square	Ad. R square	Std. Error of the Estimate	F Change	Df2	Beta β
The Whole Sample	Syntax (Alone)	.614	.377	.375	4.945	152.700	252	.614**
	Syntax (with lexical knowledge)	.677	.458	.452	4.631	70.479	250	.380**
	Breadth (Alone)	.598	.358	.355	5.022	140.398	252	.598**
	Breadth (with depth)	.612	.375	.370	4.964	75.275	251	.509**
	Breadth (with depth and syntax)	.677	.458	.452	4.631	70.479	250	.334**
	Depth (Alone)	.446	.199	.196	5.608	62.578	252	.446**
	Depth (with breadth)	.612	.375	.370	4.964	75.275	251	.159**
	Depth (with syntax and breadth)	.677	.458	.452	4.631	70.479	250	.056
High Reading Proficiency Group	Syntax (Alone)	.459	.211	.198	2.263	16.287	61	.459**
	Syntax (with depth and breadth)	.539	.290	.254	2.183	8.034	59	.374**
	Breadth (Alone)	.434	.189	.175	2.295	14.176	61	.434**
	Breadth (with depth)	.435	.189	.162	2.313	6.997	60	.428**
	Breadth (with depth and syntax)	.539	.290	.254	2.183	8.034	59	.305**
	Depth (Alone)	.141	.020	.004	2.522	1.238	61	.141
	Depth (with breadth)	.435	.189	.162	2.313	6.997	60	.024
	Depth (with syntax and breadth)	.539	.290	.254	2.183	8.034	59	-.100
Low Reading Proficiency Group	Syntax (Alone)	.382	.146	.135	2.857	12.829	75	.382**
	Syntax (with depth and breadth)	.502	.252	.222	2.710	8.208	73	.181
	Breadth (Alone)	.478	.228	.218	2.716	22.185	75	.478**
	Breadth (with depth)	.478	.229	.208	2.733	10.965	74	.466**
	Breadth (with depth and syntax)	.502	.252	.222	2.710	8.208	73	.379**
	Depth (Alone)	.281	.079	.066	2.967	6.414	75	.281*
	Depth (with breadth)	.478	.229	.208	2.733	10.965	74	.022
	Depth (with syntax and breadth)	.502	.252	.222	2.710	8.208	73	.007

Notes: **= p< .01 *=p<.05

The results of the study showed that lexical knowledge and syntactic knowledge explained about 46 percent of variance in L2 reading comprehension and their contribution was significant. Lexical knowledge and syntactic knowledge made almost equal contributions to L2 reading comprehension of the whole sample while the effect size of syntactic knowledge was a little bit higher than that of lexical knowledge. Comparing the predictive power of syntactic knowledge to lexical breadth and depth, it was found that syntactic knowledge was the best predictor of L2 reading comprehension of the whole sample. Lexical breadth was also a significant predictor of L2 reading comprehension. On the other hand, the contribution of lexical depth was very small and not significant.

In the sub-group analyses, it was found that lexical knowledge and syntactic knowledge predicted for about 46 percent of the variance in L2 reading comprehension of the high reading proficiency group. The contribution of these variables was statistically significant. Among the variables of lexical breadth, lexical depth and syntactic knowledge, the best predictor of L2 reading comprehension was found to be syntactic knowledge for the high reading proficiency group. Lexical breadth was also found to be a statistically significant contributor to L2 reading comprehension. On the other hand, lexical depth did not predict L2 reading comprehension of the high reading proficiency group when breadth and syntactic knowledge were entered into the model.

As for the low reading proficiency group, all of the variables, together, significantly contributed to L2 reading comprehension. When lexical breadth, lexical depth, and syntactic knowledge were investigated individually, it was found that lexical breadth was the best predictor of L2 reading comprehension for the low reading proficiency group. The contribution of lexical depth and syntactic knowledge was very low and not statistically significant. The sub-group analysis of this study suggested that while syntactic knowledge was the best predictor of L2 reading comprehension in the high reading proficiency group, it was lexical breadth for the low reading proficiency group. Moreover, the analyses also indicated that the significant contribution of lexical breadth remained constant across groups. The summary of regression analyses used in this study are shown in Table 4.19 above.

First of all, as stated before, lexical breadth consistently contributed to L2 reading comprehension of the participants regardless of the reading proficiency levels of the participants. Such a result supports the notion that L2 vocabulary size is a vital contributor to L2 reading comprehension. When the mean scores of high reading proficiency and low reading proficiency group are compared, it can be seen that the participants with high reading proficiency also had high levels of lexical breadth while the participants with low reading proficiency had low levels of lexical breadth. Such a finding supports the instrumentalist hypothesis proposed by Anderson and Freebody (1981). According to the instrumentalist hypothesis, the more words a learner knows, the better comprehension the reader achieves. However, as the scope of this study was to find out the contribution of lexical knowledge to reading comprehension, we cannot test the knowledge hypothesis (the role of background knowledge), the aptitude hypothesis (a third factor affecting

vocabulary and comprehension), or reciprocal connection between lexical knowledge and L2 reading comprehension.

As for the role of lexical depth, the findings indicated that lexical depth did not contribute or contributed little to L2 reading comprehension of the participants. This finding does not support or only partially supports the access hypothesis of Mezynski (1983). According to the access hypothesis, better comprehension occurs when the readers know the vocabulary well enough to access them quickly and easily. The access hypothesis suggests that reading comprehension depends on both lexical depth and breadth. However, lexical depth was not found to contribute directly to L2 reading comprehension either in the main analysis or in sub-group analyses when lexical breadth and syntactic knowledge were entered into the equation.

Comparing the two dimensions of lexical knowledge, it might be suggested that L2 lexical breath is more related to L2 reading comprehension. Some previous findings also supported this proposal (Horiba, 2012; Li and Kirby, 2014; Nergis ;2013; Tannenbaum et. al., 2006). For example, in an L1 context, Tannenbaum et. al. (2006) reported that reading comprehension was more related to lexical breadth than lexical depth and also found that reading comprehension increased the most as the lexical size of the learners increased. The researchers also revealed that the contribution of depth was significant but quite low. In an ESL context, Li and Kirby (2014) found that while lexical breadth was more related to a multiple choice reading comprehension test, lexical depth was more related to L2 summary writing. Horiba (2012) indicated that lexical breadth was a stronger explanatory variable of L2 reading comprehension compared to lexical depth for Chinese and Korean learning Japanese. In a Turkish EFL context, Nergis (2013) purported that lexical depth was not a significant contributor of L2 academic reading of fairly advanced Turkish students.

On the other hand, some other studies indicated a significant and high contribution of lexical depth to reading comprehension (Qian, 2002). In an ESL context, Qian (2002) found that lexical depth uniquely explained 14 percent of the variance in L2 academic reading when lexical breath was controlled and lexical breadth uniquely explained 8 percent of the variance when lexical depth was controlled which indicated that lexical depth was a more important predictor of reading comprehension.

Considering the role of lexical depth, the inconsistency of the findings between this study and the previous ones can be justified on some grounds. Conceptualization of

lexical depth, L1 backgrounds of the learners, or the instruments used to measure L2 reading comprehension might be the reasons for this inconsistency. As stated by Schmitt (2014, p. 941), "there is currently no true measure of depth, and whatever conceptualization or measure is used, it will only ever tap into limited facets of the overall quality of understanding of a lexical item". Consequently, different conceptualizations of lexical depth affect the choice of the lexical depth measure which, in turn, may cause different findings. Using a different lexical depth measure or a combination of lexical depth measures might reveal different results in the role of lexical depth in L2 reading comprehension.

L1 backgrounds of the participants might be another important reason for the inconsistency of the findings between this study and the previous ones. L1 backgrounds of the participants may have an impact on the role of lexical depth. In a Turkish EFL context, Nergis (2013) did not find lexical depth as a significant contributor to L2 academic reading comprehension which was similar to our findings. Similarly, Horiba (2012) found that dimensions of lexical depth contributed differently to L2 reading comprehension of Chinese and Korean learners of L2 Japanese. The study showed that while Chinese benefited from paradigmatic relations, Koreans used syntagmatic associations in reading L2 Japanese texts. The researcher concluded that the similarity between Chinese and Japanese in terms of their alphabetic writing system might be a reason for the Chinese group to make use of paradigmatic associations (synonyms) while the similarity between Korean and Japanese in terms of syntactic structure might be a reason for the Korean group to benefit from syntagmatic relations (collocations) between words. In other words, the linguistic distance across languages may influence the processing of new words. According to Grabe (2009), variations across L1 and L2 in terms of phonology, morphology, and orthography may cause difficulty while processing words of L2. Turkish is an agglutinative language and has complex morphology and word formation processes, which might cause adult Turkish EFL learners to focus more on syntactic knowledge rather than syntagmatic, paradigmatic or analytic relations in reading L2 texts.

The instrument used to measure L2 reading comprehension in this study might be another reason for the inconsistency between our findings and previous findings. Li and Kirby (2014) suggested that the predictive power of lexical breadth and lexical depth depends more on the reading comprehension test . They stated that while breadth was

more related to reading comprehension tasks measured by multiple choice questions, lexical depth was more related to summary writing which required the participants to provide definitions of words, or the morphological bases of words. In a recent study, Zhang and Yang (2016) found that the unique contribution of lexical breadth and depth varied across different L2 reading comprehension tasks. The researchers stated that for short text comprehension lexical depth was a better contributor while for long text comprehension, lexical breadth was a better contributor. They explained this as being due to the fact that the shorter texts were lexically simple while the longer texts were lexically complex which required the learners' knowledge of meanings of words. The current study which employed long reading comprehension texts followed by multiple choice questions may not have demanded the learners to use their lexical depth in comprehending the texts.

As for the role of syntactic knowledge in L2 reading comprehension of Turkish ELT students, this study showed that syntactic knowledge was the best predictor of the whole group and of the high reading proficiency group. On the other hand, syntactic knowledge did not contribute to L2 reading comprehension of the low reading proficiency group. Such a finding might suggest that L2 syntactic knowledge is more effective in contributing to L2 reading comprehension of participants who have a certain level of L2 reading proficiency. In other words, it might be proposed that the higher the L2 reading proficiency levels of the learners, the more contributive L2 syntactic knowledge is to L2 reading comprehension. This finding was also supported by Shiotsu and Weir (2007: p.121), who compared the findings of low L2 proficiency and high L2 proficiency groups and suggested that "syntactic knowledge remains one of the deciding factors in the performance on text reading comprehension for learners up to a certain level." Cupples and Holmes (1992) investigated the relationship between syntax, semantics and reading comprehension of adults in two different experiments. The results of the study showed that although good and average comprehenders had similar levels of semantic knowledge (semantic relatedness of words), syntactic judgement scores showed variety in favor of good comprehenders. The researchers stated that "syntactic knowledge is one important component of reading-comprehension ability in a sample of relatively skilled adults." (p.269). The studies of Shiotsu and Weir (2007) and Cupples and Holmes (1992) supported the notion that the predictive power of syntactic knowledge is stronger when the reading comprehension proficiency level of the learners is up to a certain level.

However, in order to verify such a claim, further studies conducted with participants of different levels of syntactic knowledge are needed.

On the other hand, for the low reading proficiency group, the non-contributory role of syntactic knowledge might be explained by the Construction-Integration model of Kintsch (1988). According to the Construction-Integration model, reading comprehension is composed of two phases; construction and integration. In the construction phase, by using syntactic and semantic knowledge, a reader turns words and syntax of a text into meaningful units (propositions). Syntactic knowledge allows the reader to combine words and sentences or identify relations and hence, helps them make sense out of sentences and syntactic processing begins when words are recognized and the meaning of sentences or clauses is also being constructed (Kintsch, 1998). Kintsch (2001) also suggests that syntax signals the most important meaning based components of a sentence. Therefore, the quality of propositions depends on the syntactic and lexical knowledge of the reader. In a similar vein, investigating the role of phonological processing, syntactic awareness, morphological awareness and working memory of 7th grade students in an ESL context with a longitudinal study, Lesaux, Lipka and Siegel (2006) found that poor readers had a deficiency in their syntactic knowledge. The researchers also indicated that readers need high levels of syntactic knowledge to make predictions for upcoming words, which is necessary for fast and efficient reading. Consequently, it can be proposed that the low reading proficiency group who also had low levels of syntactic knowledge may not have made use of syntactic signals to generate propositions and focused more on the lexical items of the texts instead.

5. CONCLUSION

This chapter first presents an overview of the thesis by summarizing the central findings of the current study. Next, with regard to the central findings, theoretical implications for L2 reading researchers and practical implications for educators and educational researchers are introduced. Lastly, limitations of the current study providing directions for further research are listed.

5.1. Summary of the Findings

The current study attempted to examine the relationship between L2 vocabulary size, depth, syntactic knowledge, and L2 reading comprehension of adult Turkish EFL learners. Further, the aim of the study was to determine the predictive power of size, depth, and syntactic knowledge in L2 reading comprehension of the participants. Moreover, the present study attempted to probe the contribution of size, depth, syntactic knowledge in L2 reading comprehension of the participants with low level and high-level reading proficiencies. With these purposes, the data was collected from a total of 254 participants. The instruments used in the study were the Reading Comprehension section of TOEFL, the Vocabulary Levels Test version 2 (Schmitt et. al. 2001), the Word Associates Test (Read, 2000), and the syntactic knowledge part of the Examination for the Certificate of Proficiency in English (ECPE) by Cambridge Michigan Language Assessment. First, the data with regards to Reading Comprehension was collected from all participants, then the VLT, WAT, and SKT were applied. The data was analyzed by a number of statistical procedures. The role of lexical and syntactic knowledge in L2 reading comprehension of the participants was answered by means of descriptive statistics, specifically the Pearson Product Moment Correlations and bivariate and multivariate regression analyses. The same statistical analyses were used to find out the role of the VLT, WAT, and SKT in L2 reading comprehension of the participants with low level and high-level reading proficiencies. The findings of the current study were discussed with regards to the previous findings.

The first research question was about the role of lexical and syntactic knowledge in L2 reading comprehension of adult Turkish EFL learners. A Pearson Product Moment Correlation analysis revealed that there were significant and positive interrelationship among the variables of the current study. Therefore, it can be concluded that an increase in a variable positively affected the other variables as well. Bivariate regression analyses

showed that lexical and syntactic knowledge significantly contributed to L2 reading comprehension of the participants. The predictive power of lexical and syntactic knowledge was found to be almost equal, with syntactic knowledge having a slightly higher effect size. This finding means that both lexical and syntactic knowledge played a significant role in explaining success in L2 reading comprehension. The multivariate regression analysis revealed that among the independent variables of the study, syntactic knowledge made the highest contribution to the L2 reading comprehension of adult Turkish EFL students. The findings of the current study also showed that vocabulary breadth had a substantial contribution to the L2 reading comprehension of adult Turkish EFL learners. These findings led us to conclude that successful L2 reading comprehension required the operation of syntactic ability and high levels of lexical breadth. Another important finding of the study was about the role of lexical depth. Although lexical depth made a significant contribution to L2 reading comprehension in the bivariate regression analysis, it did not make any contribution in the multiple regression analysis when entered with lexical breadth and syntactic knowledge. This finding can be interpreted as the overlap between the variables. In this context, Shiotsu (2010) emphasizing the overlap between lexical breadth and syntax stated that "it is also true that much of the reading variance which vocabulary could have predicted had already been accounted for by the syntax measure." (p. 137). Similarly, Tannenbaum et. al. (2006) pointing out the overlap between depth and breadth stated "the two dimensions of word knowledge have significant overlapping variance that contributes to the prediction of reading comprehension." (p. 381). This finding led us to conclude that it is difficult to disassociate these three components and that they share a substantial variance which contributes to L2 reading comprehension.

When the question was about the role of lexical and syntactic knowledge in L2 reading comprehension of the participants with a high level of reading proficiency, the result of the correlation analysis showed that lexical breadth and syntactic knowledge significantly correlated with L2 reading comprehension. The correlation between lexical depth and L2 reading comprehension was weak and not significant. Multiple regression analysis showed that syntactic knowledge and lexical breadth provided significant contributions to the L2 reading comprehension of the participants with a high level of reading proficiency. The predictive power of syntactic knowledge was found to be higher than that of lexical breadth. In contrast to some studies which revealed that lexical depth

explains variance in L2 reading comprehension, lexical depth did not provide a direct contribution to L2 reading comprehension in the current study. It was suggested that the explanation of the inconsistency between the current study and the previous ones might lie in the differences in the conceptualization of vocabulary depth, the receptive nature of reading comprehension, and the L2 reading levels of the participants. It is also worth mentioning that although lexical depth failed to make a direct contribution to L2 reading comprehension, a bivariate regression analysis showed that lexical depth significantly explained syntactic knowledge of the participants with a high level of reading proficiency. Thus, it can be concluded that while lexical depth did not provide a direct contribution to L2 reading comprehension, it provided an indirect contribution to L2 reading comprehension of the participants in the high level reading group via its direct contribution to syntactic knowledge

The present study also examined the role of lexical and syntactic knowledge in L2 reading comprehension of the participants with low levels of reading proficiency. The correlation analysis showed that all the variables of the study positively and significantly correlated for the low reading proficiency group. This finding suggested that an increase in a variable of the study was associated with an increase in the other variables as well. The multiple regression analysis revealed that only lexical breadth made a significant direct contribution to L2 reading comprehension of the participants with low level reading proficiency. Syntactic knowledge and lexical depth contributed to L2 reading comprehension in the bivariate analysis however, they did not provide direct contribution when entered into the model with lexical size. The current study suggested that there was a substantial overlap between lexical depth, breadth, and syntactic knowledge. Guo et. al. (2011) expressed the close connection between syntax and vocabulary. Schmitt (2000) noted the difficulty in separating vocabulary and syntax. Accordingly, it can be concluded that the syntactic knowledge test which was composed of vocabulary overlapped with lexical knowledge and thus prevented it from attaining significant contribution to L2 reading comprehension. Consequently, it is quite difficult to separate the concepts of depth, breadth, and syntactic knowledge for the participants with low level reading proficiency.

The last research question asked the differences between the low and high reading proficiency groups in terms of the role of lexical and syntactic knowledge in L2 reading comprehension. The results showed that there were substantial differences between these

two groups. Considering these two groups, the most important finding was the change in the predictive power of lexical and syntactic knowledge in L2 reading comprehension. While the highest contribution to L2 reading comprehension of good readers was found to be syntactic knowledge, it was lexical breadth that contributed most in L2 reading comprehension of poor readers. Considering such a finding, it can be concluded that in the L2 reading comprehension process, there might be a certain level of proficiency above which students depend more on their syntactic knowledge and below which students depend more on their lexical knowledge. Accordingly, it can be concluded that reading proficiency levels have a considerable effect on the predictive power of lexical and syntactic knowledge. It was also found that lexical breadth contributed significantly to the L2 reading comprehension of both groups. One interpretation for such a finding might be the necessity of a certain amount of lexical breath. In other words, regardless of the reading proficiency levels of the students, they should know at least the basic vocabulary for reading comprehension to take place.

5.2. Implications of the Study

The findings of the current study shed light on the role of breadth, depth, and syntactic knowledge in L2 reading comprehension of adult Turkish EFL learners. The results of the study offer some theoretical implications for L2 reading researchers and pedagogical implications for educators and educational researchers.

First of all, the knowledge of basic syntactic structures in L1 is widely shared among the speakers of L1. The level of syntactic knowledge rarely changes across the L1 speaking individuals. Therefore, syntactic knowledge is barely investigated as a component of L1 reading comprehension. As in L1 reading studies, the contribution of syntactic knowledge is taken for granted in L2 reading studies. So, the role of vocabulary is somewhat overstated while that of grammar is understated (Shiotsu and Weir, 2007). On the other hand, the findings of the current study showed that L2 syntactic knowledge is the best predictor of L2 reading comprehension of adult Turkish EFL learners. So, the essential components for L1 and L2 reading theories should be different from each other and L2 reading theories should include L2 syntactic knowledge as an essential component. In other words, the researchers investigating the complex nature of L2 reading comprehension should include syntactic knowledge in their studies.

As for the practical implications lexical breadth and syntactic knowledge should be emphasized in L2 reading instructions. However, the needs of the students should be determined first. In other words, failure in L2 reading comprehension may result from insufficient lexical breadth or syntactic knowledge. The contribution of these components in L2 reading comprehension is different so the weight of each kind of knowledge should be different depending on the L2 reading proficiency of the learners. As the current study showed that syntactic knowledge was a better predictor of L2 reading comprehension of the participants with high L2 reading proficiency level, more attention should be paid to syntactic knowledge in the instruction of good readers. On the other hand, increasing lexical size seems to be a more urgent need for poor readers.

Second, although syntactic knowledge was found to be a better predictor of L2 reading comprehension of the whole sample, EFL instructors are recommended to increase the learners' lexical breadth in order to enhance students' reading ability. In this regard, lexical breadth defined as recognizing words and knowing superficial meaning of them should be accepted as the most important dimension of lexical knowledge. As reading texts are composed of some words, knowing the meaning of at least the core words isrequired for reading comprehension to take place. In other words, irrespective of the proficiency level of the students, a certain amount of lexical size is necessary to understand a reading text. The best way to increase lexical breadth which is necessary for reading is reading itself (Eskey, 2005). Similarly, Nagy (2005) stated that "wide reading is the primary engine that drives vocabulary growth for older and more able readers." (p. 29). So, the relationship between lexical breadth and L2 reading is reciprocal. Wesche and Paribakht (1998) noted that although reading for meaning significantly increases lexical acquisition, such a reading should be supported by vocabulary exercises which will produce greater gains. Therefore, language teachers or instructors should make effective use of classroom activities to promote lexical size, and hence, L2 reading comprehension of the students.

The traditional vocabulary instructions suggest the memorization of words; however, it is almost impossible to memorize each word in a reading text. Language teachers or instructors should also focus on vocabulary learning strategies such as consulting a dictionary or other sources, inferring meaning from context, or segmenting words into parts. Therefore, classroom activities can be developed to encourage the students use such strategies while reading.

As syntactic knowledge was found to be a better predictor of L2 reading comprehension, it is also recommended that syntactic knowledge teaching be integrated into reading classes or other language classes because syntactic knowledge teaching is generally isolated from language classes. Using reading texts may be a way of developing syntactic knowledge of the learners, which will also increase the lexical breadth of the learners. "To become skilled readers, students need to develop abilities to draw meaning from phrase- and clause-level grammatical information" (Grabe and Stoller, 2011, p.130). So, when the learners are able to use their syntactic knowledge, they may be able to draw meaning by using syntactic cues.

Vocabulary training was emphasized more compared to syntactic knowledge (Yalin and Wei, 2011; Shiotsu and Weir, 2007). However, students may know all of the words of a reading text but may not comprehend it if they do not have adequate knowledge of syntactic structures. Therefore, it is necessary for language teachers to design their reading classes based on the syntactic needs of learners, and to keep a balance between the training of vocabulary and syntactic knowledge (Yalin and Wei, 2011). In this respect, it is suggested that instructors should incorporate breadth, depth, and syntactic knowledge into curriculum and classroom activities of adult L2 reading comprehension instruction.

The current study also revealed that lexical depth did not directly contribute to L2 reading comprehension of the participants, however, it provided an indirect contribution to L2 reading comprehension via its direct contribution to syntactic knowledge and lexical knowledge. Higher levels of lexical depth are associated with greater syntactic knowledge and lexical breadth which in turn would contribute to L2 reading comprehension. So, direct instruction of lexical relations such as paradigmatic, syntagmatic, or collocational would be helpful to adult L2 learners to increase their lexical size and syntactic knowledge. Because, these types of lexical associations allow readers to guess what may come next, which, in turn, helps readers infer the meaning of unknown words.

5.3. Limitations and Directions for Further Research

Although the current study seems to have notable findings and contributes to the field, there is always room for improvement. Some limitations of the current study are addressed in this section. Considering the limitations of this study, suggestions for further research are offered:

The findings of the current study are only limited to Turkish adult EFL learners. So, this study may not be generalized to all populations of EFL learners. Further studies with a group of learners with diverse L1 backgrounds and from different age groups may provide important insights into the role of lexical breadth, depth, and syntactic knowledge in L2 reading comprehension.

The current study focused only on the role of lexical and syntactic knowledge in L2 reading comprehension. However, in order to study overall second language acquisition, further studies are needed. Further studies are recommended to include additional dependent variables, especially productive ones such as speaking and writing. Such an improvement may provide a clearer picture of the role of lexical and syntactic knowledge.

L2 reading comprehension seems to involve various sub-skills, and requires the operation of multiple cognitive processes working together at the same time (Koda, 2005; Grabe, 2009; Jeon and Yamashita, 2014). The present study investigated the role of only three of these sub-skills. Further studies might include additional L2 variables such as morphological awareness, word recognition speed, working memory, phonological knowledge, and so on. Such a study might provide further insights on the componential nature of L2 reading comprehension. Further studies are suggested to include as many reading comprehension components as possible.

The lexical depth aspect of lexical knowledge was measured by the Word Associates Test in the current study. The Word Associates Test measures *analytic*, *paradigmatic*, or *syntagmatic* relations. Schmitt (2014) stated the construct of lexical depth depends on how one conceptualizes and measures depth. Thus, using other depth measures would yield different results concerning the role of lexical depth in L2 reading comprehension. In addition to word associates, using different depth measures such as knowledge of derivative forms, receptive or productive mastery, or polysemy meaning sense would provide a better understanding of the role of depth in L2 reading comprehension. Further studies are recommended to use multiple lexical depth measures.

The current study investigated the role of syntactic knowledge in L2 reading comprehension of adult Turkish learners. The predictive power of each syntactic structure may change in L2 reading. Some structures may contribute more compared to other structures. Defining the role of different syntactic structures might be useful to define the most important structures in L2 reading comprehension.

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APPENDICES

Appendix I. Approval of the Ethics Committee

Kayıt Tarihi: 13.01.2017 | Protokol No: 5898

ANADOLU ÜNİVERSİTESİ ETİK KURULU KARARI

ÇALIŞMANIN TÜRÜ:	BAP Projesi-Doktora Tez Çalışması
KONU:	Eğitim Bilimleri
BAŞLIK:	The Role of Lexical and Syntactic Knowledge in L2 Reading Comprehension of Turkish EFL Leraners İngilizceyi Yabancı Dil Olarak Öğrenen Türk Öğrencilerin İkinci Dilde Okuduğunu Anlama Becerisinde Dilbilgisi ve Sözcük Bilgisinin Rolü
~~PROJE~~/TEZ YÜRÜTÜCÜSÜ:	Prof. Dr. Ümit Deniz TURAN
TEZ YAZARI:	Samet TAŞÇI
ALT KOMİSYON GÖRÜŞÜ:	–
KARAR:	Olumlu

ETİK KURUL ÜYELERİ — **İMZA/ TARİH** 23.02.2017

Prof. Dr. Aydın AYBAR
Rektör Yardımcısı / Etik Kurul Başkanı

Prof. Dr. Hayrettin TÜRK
Fen Bil.(Fen Fak.)

Prof. Dr. Yusuf ÖZTÜRK
Sağlık Bil.(Ecz. Fak.)

Prof. Dr. Esra CEYHAN
Eğitim Bil. (Eğitim Bil. Ens.)

Prof. Dr. Bülent GÜNSOY
Sos. Bil.(İkt. Fak.)

Prof. Dr. Münevver ÇAKI
Güz. San. (Güz. San. Fak.)

Appendix II. Sample Reading Comprehension Questions

1. Survival and successful reproduction usually require the activities of animals to be coordinated with predictable events around them. Consequently, the timing and rhythms of biological functions must closely match periodic events like the solar day, the tides, the lunar cycle, and the seasons. The relations between animal activity and these periods, particularly for the daily rhythms, have been of such interest and importance that a huge amount of work has been done on them and the special research field of **chronobiology** has emerged. Normally, the constantly changing levels of an animal's activity—sleeping, feeding, moving, reproducing, metabolizing, and producing enzymes and hormones, for example—are well coordinated with environmental rhythms, but the key question is whether the animal's schedule is driven by external cues, such as sunrise or sunset, or is instead dependent somehow on internal timers that themselves generate the observed biological rhythms. Almost universally, biologists accept the idea that all eukaryotes (a category that includes most organisms except bacteria and certain algae) have internal clocks. By isolating organisms completely from external periodic cues, biologists learned that organisms have internal clocks. For instance, apparently normal daily periods of biological activity were maintained for about a week by the fungus Neurospora when it was intentionally isolated from all geophysical timing cues while orbiting in a space shuttle. The continuation of biological rhythms in an organism without external cues attests to its having an internal clock.

2. When crayfish are kept continuously in the dark, even for four to five months, their compound eyes continue to adjust on a daily schedule for daytime and nighttime vision. Horseshoe crabs kept in the dark continuously for a year were found to maintain a persistent rhythm of brain activity that similarly adapts their eyes on a daily schedule for bright or for weak light. Like almost all daily cycles of animals deprived of environmental cues, those measured for the horseshoe crabs in these conditions were not exactly 24 hours. Such a rhythm whose period is approximately—but not exactly—a day is called **circadlan**. For different individual horseshoe crabs, the circadian period ranged from 22.2 to 25.5 hours. A particular animal typically maintains its own characteristic cycle duration with great precision for many days. Indeed, stability of the biological clock's period is one of its major features, even when the organism's environment is subjected to considerable changes in factors, such as temperature, that would be expected to affect biological activity strongly. Further evidence for persistent internal rhythms appears when the usual external cycles are shifted—either experimentally or by rapid east-west travel over great distances Typically, the animal's daily internally generated cycle of activity continues without change. As a result, its activities are shifted relative to the external cycle of the new environment. The disorienting effects of this mismatch between external time cues and internal schedules may persist, like our jet lag, for several days or weeks until certain cues such as the daylight/darkness cycle reset the organism's clock to synchronize with the daily rhythm of the new environment.

3. Animals need natural periodic signals like sunrise to maintain a cycle whose period is precisely 24 hours. Such an external cue not only coordinates an animal's daily rhythms with particular features of the local solar day but also—because it normally does so day after day—seems to keep the internal clock's period close to that of Earth's rotation. Yet despite this synchronization of the period of the internal cycle, the animal's timer itself continues to have its own genetically built-in period close to, but different from, 24 hours. Without the external cue, the difference accumulates and so the internally regulated activities of the biological day drift continuously, like the tides, in relation to the solar day. This drift has been studied extensively in many animals and in biological activities ranging from the hatching of fruit fly eggs to wheel running by squirrels. Light has a predominating influence in setting the clock. Even a fifteen-minute burst of light in otherwise sustained darkness can reset an animal's circadian rhythm. Normally, internal rhythms are kept in step by regular environmental cycles. For instance, if a homing pigeon is to navigate with its Sun compass, its clock must be properly set by cues provided by the daylight/darkness cycle.

1. **In paragraph 1, the experiment on the fungus *Neurospora* is mentioned to illustrate**
   A) the existence of weekly periods of activity as well as daily ones.
   B) the finding of evidence that organisms have internal clock.
   C) the effect of space on the internal clocks of organism.
   D) the isolation of one part of an organism’s cycle for study.

2. **According to paragraph 1, all the following are generally assumed to be true EXCEPT:**
   A) it is important for animals' daily activities to be coordinated with recurring events in their environment.
   B) Eukaryotes have internal clocks.
   C) The relationship between biological function and environmental cycles is a topic of intense research.
   D) Animals' daily rhythms are more dependent on external cues than on internal clocks.

3. **Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.**

   A) Stability, a feature of the biological clock's period, depends on changeable factors such as temperature.
   B) A major feature of the biological clock is that its period does not change despite significant changes in the environment.
   C) A factor such as temperature is an important feature in the establishment of the biological clock's period.
   D) Biological activity is not strongly affected by changes in temperature.

4. **According to paragraph 2, which of the following is true about the circadian periods of animals deprived of environmental cues?**
   A) They have the same length as the daily activity cycles of animals that are not deprived of such cues.
   B) They can vary significantly from day to day.
   C) They are not the same for all members of a single species.
   D) They become longer over time.

5. **According to paragraph 2, what will an animal experience when its internal rhythms no longer correspond with the daily cycle of the environment?**
   A) Disorientation
   B) Change in period of the internal rhythms
   C) Complete reversal of day and night activities
   D) Increased sensitivity to environmental factors

6. **In paragraph 2, the author provides evidence for the role of biological clocks by**
   A) listing the daily activities of an animal's cycle: sleeping, feeding, moving, reproducing, metabolizing, and producing enzymes and hormones
   B) describing the process of establishing the period of a biological clock
   C) presenting cases in which an animal's daily schedule remained stable despite lack of environmental cues
   D) contrasting animals whose daily schedules fluctuate with those of animals whose schedules are constant

7. **In paragraph 2, why does the author mention that the period for different horseshoe crabs ranges from 22.2 to 25.5 hours?**
   A) To illustrate that an animal's internal clock seldom has a 24-hour cycle
   B) To argue that different horseshoe crabs will shift from daytime to nighttime vision at different times
   C) To illustrate the approximate range of the circadian rhythm of all animals
   D) To support the idea that external cues are the only factors affecting an animal's periodic behavior of reflection may not be apparent immediately

8. **The word "it" in the passage refers to**
   A) an external cue such as sunrise
   B) the daily rhythm of an animal
   C) the local solar day
   D) a cycle whose period is precisely 24 hours

9. In paragraph 3 of the passage, there is a missing sentence. The paragraph is repeated below and shows four letters (A, B, C, and D) that indicate where the following sentence could be added.

   Because the internal signals that regulate waking and going to sleep tend to align themselves with these external cues, the external clock appears to dominate the internal clock.

Animals need natural periodic signals like sunrise to maintain a cycle whose period is precisely 24 hours. **(A)** Such an external cue not only coordinates an animal's daily rhythms with particular features of the local solar day but also—because it normally does so day after day—seems to keep the internal clock's period close to that of Earth's rotation. **(B)** Yet despite this synchronization of the period of the internal cycle, the animal's timer itself continues to have its own genetically built-in period close to, but different from, 24 hours. **(C)** Without the external cue, the difference accumulates and so the internally regulated activities of the biological day drift continuously, like the tides, in relation to the solar day. **(D)** This drift has been studied extensively in many animals and in biological activities ranging from the hatching of fruit fly eggs to wheel running by squirrels. Light has a predominating influence in setting the clock. Even a fifteen-minute burst of light In otherwise sustained darkness can reset an animal's circadian rhythm. Normally, internal rhythms are kept in step by regular environmental cycles. For Instance, if a homing pigeon Is to navigate with its Sun compass, its clock must be properly set by cues provided by the daylight/darkness cycle.

Where would the sentence best fit?

A) Choice A
B) Choice B
C) Choice C
D) Choice D

10. ***Directions:*** **An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.** ***This question is worth 2 points.***

Write your answer choices in the spaces where they belong. You can either write the letter of your answer choice or you can copy the sentence.

- **The activity of animals is usually coordinated with periodically recurring events in the environment.**

1.
2.
3.

Answer Choices

A) Most animals survive and reproduce successfully without coordinating their activities to external environmental rhythms.
B) Animals have internal clocks that influence their activities even when environmental cues are absent.
C) The circadian period of an animal's internal clock may vary slightly for different individuals but is generally quite stable for any one individual.
D) Animals are less affected by large differences between their internal rhythms and the local solar day than are humans.
E) Environmental cues such as a change in temperature are enough to reset an animal's clock.
F) Because an animal's internal clock does not operate on a 24-hour cycle, environmental stimuli are needed to keep the biological day aligned with the solar day.

Appendix III. Vocabulary Levels Test Questions

Version 2 The 2.000-word level

1 copy	
2 event	_____ end or highest point
3 motor	_____ this moves a car
4 pity	_____ thing made to be like another
5 profit	
6 tip	

1 accident	
2 debt	_____ loud deep sound
3 fortune	_____ something you must pay
4 pride	_____ having a high opinion of yourself
5 roar	
6 thread	

1 coffee	
2 disease	_____ money for work
3 justice	_____ a piece of clothing
4 skirt	_____ using the law in the right way
5 stage	
6 wage	

1 clerk	
2 frame	_____ a drink
3 noise	_____ office worker
4 respect	_____ unwanted sound
5 theater	
6 wine	

1 dozen	
2 empire	_____ chance
3 gift	_____ twelve
4 opportunity	_____ money paid to the government
5 relief	
6 tax	

1 admire	
2 complain	_____ make wider or longer
3 fix	_____bring in for the first time
4 hire	
5 introduce	_____ have a high opinion of someone
6 stretch	

1 arrange	
2 develop	_____ grow
3 lean	_____ put in order
4 owe	_____ like more than something else
5 prefer	
6 seize	

1 blame	
2 elect	_____ make
3 jump	_____ choose by voting
4 manufacture	_____ become like water
5 melt	
6 threaten	

1 ancient	
2 curious	_____ not easy
3 difficult	_____ very old
4 entire	_____ related to God
5 holy	
6 social	

1 bitter	
2 independent	_____ beautiful
3 lovely	_____ small
4 merry	_____ liked by many people
5 popular	
6 slight	

1 bull
2 champion
3 dignity
4 hell
5 museum
6 solution

_____ formal and serious manner
_____ winner of a sporting event
_____ building where valuable objects are shown

1 blanket
2 contest
3 generation
4 merit
5 plot
6 vacation

_____ holiday
_____ good quality
_____ wool covering used on beds

1 comment
2 gown
3 import
4 nerve
5 pasture
6 tradition

_____ long formal dress
_____ goods from a foreign country
_____ part of the body which carries feeling

1 administration
2 angel
3 frost
4 herd
5 fort
6 pond

_____ group of animals
_____ spirit who serves God
_____ managing business and affairs

1 atmosphere
2 counsel
3 factor
4 hen
5 lawn
6 muscle

_____ advice
_____ a place covered with grass
_____ female chicken

1 abandon
2 dwell
3 oblige
4 pursue
5 quote
6 resolve

_____ live in a place
_____ follow in order to catch
_____ leave something permanently

1 assemble
2 attach
3 peer
4 quit
5 scream
6 toss

_____ look closely
_____ stop doing something
_____ cry out loudly in fear

1 drift
2 endure
3 grasp
4 knit
5 register
6 tumble

_____ suffer patiently
_____ join wool threads together
_____ hold firmly with your hands

1 brilliant
2 distinct
3 magic
4 naked
5 slender
6 stable

_____ thin
_____ steady
_____ without clothes

1 aware
2 blank
3 desperate
4 normal
5 striking
6 supreme

_____ usual
_____ best or most important
_____ knowing what is

Version 2 The 5.000-word level

1 analysis
2 curb
3 gravel
4 mortgage
5 scar
6 zeal

_____ eagerness
_____ loan to buy a house
_____ small stones mixed with sand

1 contemplate
2 extract
3 gamble
4 launch
5 provoke
6 revive

_____ think about deeply
_____ bring back to health
_____ make someone angry

1 cavalry
2 eve
3 ham
4 mound
5 steak
6 switch

_____ small hill
_____ day or night before a holiday
_____ soldiers who fight from horses

1 demonstrate
2 embarrass
3 heave
4 obscure
5 relax
6 shatter

_____ have a rest
_____ break suddenly into small pieces
_____ make someone feel shy or nervous

1 circus
2 jungle
3 nomination
4 sermon
5 stool
6 trumpet

_____ musical instrument
_____ seat without a back or arms
_____ speech given by a priest in a church

1 correspond
2 embroider
3 lurk
4 penetrate
5 prescribe
6 resent

_____ exchange letters
_____ hide and wait for someone
_____ feel angry about something

1 artillery
2 creed
3 hydrogen
4 maple
5 pork
6 streak

_____ a kind of tree
_____ system of belief
_____ large gun on wheels

1 decent
2 frail
3 harsh
4 incredible
5 municipal
6 specific

_____ weak
_____ concerning a city
_____ difficult to believe

1 chart
2 forge
3 mansion
4 outfit
5 sample
6 volunteer

_____ map
_____ large beautiful house
_____ place where metals are made and shaped

1 adequate
2 internal
3 mature
4 profound
5 solitary
6 tragic

_____ enough
_____ fully grown
_____ alone away from other things

Version 2 The 10.000-word level

1 alabaster
2 chandelier
3 dogma
4 keg
5 rasp
6 tentacle

_____ small barrel
_____ soft white stone
_____ tool for shaping wood

1 benevolence
2 convoy
3 lien
4 octave
5 stint
6 throttle

_____ kindness
_____ set of musical notes
_____ speed control for an engine

1 bourgeois
2 brocade
3 consonant
4 prelude
5 stupor
6 tier

_____ middle class people
_____ row or level of something
_____ cloth with a pattern or gold or silver threads

1 alcove
2 impetus
3 maggot
4 parole
5 salve
6 vicar

_____ priest
_____ release from prison early
_____ medicine to put on wounds

1 alkali
2 banter
3 coop
4 mosaic
5 stealth
6 viscount

_____ light joking talk
_____ a rank of British nobility
_____ picture made of small pieces of glass or stone

1 dissipate
2 flaunt
3 impede
4 loot
5 squirm
6 vie

_____ steal
_____ scatter or vanish
_____ twist the body about uncomfortably

1 contaminate
2 cringe
3 immerse
4 peek
5 relay
6 scrawl

_____ write carelessly
_____ move back because of fear
_____ put something under water

1 blurt
2 dabble
3 dent
4 pacify
5 strangle
6 swagger

_____ walk in a proud way
_____ kill by squeezing someone's throat
_____ say suddenly without thinking

1 illicit
2 lewd
3 mammoth
4 slick
5 temporal
6 vindictive

_____ immense
_____ against the law
_____ wanting revenge

1 indolent
2 nocturnal
3 obsolete
4 torrid
5 translucent
6 wily

_____ lazy
_____ no longer used
_____ clever and tricky

Version 2 Academic Vocabulary

1 area
2 contract
3 definition
4 evidence
5 method
6 role

_____ written agreement
_____ way of doing something
_____ reason for believing something is or is not true

1 debate
2 exposure
3 integration
4 option
5 scheme
6 stability

_____ plan
_____ choice
_____ joining something into a whole

1 access
2 gender
3 implementation
4 license
5 orientation
6 psychology

_____ male or female
_____ study of the mind
_____ entrance or way in

1 accumulation
2 edition
3 guarantee
4 media
5 motivation
6 phenomenon

_____ collecting things over time
_____ promise to repair a broken product
_____ feeling a strong reason or need to do something

1 adult
2 exploitation
3 infrastructure
4 schedule
5 termination
6 vehicle

_____ end
_____ machine used to move people or goods
_____ list of things to do at certain times

1 alter
2 coincide
3 deny
4 devoe
5 release
6 specify

_____ change
_____ say something is not true
_____ describe clearly and exactly

1 correspond
2 diminish
3 emerge
4 highlight
5 invoke
6 retain

_____ keep
_____ match or be in agreement with
_____ give special attention to something

1 bond
2 channel
3 estimate
4 identify
5 mediate
6 minimize

_____ make smaller
_____ guess the number or size of something
____ recognizing and naming a person or thing

1 explicit
2 final
3 negative
4 professional
5 rigid
6 sole

_____ last
_____ stiff
_____ meaning `no' or `not'

1 abstract
2 adjacent
3 controversial
4 global
5 neutral
6 supplementary

_____ next to
_____ added to
_____ concerning the whole world

Appendix IV. Word Associates Test Questions

1. beautiful	
☐ enjoyable ☐ expensive ☐ free ☐ loud	☐ education ☐ face ☐ music ☐ weather
2. bright	
☐ clever ☐ famous ☐ happy ☐ shining	☐ color ☐ hand ☐ poem ☐ taste
3. calm	
☐ open ☐ quite ☐ smooth ☐ tired	☐ cloth ☐ day ☐light ☐ person
4. natural	
☐ expected ☐ helpful ☐ real ☐ short	☐ foods ☐ neighbors ☐ parents ☐ songs
5. fresh	
☐ another ☐ cool ☐ easy ☐ raw	☐ cotton ☐ heat ☐ language ☐ water
6. general	
☐ closed ☐ different ☐ usual ☐ whole	☐ country ☐ idea ☐ reader ☐ street
7. bare	
☐ empty ☐ heavy ☐ uncovered ☐ useful	☐ cupboard ☐ feet ☐ school ☐ tool
8. acute	
☐ hidden ☐ often ☐ rich ☐ sharp	☐ angle ☐ hearing ☐ illness ☐ stones
9. common	
☐ complete ☐ light ☐ ordinary ☐ shared	☐ boundary ☐ circle ☐ name ☐ party
10. complex	
☐ angry ☐ difficult ☐ necessary ☐ sudden	☐argument☐passengers☐patterns☐problem
11. broad	
☐ full ☐ moving ☐ quite ☐ wide	☐ night ☐ rivers ☐ shoulders ☐ smile

12. conscious	
☐ awake ☐ healthy ☐ knowing ☐ laughing	☐ face ☐ decision ☐ effort ☐ student
13. convenient	
☐ easy ☐ fresh ☐ near ☐ suitable	☐ experience ☐ sound ☐ time ☐ vegetable
14. dense	
☐ crowded ☐ hot ☐ noisy ☐ thick	☐ forest ☐ handle ☐ smoke ☐ weather
15. curious	
☐ helpful ☐ interested ☐ missing ☐ strange	☐ accident ☐ child ☐ computer ☐ steel
16. distinct	
☐ clear ☐ famous ☐ separate ☐ true	☐ advantage ☐ meanings ☐ news ☐ parents
17. dull	
☐ cloudy ☐ loud ☐ nice ☐ secret	☐ colour ☐ knife ☐ place ☐ rock
18. direct	
☐ honest ☐ main ☐ straight ☐ wide	☐ fence ☐ flight ☐ heat ☐ river
19. favorable	
☐ helpful ☐ legal ☐ possible ☐ positive	☐ habit ☐ response ☐ teacher ☐ weather
20. secure	
☐ confident ☐ enjoyable ☐ fixed ☐ safe	☐ game ☐ job ☐ meal ☐ visitor
21. tight	
☐ close ☐ rough ☐ uncomfortable ☐ wet	☐ bend ☐ pants ☐ surface ☐ wood
22. violent	
☐ expected ☐ smelly ☐ strong ☐ unlucky	☐ anger ☐ death ☐ rubbish ☐ storm

23. chronic	
☐ continuing ☐ local ☐ serious ☐ unplanned	☐accident ☐examination ☐illness ☐shortage
24. compact	
☐ effective ☐ small ☐ solid ☐ useful	☐ group ☐ kitchen ☐ medicine ☐ string
25. crude	
☐ clever ☐ fair ☐ rough ☐ valuable	☐ behavior ☐ drawing ☐ oil ☐ trade
26. domestic	
☐ home ☐ national ☐ regular ☐ smooth	☐ animal ☐ movement ☐ policy ☐ speed
27. profound	
☐ bright ☐ deep ☐ exact ☐ great	☐ effect ☐ machine ☐ taste ☐ thought
28. fertile	
☐ dark ☐ growing ☐ private ☐ special	☐ business ☐ egg ☐ mind ☐ soil
29. formal	
☐ fast ☐ loud ☐ organized ☐ serious	☐ bomb ☐ education ☐ growth ☐ statement
30. independent	
☐ changed ☐ equal ☐ important ☐ separate	☐ child ☐ country ☐ ideas ☐ prices
31. original	
☐ careful ☐ closed ☐ first ☐ proud	☐ condition ☐ mind ☐ plan ☐ sister
32. sensitive	
☐ feeling ☐ interesting ☐ sharp ☐ thick	☐ clothes ☐ instrument ☐ skin ☐ topic
33. professional	
☐ paid ☐ public ☐ regular ☐ religious	☐ advice ☐ manner ☐ musician ☐ transport

34. critical	
☐ clear ☐ dangerous ☐ important ☐ rough	☐ festival ☐ illness ☐ time ☐ water
35. synthetic	
☐artificial ☐electronic ☐expensive ☐simple	☐ drug ☐ meal ☐ radio ☐ sound
36. liberal	
☐ free ☐ moderate ☐ plenty ☐ valuable	☐ crops ☐ furniture ☐ parents ☐ transport
37. dramatic	
☐ exciting ☐ official ☐ surprising ☐ worried	☐ adventure ☐ change ☐ patient ☐ salary
38. conservative	
☐ cautious ☐ hopeful ☐ traditional ☐ warm	☐ clothes ☐ estimate ☐ meeting ☐ signal
39. coherent	
☐ clear ☐ normal ☐ recent ☐ together	☐ crime ☐ health ☐ speech ☐ theory
40. ample	
☐ heavy ☐ large ☐ plentiful ☐ windy	☐ amount ☐ climate ☐ feelings ☐ time

Appendix V. Sample Syntactic Knowledge Test Questions

1. The movie *The Lost Weekend* is really _____ seeing.
a. worthy
b. worthwhile
c. worth it
d. worth

2. The investment company was accused _____ to take all the money.
a. to try
b. for trying
c. that they tried
d. of trying

3. In order to finish the paper on time, Joseph _____ miss the lecture.
a. would have had to
b. have to
c. have had to
d. couldn't have to

4. Ann will be amazed _____ how fast her grandson has grown.
a. that
b. at
c. for
d. in

5. _____, we didn't need to meet the applicant after seeing her resume.
a. It suffices saying
b. Suffice it to say
c. To say suffices it
d. To suffice it

6. _____ great at math, but she can also speak three languages.
a. Although Lisa is
b. Not only Lisa is
c. Not only is Lisa
d. Whereas is Lisa

7. The fisherman wanted to free the dolphin without letting the fish _____ away.
a. getting
b. to get
c. get
d. gets

8. _____ economists' predictions, the stock market still has not recovered.
a. Although
b. Despite
c. Regardless
d. On the contrary

9. Dr. Briggs' recommendation was different _____ Dr. Simpson.
a. than that of
b. than
c. than of
d. that of

10. _____ the difficulty of the material, the teacher took extra time teaching it to her students.
a. Because recognizing
b. By recognizing
c. Recognizing
d. To recognize

11. What qualifications _____ in order to become president?
a. must someone have
b. must have someone
c. someone must have
d. have someone

12. We will have to be very efficient during our meeting; I have an appointment this afternoon, so _____ eleven thirty.
a. we'll finish up to
b. we'll have to finish by
c. we should finish until
d. we could have finished at

13. The towers of the new bridge are fifty-six meters _____ the old one.
a. as high as those of
b. as high as
c. higher than of
d. higher than those of

14. The principal stands by all her decisions even though _____ popular.
a. they have not always been
b. they always have not been
c. they have not been always
d. not always have been

15. David Smith is the name of the man _____ daughter I met.
a. his
b. whose
c. who his
d. whom his

16. Helen's decision to retire _____ surprise.
a. caught me in
b. caught me by
c. was caught by my
d. was caught in my

17. I bet I'm not the first person _____ that you have a wonderful singing voice.
a. who telling you
b. who tells
c. to tell you
d. tells you

18. All the students tried _____ to win the recycling prize.
a. their best they could
b. their best
c. with their best
d. as their best

19. Now that he has started law school, Eric _____ give up his volunteer work.
a. has had to
b. has had
c. has been
d. was to

20. The Olympics _____ for athletes from all over the world to compete with each other.
a. possibly make
b. make possible
c. make it possibly
d. make it possible