The Roles of L2 Written Linguistic Knowledge and L2 Listening Comprehension of First-year High School EFL Learners in L2 Reading Comprehension: An SEM Analysis

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2022년 8월

서울대학교 대학원

외국어교육과 영어전공

김 현 순

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by

Hyunsoon Kim

A Dissertation Submitted to

the Department of Foreign Language Education

in Partial Fulfillment of the Requirements

for the Degree of Doctor of Philosophy in English Language

Education

At the

Graduate School of Seoul National University

August 2022

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2022년 7월

서울대학교 대학원
외국어교육과 영어전공
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김현순의 박사학위논문을 인준함

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July 2022
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ABSTRACT

The Roles of L2 Written Linguistic Knowledge and L2 Listening

Comprehension of First-year High School EFL Learners in L2 Reading

Comprehension: An SEM Analysis

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L2 written vocabulary and grammatical knowledge have been a major focus in English classrooms in Korean secondary schools. Many foreign language (FL) researchers tried to explain the L2 reading comprehension ability of the developing FL learners based on this L2 linguistic knowledge (LK), often defined in written modes. In a broader domain, however, a different perspective has been widely supported to explain the reading comprehension ability of various populations including monolingual (L1) or second language (SL) learners. This framework is the Simple View of Reading (SVR) model, which delineates that reading comprehension ability is predicted by listening comprehension ability as well as decoding. The present study aims to clarify the role of L2 written LK, an FL-specific construct, in the context of the SVR, a dominant theory in reading research. Two hypotheses are formulated that test different relations between L2 LK and L2 reading comprehension: one is the direct and indirect relation via L2 listening comprehension and the other is the fully indirect one via L2 listening comprehension. They were tested on secondary school EFL learners with the SEM analysis.

The participants are first-year high school learners residing in mid- or low-

income areas in Seoul and its neighboring province in Korea. Data from 250 participants were used for the present analysis. Nine L2 reading-related instruments were used and the data were collected in two sessions. By the CFA analysis, the latent constructs (i.e., decoding, written LK, listening comprehension, and reading comprehension) were created with the measured variables. The L2 written LK was created as a second-order factor capturing the common feature between L2 vocabulary and grammatical knowledge.

The comparison of the SEM model fit showed that the indirect model was the best fitting model for the present EFL data for parsimony. This indirect model suggests that decoding and listening comprehension are significant predictors of L2 reading comprehension for EFL learners, in line with the SVR theory. More importantly, the indirect model shows that L2 listening comprehension fully mediates the effect of L2 written LK on L2 reading comprehension. L2 written LK had a substantial relationship with L2 listening comprehension of EFL learners.

These findings were discussed focusing on the role of L2 listening comprehension in the relationship between L2 written LK and L2 reading comprehension; the substantial relation between L2 written LK and L2 listening comprehension; reasons for the fully indirect relation between L2 written LK and L2 reading comprehension for the current study; the nature of the L2 written LK in the current SVR model; and overall characteristics of the first-year high school EFL learners' L2 reading comprehension ability by the SVR. The more proximal role of L2 listening comprehension than the L2 LK for L2 reading comprehension suggests the commonality between L2 listening and reading comprehension. The role of L2 listening comprehension that mediates the relationship between L2 written LK and

L2 reading comprehension highlights the importance of the automaticity of linguistic components and the L2 phonological knowledge for L2 text comprehension. The substantial relationship between L2 LK and L2 listening comprehension suggests that L2 written LK could be part of the language comprehension of the SVR for EFL learners by promoting parsing for comprehension. This hierarchical relationship between L2 written LK and L2 listening comprehension can be partly relevant to the way the L2 written LK was operationalized in the present study or the low L2 proficiency. This indirect model has an additional finding that L2 decoding still makes a significant influence on L2 reading comprehension for first-year high school EFL learners.

The present study has some theoretical implications. The findings confirm the SVR theory with EFL learners and advance the existing SVR theory by inviting the L2 written LK and explicitly separating the knowledge and the oral comprehension construct, which have often been mix-used for the language comprehension construct in previous SVR-based FL studies. Lastly, the present study provides a strong FL reading model that can explain more than 90% of the variance in L2 reading comprehension for lower-level EFL learners. Pedagogical implications can also be offered. One of them is that L2 written LK is still important but its instruction should more focus on processing them for comprehension, as it was operationalized in the current study. Also, first-year high school students in Korea still need more practice decoding English words with more efficiency. Study limitations were discussed along with suggestions for future research.

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CHAPTER 1.
GENERAL INTRODUCTION

This chapter introduces motivations for the current investigation and illustrates a theoretical framework of the current study, the Simple View of Reading (hereinafter SVR). It will examine how the SVR model has been studied in prior reading education research, mostly in the first language or second language fields, focusing on key concepts and the significance of the theory. Considering the different language learning experiences between second and foreign language contexts, this chapter points out the FL-specific component for L2 reading, explicitly learned L2 written linguistic knowledge. Subsequently, key terms and abbreviations, significance, and the organization of the thesis are presented.

1.1. The Background of the Study

Maryanne Wolf's (2018) seminal book *Reader, come home: The reading brain in a digital world* explicates reading comprehension as the complex cognitive process, in which various compartments in our brain are networked and operated simultaneously and rapidly - like a vibrant circus performance. This complexity of reading comprehension has been extensively researched in cognitive psychological research from populations of monolingual (L1) or second language (SL) learners mostly with English language learners. However, it has been steadily asserted that the nature of L2 reading skills in foreign language (FL) learners, who learn the L2 in formal classrooms with little exposure to its oral language, has been relatively understudied, compared to the L1 or SL learners

(Shiotsu, 2010; Jeon & Yamashita, 2014; Yamashita & Shiotsu, 2017).

L2 reading skills of FL learners are often studied in the applied linguistic field, if there are any. The major interest in this strand is the role of L2 linguistic components including vocabulary, morphology, and syntactic knowledge, which were mostly defined in written skills (e.g., Aryadoust & Baghaei, 2016; Choi & Zhang, 2018; Jung, 2009; Laufer & Aviad–Levitzky, 2017; Mecartty, 2000; Shiotsu, 2010; Shiotsu & Weir, 2007; van Gelderen et al., 2004; Yalin & Wei, 2011; Zhang, 2012; Zhang & Koda, 2012). Shiotsu (2010) revealed that L2 reading comprehension ability for Japanese EFL learners is influenced by 'a heavy syntax-based component' (p. 170), highlighting the potent role.

However, this linguistic component approach to FL reading comprehension seems to be less systematic compared to a reading theory called the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990; Hoover & Tunmer, 1993). The SVR captures the complex processes of reading simply in two main constructs: print-related decoding (D) and oral language comprehension ability (LC). That is, it simply formulates that reading comprehension ability is a product of decoding and language comprehension, as indicated in a formula, Reading Comprehension = D * LC. This simple formula indicates that the two constructs are independent and "reading takes place only when both D and LC are greater than zero" (Gough et al., 1996, p. 3). They are not an additive relationship (i.e., D + LC), but a multiplicative relationship (i.e., D * LC) (Kendeou, Savage, et al., 2009). This theory is seminal because decoding and oral language comprehension serve as two backbones of reading comprehension ability and this simple concept has theoretical and pedagogical applicability for various types of populations

(Catts, 2018).

The SVR has been widely supported as a reading model due to many reasons. First, it could effectively explain the individual variation of reading comprehension. The model accounted for approximately 53% to 100% of the variance in reading comprehension for L1 learners ranging from grade 1 to grade 10 (Foorman, Koon, et al., 2015; Foorman, Herrera, et al., 2015; Kim, 2017; Quinn & Wagner, 2018; Stanley et al., 2018); 52% to 99% of the variance in reading comprehension for L2 learners in the SL contexts (Bonifacci & Tobia, 2017; Cho et al., 2019; Lesaux et al., 2010; Verhoeven & Van Leeuwe, 2012). The SVR was also effective to diagnose reading comprehension difficulties in both L1 and L2 readers (Catts et al., 2006; Kim. H & Lee, 2021; Lesaux & Kieffer, 2010; Spencer & Wagner, 2017; Wagner et al., 2021). Thus, it has served as an instructional framework for L1 or L2 literacy education (Foorman et al., 2006; Kendeou et al., 2005; Lesaux, Kieffer, et al., 2010). Lastly, the SVR has been used in cognitive psychology as a frame to explain general text processing (e.g., Deniz et al., 2019; Michael et al., 2001; Palmer et al., 1985; Van Dyke et al., 2014).

The brevity of the SVR lies in using the listening comprehension ability to estimate one's reading comprehension (Duke & Cartwright, 2021), based on the concept that the language comprehension of the SVR is the "parsing, bridging, and building discourse" ability (Hoover & Gough, 1990, p. 128). This oral language comprehension has been proposed to capture the complicated comprehension processes during reading involving various linguistic and cognitive components (e.g., Catts, 2018; Kim, 2017, 2019, 2020; Lervåg et al., 2018; Tong & Deacon, 2017). This notion is little disputed in L1 or SL contexts where the target language

of literacy instruction is spoken in daily life. Indeed, there is a wealth of evidence in the SL field that L2 listening comprehension is the main source of L2 reading comprehension difficulties in various SL populations including English, Dutch, or Italian (e.g., Bonifacci & Tobia, 2017; Crosson & Lesaux, 2010; Farnia & Geva, 2013; Geva & Farnia, 2012; Lesaux, Crosson, et al., 2010; Paige & Smith, 2018; Spencer & Wagner, 2017; Trapman et al., 2014; Zadeh et al., 2012).

The influence of L2 oral comprehension skills in L2 text comprehension for SL learners is easily understood from developmental perspectives as well. Acquisition of oral language skills including both vocabulary and syntax precedes literacy skills in a first language (Nation & Snowling, 2000). Thus, SVR supporters state that once decoding skills are learned, the text is fully comprehended by the general comprehension system that has been developed by prior oral language experiences (Gough et al., 1996). In this regard, the language comprehension construct for L1 and second language (SL) learners was defined by either listening comprehension or a combination of orally measured vocabulary, morphology, and syntactic skills along with listening comprehension as a proxy of the language comprehension construct (e.g., Kieffer et al., 2016; Lesaux, Crosson, et al., 2010; Foorman, Herrera, et al., 2015; Foorman, Koon, et al., 2015 for L1; Gottardo et al., 2017; Verhoeven & van Leeuwe, 2012; Proctor et al., 2005 for SL). To summarize, listening comprehension was an important variable for L1 or SL reading comprehension because it is reflective of various linguistic and cognitive components.

1.2. Statement of the Problem

In contrast to the SL context, FL contexts give limited opportunities to access L2 oral language. Accordingly, L2 oral language skills are not necessarily developed in advance to L2 literacy skills in the foreign language context, rather developing in tandem (Alderson et al., 2016; Sparks, 2019). In some other contexts, L2 learning and instructions of EFL learners tend to focus on developing written language skills including vocabulary and grammar. This is illustrated in Lee's (2008) analysis that the accumulated amount of exposure to English oral language by Korean English learners throughout their secondary-level English education was significantly limited, on average less than 200 hours. Empirical studies have also revealed that explicit grammar instruction and translation are the most prevailing practices in Korean English classrooms (e.g., An, 2007; Lee, 2009; Lee et al., 2015). These findings imply that L2 language skills are largely developed by practice focusing on vocabulary and grammar in Korean EFL contexts. Moreover, most of the FL reading research investigated vocabulary and grammar as written linguistic skills (e.g., Aryadoust & Baghaei, 2016; Choi & Zhang, 2018; Jung, 2009; Laufer & Aviad–Levitzky, 2017; Mecartty, 2000; Shiotsu, 2010; Shiotsu & Weir, 2007; van Gelderen et al., 2004; Yalin & Wei, 2011; Zhang, 2012; Zhang & Koda, 2012), implying that the written linguistic knowledge is an important factor for FL learners' L2 reading comprehension without considering the theoretical model of the SVR. It seems intuitively natural that L2 written linguistic knowledge should be a primary focus in EFL literacy instruction.

This series of accounts on FL reading comprehension and its development

renders an expectation that explicitly learned L2 written linguistic knowledge is accountable for L2 reading comprehension ability in the FL context. However, this notion is not converged with the widely-supported SVR model that reading comprehension is explained by decoding and listening comprehension. Moreover, some studies, albeit still limited, have shown that L2 listening comprehension plays a significant role in FL learners' L2 reading comprehension (e.g., Erbeli & Joshi, 2022; Kang, 2020, 2021; Jeon, 2011, 2012; Lee, 2018; Sparks et al., 2018).

Thus, it is still an unresolved issue in the FL reading research field – Can the oral language comprehension skill in the SVR predict the L2 reading comprehension abilities of FL learners? If so, what is the role of L2 linguistic knowledge, which is often defined in written linguistic skills in the context of the SVR? In other words, the interest of the current study is the relationship among L2 listening comprehension, L2 written linguistic knowledge, and L2 reading comprehension of EFL learners who are mostly instructed and exposed to written language inside and outside the classroom.

1.3. The Present Study

The present study aims to clarify the roles of L2 written linguistic knowledge in EFL reading comprehension in the broader theoretical discourse, called the SVR. This investigation serves first-year high school English learners with limited L2 proficiency in Korean educational contexts. The L2 linguistic knowledge is particularly defined as written knowledge because it is developmentally adequate when investigating adolescent L2 learners. In SL

research, this linguistic knowledge was generally defined in oral modes because the participants were children. Also, the majority of previous EFL reading studies measured L2 linguistic knowledge with written forms (e.g., Aryadoust & Baghaei, 2016; Choi & Zhang, 2018; Jung, 2009; Laufer & Aviad–Levitzky, 2017; Mecartty, 2000; Shiotsu, 2010; Shiotsu & Weir, 2007; van Gelderen et al., 2004; Yalin & Wei, 2011; Zhang, 2012; Zhang & Koda, 2012). Moreover, L2 language components tend to be learned by explicit instructions via written modes in school English classrooms in Korea.

The analytical strategy is structural equational modeling (SEM) by using maximum likelihood estimation. The study developed in two phases. First, the factor structures of the proposed latent constructs are confirmed in the measurement model. Based on the confirmed factor structure, the structural relations among latent constructs were estimated. Since there is little relevant research examining the oral language comprehension construct in relation to the written linguistic knowledge in the FL context, this study is explorative. By determining the best-fitting model for the current data, the optimal relations among the target constructs will be suggested.

1.3.1. The Korean Context for Learning English

In Korea, English instruction at school is initiated from the 3rd grade of elementary school and continues to the end of high school, following a centralized national curriculum. English classes are generally scheduled in two units (40 min per unit) a week for Grades 3 and 4 and three units a week for Grades 5 and 6 during elementary school and three to four units (45 min per unit) a week every

grade levels during middle school even though some schools might add one or more units. In all, Korean students receive English lessons for from 80 minutes to three hours a week for seven years before they enter high school (a total of approximately 482 hours). Another contextual feature of L2 learning in the Korean EFL environment, especially for adolescent learners, is that English exposure and achievement are influenced by parental support, which is largely associated with SES and shadow education. Thus, high income-areas are more likely to be associated with higher proficiency in English while low income-areas are more likely to be associated with low English proficiency (J. Kim, 2015; Lim et al., 2018).

To summarize, the current investigation on the role of L2 written linguistic knowledge and L2 listening comprehension in L2 reading comprehension is conducted in the Korean-specific EFL context, where English exposure at school is quantitatively limited and the English proficiency of these high-school students is dependent on individual socio-contextual factors.

1.4. Definitions of the Terms and Key Abbreviations

The operational definition of the terms used in the current study is presented. Key abbreviations were also listed.

- Second language (SL): Second language refers to the L2 acquired in the L2-speaking contexts. L2 is comprehensively used in daily lives in the second language contexts including schools and society, except for home.

Hence, second language readers are those who learn to read in the L2 that is largely acquired through oral language experiences. For example, SL readers include adolescent immigrants in the U.S., who learn to read in English while they simultaneously acquire their second language.

- Foreign language (FL): Foreign language refers to the L2 acquired in formal learning contexts. Also, L2 is not comprehensively used in daily lives and thus its oral exposure is significantly limited. Foreign language readers are those who learn to read in the L2 that is largely acquired through written input. For example, FL readers include English language learners who learn to read in English in Korea or China.

- English as a foreign language (EFL): For brevity, those FL learners of English were referred to as EFL learners in the current study.

- L2 written linguistic knowledge: Written linguistic knowledge (i.e., LK) in this study refers to the set of L2 component skills including vocabulary, syntax, and morphology tested in a written mode. L2 written knowledge, skills, or abilities were often interchangeably used in the present study. Although it requires some decoding, L2 LK is distinguished from L2 decoding in that it includes lexical knowledge and how the lexical entries are formed at word levels and sentence levels.

- Decoding ability refers to the knowledge of English orthography and rules of matching grapheme and phoneme of English at syllable or word levels.

1.5. Significance of the Study

The study contributes to enhancing our understanding of the FL-specific language comprehension construct in the SVR for an FL population who has been understudied in the L2 reading research. As the present investigation was drawn upon the contextual difference between the SL and FL, the model focuses on the language comprehension construct in relation to L2 listening comprehension and L2 written linguistic skills. By fitting the model built by L2-related constructs, the study would be able to know whether the predictive relationship between oral and reading comprehension (SVR) is applicable to FL learners. Furthermore, it can scrutinize a question: what is the structural relationship of the L2 written LK, L2 listening comprehension, and L2 reading comprehension.

Another significance of the current study is that the direct and indirect relations among critical FL reading-related variables (or components) are tested in a latent variable-based structural equational paradigm. This statistical approach can enhance the power in estimating the relations among the variables because measurement errors can be reduced that are inherent in traditional single-variable methods (e.g., path analysis or regression) by using error-free latent constructs estimated by the common variances among the observed variables (MacCallum & Austin, 2000). Thus, the current study can provide more valid and reliable results advancing the understanding of L2 reading in the FL domain (e.g., Huo et al., 2021; Kang, 2020, 2021; Sparks et al., 2018; van Gelderen et al., 2004).

Lastly, the present study may provide an optimal reading model for understanding the English reading abilities of average Korean high school learners. This academic examination of their English reading abilities can be a foundation

upon which educators can develop an adequate instructional approach and support for developing their English reading ability.

1.6. Organization

This dissertation is organized into six chapters. Chapter 1 introduces the background of the study, purpose, and current study. Chapter 2 provides a review of the literature used for building the research model and present two research questions based on the remaining questions from the review. Chapter 3 describes the research methodology including participants, instruments, procedure, and analysis. Chapter 4 reports the result of the study and Chapter 5 discusses central issues of research results. Chapter 6 summarizes major findings and concludes with pedagogical implications, limitations, and suggestions for future study.

CHAPTER 2.
LITERATURE REVIEW

This chapter comprehensively reviews related literature to find research gaps and to establish the rationale for the present model. It is concerned with three major areas. First, it sets out to examine key findings by the SVR on the reading comprehension abilities of FL learners and focus on the language comprehension construct represented in FL as well as SL studies. Second, the role of L2 listening comprehension in L2 reading ability is comprehensively examined to see the nature of the construct, the association with reading comprehension, and its role demonstrated in the FL reading research. Third, this chapter will examine the characteristics of L2 reading abilities described in FL-specific research by focusing on various critical L2 components of reading comprehension and the nature of developing L2 reading skills in the FL context from processing perspectives.

2.1. The Simple View of Reading (SVR)

This section examines what literature within the SVR has revealed about the reading comprehension abilities of FL learners and discusses some issues on the oral language comprehension construct found in the FL and SL studies. In this section, reading in the FL context is assumed to be distinguished from reading in the SL context in terms of the learning context for L2.

2.1.1. Key Findings by the SVR in FL Contexts

Compared to the strong body of research in SL contexts, the SVR model has been less investigated in the FL reading research (e.g., Erbeli & Joshi, 2022; Huo et al., 2021; Kang, 2020, 2021; Spark, 2021; Sparks et al., 2018; Yamashita & Shiotsu, 2017). If any, the FL reading research framed within the SVR has yielded mixed findings on the component skills that can explain L2 reading comprehension.

Huo et al.'s (2021) study was conducted with French learners in the L2-immersion environment from kindergarten to Grade 2 in an English-speaking country (i.e., Non-francophone families in Canada). L2 (French) decoding measured by accuracy and fluency had a longitudinally strong effect on L2 reading comprehension over and above the comprehension measured by L2 oral vocabulary knowledge. Their FL model explained 57% of the variance in L2 reading comprehension in Grade 1 and 62% in Grade 2.

Sparks et al. (2018) elucidated the role of L2 listening comprehension in L2 reading comprehension of FL learners of Spanish in U.S high schools. They could compare relative contributions of each variable by the length of L2 learning because their participants were Spanish as-a-foreign language learners who completed first-, second-, and third-year Spanish courses at U.S. high schools. Irrespective of the lengths of learning, the L2 listening comprehension component was the strongest predictor of L2 reading comprehension over and above other primary variables including L2 phonemic awareness, oral vocabulary knowledge, and non-word decoding. Moreover, its contribution to L2 reading comprehension

became larger as the length of learning increased. The path coefficient from L2 listening comprehension to L2 reading comprehension was .249 for the first-year learners whereas .350 for the second-year learners and .585 for the third-year learners of Spanish. This indicates that L2 listening and reading comprehension is increasingly related to each other as L2 proficiency develops in this group of FL learners.

On the contrary, the L2 decoding was not a critical limit consistently even for the first-year learners who learned the FL (Spanish) in less than a year. This suggested that L2 decoding could be acquired at ease even at the beginning stage of L2 learning of Spanish because these learners are more familiar with an alphabet that English and Spanish share. Moreover, since Spanish is a relatively shallow language compared to English, these learners of Spanish can acquire decoding skills more easily (Frost, 2005). Their path analysis model built with decoding, vocabulary, and listening comprehension explained 20%, 39%, and 63% of the variance of FL reading comprehension abilities.

In Korean EFL contexts, Kang (2020, 2021) investigated pathways of L2 language comprehension components including L2 listening comprehension and vocabulary to L2 reading comprehension. Kang (2020) showed an L2 reading model for Korean EFL students comprised of first- and second-year middle school students. The model highlighted the role of L2 vocabulary by separating it into two dimensions (i.e., depth and breadth knowledge). Both L2 vocabulary breadth (.25) and depth knowledge (.40) had indirect effects via L2 listening comprehension on L2 reading comprehension, and L2 vocabulary depth knowledge (.670) had a strong direct effect on L2 reading comprehension. In this

model, the direct and indirect effects of L2 reading fluency (i.e., decoding), L2 listening comprehension, L2 vocabulary depth, and L2 vocabulary breadth components explained 65.7% of the variance in the L2 reading comprehension of the Korean EFL learners, although the path from the L2 reading fluency was not significant.

Her later model with Korean elementary school learners of English (Kang, 2021) explained L2 reading comprehension with L2 decoding at word level and L2 oral language comprehension. In the model, L2 oral language comprehension measured by a combination of L2 listening comprehension and L2 oral receptive vocabulary was a strong predictor (.72). This model uniquely revealed that L2 decoding mediated the relationship between L2 oral language comprehension and L2 reading comprehension. However, the FL reading model did not take into consideration written linguistic knowledge. In this model, the direct effect of L2 decoding and the direct and indirect effect of L2 oral language comprehension explained 74% of the variance in the L2 reading comprehension of Korean elementary school EFL learners.

Erbeli and Joshi (2022) built their SVR model with 7th grade Slovenian EFL learners in middle schools. Their SEM model found that the L2 decoding measured by silent word reading fluency and orthographic skills (.87) had a stronger effect on L2 reading comprehension than the L2 language comprehension (.16), measured by L2 written vocabulary and L2 listening comprehension. The substantially weaker contribution of L2 language comprehension was interpreted in relation to the low proficiency of L2 listening comprehension for their EFL participants in the Slovenian context. Another key finding of their study is that L1

comprehension was not a significant predictor of L2 reading comprehension of these EFL learners. L2 decoding and L2 language comprehension explained 96% of the variance of L2 reading comprehension of these 7th grade Slovenian EFL learners.

Although there is not yet sufficient accumulated research on the SVR models for FL learners to draw a common finding, one tendency is that the role of decoding was relatively minor compared to the language comprehension construct in those studies that defined decoding with the oral reading measures for adolescent FL learners (Kang, 2020, 2021; Sparks et al., 2018).

Apart from the previous FL studies, Yamashita and Shiotsu (2017) included the language comprehension of the SVR and the knowledge construct together to explain L2 reading comprehension for college-level EFL learners in Japan. The comprehension construct had two dimensions including L1 comprehension (written) and L2 listening comprehension (see Figure 2.1). They presented that L2 linguistic knowledge, measured by L2 written vocabulary and written syntactic knowledge (.48) and L2 listening comprehension (.59) had unique, independent effects on L2 reading comprehension. Within the subgroup comprised of high-proficiency participants, the effect of L2 listening comprehension was relatively reduced (.30), while the effect of L1 reading comprehension became significant (.26). More importantly, the effect of L2 linguistic knowledge increased in this particular high proficiency FL subgroup. In their FL reading model, since the relation between L2 linguistic knowledge and L2 listening comprehension was represented as a correlation, it was unknown whether the effect of the L2 knowledge was via L2 listening comprehension or independent.
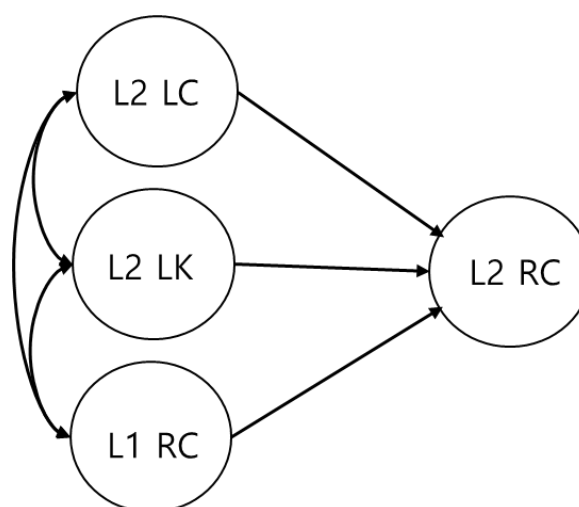
Note. L1 RC = L1 reading comprehension; L2 LK = L2 linguistic knowledge; L2 LC = L2 listening comprehension; L2 RC = L2 reading comprehension.

Figure 2.1

The Comprehension and Knowledge Components Explaining L2 Reading Comprehension for Adult EFL Readers (modified from Yamashita and Shiotsu, 2017)

2.1.2. The Language Comprehension Construct of the SVR

As mentioned in the introduction chapter, L2 researchers shed more light on the language comprehension construct of the SVR to explain the individual differences in L2 reading comprehension. Accordingly, the investigations were active to see what constitutes the L2 language comprehension construct, mostly by researchers in the L1 and SL wings. One trend was to explicate the language comprehension construct with oral language component skills including vocabulary, morphological or syntactic skills (e.g., Foorman, Koon, et al., 2015;

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Foorman, Herrera, et al., 2015; Gottardo et al., 2017; Kieffer et al., 2016). They found that the language comprehension predicting reading comprehension ability (L1) is the higher-order common variance among the component skills, suggesting that the comprehension construct is an integrative process (Foorman, Koon, et al., 2015; Foorman, Herrera, et al., 2015; Kieffer et al., 2016). For SL learners, the language comprehension could also be successfully explained by the component skills. More importantly, L2 vocabulary was substantially important because it directly affected L2 reading comprehension and mediated the effect of L2 morphological knowledge on L2 reading comprehension (Gottardo et al., 2017).

Another trend observed in L1 and SL fields for the SVR is an interest in whether vocabulary as a language component is an additional independent factor, separated from L2 listening comprehension (e.g., Braze et al., 2016; Cho et al., 2019; Lonigan & Milburn, 2017; Paige & Smith, 2018; Proctor et al., 2005; Sabatini et al., 2010; Tunmer & Chapman, 2012). Three SL studies (i.e., Cho et al., 2019; Paige & Smith, 2018; Proctor et al., 2005) investigate the unique effects of L2 vocabulary on L2 reading comprehension after controlling the effect of L2 listening comprehension. The participants were all Grade 5 SL learners of English. The results differ in that two studies (i.e., Paige & Smith, 2018; Proctor et al., 2005) showed a direct effect of L2 vocabulary, suggesting that L2 vocabulary had a unique role in L2 reading comprehension over and above L2 listening comprehension. On the other hand, L2 vocabulary in Cho et al. (2019) did not have a direct effect on L2 reading comprehension, but it was completely mediated by L2 listening comprehension, suggesting that L2 vocabulary for this SL learner group did not have a unique direct contribution to L2 reading comprehension.

The various investigations on the language comprehension of the SVR in L1 and SL fields share a common feature in research design in that the language components including vocabulary or syntactic knowledge were measured in an oral mode. This is developmentally appropriate for their target populations because language skills are primarily developed by oral language use before learning literacy skills in these two groups of learners.

However, there lacks consistency in representing the language comprehension construct in the SVR research for FL learners (e.g., Erbeli & Joshi, 2022; Kang, 2020). Erbeli and Joshi (2022) defined the latent construct of L2 language comprehension with a combination of both L2 listening comprehension and L2 written vocabulary knowledge. Kang (2020) used L2 written vocabulary depth knowledge measure and L2 oral vocabulary breadth knowledge measure, along with L2 listening comprehension. By the assumption of the SVR that reading comprehension is predicted by one's oral comprehension ability (i.e., listening comprehension), the mixed use of knowledge and comprehension in some FL studies is not in line with the overarching strand of the SVR frame. Furthermore, previous FL reading studies that did not include the knowledge aspect of L2 (e.g., Huo et al., 2021; Kang, 2021; Sparks et al., 2018) may not be complete enough to represent FL learners' reading comprehension abilities, considering their learning backgrounds of L2.

Table 2.1. summarizes the SVR studies conducted in FL learning contexts focusing on grade levels of participants, how the L2 language comprehension ability was measured, path coefficients of decoding and language comprehension, and the effect sizes.

Table 2.1.
Summary of FL Studies within the SVR

Studies	L2 / FL context	Participants	Length of learning L2 (years)	Decoding		Language comprehension		Effect size (Model)
				Measurements	Effect	Measurements	Effect	
Erbeli & Joshi (2022)	English / Slovenia	Grade 7	3	Silent word recognition, Orthographic processing	.87	Written VK, LC	.16	96%
Huo et al. (2021)	French /Canada	Grade 1→ 2	1	Oral word reading	.53 →.78	Oral VK	.10 →.14	57% → 62%
Kang (2021)	English / Korea	Grade 5	2	Oral text reading	.27	Oral VK, LC	.87	74%
Kang (2020)	English / Korea	Grade 7 & 8	4 to 5	Oral word reading	*ns*	Oral VK (breadth), Written VK(depth), LC	.25 1.09 .16	66%
Sparks et al. (2018)	Spanish / U.S.	Grade 9	1	Oral word / non-word reading	.15	Oral VK, LC	.16 .25	20%
		Grade 10	2		.18		.28 .35	39%
		Grade 11	3		.32		.42 .59	63%

Note. '→' was used for change in longitudinal studies; VK = L2 vocabulary knowledge; LC = L2 listening comprehension.

2.2. The Role of L2 Listening Comprehension in L2 Reading Comprehension

L2 listening comprehension will be discussed in depth by focusing on the construct of L2 listening comprehension from theoretical perspectives of L2 reading comprehension. Then, its association with reading comprehension will be discussed by reviewing L2-related empirical studies from various domains. Lastly, it will be discussed how L2 listening comprehension has been discussed in FL reading research in relation to other critical L2 linguistic skills.

2.2.1. The Underlying Components of Listening Comprehension

A strong body of reading research in L1 provided various accounts on what constitutes oral comprehension ability, mostly based on L1-speaking young learners. They suggested that linguistic component skills including vocabulary or syntax constitute the underlying construct of listening comprehension (e.g., Kim, 2017, 2019, 2020; Lervåg et al., 2018; Peng et al., 2021; Protopapas et al., 2013). Kim (2017, 2019, 2020) proposed the Direct and Indirect Effects Model of Reading (DIER) to explicate the construct of listening comprehension as a predictor of reading comprehension for L1 children. This model displays the direct and indirect relations among fundamental cognitive skills (e.g., working memory), oral language skills (e.g., vocabulary and grammar), and higher-order cognitive skills (e.g., inferencing) (see Figure 2.2). In the DIER model, working memory is the most foundational construct affecting vocabulary and grammar skills and these oral linguistic skills affect higher-order thinking skills (e.g., inference, comprehension

monitoring, and perspective-taking). The listening comprehension is an upper-level skill mediating between the lower language and cognitive component skills and reading comprehension.
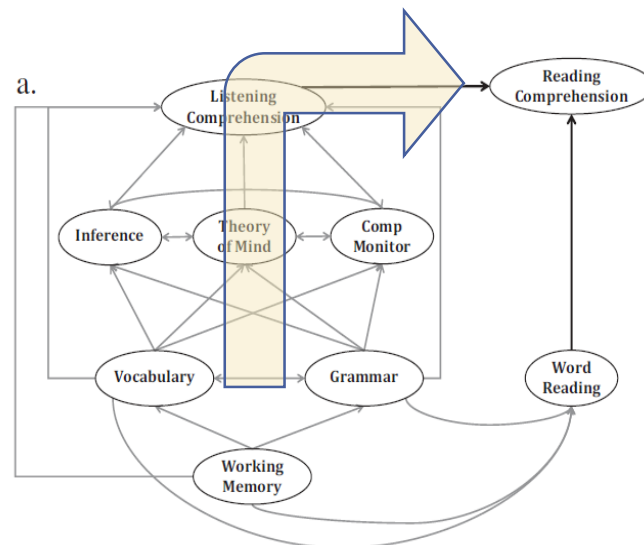
Figure 2.2

The DIER Model (modified from Kim, 2017)

The DIER model has several significant implications in investigating the relationships among linguistic component skills, listening comprehension and reading comprehension. First, the DIER highlights the absence of the direct path of linguistic skills to reading comprehension, although vocabulary showed a direct path to reading comprehension when the texts had demanding vocabulary (Kim, 2020). Second, this model suggests the commonality between listening and reading comprehension because the hierarchical relationship among the linguistic and cognitive component skills explains a substantial amount of the variance in listening and reading comprehension (i.e., 86% in listening; and 66% in reading).

Third, albeit indirect, the effects of vocabulary (.23) and grammar (.15) variables on reading comprehension in the DIER model were substantially large for this group of young L1 readers, compared to higher-order thinking skills including inferencing (.05), theory of mind (.18), and comprehension monitoring (.10).

Lervåg et al.'s (2018) study similarly attempted to uncover the underlying structure of listening comprehension in elementary school L1 readers. Unlike Kim's DIER, their model specified the common 'language' factor shared by separate vocabulary, grammatical skills, verbal working memory, and inferencing skills. This common language factor predicted listening comprehension at a substantial magnitude ($\beta = .95$, $p < .01$, $R^2 = 90\%$). Along with the DIER, this model proposes a hierarchical notion that vocabulary and grammatical skills constitute part of the subcomponents of listening comprehension, as graphically shown by the dotted circle in Figure 2.3.
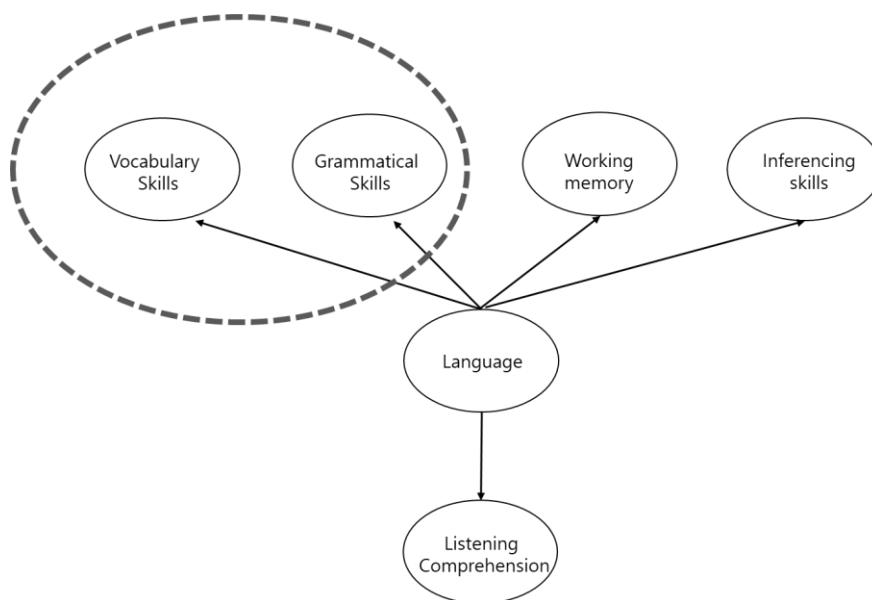
Figure 2.3

The Structure of Listening Comprehension (modified from Lervag et al., 2018)

In L1 reading contexts, Protopapas et al. (2013) also found that the effect of vocabulary on reading comprehension was fully mediated by listening comprehension in L1. Although oral vocabulary and listening comprehension were statistically identical in terms of the same coefficient values, the best fitting model was the vocabulary-based model in which vocabulary was completely mediated by listening comprehension to reading comprehension, not *vice versa* and the path coefficient between vocabulary and listening comprehension was substantially large. These findings indicate that listening comprehension, not vocabulary, is a direct predictor of reading comprehension, although vocabulary and listening comprehension are highly associated.

A body of researchers in L1 or SL contexts presented that listening comprehension is comprised of language-general cognitive skills as well as linguistic components. Fundamental cognitive functioning skills including working memory or cognitive controls (e.g., cognitive flexibility or inhibition) were part of oral comprehension skills in both L1 or SL readers, but they were not directly related to reading comprehension (Spencer et al., 2020; Taboada Barber et al., 2021). A meta-analytic study by Quinn and Wagner (2018) demonstrated the underlying structure of listening comprehension of L1 readers varies as grade levels increased. Inferencing skills and working memory were subsumed under listening comprehension in the younger group (i.e., below 6th grade), while they constituted separate factors from listening comprehension in the older learner group.

These reviewed L1 studies above show that linguistic skills including vocabulary or grammar constitute part of the underlying subcomponents of

listening comprehension seemingly without direct relation to reading comprehension. Also, general cognitive or higher-order thinking skills are included in listening comprehension skills, especially for developing learners.

2.2.2. Association between Listening and Reading Comprehension found in L2-related Empirical Studies

Listening and reading are primarily different processes in that reading accesses information visually, while listening accesses information aurally. Listening is characterized by sound features including tones or pauses, which are called prosody, and the incoming information during listening is transient with no possibility of freely backtracking by the listener. Nevertheless, there is ample evidence supporting strong associations between the two different comprehension skills.

Several L2 studies demonstrated the similarities between L2 listening and reading comprehension. Song (2008) empirically demonstrated that L2 listening and reading comprehension share the same cognitive skills in adult L2 learners who newly entered a university in the U.S. The confirmatory factor analytic study revealed that different subskills involved in L2 listening and reading comprehension are subsumed into three common constructs, suggesting that listening and reading comprehension is a common comprehension process with different decoding processes by modality. Babayiğit (2014) examined what are the critical factors influencing L2 listening and reading comprehension for SL learners of English attending elementary schools in the U.K. The study found that vocabulary (oral) and grammatical (oral) skills were strong predictors in both L2 listening and L2 reading

comprehension over and above L2 decoding skills.

The commonality between L2 listening and reading comprehension was investigated by correlational studies in FL contexts. Hirai (1999) showed that L2 listening and reading rate have strong correlations for adult EFL learners in Japan who had adequate L2 proficiency. This result was interpreted in relation to the processing efficiency. That is, listening and reading comprehension can have a substantial commonality because they are bottom-up processes requiring efficient word recognition (phonologically or orthographically) and syntactic parsing. Spoden et al. (2020) revealed that the correlations between L2 listening and reading comprehension scores increased for upper-grade level subgroups among high school EFL learners in Germany. This result was translated as evidence showing that L2 listening and reading comprehension skills converge into one comprehension ability as L2 develops.

The strong association between L2 listening and reading comprehension can be supported by SVR-based longitudinal findings that L2 listening comprehension is causally related to reading comprehension of SL learners (e.g., Bérubé et al., 2022; Droop & Verhoeven, 2003; Verhoeven & van Leeuwe, 2012; Verhoeven et al., 2019). In Verhoeven and Van Leeuwe (2012) with SL learners of Dutch, L2 listening comprehension at earlier grades (e.g., Grade 1, Grade 3, and Grade 5) predicted L2 reading comprehension at later grades (e.g., Grade 2, Grade 4, and Grade 6). Moreover, this study revealed that earlier L2 reading comprehension predicted later L2 listening comprehension, suggesting a reciprocal relationship between L2 listening and L2 reading comprehension among SL learners. Nevertheless, this reciprocity was less strong compared to the L1 counterpart.

Experimental research investigating the multi-modality effect on information acquisition or learning added evidence to the close association between L2 listening and L2 reading comprehension for FL learning. Jiang et al. (2018) and Moussa-Inaty et al. (2012) conducted studies with English and French learners in FL contexts, respectively. After three types of conditioned-training (i.e., read-only, read+listen, and listen-only) for L2 listening comprehension, the group who received the L2 read-only instructions performed better on the L2 listening comprehension (Moussa-Inaty et al., 2012). In Jiang et al. (2018), the L2 read-only training for developing listening comprehension was only advantageous for higher-level FL learners, while the L2 read-with-listen instruction was advantageous for lower-level FL learners. In both studies, the L2 listen-only training for L2 listening comprehension was the least effective. These results were explained in relation to the effect of cognitive load or working memory capacity in learning new information. If FL learners have the ability of converting L2 written input into the corresponding English sounds, learning L2 listening comprehension skills through L2 reading can be an effective way (if not better) because the visual textual input during reading is not transient so that the L2 learners can process L2 syntax and comprehend the discourse in L2. Through this kind of practice, the acquired speedy processing skills can be used in processing L2 spoken input.

The close relation between listening and text reading comprehension can also be supported by a notion called 'implicit prosody', suggested by Fodor (2002). Prosody including intonation, rhythm, or melody is a distinctive feature found in only spoken language (Koriat et al., 2002). This oral language-specific feature was suggested to facilitate syntactic parsing during reading comprehension as readers

silently generate implicit prosody during processing written words. This helps them to chunk the written information into meaningful boundaries and hold the sequence in working memory until a complete semantic analysis can be conducted, as they do during oral comprehension (Rayner et al., 2012).

2.2.3. Listening in FL Reading Comprehension Research

L2 listening comprehension was suggested to play a significant role in FL reading comprehension as well. Jeon and Yamashita's (2014) meta-analysis revealed that the relation of L2 listening comprehension to L2 reading comprehension was substantially strong ($r = .77$), along with the relations between L2 grammar knowledge ($r = .85$) and L2 vocabulary ($r = .79$). Several studies in the FL-specific contexts reported a significant relationship between L2 listening and reading comprehension.

Alderson et al. (2016) attempted to find distinguishing features of weak FL readers from strong FL readers among L1 Finnish-speaking learners of English in three cross-sectional groups including 4th, 8th, and upper high school learners. Among L2-general cognitive skills, L2 language skills (i.e., L2 listening comprehension and L2 written vocabulary), and various dimensions of L2 learning motivations, L2 listening comprehension along with L2 written vocabulary knowledge were conspicuously distinguishing features, bolstering the notion that L2 listening comprehension is a critical skill for L2 reading comprehension of FL learners in Finland.

In Jeon's (2011) study investigating the role of L2 morphology in the FL

reading for Korean high school English learners, L2 listening comprehension made a more unique contribution (27%) to predicting L2 reading comprehension than L2 vocabulary measured in a written mode (23.9%) or decoding skills (11.6%). Lee's (2018) discriminant analysis of Korean elementary school FL learners of English demonstrated that L2 listening comprehension was a significant discriminant factor along with several other reading-related variables. Nevertheless, more important discriminants were L2 print-related skills including L2 letter naming or L2 sight word reading. On the other hand, a series of Sparks' studies consistently showed that L2 listening comprehension plays an important role when Spanish-as-a-foreign-language learners in the U.S. read a text in Spanish (Sparks, 2015, 2019; Sparks & Patton, 2016; Sparks et al., 2018). FL context for L2 learning is constrained by limited L2 oral language exposure in both school and home and thus the development of L2 oral language skills does not necessarily precede the development of L2 written language skills, which is not in the case of SL contexts (Sparks, 2019).

MeCartty (2000) presented a similarity between L2 listening and reading comprehension in the FL context of learning Spanish in the U.S. For the college-level non-major Spanish FL learners, L2 vocabulary knowledge (written) explained significant variance in L2 listening as well as L2 reading comprehension, while L2 grammatical knowledge (written) did not make any additional contribution. Despite the different modalities between listening and reading comprehension, the L2 written linguistic knowledge (i.e., L2 vocabulary in this study) was significantly involved in explaining individual differences in both listening and reading comprehension.

Some FL reading studies attempted to show the facilitative role of L2 phonological awareness for skillful reading. Walter (2008) with secondary school EFL learners in the French context revealed that good L2 comprehender groups performed statistically better on phonological awareness tasks. Secondary school EFL learners in the Japanese context showed better performance on L2 reading comprehension when they had a better phonological awareness (Miyasako & Takatsuka, 2004). In a supra-segmental phonology dimension, Cui et al. (2021) demonstrated the positive role of L2 oral language features in L2 reading comprehension with a group of Chinese EFL learners. After a 12-week long training on prosodic features in L2 oral language (i.e., stress, intonation, and rhythm), the college-level EFL learners showed better performance on L2 reading comprehension. These studies on phonology commonly agree on the important role of exposure to L2 spoken language (especially prosodic features) in L2 text comprehension and suggested the need for intentional instruction on the L2 phonological and prosodic features in L2 reading classrooms.

The studies reviewed in this section note that the role of listening comprehension in reading is the upper-construct that overarches language (e.g., vocabulary or syntactic knowledge) and higher-order cognitive (e.g., inferencing) skills and mediates the relations of the language and cognitive components to text comprehension. Many empirical studies in L1 and L2 supported the strong relation between listening and reading comprehension in various research designs. In FL contexts where the L2 is little experienced in oral forms, the significant effect of L2 listening comprehension was often reported after controlling for other critical written linguistic knowledge variables including L2 vocabulary or syntax.

2.3. Characteristics of L2 Reading Comprehension in FL Contexts

This section will illustrate the roles of various L2 reading component skills discussed in the FL domain and discuss nature of the development for L2 comprehension skills in the FL context from the skill learning perspective.

2.3.1. L2 Linguistic Components for FL Reading

As discussed in the general introduction Chapter, FL reading community had an interest in explaining the variability of FL reading comprehension with L2 component skills. For example, FL researchers attempted to find which predictors (e.g., vocabulary and syntax) are the best predictor of FL reading comprehension (e.g., Choi & Zhang, 2021; Kim & Cho, 2015; MeCartty, 2000; Zhang, 2012), which was not a common topic in the SL reading fields. Moreover, the L2 component skills in FL research were defined as written L2 linguistic knowledge. This is also a distinct trend from L1 or SL reading research, especially framed by the SVR, where the L2 linguistic variables are mostly defined as oral language skills.

A group of FL researchers agrees on the prominent role of L2 written vocabulary for FL reading comprehension (e.g., Chen & Liu, 2020; MeCartty, 2000; Laufer & Aviad–Levitzky, 2017; van Gelderen et al., 2004; Zhang, 2012). Laufer and Aviad–Levitzky (2017) examined the different dimensions of vocabulary knowledge with adult English learners in the Israeli context. The recognition dimension was the most significant predictor of L2 reading

comprehension compared to the recall dimension. Zhang (2012) found that vocabulary size has the largest contribution to L2 reading comprehension beyond vocabulary depth and syntactic knowledge among adult EFL learners. Similarly, Chen and Liu (2020) demonstrated that the L2 reading comprehension performance of adult Chinese EFL learners was significantly predicted by the vocabulary size up until 6,000 frequency level after controlling the vocabulary depth knowledge. Despite oral comprehension mode (i.e., listening comprehension), Staehr (2009) offered evidence that L2 vocabulary depth knowledge did not make an additional contribution beyond L2 vocabulary breadth knowledge among adult Dutch EFL learners.

L2 morphological knowledge received frequent attention in many FL reading studies (e.g., Jeon, 2011; Zhang & Koda, 2012, 2013; Zhang & Lin, 2021). In Jeon (2011), it was the most significant predictor even after controlling other critical L2 variables (e.g., L2 listening comprehension, written L2 vocabulary, or L2 decoding) for Korean high school EFL learners. Recently, a longitudinal effect of L2 morphological awareness on L2 reading comprehension was reported for college-level EFL learners in China (Zhang, 2021). Zhang and Koda (2013) uniquely found that derivational awareness was more contributable to L2 reading comprehension than compound word knowledge. In Zhang and Lin (2021), the regression coefficient of morphological form knowledge was larger than the one of knowledge on morpheme meaning after controlling vocabulary knowledge, suggesting that L2 reading comprehension of EFL learners is more significantly associated with morphological form knowledge than the knowledge on morpheme meaning.

Syntactic knowledge has been suggested to be the most critical difference between L1 and L2, especially FL, readers because it is an environmentally acquired skill from oral language for L1 readers before learning literacy skills (Grabe, 2009). Accordingly, it was the least problematic component causing L2 reading comprehension problems in the SL context where the L2 is naturally exposed both inside and outside the classroom (D'Angelo & Chen, 2017; Li et al., 2021). Nevertheless, L2 syntactic skill in some other SL studies was often reported to be a strong predictor of the growth in L2 reading comprehension even after accounting for L2 vocabulary and L2 listening comprehension (Farnia & Geva, 2013; Geva & Farnia, 2012). In the FL context, L2 syntactic knowledge was steadily pointed out as a critical variable yielding the individual differences in FL reading comprehension (Aryadoust & Baghaei, 2016; Shiotsu, 2010; Shiotsu & Weir, 2007; Yalin & Wei, 2011).

Shiotsu and Weir (2007) demonstrated that L2 syntactic knowledge, which was measured by a task of sentence completion, was the best predictor of L2 reading comprehension over and above the L2 vocabulary breadth knowledge for adult FL learners of English, irrespective of the L2 proficiency and the learning contexts (i.e., SL vs. FL). This result is somewhat inconclusive because the critical role of L2 written syntactic knowledge was found even for learners at a fairly high level of L2 proficiency. In a more comprehensive study by the same author (Shiotsu, 2010), the written L2 syntactic knowledge was shown to be the most influential predictor over and above other critical variables (e.g., L2 word recognition efficiency, L2 vocabulary breadth or L2 working memory, etc.), highlighting the significant role of L2 written syntactic knowledge in FL reading

comprehension.

2.3.2. Characteristics of L2 Linguistic Components for FL Comprehension

L2 language skills in FL contexts were generally defined in written forms in research while they were generally defined in oral modes in L1 or SL contexts. Since L2 language skills of SL learners are generally learned through daily oral exposure in the target language contexts, their vocabulary and syntactic knowledge are better reflected on their L2 oral language skills. However, since the L2 language skills are dominantly learned in classroom and the L2 oral language is scarcely available inside and outside the classroom in an EFL environment (Ellis, 1994), the L2 vocabulary and grammatical knowledge are likely to be represented in their written language skills. This nature of L2 language skills of FL learners is implicitly shown in a number of FL reading studies where L2 components were predominantly measured in written forms (e.g., Jung, 2009; Shiotsu. 2010). Additionally, since main participants in FL studies are above elementary school L2 learners, it is developmentally appropriate to measure the language skills in written modes (Jeon & Yamashita, 2014).

One study in an EFL context attempted to separate oral and written language components to explain L2 listening and reading comprehension (Oh, 2016). For the Korean college-level EFL learners, L2 listening is significantly predicted by the oral L2 vocabulary over and above the written L2 vocabulary while L2 reading comprehension is significantly predicted by the written L2 vocabulary over and above the oral L2 vocabulary. Nevertheless, the L2 written vocabulary still had

strong correlations with L2 listening comprehension, assuming that the L2 vocabulary measured in a written mode may work as a significant contributor to L2 listening comprehension when it is used alone without other orally measured variables.

A second characteristic is that the component skills, which were mostly measured in written forms, are often highly related one another, especially for developing FL learners. van Gelderen et al. (2004) investigated the roles of L2 written linguistic component skills, L2 word recognition fluency, and L2 sentence reading fluency in Grades 8 to 10 EFL learners in the Dutch context. It was shown that L2 written vocabulary was the only significant predictor of FL reading comprehension, although there was a substantial interdependency among the component skills (i.e., L2 vocabulary, L2 syntactic knowledge, L2 word recognition, and L2 sentence reading fluency). Many FL reading experts represented the lexical and syntactic components as a common underlying factor based on a notion that they are highly associated for FL learners (e.g., Purpura, 1999; Shiotsu, 2003).

The empirical results drawn from regression analysis on the individual variables yielded the minor role of L2 syntactic knowledge in FL reading comprehension compared to the other variables (e.g., L2 vocabulary knowledge, L2 decoding, or processing efficiency). However, this finding does not conform to the theoretical account of the importance of L2 syntactic knowledge for FL reading comprehension that aids in parsing the recognized word into a meaningful unit for comprehension (Grabe & Stoller, 2019; Koda, 2005, 2007). Indeed, Jeon and Yamashita's (2014) meta-analysis also revealed that L2 reading comprehension

was similarly related to L2 vocabulary ($r = .79$) and L2 grammatical knowledge ($r = .85$). Thus, the L2 linguistic knowledge variables need to be approached in the FL reading research in different analytical framework in order to take into account the large shared variance between themselves.

2.3.3. Developing L2 Reading Comprehension Skill in FL Contexts

Reading comprehension is ultimately to build a coherent situation model of the written text. This can be succeeded when the processing of word recognition, retrieval of meaning, and syntactic parsing is automatized and speedy so that it can free up working memory resources that are used for higher-order comprehension activities required for comprehension (Grabe & Stoller, 2019; Koda, 2005, 2007). Extensive research on eye movements during reading has strengthened the notion that reading is a bottom-up processing. Readers focus on almost every word without guessing or sampling textual information and the vast majority of words on a text are identified (Grabe, 1991; Rayner et al., 2012; Stanovich, 1990).

An information processing theory by LaBerge and Samuels (1974) explicates that three codes in words should be automatized for successful text comprehension: visual, phonological, and semantic codes. Another word-level reading theory, Dual route theory (Coltheart, 2005; Coltheart et al., 2001), conceptualizes how written words are processed from a computational perspective. One of the word reading routes is via the phonological route, which is to translate the spelling units into sound units. This phonological route requires knowledge on the grapheme and phoneme relation. The other route of the word reading

processing is the lexical route, which is the direct access to semantics from the orthography. When words are recognized from the lexical route, the phonological information is instantly retrieved from memory. These theories share a view that phonological information on words is important for comprehension, which can be a major limit in learning to read in L2 in the FL context where the oral language input is rather limited.

The automatization of reading skills means changing from 'strategy' to 'skill' (Afflerbach et al., 2008). Afflerbach et al. explained that "reading strategies are deliberate, conscious, effortful attempts to control and modify the readers' effort to decode text, understand words, and construct meaning of text" (p. 15). Skilled reading takes place when FL readers unconsciously and effortlessly use various components involved in L2 reading. To bridge the strategic FL reading practice to the skilled FL reading indicates automatization of lower-level processing and this requires continual practice of processing the subcomponent skills (Dekeyser, 2000), as seen in Figure 2.4. This is remarkably difficult in FL contexts where the L2 is not environmentally exposed to FL learners.
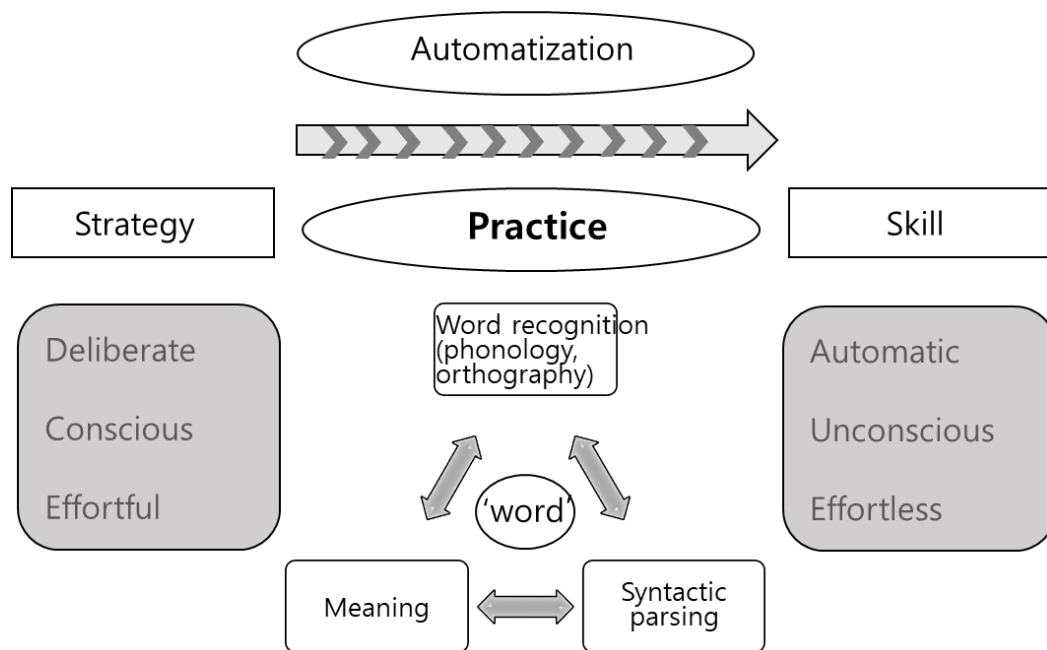
Figure 2.4
Strategy to Skill Continuum in Learning to Read

The importance of automaticity of lower-level components for L2 reading was empirically demonstrated in Bae (2017) with Korean first-year high school EFL learners. The lower-level components including orthographic knowledge, phonological knowledge, semantic access, and syntactic knowledge explained 71% of the variance in L2 reading comprehension of the low-proficiency group, while these lower-level components explained 38% of the variance among the high-proficiency group. Moreover, orthographic knowledge was one of the most important predictors of L2 reading comprehension in both low- and high-proficiency groups.

2.4. Research Questions

Based on the review of the literature and the remaining questions on the focus of L2-related reading skills, the present investigation aims to investigate the relationship among the three SVR constructs (i.e., L2 decoding, L2 oral comprehension, and L2 reading comprehension) and L2 written LK. To this end, the objectives of the present study are twofold by addressing the following two research questions.

1. What is the best measurement model of decoding, written LK, listening comprehension, and reading comprehension variables?

   H1. It would be represented with decoding, listening comprehension, reading comprehension, and written LK that is indicated by vocabulary, morphological decomposition, syntactic comprehension, and grammatical error detection measured in a written mode.

   H2. It would be represented with decoding, listening comprehension, reading comprehension, and written LK that captures a common variance integrating both vocabulary and grammar measured in a written mode.

2. What is the relation among L2 decoding, L2 listening comprehension, L2 written LK, and L2 reading comprehension for first-year high school EFL learners? Is the L2 written LK directly related or only indirectly related to L2 reading comprehension?

The second question is more elaborated into two hypotheses (i.e., M1 and M2). The two hypotheses have in common in which decoding and listening comprehension are direct predictors of reading comprehension by the conception of the SVR.

M1. L2 listening comprehension and decoding would make direct contributions to reading comprehension. L2 written LK would have both a direct and an indirect contribution to L2 reading comprehension via L2 listening comprehension (i.e., direct/indirect model).

M2. L2 listening comprehension and decoding would make direct contributions to reading comprehension. L2 written LK would have a fully mediated contribution to L2 reading comprehension via L2 listening comprehension (i.e., indirect model).

Each hypothesis is graphically displayed in Figure 2.5a and 2.5b, respectively. To simplify the relationship, decoding was not drawn in the figures.
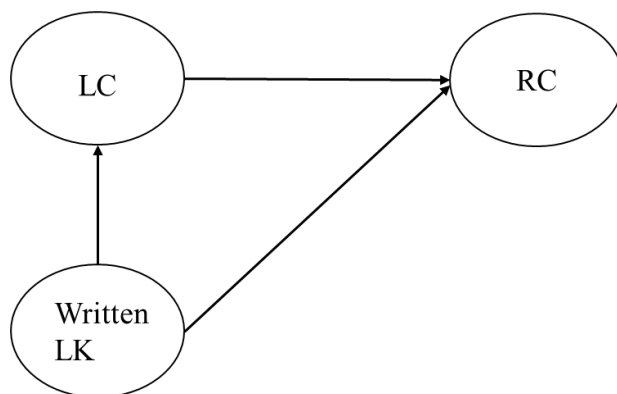
a. Direct/Indirect Model (M1)
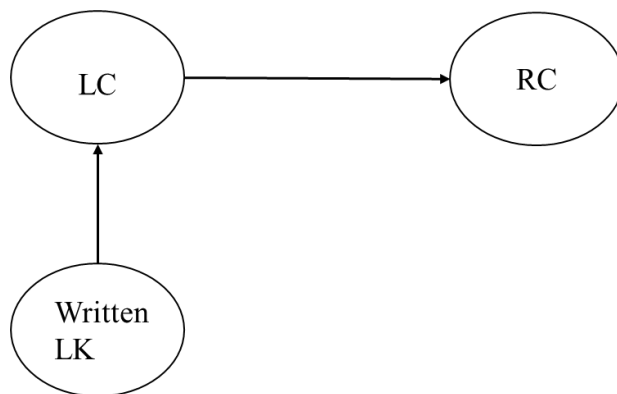
b. Indirect Model (M2)

Note. LC = L2 listening comprehension; Written LK = L2 written linguistic knowledge; RC = L2 reading comprehension. Decoding is correlated with written LK but it was omitted to simplify the figures.

Figure 2.5
The Two Alternative Structural Models

CHAPTER 3.
METHODOLOGY

3.1. Participants

Two hundred sixty-four first-year high school students learning English as a foreign language were recruited from two high schools in Seoul and Gyeonggi Province. The two schools were selected to represent the characteristics of first-year high school students in the regions. The students were 15 or 16 years old when they were recruited. According to national statistics regarding educational resources and the housing and land cost (Korean Statistical Information Service, 2020), the two schools were located in mid-and low-income neighborhoods.

Of these 264 students, nine participants were dropped because they did not complete all the measures in the study. Additional five students were also excluded because they were extreme outliers. As a result, a total of 250 students (i.e., 180 students from a vocational high school in Seoul (i.e., D School) and 70 students from a general high school in Gyeonggi Province (i.e., G School) remained for final analysis. Since the data were collected at the beginning of the school year, the different types of the high school curriculum (i.e., one is vocational and the other is general) would not affect these students' overall English achievements and learning experiences. These students' English skills could primarily reflect their learning experiences when they were in elementary and middle schools.

Although individual English proficiency of these students was not measured in the study, relevant data were collected from a survey on the English language learning experiences. Table 3.1 summarizes these students' English language

learning experiences including living in an English-speaking country, attending an English-medium kindergarten, and having English books at home. Out of 250 students, four resided in English-speaking countries for less than a year, and twelve participants attended an English-medium kindergarten. Roughly, 29.2% ($n = 72$) possessed books in English at home, while 70.7% ($n = 174$) did not. The number of English books at home was used as an indicator of parent supports for learning English. 34.6% of the participants ($n = 85$) did not take any private tutoring for English during middle school years.

The English language learning experiences regarding residency of English-speaking countries and attending English-medium kindergarten indicate that the present participants seem to have limited exposure to spoken English. The number of English books at home and the length of private education had some variations. Also, according to English teachers of these schools, the present participants do not have a higher-level English proficiency, despite the lack of any specific data compared to the national norm. Overall, the present EFL participants are characterized of mid- or low-income family background, limited L2 oral language experiences, and mid- or low-L2 proficiency. Consent forms for this study were obtained by both the participating students and their parents. Study procedures were approved by the Seoul National University Institutional Review Board.

TABLE 3.1
Language Learning Backgrounds of the Participants by Schools

		N (%)[a]		
		School D $n = 176$	School G $n = 70$	Total $n = 246$[b]
Residency in English speaking countries	No	172 (97.7)	70 (100.0)	242 (96.8)
	Yes	4 (2.3)	0 (.)	4 (1.6)
Attending English-medium Kindergarten	No	168 (95.5)	66 (94.3)	234 (95.1)
	Yes	8 (4.5)	4 (5.7)	12 (4.9)
Presence of English books at home	0	135 (76.7)	39 (55.7)	174 (70.7)
	10 or less	39 (22.2)	26 (37.1)	65 (26.4)
	11 or more	2 (1.1)	5 (7.1)	7 (2.8)
Private education in English during middle school	None	69 (39.2)	16 (22.9)	85 (34.6)
	Less than 1 year	41 (23.3)	10 (14.3)	51 (20.7)
	2 years	33 (18.8)	22 (31.4)	55 (22.4)
	3 years	33 (18.8)	22 (31.4)	55 (22.4)

Note.
[a]The numbers in the parenthesis in the column are the percentage of the total students in each column.
[b]4 cases are missing in the survey.

3.2. Instruments

3.2.1. Operationalization of Latent Constructs

Before presenting the instruments, a set of latent constructs was operationalized. Four constructs (i.e., L2 listening comprehension, L2 decoding, L2 written linguistic knowledge, and L2 reading comprehension) were defined.

L2 listening comprehension (i.e., LC) in the present model is the ability of oral comprehension ability of English discourse. Considering substantial reliance on written input for L2 learning in FL contexts (Cheng, 2015; Gradman & Hanania, 1991; Lee, 2008), the present study included this listening comprehension construct to test whether it could play a role of a proxy for the language comprehension ability in the SVR model, especially in an FL context.

L2 decoding in the current study is to enter the orthographic signals into the comprehension system (Perfetti & Stafura, 2014) and is systematically defined by the dual route theory (Coltheart, 2005; Coltheart et al., 2001). That is, decoding includes two main routes: a sub-lexical route that reflects the grapheme-phoneme matching rules and a lexical route that reflects the ability of accessing whole words directly without the matching process of grapheme-phoneme. The former is in line with the traditional definition in the spirit of Gough and Tunmer (1986), which was to "read isolated words quickly, accurately, and silently" fundamentally through "the use of letter-sound correspondence rules" (p. 7). This sub-lexical route of decoding is often operationalized with the reading of pseudowords and this task relies more on the sounding out of small units such as letters and syllables (Johnston & Kirby, 2006). The present study includes the other dimension of decoding (i.e., lexical route) that is related to word recognition. This lexical route of decoding is often operationalized with the word recognition task that is influenced by word meaning and morphology (Plaut, 2005). L1, SL, and FL reading researchers claim that the ability of accessing whole words should be included as a decoding component, which otherwise underestimate the relation between decoding and reading comprehension (Garcia & Cain, 2014; Johnston &

Kirby, 2006; Kirby & Savage, 2008; Yamashita, 2013).

L2 written linguistic knowledge (i.e., LK) is the vocabulary and grammatical knowledge. Since this L2 written LK requires decoding processes, it may have some overlaps with the L2 decoding construct. However, it differs from decoding because LK is not necessarily reflective of processing efficiency. The present study hypothesized the common language factor (LK) instead of specifying the L2 vocabulary and grammar variables separately for theoretical and practical reasons. Theoretically, although vocabulary and grammar are the two distinguished constructs, they tend to be highly inter-related especially for lower-level FL learners (Choi & Zhang, 2018). Since it is not an aim to address the relative contributions of the two language variables, the study decided to specify a common language factor that captures the interrelationship between them for parsimony of a model.

Since a second-order factor is constructed from hypothetical variables (i.e., first-order factors), not from measured indicators, it has to be well-defined (Brown, 2006). Thus, the first-order vocabulary and grammar knowledge latent variables were thoroughly defined. L2 vocabulary was a breadth knowledge on lexical entries (Schmitt, 2014). This breadth knowledge is a more reasonable indicator of vocabulary knowledge that affects reading comprehension for L2 learners (Babayiğit et al., 2022; Li et al., 2021) and advanced EFL learners (Chen & Liu, 2020; Zhang, 2012). L2 grammar was defined as syntax and morphology, following the definition of grammar by Perfetti (2003). That is, it includes L2 knowledge about the morphological structure of complex English words (Zhang & Koda, 2013; Zhang & Lin, 2021) and the syntactic rules of English sentences

and the ability of parsing English sentences for comprehension.

L2 reading comprehension (i.e., RC) is the ability of building a coherent mental representation of text from lower-level and higher-level processes. This ability was indicated by sentence- and passage-level comprehension.

3.2.2. Measured Variables

The present study used a total of nine instruments to measure variables of students' L2-literacy components and reading comprehension constructs: (1) L2 decoding, (2) L2 vocabulary, (3) L2 grammar, (4) L2 listening comprehension, and (5) L2 reading comprehension. More than two measures were used for L2 decoding, L2 grammar, and L2 reading comprehension. L2 vocabulary and L2 listening comprehension were measured with one instrument due to time constraints, but they were parceled into two based on a rational of the applicability in the present research design. A pilot test was conducted using a similar group of students ($n = 60$) to test the difficulties of the items, the amount of time, and to develop protocol for study administration. The nine instruments were described below.

3.2.2.1. L2 Decoding

Word Reading Fluency

To measure the construct of L2 decoding fluency, two measures were used: one was word reading fluency and the other L2 orthographic processing fluency. Word reading fluency was assessed by adapting the Test of Silent Word Reading

Fluency-2 (TSWRF-2; Mather et al., 2014). While the typical measurement of decoding in the SVR takes an oral performance format, this study measured it in a silent mode (e.g., Erbeli & Joshi, 2022; Kieffer et al., 2016; O'Connor et al., 2019; Proctor et al., 2005; Sabatini et al., 2015; Trapman et al., 2014; van Gelderen et al., 2004; Yamashita, 2013). The TSWRF includes real words, gradually listing from Preschool (Pre-K) to adult academic words. For the present study, words from the preschool to the 4th grade were used and 10 words were added to the Pre-K level from a list of 1st 1000 most frequent words in the BNC/COCA headword lists (Nation, 2012)[1]. The 10 words included *and, way, do, will, make, this, no, have, you*, and *see*. Furthermore, considering the participants' English proficiency, some words (e.g., *jolly, crept, hound, bulb, elves, mound, gull, bulge, gravy, tuck, lily, rove, dazzle, clench, bluff, nudge, lurch*) in the TSWRF-2 were replaced with more familiar words (e.g., *junior, client, health, bend, selves, method[1], grasp, breeze, guilty, tick, link, role, debate, credit, blind, notion, legal*), from the Academic Word List (Coxhead, 2000) and the vocabulary list of the 2015 national English curriculum (Korean Ministry of Education, 2015). The final measurement was carefully examined to confirm that all the words included do not form any compound words with the neighboring words.

The participants were given rows of unrelated words of increasing difficulty with no spaces between them (e.g., *dolovemytwotreewhy*) and required to draw lines as many as they can during three minutes' periods (e.g., *do/love/my/two/tree/why*). According to the manual (Mather et al., 2014), the

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[1]This word turned out to be two words 'met' and 'hod', which were unintentionally compound words. Thus, 'method' and 'met/hod' were both scored correct.

scoring was conducted backward from the last line marked by each student toward the beginning line. If two consecutive rows were correct, all the words appearing above that row were scored correctly. The publisher reports high reliability as well as strong validity as decoding measures (Mather et al., 2014). The final version is provided in Appendix 1.

L2 Orthographic Processing Efficiency

Based on the notion that the activation of phonological information is universal in word recognition (Perfetti, 2003), the orthographic regularity judgment task was used to measure a dimension of decoding ability by obtaining the material from Yamashita (2013). This instrument was designed to assess the ability to recognize conventional orthographic patterns of English. According to the original author (i.e., Yamashita), it consisted of 63 pseudo words (orthographically plausible) from the Test of Word Reading Efficiency (TOWRE; Torgesen et al., 1999) and 62 irregular strings of letters created from the ARC Non word Database.[2] All of these 163 words were all non-words, but half of them were orthographically plausible (e.g., *rup*) and the rest were orthographically implausible in English (e.g., *qru*). In the present study, although the order of psuedowords was slightly modified, the overall format was maintained. During two minute periods, the participants were instructed to read each word and to decide as quickly and accurately as possible whether a word looks like a real word in English. The final version is provided in Appendix 2.

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[2] Driven from http://www.cogsci.mq.edu.au/research/resources/nwdb/

3.2.2.2. L2 Vocabulary Knowledge

Updated Vocabulary Level Test (UVLT; Webb et al., 2017) was used to assess the English vocabulary knowledge of the present EFL learners. UVLT originally consists of five parts, representing five levels of word frequency in English from 1,000 to 5,000. Each part of the test was comprised of 10 clusters of six randomly sampled words from each frequency list. Following the suggestion of Kremmel and Schmitt (2017), the current study only included word clusters at the 1,000, 2,000, and 3,000 levels because these levels are in pedagogical demand on the target population of the present study. Due to the time constraint, the 3,000 level included only four clusters out of ten. Also, the meaning explanations were changed to the participants' L1, Korean from English. In this task, the participants were asked to select three English words (*neighbor, garbage*, and *shirt*) out of six English word choices (e.g., *bar, conversation, neighbor, rain, garbage*, and *shirt*) to match the three meaning explanations in Korean (e.g., *이웃, 쓰레기, 셔츠*). They receive one point for correctly choosing a word. The total score was 72. The final version was provided in Appendix 3.

3.2.2.3. L2 Grammatical Knowledge

The students' L2 grammatical knowledge was assessed using three measures: morphological decomposition, syntactic structure, and grammatical error detection.

Morphological Decomposition

A morphological decomposition task was used to assess the ability of knowing the structures of morphemic words. The test items were developed by the present author based on rationales from previous studies (e.g., Carlisle, 1988; Mahony, 1994; Nagy et al., 2006; Zhang & Koda, 2013). Among the 24 items, two items were inflected words and five items were prefix-derivational words. The other 17 items were suffix-derivational words. The 22 derivational affixes are common and productive for young English speakers and L2 learners. Previous studies asked the participants to choose the derived word (e.g., *happiness*) from choices (e.g., *happily, unhappy, happiness*) in order to complete a sentence (e.g., *My little sister brings us a lot of _____*). However, the present study requires the students to extract the base word by drawing a line between the base and morphemes given the list of words (e.g., *teach/er*) to focus on assessing the students' awareness of the morphological structure of complex English words. The scoring was administered following the scoring scheme by Lesaux and Kieffer (2010). The final version is provided in Appendix 4.

Syntactic Structure

A subtest of Clinical Evaluation of Language Fundamentals (CELF-4; Semel, et al., 2003) was used to measure the ability of parsing syntactic structures for comprehension. This material was altered to be provided in a written mode for the present EFL study, although it was originally conducted in an oral mode. The syntactic structures assessed include the future tense, present perfect, subjectless complement clause (e.g., to-infinitive), relative clauses, conjunctions, passive voice, negation, dative verb construction, direct request, subordination clause.

Although the original test contains 26 items, the present study includes only 21 items due to time constraints. The selection of the 21 items was based on the instructional needs in the national curriculum and the pilot test. The participants were required to read each sentence and choose the corresponding picture of each sentence among the four options. Scoring was undertaken dichotomously. The final version is provided in Appendix 5.

Grammatical Error Detection

The grammatical error detection task was developed by adapting the Grammaticality Judgement Test by Dekeyser (GJT; 2000). This task was to measure the knowledge of the underlying rules of the English language through the identification of L2 sentences that did or did not follow to the rules. Although GJT used in previous studies has been administered in oral modes (e.g., Farnia & Geva, 2013; Foorman et al., 2015), the present study was administered in a written mode without any time limit (e.g., Kim & Cho, 2015; Shibasaki et al., 2015; van Gelderen et al., 2004; Zhang & Koda, 2013). From the original GJT, 22 items were selected considering the participants' English language proficiency. The average number of words per sentence was 7.5 words. The structures assessed include subordination clause by adverbials, third person agreement, past tense, plural, present progressive, dative verb construction, Y/N and WH questions, subcategorization (to-infinitive, bare infinitive etc.), coordination, and particle movement. On the grammatical error detection task, the participants were asked to read each sentence (e.g., *The boy is speak to a policeman*) and judge whether the sentence was grammatically correct or not. If the sentence was correct, they chose 'No error' in the option; if the sentence was grammatically incorrect, they

chose the error that contributed to the ungrammaticality of the sentence out of two options (*speak, a*). Two items (#6, #14) were dropped due to the low reliabilities. Thus, the data from 20 test items were used for the present study. The final version is provided in Appendix 6.

3.2.2.4. L2 Listening Comprehension

The listening comprehension measure was adapted from previous English listening comprehension tests of middle school students developed by a school district in Seoul (i.e., 2018 and 2019, developed by the Seobu District Office of Education in Seoul). 16 aural scripts and the corresponding question items were selected. One additional question was added to the last script because a single question was not enough to check the overall comprehension for the relatively lengthy discourse. A total of 17 items were prepared. Students were required to choose one correct answer out of the four options. Out of the original 17 items, two items were removed due to the severely low reliabilities (# 8 and # 9 items). Thus, the total score was 15. The final version is provided in Appendix 7.

3.2.2.5. L2 Reading Comprehension

Sentence Reading Comprehension

The sentence reading comprehension was measured with the material used in Oh (2016). According to the study, the sentences were taken from second-grade middle school textbooks in Korea. The task required participants to read each sentence (e.g., *Dogs have four legs.; Airplanes are made of dogs.*) and judge if the statements make sense or not by answering either 'yes' or 'no' based on general

knowledge. This sentence-level reading comprehension format was frequently used for lower-level L2 learners (Cho et al., 2019; Shiotsu, 2009). A total of 20 sentences were used. The final version is provided in Appendix 8.

Passage Reading Comprehension

Passage reading comprehension was measured with the material from a collection of benchmark passages for informal diagnostic assessment[3]. Passages were selected taking into account the population's English proficiency level and topic familiarity. Questions were developed to examine the explicit and implicit meaning of the text and they were written in Korean. Piloting a compatible group of high school students, the final test items were prepared with four passages. The number of words in the passages is 99, 103, 141, and 156 respectively. The readability measured by Flesh-Kincaid grade levels is 1, 2.6, 3.8, and 4.1. This readability range of the passages was assumed to be adequate for the target population of the present study based on a result from Ryu and Lee (2021) that the levels of English reading fluency of Korean second-year high school students were most distributed between the first and fourth grade levels of native English speaking children. A total of 12 items were used. Test items and the corresponding passages are provided in Appendix 9.

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[3] https://www.raz-plus.com/assessments/benchmark-passages/

3.3. Procedure

The collection of data took place in two consecutive sessions during the scheduled classes of English in each high school. The entire assessments were administered by the present researcher and the school English teachers. An hour-long session was offered by the researcher focusing on how to run each measure. All the procedures were administered by a protocol developed by the researcher. Strict time constraints were given to the two decoding fluency measures (i.e. word reading fluency and orthographic processing). Although time limits were included in the instruction, they were sufficient time to perform each task. The total measurement time was about 45 minutes in each session and it took one and half hours in total to complete the ten measures. The administration procedure was summarized in Table 3.2. The responses were scored dichotomously (1 = correct, 0 = incorrect), except for the word reading fluency measure. In the case of the word reading fluency, the number of correctly identified words was summed up. The collection was presumed in March 2021 and finished in May 2021, which was when the participants were in the first semester in Grade 1 in high schools.

Table 3.2
A Summary of Instruments and Procedures

Constructs	Measures	Source	Time (min)	Session
L2 Decoding				
	1. L2 word reading fluency	Test of Silent Word Reading Fluency -2 (Mather et al., 2014)	3[a]	1
	2. L2 orthographic processing efficiency	Yamashita (2013)	2[a]	1
L2 Vocabulary				
	3. L2 vocabulary knowledge	Updated Vocabulary Level Test (Webb et al., 2017)	9	1
L2 Grammar				
	4. L2 morphological decomposition	Carlisle (1988), Mahony (1994), Nagy et al. (2006) Zhang & Koda (2013)	4	2
	5. L2 syntactic structure	Syntactic structure: CELF-4 (Semel, et al., 2003)	10	2
	6. L2 grammatical error detection	Grammaticality Judgement Task (Dekeyser, 2000)	8	2
L2 Listening comprehension				
	7. L2 listening comprehension	Middle school English listening comprehension (Seobu District Office of Education in Seoul, 2018, 2019)	16	2
L2 Reading comprehension				
	8. L2 sentence reading	Oh (2016)	5	1
	9. L2 passage reading	An English library website	16	1

Note. [a]Tasks with strict time limit. The time in other tasks were sufficient.

3.4. Analysis
3.4.1. Statistical Analysis

The current study used structural equation modeling (i.e., SEM) to analyze the relationship of multiple L2 components to L2 reading comprehension. SEM is a technique for finding implicational patterns in data where variables have covariance structures. SEM has advantages over other related statistical analyses (e.g., regression analysis or path analysis). First, the analysis is conducted with latent constructs that have erased measurement errors. Thus, the SEM approach overcomes a limitation of the general regression approach by providing a correction for measurement error and the estimation can be done with minimal influence by the construct-irrelevant effects (Kline, 2010). Second, this covariance structure analysis of SEM is adequate for the present study because they could deal with measurement errors that can be caused by correlations among L2 reading subcomponent skills. Third, SEM can manage multiple endogenous constructs simultaneously so that it can ease specifying statistical models that are closely align with theory (Steenkamp & Baumgartner, 2000).

The SEM analyses were conducted in two stages following Bollen (1989): measurement and structural models. First, the measurement model was confirmed by the CFA to see that the hypothesized constructs (i.e., L2 decoding, L2 written LK, L2 listening comprehension, and L2 reading comprehension) are statistically valid by the measured variables. The latent constructs of L2 vocabulary and L2 listening comprehension were created by using the item parceling strategy (e.g., Cho et al., 2019; Cromley & Azevedo, 2007; Cromley et al., 2010; van Gelderen et al., 2004). The odd and even number items of vocabulary were parceled and loaded in

the latent construct of L2 vocabulary; the odd and even number items of L2 listening comprehension measures were loaded in the latent construct of L2 listening comprehension. The application of this strategy is assumed not to cause any bias because the individual items in two measures did not have multidimensional structures, which otherwise such item parceling can bias the result (Bandalos, 2002; MacCallum & Austin, 2000; Matsunaga, 2008). Noticing the high correlation between L2 word reading fluency and vocabulary measures, a complementary CFA was conducted to see whether the strong relation complicates the present measurement model.

In the subsequent phase of building the structural model, the second research question was addressed by fitting two alternative models to the present data. In all models, L2 decoding was allowed to correlate with the L2 written LK. As a subsequent analysis, the two models were tested with possible confounding variables (e.g., private education and number of English books at home) controlled following the suggestion by Kim and Yang (2021).

Model fits were evaluated by chi-square statistics, comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA) with 90% confidence interval, standard root mean square residual (SRMR), Akaike information criterion (AIC), and Bayesian Information Criterion (BIC). The chi-square values were not used for assessing fit because the chi-square is sensitive to many factors including large sample sizes and large correlations among variables (Hu & Bentler, 1999). The CFI, TLI, RMSEA with CI, and SRMR were used to assess the goodness of fit of the identified measurement and structural models. The CFA and TLI values greater than .95, RMSEA values below .08, and SRMR equal

to or less than .05 are preferred for an excellent model fit (Hu & Benlter, 1999; Schumacker & Lomax, 2016). RMSEA values below .10 are considered acceptable (Kline, 2010). Since the models were nested, chi-square difference testing was used to choose a more optimal model. The AIC and BIC values were also used. The lower value of AIC and BIC indicates a better model fit. Substantive theories were also considered to determine the best-fitting model. Also, we used a bootstrapping method in Amos to calculate a confidence interval that can be used to conduct significance testing of indirect effects (Byrne, 2016).

Raw scores were used in all the analyses except for the univariate normality check by z-scores. The descriptive statistics were calculated by SPSS statistics (IBM). Amos 27 (IBM) was used for multivariate normality check, obtaining bootstrapped standard errors, and the SEM analysis.

3.4.2. Data Screening

The data were examined to confirm the multivariate normality that has to be assumed to apply the maximum likelihood (ML)-based SEM estimation (Byrne, 2016; Kline, 2010; Schumacker & Lomax, 2016). Univariate normality was checked by the skewness and kurtosis values and z-scores. The skewness and kurtosis values of all the variables do not exceed 1.5 in magnitude. One case is 3 SD below on the L2 morphological decomposition task and two cases are 3 SD below on the L2 sentence reading comprehension measure. Bivariate linearity was also checked by a visual inspection of scatter plots. Using Mahalanobis d-squared, two substantial multivariate outliers were detected. In total, the five participants' cases were

detected as univariate and multivariate outliers for the present study. Since the present study is to find a representative relationship among L2-reading related components for general EFL learners, the performance of the outliers was not within the scope of the present research. Thus, they were screened out for subsequent analysis. As a result, 250 cases without any missing values constituted the final dataset. The multivariate normality was evaluated by Mardia's normalized estimate of multivariate kurtosis (Mardia, 1970; Kurtosis = 6.04, c.r. = 2.80, $p < .05$). Although the Mardia's coefficient (critical value, > 1.96) provides evidence of statistical departure from multivariate normality, the SEM estimation is little affected until the Mardia's kurtosis value is 6 or beyond (Bentler, 1995, p.106). Therefore, the maximum likelihood estimation method was applied for the SEM analysis and chi-square values were used without any statistical corrections or adjustments (Hu et al., 1992; Satorra, 1990; Satorra & Bentler, 1994).

Lastly, because present data were collected from two different types of schools, the Box's M homogeneity test was performed to compare variance and covariance matrices associated with data across the variables collected from two schools. The Box's M test produced a non-significant result (Box's $M = 57.716$, $F = 1.217$, $p = .151$), indicating the datasets from two schools have equal covariance matrices. Therefore, data from the two schools were combined for subsequent analyses.

CHAPTER 4.
RESULTS

This chapter reports the research findings based on two research questions on the best representation of the L2-reading related components for EFL learners and the roles of L2 written LK in relation to L2 listening comprehension for L2 reading comprehension. The research questions were addressed by conducting CFA and structural regression analysis with latent variables in the SEM frame. Prior to reporting the results of the SEM analysis, descriptive statistics are presented.

4.1. Descriptive Statistics

Table 4.1 shows descriptive statistics including means, standard deviations, minimum, maximum, skewness, and kurtosis of each variable for the final dataset ($n = 250$). Overall, the students' mean scores on the eleven measures were in the average or above-midpoint. The distributional properties of the variables were appropriate as indicated by skewness ($< |2|$) and kurtosis ($< |7|$). All the eight measures except for the L2 word reading fluency have acceptable-to-excellent reliabilities indicated by Cronbach alpha values, $.66 \leq \alpha s \leq .96$. The reliability of L2 word reading fluency cannot be obtained from the current study. Nevertheless, it is assumed to be satisfactory, according to the publisher-reported reliability by the Kuder-Richardson formula, which is from .90 to .92 (Mather et al., 2014).

Table 4.1
Descriptive Statistics (*n* = 250)

	WRF	Ortho	VK_Odd	VK_Even	MorD	SynS	GrmE	LC_Odd	LC_Even	SRC	PRC
Total	120	102	36	36	24	21	20	8	7	20	12
Min/ Max	0/ 116	7/ 97	2/ 36	0/ 36	2/24	1/21	1/18	0/ 8	0/ 7	2/20	1/12
Mean	60.96	63.10	20.95	19.30	16.55	13.41	9.67	4.50	4.86	13.14	6.30
SD	28.65	20.32	8.29	8.24	5.26	4.16	3.45	1.81	1.70	3.57	2.41
Skewness	-.17	-.43	-.27	-.19	-.67	-.57	.13	-.06	-.43	-.57	.22
Kurtosis	-.71	-.42	-.82	-.76	-.39	-.18	-.14	-.53	-.82	.12	-.65
Cronbach alpha	−[a]	.96	.96	.96	.89	.79	.66	.75	.74	.75	.66

Note. WRF = L2 word reading fluency; Ortho = L2 orthographic processing fluency; VK_Odd = Odd items of L2 vocabulary knowledge; VK_Even = Even items of L2 vocabulary knowledge; MorD = L2 morphological decomposition; SynS = L2 syntactic structure; GrmE = L2 grammatical error detection; LC_Odd = Odd items of L2 listening comprehension; LC_Even = Even items of L2 listening comprehension; SRC = L2 sentence reading comprehension; PRC = L2 passage reading comprehension.
[a]The reliability of WRF cannot be obtained from the current study, but the publisher-reported reliability by Kuder-Richardson Formula is .90 to .92.

Bivariate correlations between measures are displayed in Table 4.2. The eleven variables were moderate to highly correlated with one another, $.215 \leq r\text{s} \leq .924$. A strong correlation was found between the L2 word reading fluency and L2 vocabulary knowledge measures ($r = .812$ for odd items of L2 vocabulary; $r = .830$ for even items of L2 vocabulary). L2 vocabulary and L2 grammar variables (i.e., morphological decomposition, syntactic structure, and grammatical error detection) were moderate to strongly related to each other ($.483 \leq r\text{s} \leq .781$), which provides an empirical support for the specification of a common factor explaining the two L2 linguistic knowledge constructs.

Table 4.2
Bivariate Correlations between Measured Variables

	1. WRF	2. Ortho	3. VK_Odd	4. VK_Even	5. MorD	6. SynS	7. GrmE	8. LC_Odd	9. LC_Even	10. SRC	11. PRC
2	.575	-									
3	.812	.577	-								
4	.830	.598	.924	-							
5	.753	.465	.779	.781	-						
6	.708	.483	.779	.744	.749	-					
7	.480	.215	.537	.526	.483	.541	-				
8	.525	.263	.595	.578	.580	.621	.435	-			
9	.589	.345	.603	.609	.590	.641	.478	.597	-		
10	.604	.443	.674	.651	.606	.618	.469	.468	.499	-	
11	.579	.341	.597	.630	.566	.554	.521	.554	.553	.526	-

Note. Correlation coefficients are all significant at .01 level. WRF = L2 word reading fluency; Ortho = L2 orthographic processing fluency; VK_Odd = Odd items of L2 vocabulary knowledge; VK_Even = Even items of L2 vocabulary knowledge; MorD = L2 morphological decomposition; SynS = L2 syntactic structure; GrmE = L2 grammatical error detection; LC_Odd = Odd items of L2 listening comprehension; LC_Even = Even items of L2 listening comprehension; SRC = L2 sentence reading comprehension; PRC = L2 passage reading comprehension.

4.2. Research Question 1: The Representation of the L2 Reading-related Components

Using confirmatory factor analysis, two competing measurement models were tested to define latent variables for L2 decoding, L2 listening comprehension, L2 written LK, and L2 reading comprehension. In the first hypothesized measurement model (H1), the L2 written LK was defined by odd and even parcels of vocabulary, morphological decomposition, syntactic comprehension, and grammatical error detection (see Figure 4.1). The H1 measurement model did not yield an acceptable model fit to the data, χ^2 (38) = 129.68 ($p < .05$); CFI = .95, TLI = .93, RMSEA = .098, 90% CI [.08, .11], and SRMR = .044.
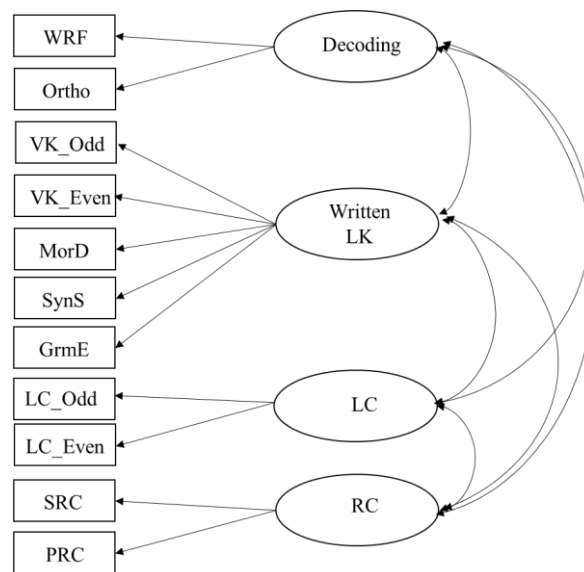
Note. WRF = L2 word reading fluency; Ortho = L2 orthographic processing fluency; VK_Odd = Odd items of L2 vocabulary knowledge; VK_Even = Even items of L2 vocabulary knowledge; MorD = L2 morphological decomposition; SynS = L2 syntactic structure; GrmE = L2 grammatical error detection; LC_Odd = Odd items of L2 listening comprehension; LC_Even = Even items of L2 listening comprehension; SRC = L2 sentence reading comprehension; PRC = L2 passage reading comprehension.

Figure 4.1
Confirmatory Factor Analysis for the Measurement Model (H1)

In the second hypothesized measurement model (H2), the L2 written LK was defined as a second-order factor overarching two lower-order latent variables of L2 vocabulary and L2 grammatical knowledge (see Figure 4.2). The residual of the L2 vocabulary knowledge was allowed to correlate with L2 decoding for two reasons: first, the residual of the vocabulary in the current data represents a more extended amount of vocabulary knowledge, which could not be overlapped with the present grammatical knowledge measures that used simple and basic words. Second, since it is a developmental feature of lower-level L2 learners that L2 vocabulary (written) is highly associated with decoding construct (Pasquarella et al., 2012), the residual of the present latent construct of the vocabulary knowledge was determined to have a relation with L2 decoding. Residual variance for L2 grammar was fixed to zero because it was negative but small (Chen et al., 2001)[4]. This second-order factor measurement model had an acceptable model fit, χ^2 (34) = 72.42 ($p < .05$); CFI = .98, TLI = .97, RMSEA = .067, 90% CI [.04, .09], and SRMR = .038.

This second-order measurement model suggests that the two constructs (i.e., L2 vocabulary and L2 grammar) are distinct constructs, but highly associated. In the present study, L2 vocabulary was measured with updated VLT (Webb et al., 2017) from 1,000 to 3,000 level words and lexical or sentence items of the three measures for the L2 grammar construct were measured with elementary words, taking into consideration the L2 proficiency levels of the participants. Thus, it seems to be inevitable to have a substantial overlap between these language factors for the current lower-level EFL learners.

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[4] The residual variance was -0.77 (p > .05), indicating that it was not different from zero.
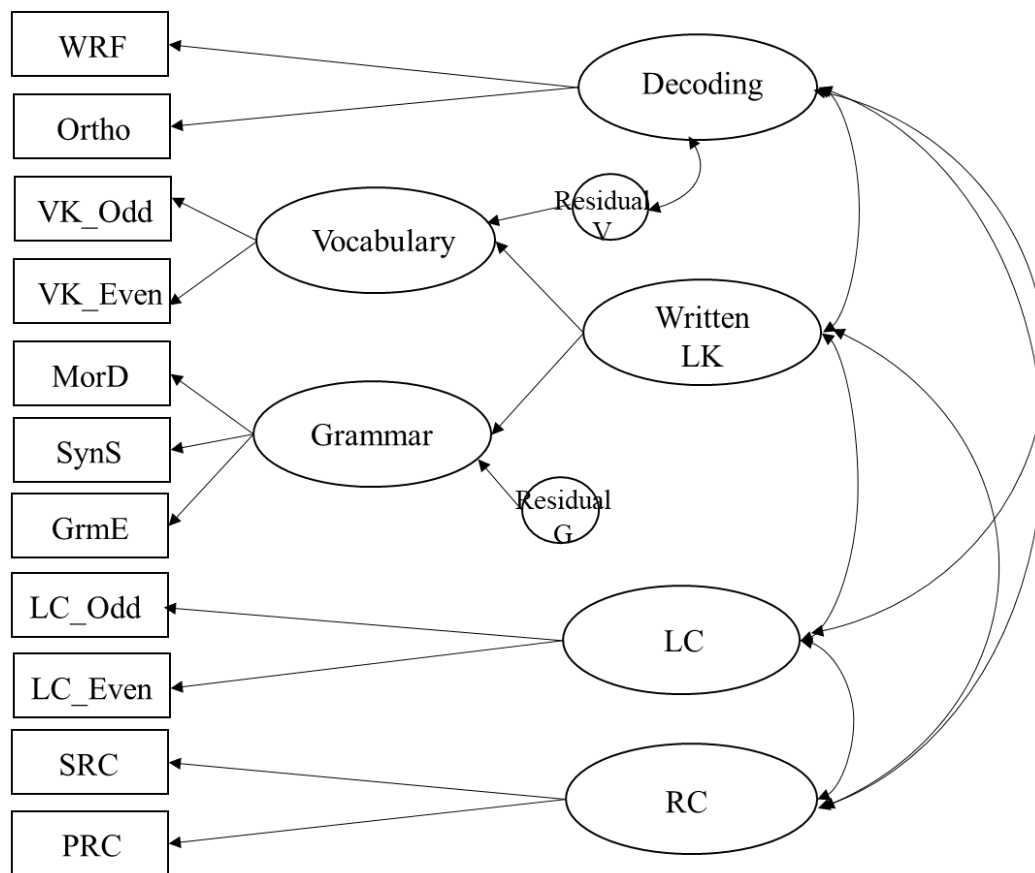
Note. WRF = L2 word reading fluency; Ortho = L2 orthographic processing fluency; VK_Odd = Odd items of L2 vocabulary knowledge; VK_Even = Even items of L2 vocabulary knowledge; MorD = L2 morphological decomposition; SynS = L2 syntactic structure; GrmE = L2 grammatical error detection; LC_Odd = Odd items of L2 listening comprehension; LC_Even = Even items of L2 listening comprehension; SRC = L2 sentence reading comprehension; PRC = L2 passage reading comprehension. Written LK = L2 written linguistic knowledge.

Figure 4.2
Confirmatory Factor Analysis for the Measurement Model (H2, Final)

The chi-square values and model fit indices of the two measurement models are summarized in Table 4.3.

Table 4.3
Model Fit Indices for the Alternative Measurement Models

	First-order LK (H1)	Second-order LK (H2)
χ^2 (df)	129.68* (38)	72.42* (34)
CFI / TLI	.95 / .93	.98 / .97
RMSEA [90% CI]	.098 [.08, .11]	.067 [.04, .09]
SRMR	.044	.038

Note. CFI = Comparative Fit Index (> .95); TLI = Tucker-Lewis Index (> .95); RMSEA = Root Mean Square Error Approximation (< .80); SRMR = Standard Root Mean Square (≤ .05). *p < .05.

A supplementary CFA was conducted to see whether the high correlation between the L2 vocabulary and word reading fluency measures (*r* = .812; .830) causes any misspecification. The two vocabulary measures were specified as indicators of L2 decoding (see Appendix 10). Although this assumption yielded acceptable model fit indices, χ^2 = 80.17 (38), *p* < .05; CFI = .98; TLI = .97; RMSEA = .067, SRMR = .043, the correlation between the written LK and decoding was still large (*r* = .93). Thus, the theoretically hypothesized second-order factor measurement model (Figure 4.2.) was maintained as the best representation of the present EFL data.

The present measurement model was further validated with several statistical indices by Bollen (1989): factor loadings, the average variance extracted (AVE), and composite reliability (CR). AVE indicates to what extent the observed variables share the variance with the corresponding latent variable (Fornell &

Larcker, 1981)[5]. If the AVE is less than .5, the variance due to the measurement error is larger than the variance shared by the construct. CR represents "the proportion of the variance to total observed variance in the measure" (Brown, 2006, p. 338), computed by the standardized loadings and error variance (Raykov, 1997)[6]. If the CR is less than .7, the construct is not stably measured by the observed variables. Overall, standardized factor loadings greater than .5; AVE values greater than .5; and composite reliability coefficients greater than .7. were considered as statistical criteria to confirm that the observed variables are strongly converged to the hypothesized latent construct (Hair et al., 2018).

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[5]The AVE was calculated by the following equation: AVE = $\sum$ (standardized loading^2) / ($\sum$standardized loading)^2 + (1 − (standardized loadings)^2)
[6]The CR was calculated by the following equation: CR = ($\sum$standardized loadings)^2 / ($\sum$standardized loadings)^2 + $\sum$ (1 − (standardized loadings)^2)

As shown in Table 4.4, the standardized factor loadings of all observed variables loaded significantly on the corresponding constructs, which was from .61 to .96. The latent constructs of L2 vocabulary and L2 grammar strongly loaded onto the second-order factor (i.e., L2 written linguistic knowledge), .93 and 1.00. The AVE values of all the latent variables were above .05. Composite reliability coefficients were .76 for the decoding; .96 for the vocabulary; .83 for the grammar; .96 for the written LK; .74 for the listening comprehension; and .69 for the reading comprehension.

Table 4.4
Factor Loadings of Measured Variables and the AVE and Composite Reliability of the Latent Constructs

	Loading (*SE*)	AVE	CR
L2 decoding		.61	.76
Word reading fluency	.91 (.026)		
Orthographic processing	.63 (.039)		
L2 written linguistic knowledge		.92	.95
Vocabulary	.96 (.020)		
Grammar	1.00 (.000)		
L2 vocabulary		.92	.96
VK_Odd number	.96 (.007)		
VK_Even number	.96 (.007)		
L2 grammar		.61	.83
Morphological decomposition	.86 (.024)		
Syntactic structure	.86 (.020)		
Grammatical error detection	.61 (.041)		
L2 listening comprehension		.59	.74
LC_Odd number	.76 (.040)		
LC_Even number	.78 (.034)		
L2 reading comprehension		.53	.69
Sentence reading comprehension	.74 (.038)		
Passage reading comprehension	.72 (.036)		

Note. AVE (Average Variance Extracted) greater than .5 and CR (Composite Reliability) greater than .7 indicate good convergent validity of the latent constructs and their corresponding measured variables.

The latent variables were shown to be highly correlated with one other (.77 $\leq r \leq$ .95; see Table 4.5). The correlation between two exogenous variables, L2 decoding and LK, is sizable, $r = .92$.

Table 4.5
Correlations Among L2 Latent Variables

	1	2	3	4
1. Decoding	-			
2. Written LK	.92	-		
3. Listening comprehension	.77	.92	-	
4. Reading comprehension	.89	.95	.92	-

Statistically, the high correlation increases the problem of multicollinearity in SEM analysis, causing unstable estimation of the parameters (Grewal et al., 2004). The large correlation coefficients can increase standard error, which in turn increases the probability of committing Type II error for on the effect of the path coefficients (Geiser, 2013; Marsh et al., 2004). However, the high collinearity problem can be mitigated under several conditions including CR greater than .7; large sample size ($\geq$ 200), and the AVE value larger than .5 (Grewal et al., 2004; Mason & Perreault, 1991). The present measurement model suffices these conditions, suggesting that the high correlation among the independent variables is not a critical restriction for the present SEM analysis. Moreover, the high correlation among the variables are not directly related to the estimation of the goodness-of-fit of the model because model fit indices in SEM are determined by how well it can estimate a covariance structure for sample data (C. Geiser, June 1, 2022, personal communication). The collinearity issue can be involved in the interpretation of the path effect once an adequate model is determined. Thus, it is assumed that the high correlations among the present latent variables are not a

critical limit for the present research that is to examine structural relations among variables by the SEM standards.

In summary, L2 reading-related components for the first-year high school EFL learners were represented by the three SVR constructs (i.e., L2 decoding, L2 listening comprehension, and L2 reading comprehension) and an additional latent variable (i.e., L2 written LK). This LK was represented by vocabulary and grammatical knowledge that are highly correlated but distinct latent constructs.

4.3. Research Question 2: What is the relation between L2 written LK and L2 reading comprehension?

Based on the confirmed measurement model, the second research question was addressed by examining two alternative structural models that suggest different relations between the L2 written LK and L2 reading comprehension. The chi-square values and model fit indices of the two models along with the model fit comparison results are reported in Table 4.6.

Table 4.6
Model Fit Indices for the Alternative Structural Models

	Direct/Indirect	Indirect
χ^2 (df)	77.03* (37)	77.74* (38)
CFI / TLI	.98 / .97	.98 / .97
RMSEA [90% CI]	.066	.065
	[.044, .087]	[.044, .085]
SRMR	.035	.036
AIC / BIC	135.03 / 237.15	133.74 / 232.34
$\Delta\chi^2$ (Δdf), p-value		0.71(1), p = .40 (>.05)
ΔAIC / BIC		-1.28 / -4.81

Note. CFI = Comparative Fit Index (> .95); TLI = Tucker-Lewis Index (> .95); RMSEA = Root Mean Square Error Approximation (< .80); SRMR = Standard Root Mean Square (≤ .05). *p < .05.

The direct/indirect model was fitted to test the hypothesis that L2 reading comprehension of FL learners is directly predicted by L2 decoding and L2 listening comprehension and the effect of L2 written LK on L2 reading comprehension is direct and indirect via L2 listening comprehension. As shown in Table 4.6 above, this direct/indirect model provided an acceptable fit to the data: $\chi^2 (37) = 77.03$, p <.05; CFI = .98, TLI = .97, RMSEA = .066, 90% CI [.044, .087], and SRMR = .035. However, none of the paths from L2 listening comprehension, L2 written LK, and L2 decoding to L2 reading comprehension were significant (see Figure 4.3).
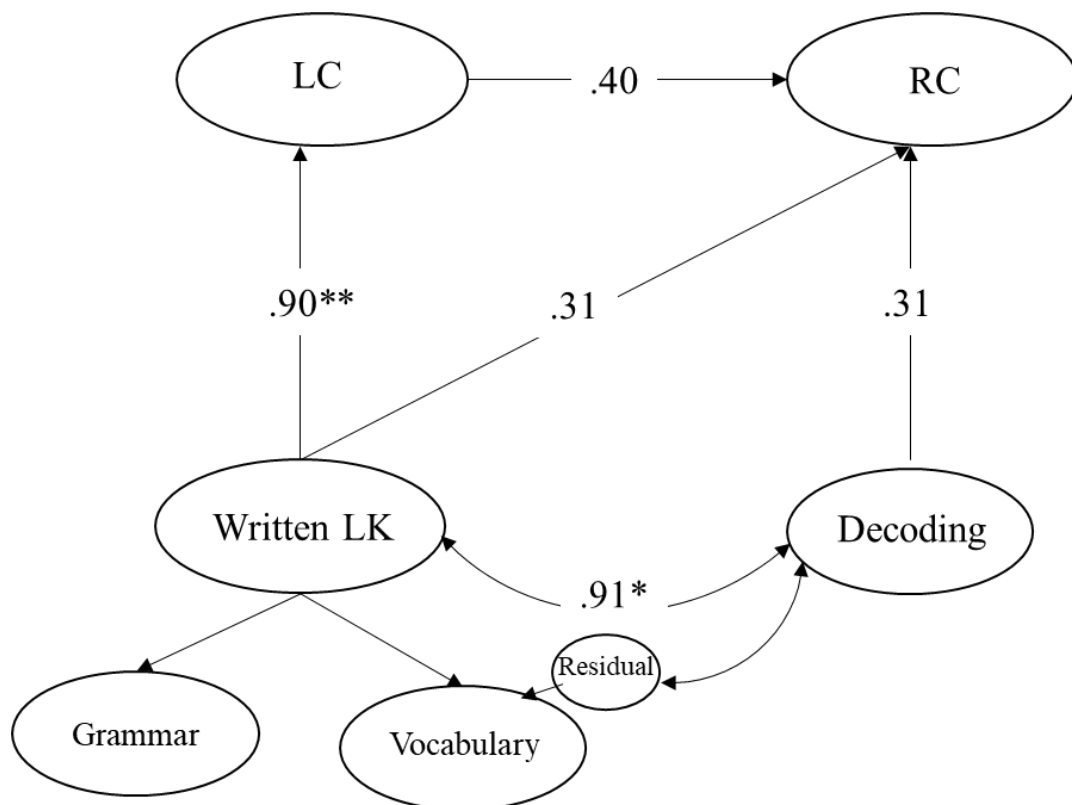
Note. LC = L2 listening comprehension; RC = L2 reading comprehension; Written LK = L2 written linguistic knowledge. *p < .05; **p < .01.

Figure 4.3
Direct/Indirect Model with Standardized Path Estimates

The final indirect model was tested to examine the hypothesis that L2 reading comprehension of FL learners is directly predicted by L2 decoding and L2 listening comprehension and the effect of L2 written LK on L2 reading comprehension is fully mediated via L2 listening comprehension skills (see Figure 4.4). As shown in Table 4.6 above, this model also provided adequate fit indices: χ^2 (38) = 77.74, $p < .05$; CFI = .98, TLI = .97, RMSEA = .065, 90% CI [.044, .085], and SRMR = .036.
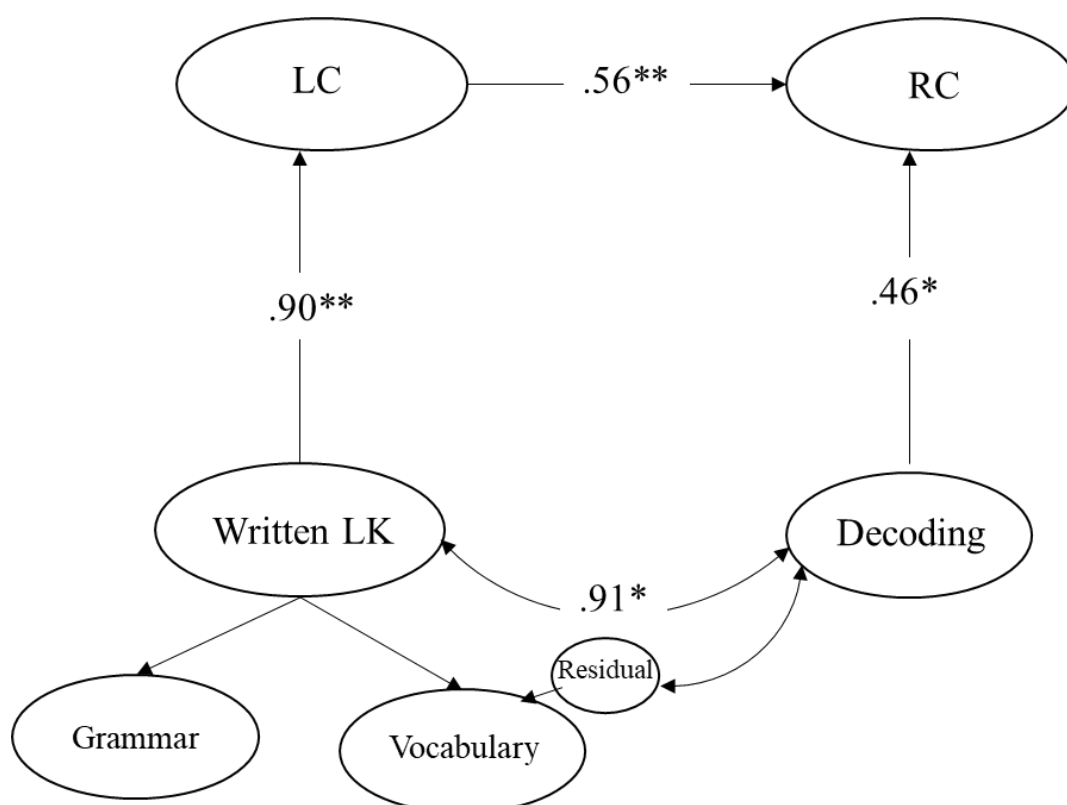
Note. LC = L2 listening comprehension; RC = L2 reading comprehension; Written LK = L2 written linguistic knowledge. *$p < .05$; **$p < .01$

Figure 4.4
Indirect Model with Standardized Path Estimates

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Chi-square difference testing was used between one model and the model with one less degree of freedom to determine the best-fitting model among the two alternatives (see Table 4.6 above). The difference in the chi-square values between the indirect model and the direct/indirect model was not significant ($\Delta\chi^2\,(\Delta df) = .71$ (1), $p = .40$). The indirect model fits the present EFL data well with one more degree of freedom than the direct/indirect model, suggesting that the indirect model is more parsimonious than the direct/indirect model. The value of AIC and BIC of the indirect model is the smallest compared to the other two models. As a result, the indirect model was chosen as the final model for parsimony and superiority of the model fit.

An additional test was conducted with control variables to see whether the present results are consistent even after considering individual differences in learning background (see Appendix 11). Private education and parental support (i.e., the number of English books) were counted as control variables based on empirical results showing that the differences in those contextual factors affect that the individual differences in English achievement in Korean secondary school levels (e.g., J. Kim, 2015; Lee et al., 2011; Lim et al., 2018). As shown in Table 4.7., the two alternative models provided adequate fits to the data. Chi-square difference testing reveals the indirect model was still the most parsimonious and best-fitting model, compared to the model with one less degree of freedom ($\Delta\chi^2\,(\Delta df) = .80$ (1), $p = .37$). This indicates that the individual differences do not confound the present fully indirect relation of L2 written LK on L2 reading comprehension. Thus, the indirect model is consistently supported.

Table 4.7
Model Fit Indices for the Alternative Models with Control Variables

	Direct/Indirect	Indirect
χ^2 (*df*)	87.82* (49)	88.62* (50)
CFI / TLI	.98 / .97	.98 / .97
RMSEA	.056	.055
[90% CI]	[.04, .08]	[.04, .07]
AIC	197.83	196.62
$\Delta\chi^2$ (Δdf), *p*-value		.80 (1), *p* = .37 (>.05)
ΔAIC		-1.21

Note. CFI = Comparative Fit Index (> .95); TLI = Tucker-Lewis Index (> .95); RMSEA = Root Mean Square Error Approximation (< .80); SRMR = Standard Root Mean Square (≤ .05). *p < .05.

The indirect model was simplified to focus on the pathways among L2 listening comprehension, L2 written LK, and L2 reading comprehension in Figure 4.5. The missing data in control variables did not allow bootstrapping in Amos, which is needed to calculate standard errors. Thus, the indirect model without the control variables was presented as the final model. The lower-order factors of L2 written LK (i.e., vocabulary and grammar) and the residual of vocabulary was omitted to show a core structural relationship of the major latent constructs. L2 listening comprehension (ß = .56, *SE* = .17, *p* < .01) and L2 decoding (ß = .46, *SE* = .16, *p* < .05) had direct relations on L2 reading comprehension at similar magnitudes. The effect of L2 written LK on L2 reading comprehension was completely mediated by L2 listening comprehension, ß =.51, *SE* = .16, *p* < .01. The relation between L2 listening comprehension and L2 written linguistic knowledge is sizable (ß = .90, *p* < .01). The correlation between L2 written linguistic knowledge and L2 decoding was also large (*r* = .91, *p* < .01). This indirect model explained 96% of the variance in L2 reading comprehension skills for the lower-level first-year high school EFL learners.
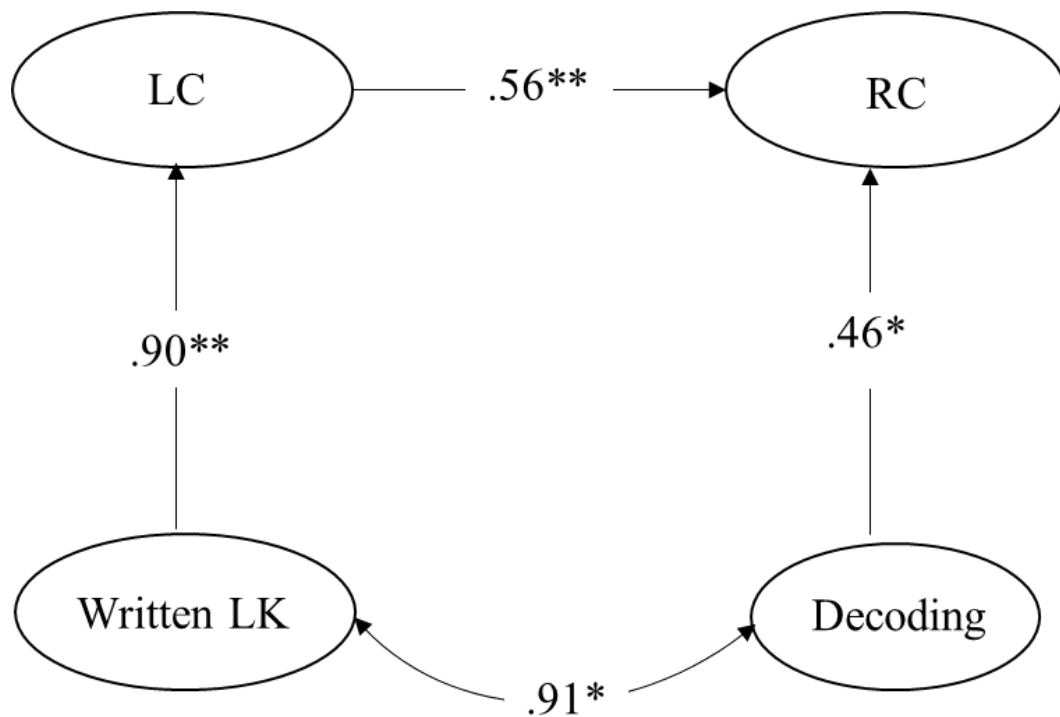
Note. LC = L2 listening comprehension; RC = L2 reading comprehension; Written LK = L2 written linguistic knowledge. *p* < .05; **p* < .01.

Figure 4.5
Simplified Indirect Model (Final Model)

In summary, the final model indicates that the L2 reading comprehension ability of FL learners is an outcome represented by both L2 decoding and L2 listening comprehension with L2 written LK that is fully mediated via L2 listening comprehension. Although the effect of this L2 LK on L2 reading comprehension was indirect, its overall role in L2 reading comprehension is similarly important with L2 decoding and L2 listening comprehension.

CHAPTER 5.
DISCUSSION

For the first research question, results of the CFA showed that the L2 reading-related components are adequately represented with a second-order factor model reflecting L2 listening comprehension, L2 written LK, L2 decoding, and L2 reading comprehension, respectively. The L2 written LK factor was represented as a second-order factor capturing the shared variance between L2 vocabulary and grammar. For the second research question, the indirect model where the effect of L2 written LK on L2 reading comprehension was completely mediated by L2 listening comprehension was chosen as the best-fitting model for the present data. This result was consistent even after including control variables such as the learners' experiences of private education and parental support at home represented as the number of English books. Although the relationship was indirect, the role of L2 written LK in L2 reading comprehension was influential as large as L2 listening comprehension and L2 decoding.

The results are interpreted in depth by focusing on the significant contribution of L2 listening to L2 reading comprehension; the hierarchical relation between L2 written LK and L2 listening comprehension; the fully mediated effect of L2 written LK on L2 reading comprehension; the nature of L2 written LK for EFL readers; and the characteristics of first-year high school EFL learners' L2 reading comprehension ability by the SVR frame.

5.1. The Role of Listening Comprehension in Reading Comprehension for EFL Learners

The acceptable fit indices of the indirect model indicate that L2 listening comprehension is a significant predictor of L2 reading comprehension, following the large body of SVR supporters for L1-speaking children (Quinn & Wagner, 2018; Stanley et al., 2018) and SL learners (Catts et al., 2006; Geva & Zadeh, 2006; Gottardo & Mueller, 2009; Kendeou, van den Broek, et al., 2009; Lesaux et al., 2010). Several FL studies also provided similar results that L2 listening comprehension is, at least partly, accountable for L2 reading comprehension of FL learners beyond other critical L2 components (e.g., Alderson et al., 2016; Jeon, 2011; Sparks, 2015, 2019; Sparks & Patton, 2016; Sparks et al., 2018; Yamashita & Shiotsu, 2017). Yamashita and Shiotsu (2017) showed that L2 listening comprehension had a unique, independent effect on L2 reading comprehension as much as L2 vocabulary and grammatical knowledge did.

It is worth discussing that the current study found a significant relation between L2 listening and L2 reading comprehension for the present first-year high school EFL learners after accounting for L2 decoding and L2 written LK. L2 listening comprehension has been relatively little investigated for EFL reading comprehension. The present study tries to explain the direct, significant relation of L2 listening to L2 reading comprehension among EFL learners, focusing on the cognitive similarity of the two comprehension processes for EFL reading comprehension.

The two types of comprehension (i.e., listening and reading comprehension) share similar cognitive processes even for FL learners. Hirai (1999) demonstrated

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the similarity with strong correlations between listening and reading comprehension rates among Japanese adult EFL learners. Among German secondary school EFL learners, the two comprehension skills converged as a general comprehension factor, as the L2 proficiency gained (Spoden et al., 2020). Song also (2008) found that various subskills of L2 listening and reading comprehension for adult English learners were factored into three general comprehension-related constructs, irrespective of modality. This series of work claims that L2 listening and L2 reading comprehension share a common ability of building a coherent mental representation of the text that can involve various higher-order comprehension skills including the reader's world knowledge or inferences including basic linguistic knowledge (Graesser et al., 1994; McNamara & Magliano, 2009).

What is more noteworthy in the current study is that the role of L2 listening comprehension for L2 reading comprehension for EFL learners is not only a direct predictor of L2 reading comprehension but also a mediator between L2 written LK and L2 reading comprehension. This was indicated by the superiority of the indirect model to the direct/indirect model. The fully mediating role of L2 listening comprehension can be explicated by the role of phonology in L2 reading. During word reading, the phonological information of words is strategically computed by the grapheme-phoneme matching rules as well as directly accessed (Coltheart, 2005; Coltheart et al., 2001). The former processing is related to "subvocalization", which is important in comprehending written text (Rayner et al., 2012, p. 188) and is universal in any language when readers read a word (Perfetti, 2003). This phonological processing of written input should be automatically performed along

with other critical components including visual and semantic codes for comprehension (LaBerge & Samuels, 1974). Some studies in EFL contexts showed that L2 listening comprehension affected L2 reading comprehension partly via L2 word reading (e.g., Kang, 2021), indicating the important role of sound information in L2 text comprehension.

Phonology can play a crucial role in text comprehension because the visual input from the text just read is "fed into the phonological store by means of sub-vocal speech" (Baddeley et al., 1998, p. 170), where the information is manipulated for comprehension (Baddeley, 1992). This storage in working memory, called the phonological loop (Baddeley, 1992), has been found necessary for learning new words in L2. The importance of the phonological loop was corroborated by FL studies showing that elaborated FL phonological inventories are a sign of good L2 text comprehension (e.g., Miyasako & Takatsuka, 2004; Walter, 2008).

The role of phonological features of L2 listening comprehension in L2 reading comprehension can also be supported by prosody, a supra-segmental phonology. From a psycholinguistic perspective, the prosody including pause, intonation, or stress that is inherent in oral language aids in the silent reading process by parsing the text into meaningful syntactic units and holding it into working memory (Fodor, 2002; Swets et al., 2007). Cui et al. (2021) corroborated this psycholinguistic association between phonology and text reading with Chinese college-level EFL learners. After training in the L2 supra-segmental phonology, the L2 learners showed better performance on L2 reading comprehension.

Nevertheless, some studies have reported a non-significant role of L2 listening comprehension in the SVR frame (e.g., Ji & Baek, 2019; Uchikoshi, 2013). They share a view that L2 listening comprehension is not a significant predictor of L2 reading comprehension until the L2 proficiency reaches a certain level. However, the different role of L2 listening comprehension between their findings and the current study might be due to the difference in the measurements and the age or proficiency levels. The participants in the two previous studies are all elementary school students in Grade 2 or 4, respectively. Indeed, for the fourth-grade EFL learners, Ji and Baek (2019) designed the L2 reading comprehension measure mostly with sentence-level items while the L2 listening comprehension measure had short but passage-level items. Since this sentence-level reading comprehension measure may not be reflective of higher-order comprehension that can be represented in listening comprehension, it is believed to yield a weakened relationship between L2 listening and L2 reading comprehension for young EFL learners.

Lastly, the role of L2 listening comprehension in the present indirect SEM model can be explicated in light of automatization. L2 written LK measured with sufficient time in the present study represents a type of knowledge that is conscious, effortful, and deliberately accessed. However, this type of L2 written LK is yet of limited help in L2 reading comprehension because reading comprehension takes place when linguistic components can be fluently and somewhat automatically processed so that more cognitive resources become available for higher-order thinking (Afflerbach et al., 2008; Grabe & Stoller, 2019; Koda, 2005, 2007). L2 listening comprehension ability seems to reflect this smooth, streamlined, and

fluent processing because linguistic input in listening is transient and thus listeners are required to rapidly parse the entering individual input into meaningful units and encode them for comprehension without any possibility of backtracking (Grabe, 1991; Rayner et al., 2012; Stanovich, 1990). This notion is supported by findings that training in speedy processing through reading L2 materials improved the L2 listening comprehension of FL learners (Jiang et al., 2018; Moussa-Inaty et al., 2012).

Overall, it is suggested that L2 listening comprehension is a significant predictor of L2 reading comprehension at least for secondary level EFL learners. Moreover, L2 listening comprehension has a proximal relation to L2 reading comprehension by fully mediating the effect of L2 written LK on L2 reading comprehension for these lower-level EFL learners. This suggests that the L2 written LK can contribute to EFL reading comprehension via the elaborated phonological representations of L2 in various forms including subvocalization, phonological loop, or prosody. Also, L2 listening comprehension represents the automatized processing of L2 linguistic components, which is required for L2 reading comprehension.

5.2. L2 Written LK as an Underlying Part of L2 Listening comprehension

L2 written LK had a strong predictive relationship with L2 listening comprehension (β = .90). This finding is interpreted from two perspectives. One is that the L2 written LK can be hierarchically related to L2 listening comprehension for EFL learners. This notion is supported by L1 studies

investigating the structure of oral comprehension ability in the SVR reading (e.g., Kim, 2016, 2017, 2019; Lervag et al., 2018). They revealed that language components are not directly related to reading comprehension but they are hierarchically lower-order components of oral comprehension ability. The series of Kim's studies empirically demonstrated that various linguistic components (e.g., vocabulary and grammar) are foundational skills that directly and indirectly affect listening comprehension via higher-order thinking skills (e.g., inferencing). The effect size of the linguistic components in predicting listening and reading comprehension was sizable compared to the other cognitive components. Lervag et al. (2018) similarly suggested that listening comprehension is strongly predicted by a common language factor that captures the common variance among vocabulary, syntax, working memory, and inferencing skills. This common language factor predicted listening comprehension with a substantial size ($\beta = .95$), but it did not predict reading comprehension directly.

Nevertheless, the present findings differ from the above L1 studies, in which the language components were measured in oral forms. The current study defined language components in written forms, which needs further explanation on how the written components can be part of oral comprehension skills. Since the participants in the previous studies are L1 speakers of elementary school ages, the language variables presumably reflect some written language skills as well as oral language skills although they were measured in only oral modes. If this is true, listening comprehension may include both oral and written language skills, leading to the notion that present L2 written LK can be a part of the underlying construct of L2 listening comprehension. This assumption can be supported by

some empirical EFL studies where L2 listening comprehension was substantially predicted by L2 written vocabulary (e.g., M. Kim, 2019; Staehr, 2009). M. Kim (2019) with third-grade middle school EFL learners in Korea showed that L2 listening, as well as L2 reading comprehension, was better predicted by L2 written vocabulary than L2 oral vocabulary. The L2 written vocabulary explained 41% of the variance in L2 listening comprehension, which was larger than the amount of the explained variance in L2 reading comprehension (33%).

Another interpretation of the substantial relationship between L2 written LK and L2 listening comprehension is that the written LK in the current study significantly reflects what L2 listening comprehension represents in lower-level EFL learners. Previous SL and FL studies that estimated the relation between L2 listening comprehension and language components used only L2 vocabulary or L2 vocabulary and grammar separately as individual components (e.g., Babayiğit & Shapiro, 2020; Kang, 2020; K. Kim, 2015; Paige & Smith, 2018). These studies reported a weaker relationship between them, which ranged from .253 to .450 by path coefficients. However, the LK construct in the present study was comprehensively defined as a second-order construct capturing the shared variance between knowledge of words (i.e., vocabulary) and knowledge of how the words and phrases are formed (i.e., grammar). Furthermore, the measurements for the L2 written LK are less likely to reflect the EFL learners' metalinguistic knowledge of English grammatical rules. Rather, they are more likely to reflect somewhat implicit knowledge since the measurements accessed a type of linguistic knowledge for judging grammaticality or processing for comprehension (e.g., knowledge of the differences in relative clauses). Due to this reason, L2

written LK is conducive to L2 listening comprehension despite the different modalities.

5.3. The Fully Mediated Effect of L2 Written LK on L2 Reading Comprehension

The two alternative models in the current study are different by the presence or absence of the direct relation between L2 written LK and L2 reading comprehension. The SEM fit comparison found that the indirect model was superior to the direct/indirect model for parsimony although the fit indices of both alternative models were all acceptable. This result was consistent when the individual contextual factors (e.g., private education or parental support at home) were controlled. Although L2 vocabulary and grammar have received tremendous attention among many FL reading researchers (Choi & Zhang, 2018; Jeon & Yamashita, 2014; Jung, 2009; Shiotsu, 2010), their roles are less likely to be direct in the presence of L2 listening comprehension. This finding on the fully indirect effect of L2 written LK can be interpreted in relation to variations including L2 proficiency, task demands, and measurements in previous studies.

First, the current finding can be related to the limited L2 proficiency levels of the present EFL learners. Since the present EFL learners have lower-level proficiency, L2 decoding and the sound knowledge of English can make more contributions to L2 reading comprehension. This notion is aligned with a study with low-achieving 5th grade SL learners (Cho et al., 2019). They reported diverging pathways of the effect of L2 oral vocabulary on L2 reading

comprehension in that the low-proficiency SL learners showed the fully mediated effect of L2 oral vocabulary via L2 listening comprehension while their L1 counterparts showed a direct effect of vocabulary on reading comprehension. Similarly, Paige and Smith (2018) and Proctor et al. (2005) with general 5th grade SL learners reported a direct path of L2 vocabulary to L2 reading comprehension. Two EFL studies with college-level learners found the unique effect of L2 written components on L2 reading comprehension over and above L2 listening comprehension (Oh, 2016; Yamashita & Shiotsu, 2017). Yamashita and Shiotsu (2017) additionally showed that L2 LK had an enhanced effect compared to L2 listening comprehension in the higher proficiency subgroup. Oh (2016) showed a unique significant effect of written sentence processing ability on L2 reading comprehension, after controlling L2 listening comprehension. This series of works corroborate that L2 proficiency holds leverage for the role of L2 written LK in L2 reading comprehension.

Second, the lack of direct relation between L2 written LK and L2 reading comprehension may be because the reading comprehension measures are not topically demanding. Among L1 children, vocabulary was shown to have a direct relation to reading comprehension in topic-specific comprehension tasks (Kim, 2020), while it was not found in general topic tasks (Kim, 2017, 2019). The passages written for adults or young adults were strongly predicted by vocabulary knowledge (Cromley & Azevedo, 2007; Cromley et al., 2010). Since the present L2 reading comprehension measures were written for children or Korean middle school English learners, they are less demanding of L2 vocabulary and grammar knowledge, thus limiting the possibility of exerting the direct effect of L2

vocabulary and syntax on L2 reading comprehension beyond L2 listening comprehension for the present EFL learners with limited English proficiency.

Lastly, the present full mediation effect of L2 written LK is relevant to the measurement variations. Part of the L2 written LK was operationalized with L2 grammatical knowledge that is to recognize words' morphological structures and detect grammatical errors and process syntactic structures for comprehension. This type of L2 grammatical knowledge is different from how it has been measured in many FL studies, where the FL participants had to use metalinguistic and analytical skills to perform the tasks (e.g., Kim & Cho, 2015; Shibasaki et al., 2015; Shiotsu, 2010; Zhang & Koda, 2013). As discussed in the previous section, since the present L2 written LK was somewhat implicit and less analytical knowledge, it is fully represented in EFL learners' L2 listening comprehension, without little additional effect on L2 reading comprehension.

The operationalization of L2 vocabulary in the current study was also different from other SL or FL studies that found a direct path with L2 reading comprehension (e.g., Kang, 2020; K. Kim, 2015; Paige & Smith, 2018; Proctor et al., 2005). These studies measured L2 vocabulary in a productive mode or assessed the depth dimension of vocabulary knowledge by requiring to choose the synonyms or antonyms of target words. On other hand, L2 vocabulary in the present study was measured by a receptive form that taps the breadth dimension of knowledge. While Kang's (2020) model for Korean middle school EFL learners revealed a direct effect of L2 vocabulary depth knowledge on L2 reading comprehension, the breadth knowledge was completely indirect via L2 listening comprehension, as it was in the present model. Given that vocabulary breadth

knowledge has been reported as a more critical source of L2 reading comprehension than vocabulary depth knowledge for SL and FL learners (e.g., Babayiğit et al., 2022; Chen & Liu, 2020; Li et al., 2021; van Gelderen et al., 2004; Zhang, 2012), the present indirect relation between L2 LK and L2 reading comprehension is more generalizable to developing EFL learners.

5.4. The Nature of the L2 Written LK in the SVR for FL Learners

Albeit indirect, the L2 written LK was an important predictor of L2 reading comprehension because the indirect effect of L2 written LK (.51) was similar to the other two predictors: L2 decoding (.46) and L2 listening comprehension (.56). This result is different from Sparks et al. (2018) that highlighted the role of L2 listening comprehension for FL learners. This finding is partly in line with Kang (2020), Kim (2015), and Yamashita and Shiotsu (2017) that showed the significant effect of L2 linguistic knowledge above and beyond L2 listening comprehension. However, the present finding differs from the prior EFL studies because they showed direct effects. The indirect effect of the present L2 written LK was found due to its strong relationship with L2 listening comprehension that is significantly predictive of L2 reading comprehension. Therefore, we should not underestimate its role in FL reading, despite its non-significant direct path.

The second-order factor of L2 written LK was necessary for the current study from theoretical and empirical perspectives. The L2 LK factor is aligned with a theoretical attempt to uncover dimensionality in the language

comprehension construct of the SVR by L1 reading researchers (e.g., Foorman, Herrera, et al., 2015; Foorman, Koon, et al., 2015; Goodrich & Lonigan, 2017; Kieffer et al., 2016). They proposed that a higher-order factor existed above language components (oral) including vocabulary, morphological, and syntactic knowledge and this higher-order factor represents an integrative language comprehension skill that aids reading comprehension. As they proposed, the L2 language components, defined in written forms for EFL learners, were best represented with a common factor that overarches the shared variances between two independent factors of L2 vocabulary and grammar.

Moreover, the second-order factor of written LK in the present model suggests that L2 vocabulary and grammar are indistinguishably important language skills for comprehension. Previous EFL researchers demonstrated the large shared variance among L2 language components among EFL learners (e.g., Purpura, 1999; Shiotsu, 2003). This perspective is different from some FL studies that tried to reveal the relative importance between vocabulary and grammatical knowledge (e.g., Kim & Cho, 2015; Shiotsu, 2007; Zhang, 2012).

Another characteristic of the present L2 written LK of first-year high school EFL learners is that it is highly correlated with L2 decoding ($r = .91$). This strong correlation may indicate a limitation in measurements because the two constructs required processing printed signals. Nevertheless, the large correlation between L2 decoding and L2 LK can be interpreted as a developmental nature of EFL learners. SL studies reported a strong association between the L2 decoding and vocabulary even when the L2 vocabulary was measured in oral forms (Pasquarella et al., 2012; Tunmer & Champman, 2012). Theoretically, vocabulary knowledge

is related to both decoding system and comprehension system (Perfetti & Stafura, 2014) and recognizing whole words is influenced by word meaning, phonology, and morphology (Plaut, 2005). Thus, developing L2 learners may show some overlaps between L2 decoding and L2 LK that is represented by L2 vocabulary along with other grammatical knowledge.

5.5. The Characteristics of First-year High School EFL Learners' L2 Reading Comprehension Ability by the SVR

The present SEM results confirmed that L2 decoding and L2 listening comprehension were significant predictors of L2 reading comprehension for EFL learners, following the trajectory of the existing SVR model. The inclusion of multiple measures lends additional support to the validity of the SVR model. This model explained more than 95% of the variance in L2 reading comprehension of the first-year high school Korean EFL students. The effect size is substantially strong, compared to previous FL studies (e.g., 62% of Huo et al., 2021; 66% of Kang, 2020; 74% of Kang, 2021; 63% of Sparks et al., 2018; and 83% of van Gelderen et al., 2004).

The present model is different from previous SVR-based FL models that have shown a substantially larger contribution of L2 listening comprehension than L2 decoding (e.g., Kang, 2020, 2021; Sparks et al., 2018). Their common view was that L2 decoding is easily acquired even at the early stage of L2 learning for FL learners. Unlike their claim, L2 decoding was similarly important as much as L2 listening comprehension in predicting L2 reading comprehension for the

present EFL learners. This indicates that L2 decoding is still a critical factor influencing L2 reading comprehension for lower-level EFL learners (Erbeli & Joshi, 2022; Kahn-Horwitz et al., 2005; Nassaji, 2014). This finding is consistent with Bae (2017) that L2 orthographic knowledge was one of the most critical variables predicting L2 reading comprehension of both low- and high-proficiency groups of Korean high school EFL learners. Erbeli and Joshi (2022) also showed a substantially larger contribution of L2 decoding (.87) than the L2 language comprehension (.16) for Slovenian middle school EFL learners.

The relatively sizable contribution of L2 decoding in the present study can also be explained by the present measurements for L2 decoding. Decoding words can be achieved by applying graphic-phoneme matching rules (i.e., sub-lexical route) or by recognizing whole words as a unit (i.e., lexical route) (Coltheart, 2005; Coltheart et al., 2001; Good et al., 2001). A common measure for L2 decoding in previous SL and FL studies was the word or non-word oral reading task that is more likely to reflect the sub-lexical route (Kirby & Savage, 2008). Using this dimension of decoding alone underestimates the relationship between L2 decoding and reading comprehension (Johnston & Kirby, 2006; Kirby & Savage, 2008; Miyasako & Takatsuka 2004; Wagner et al., 2001). Moreover, the L2 decoding ability measured by grapheme-phoneme matching may be biased when the EFL learners' L1 system is alphabetic like Hangeul, which is the Korean alphabet (Cao, 2016; Kim et al., 2017; Wang et al., 2003, Wang & Koda, 2005). L2 decoding in the present study was defined by the lexical route (by the word reading fluency task) as well as the sub-lexical route (by the orthographic processing task). This would have estimated the relation between L2 decoding and L2 reading

comprehension more precisely, yielding a relatively stronger relation, compared to previous studies.

The current finding not only maintains the notion that the language comprehension, often defined as listening comprehension ability, is a critical variable for EFL learners' L2 reading comprehension, but also reveals that listening comprehension ability is largely predicted by L2 linguistic knowledge. That is, L2 LK, which is commonly acquired by written input in EFL contexts, constitutes part of L2 language comprehension of the SVR by promoting lower-order processing and parsing of L2 listening comprehension. This is another unique characteristic of lower-level EFL learners that can be suggested from the current structural model.

One last thing to discuss in the present SEM results is that the two alternative models (i.e., the direct/indirect model and indirect model) were both statistically acceptable and the chi-square values were very similar. Due to the statistical similarity, the present findings are inconclusive yet to argue that there is no direct relationship between L2 written LK and L2 reading comprehension. Moreover, a number of studies in the EFL contexts support the roles of vocabulary, morphology, and syntactic knowledge in FL reading comprehension, raising the possibility of a direct relationship between them (Aryadoust & Baghaei, 2016; Choi & Zhang, 2018; Jeon, 2011; Kim & Cho, 2015; Laufer & Aviad–Levitzky, 2017; Purpura, 1999; Shiotsu, 2010; Shiotsu & Weir, 2007; van Gelderen et al., 2004; Yalin & Wei, 2011; Zhang, 2012; Zhang & Koda, 2012, 2013; Zhang, 2021; Zhang & Lin, 2021). However, while previous SL studies clearly identified a direct relation between L2 linguistic components and L2 reading comprehension (e.g., Babayiğit

& Shapiro, 2020; Paige & Smith, 2018; Proctor et al., 2005), the relation between L2 written LK and L2 reading comprehension was not shown to be meaningful for the current EFL learners in the estimation of the direct/indirect model. Thus, it may be more legitimate to mention that the direct relation between L2 written LK and L2 reading comprehension cannot be identified yet for the current data, which can be a unique feature for Korean first-year high school lower-level EFL learners. This will be discussed further in the final chapter that suggests future research.

CHAPTER 6.
CONCLUSION

This chapter summarizes the major findings of the present study and provides theoretical and pedagogical implications, followed by limitations and suggestions for future study.

6.1. Major Findings

The primary goal of this study is to examine the role of learned L2 written LK for EFL reading comprehension in the context of the SVR model (Gough & Tunmer, 1986; Hoover & Gough, 1990; Hoover & Tunmer, 1993) that has been steadily exploited as a framework to explain reading comprehension ability of various populations. A tenet of the SVR is that reading comprehension is predicted by one's oral comprehension ability (Catts, 2018; Gough et al., 1996) and this hypothesis has been widely supported by L1 and SL learners. However, one of the expectations of the current study was that oral comprehension ability (i.e., listening comprehension) would play a weaker role in reading comprehension for EFL learners because they develop their L2 literacy skills with limited exposure to L2 oral language input. Rather, it was expected that the L2 written LK would substantially contribute to L2 reading comprehension directly. The interest in L2 written LK is based on a number of prior FL studies that highlight L2 vocabulary and/or grammar knowledge (Aryadoust & Baghaei, 2016; Choi & Zhang, 2018; Jeon, 2011; Jeon & Yamashita, 2014; Jung, 2009; Kim & Cho, 2015; Laufer & Aviad–Levitzky, 2017; Purpura, 1999; Shiotsu, 2010; Shiotsu & Weir, 2007; van

Gelderen et al., 2004; Yalin & Wei, 2011; Zhang, 2012; Zhang & Koda, 2012, 2013; Zhang, 2021; Zhang & Lin, 2021).

The present study asks two research questions. The first was to examine the factor structure of L2 reading-related components and this was addressed by confirmatory factor analysis. The second was to examine the relationship among L2 listening comprehension, L2 written LK, and L2 reading comprehension by fitting two alternative hypotheses on the relations using the SEM framework. The hypotheses were tested on the data from first-year high school EFL learners with limited L2 proficiency in Korea. Five major findings are summarized below.

First, L2 listening comprehension is the proxy of the L2 language comprehension of the SVR for first-year high school EFL learners. That is, L2 reading comprehension of EFL learners is predicted by their L2 oral comprehension skills, as it is in L1 or SL learners who develop literacy skills with sufficient exposure to the oral language. The proximal role of L2 listening comprehension in L2 reading comprehension of EFL learners suggests that the two comprehensions in different modalities represent a similar cognitive process for high school EFL learners with limited L2 proficiency. Also, the finding sheds light on the importance of phonological skills that can mediate the effect of L2 written LK on L2 reading comprehension for secondary school-level EFL learners.

Second, this study reveals a hierarchical relation between L2 written LK and L2 listening comprehension for EFL learners. For developing EFL learners, vocabulary and grammatical knowledge can constitute part of L2 oral comprehension ability, although they were measured in written skills. This substantial relationship between L2 written LK and L2 listening comprehension

was partly explained by the characteristics on L2 written LK measures that are more reflective of comprehension aspects of L2 knowledge, not metalinguistic aspects of L2.

Third, the effect of L2 written LK on L2 reading comprehension is fully mediated by L2 listening comprehension. This means that L2 written LK can aid L2 reading comprehension when the L2 linguistic components are skillfully and fluently processed, as they are during L2 listening comprehension. This full mediation of L2 written LK by L2 listening comprehension may be related to the low proficiency of the present EFL participants; topically not-demanding reading comprehension tasks; or different measurements of L2 linguistic knowledge. Although the indirect model was chosen as a better representation for the current EFL data for parsimony, the indirect/indirect model can be another alternative for EFL reading comprehension data based on its statistical similarity with the indirect model. In other words, the direct relation between L2 written LK and L2 reading comprehension can also be supported if L2 proficiency was higher or L2 LK was measured in different ways.

Fourth, the effect of L2 written LK is not trivial because it exerts a significant indirect effect via L2 listening comprehension and its relative contribution is as large as two SVR factors. This L2 written LK is the integrative language factor capturing vocabulary and grammatical knowledge and is highly correlated with L2 decoding at least for the current lower-level EFL learners.

Lastly, the SVR model explained the L2 reading comprehension ability of first-year high school EFL learners in Korea with a substantial effect size. L2 decoding is still an important factor weighing the L2 reading comprehension

ability in the present lower-level adolescent EFL learners. More importantly, it is suggested that L2 LK in EFL contexts, often acquired in written forms, aids L2 listening comprehension of EFL learners, resulting in constituting the language comprehension construct in the SVR.

6.2. Theoretical and Pedagogical Implications

The present study gives several theoretical implications to FL reading research. First, the present investigation confirms that the SVR theory, a prevalent model in reading research in both L1 and SL fields, can also explain FL reading comprehension ability. It is startling that EFL learners' reading comprehension ability can be directly estimated by their oral comprehension ability without any additional contribution of L2 written LK. The present finding can provide a more systemic answer to what constitutes EFL learners' reading comprehension, moving away from written language-based FL research. For example, while Jeon (2012) revealed the importance of L2 oral reading fluency (i.e., decoding) for EFL learners, the study remains 80% of the variance in L2 reading comprehension unexplained. The unexplained variance of the EFL learners' reading comprehension may have been explained by their oral comprehension ability.

Second, the present study corroborated that the SVR can explain EFL learners who are developing L2 literacy skills without sufficient L2 oral language exposure. Nevertheless, the present study differs from prior FL studies in that they mixed L2 written with oral language skills to estimate the role of the language comprehension construct (e.g., Erbeli & Joshi, 2022; Kang, 2020, 2021). This can

contaminate the theoretical concept of the SVR that oral comprehension ability predicts text comprehension (Gough & Tunmer, 1986; Hoover & Gough, 1990; Hoover & Tunmer, 1993). On the other hand, some SVR-based FL reading models included only oral language skills (e.g., Huo et al., 2021; Sparks et al., 2018). This may neglect the role of L2 written LK for FL reading comprehension that has been evidenced in a number of studies (Aryadoust & Baghaei, 2016; Choi & Zhang, 2018; Jeon, 2011; Jeon & Yamashita, 2014; Kim & Cho, 2015; Laufer & Aviad–Levitzky, 2017; Purpura, 1999; Shiotsu, 2010; Shiotsu & Weir, 2007; van Gelderen et al., 2004; Yalin & Wei, 2011; Zhang, 2012; Zhang & Koda, 2012, 2013; Zhang, 2021; Zhang & Lin, 2021). In contrast to these previous studies, the current study separated L2 oral and written language skills and specified the underlying structure of L2 listening comprehension with the L2 written LK. This specification is different from the attempt of Yamashita and Shiotsu (2017) that the effect of L2 vocabulary and L2 grammatical knowledge on L2 reading comprehension was independently estimated from L2 listening comprehension. The present research design has limitations to show that L2 listening comprehension of EFL learners is exclusively constructed with L2 written LK against the oral LK. However, L2 written LK can be the underlying part of L2 oral comprehension ability.

Third, the present study defined the role of L2 written LK in the context of a more universal theory in reading research, the SVR and suggested that L2 vocabulary and grammatical knowledge are important sources of L2 reading comprehension, as cited above. For example, Purpura (1999) has reported an almost identical relation between L2 written LK and reading comprehension (ß = .985). However, when L2 written LK is examined in relation to L2 listening

comprehension, its effect on L2 reading comprehension becomes dismal although its relative contribution is still remarkable.

Lastly, another implication of the current study is that more than 90% of the L2 reading comprehension can be explained by several key L2 components without any language-general cognitive variables. Therefore, the current study attempted to provide a more complete explanation of the L2 reading comprehension ability of FL learners by drawing on the dominant reading theory in educational psychology, the SVR, and empirical findings from FL-specific reading research.

Recent reading research has often argued that the language-general cognitive components (e.g., inferencing) or background knowledge should be included to explain reading comprehension ability (Wagner et al., 2021). However, they are assumed to play a minimal role in the present study because the higher-order cognitive skills are reflected in listening comprehension in lower-level comprehension tasks (Kim, 2016, 2017, 2019; Lervag et al., 2018; Quinn & Wagner, 2018; Spencer et al., 2020; Taboada Barber et al., 2021).

From an epistemological perspective, higher-order thinking skills (e.g., inferencing skills) are not domain-general intellectual abilities, but they are domain-specific abilities that vary by learning context including who the learner is, what is learned, or where the learning takes place (Alexander et al., 2011). However, the L2 reading comprehension measures used in the present study do not cover contents that are demanding topical knowledge.

The present study has some pedagogical implications as well. First, English classrooms should continue teaching vocabulary and grammar to lower-level EFL

learners. But, the approach should be based on comprehension, as the L2 written LK represented in the current study is substantially related to L2 listening comprehension, rather than to L2 reading comprehension. Focus on grammatical structures and detailed explicit explanations are common practices that characterize English classrooms in Korean secondary schools. For example, students are expected to analyze the English sentences by grammatical features and explain grammatical forms metalinguistically. Unlike this common practice, this study tried to describe the participants' L2 grammatical knowledge in a less analytical and more comprehension-friendly manner. This knowledge substantially explained the variance of L2 listening comprehension. Thus, EFL students should spend more time processing the language components rather than metalinguistically learning the components so that they can get efficiency in processing them for comprehension.

Second, the English classroom should include more instructions to get students familiarized with the sound of English words and fast and efficient processing of English through listening. Perfetti (2003) mentioned that activating sound when a person reads a word is obligatory and universal in any language. Without sufficient access to the sound of L2, EFL learners are forced to grapple with L2 reading with endless frustration. Pedagogic support can be given in various forms. For example, reading English texts out to students can be a good choice. Focused training for phonological awareness and prosodic features can be also supportive. Most of all, the 'reading while listening' practice is highly recommended (e.g., Amer, 1997; Askildson, 2011; Gobel & Kano, 2014; Tragant & Vallbona, 2018; Woodall, 2010). It can aid in parsing the L2 visual linguistic

input into meaningful units via prosody and scaffold the FL learners to process the L2 input that otherwise would be slowly processed.

Lastly, the fluency of L2 decoding skills should steadily receive instructional attention from many lower-level middle and high school learners. This skill tends to be easily mastered even at the early stage of L2 literacy development for SL learners. However, translating the orthographic signals into phonological and lexical information in a speedy manner requires a more extended period of practice in Korean EFL contexts. Adolescent SL learners in the U.S. still had struggles with L2 decoding, unlike a common expectation that L2 decoding is easily acquired (Mancilla-Martinez et al., 2011). According to Pretorius and Spaull (2016), L2 reading fluency has a linear relationship with reading comprehension until they orally read 70 words correctly per minute. Since the present participants read only 61 words on average for three minutes, their fluency is estimated as 20 words per minute. This approximate estimation indicates that the L2 decoding ability of the present first-year high school EFL learners did not reach the threshold level yet, at which word reading fluency is no more a critical variable of FL learners' reading comprehension. Various fluency training including shadow reading, repeated reading, and extensive reading with an i+1 level text can increase this ability (Anderson, 2009).

6.3. Limitations and Suggestions for Future Research

There are limitations to consider when interpreting the current findings. First, the latent variables had strong correlations with one another in the current study.

This high correlation increased standard errors and type II error in parameter estimation. This may be a reason why all the three paths to L2 reading comprehension in the direct/indirect model turned out to be non-significant. Although other validity indices mitigated the possible problem of collinearity among the variables, future studies should consider the research designs to develop measures that can secure more discriminant validity. For example, future studies should include more pre-K level words in the L2 word reading fluency measure to lower the involvement of EFL learners' vocabulary knowledge in performing the task and rather to be more reflective of the ability to recognize whole words rapidly. Also, L2 grammatical knowledge in future studies will be assessed with different measures that little require sentence processing skills to minimize the overlapped portion with reading comprehension. For example, the sentence assembly task in CELF (Semel et al., 2003) can be a good alternative because it requires to re-order the given words to produce syntactically correct sentences.

Second, the present study had its genesis in the SVR theory that has led major discussions in the field of reading science for about 40 years. The role of L2 written LK in reading comprehension was adequately explained in relation to the two SVR components for EFL learners. Accordingly, the present model was believed to represent the present EFL data well. However, a few statistical values including high correlations between decoding and LK variables or the negative (albeit small) residual variance of L2 grammar, which was fixed to zero, indicating that there may be still some gaps between the theory and practice. That is, there can be possibilities that EFL learners' L2 reading-related components are better

represented with modifications of the SVR frame. For example, L2 listening comprehension can be predictive of L2 decoding (Kang, 2021) because the interdependency between decoding and listening comprehension has often been suggested by L1 and SL researchers (Foorman et al., 2018; Kirby & Savage, 2008; Tunmer & Chapman, 2012). Future studies should be conducted to see whether the present model is replicated with different EFL learners and further examine if additional relations can be found between L2 decoding, L2 listening comprehension, and L2 written LK.

Third, the present findings should limit to lower-level EFL learners because the model was tested on EFL learners with limited proficiency and with less varied learner characteristics. That is, the direct/indirect model can be chosen as the best-fitting model if the model is tested on more advanced-level EFL learners. Indeed, the direct/indirect models yielded an acceptable fit to the current data, although the chi-square difference testing and the differences in AIC, and BIC values favored the full mediation model. The similar fit indices suggest that all the models explain the covariance relations existing in the EFL data to some extent. Future studies can be performed with participants with more varying characteristics by L2 proficiency or L2 oral language experiences to examine whether different direct/indirect relations can be detected and the dynamic relations can be found by the different proficiency levels.

Fourth, since the language components in the current study were measured in only written modes, there is a restraint to claiming that the underlying structure of L2 listening comprehension for EFL learners consists only of L2 written LK. In other words, the present research design limits the finding that L2 written LK

can be part of L2 listening comprehension that predicts L2 reading comprehension. Future studies can use orally-measured L2 vocabulary and grammar knowledge to systematically examine the components of L2 listening comprehension for EFL readers.

Fifth, the present study reinforced the notion that listening comprehension is invariably important for EFL learners and suggested several reasons from theories with related empirical studies to support the finding. However, the present study cannot provide systemic evidence on why L2 listening comprehension played such an important role in FL reading comprehension with the current research design. Future studies may include more comprehensive variables including vocabulary and grammar variables by different modalities (i.e., oral and written) and phonological or phonemic awareness with learner groups with more varied L2 proficiency.

The SVR model is a seminal theory in reading research and has been steadily investigated mostly in L1 or SL environments. The present study was an attempt to address this model for EFL learners, an underrepresented population in L2 reading research. For this particular population, it added the L2 linguistic knowledge, which is often explicitly learned in classrooms, as an independent construct. Overall, the present findings suggest that decoding and oral comprehension were predictors of the reading comprehension ability of EFL learners, consistently with the existing SVR theory. More importantly, the present study illuminates that L2 written LK is part of L2 oral comprehension ability for first-year high school EFL learners and its effect on L2 reading comprehension is fully mediated by L2 listening comprehension. Although this indirect model was

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supported against the direct/indirect model in the current study for parsimony, the two models yielded statistically similar fits to the data. Thus, it is a remaining question whether more dynamic direct and indirect relations can be found by different L2 proficiency levels (high vs. low levels) or different measurements for L2 written LK (e.g., explicit vs. implicit knowledge measures).

Nevertheless, the current study still shed light on the role of L2 listening in L2 reading comprehension instructions by the closer association of L2 listening comprehension with L2 reading comprehension and its mediation of L2 written LK. Future studies are needed to further inform the construct of L2 listening comprehension in depth in terms of modality and reveal the dynamics of the relations among L2 listening, L2 LK, and L2 reading comprehension in more extensive contexts. These future studies will include more variables including language-general cognitive (Cromley & Azevedo, 2007; Cromley et al., 2010; Spencer et al., 2020; Taboada Barber et al., 2021; Talwar et al., 2018); L1 comprehension (Erbeli & Joshi, 2022; Garrison, 2012; K. Kim, 2015; Shibasaki et al., 2015; Vandergrift, 2006; Yamashita & Shiotsu, 2017); or oral linguistic components.

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APPENDICES

APPENDIX 1. Word Reading Fluency

※ 아래와 같이 단어 경계를 빗금 '/' 으로 표시하세요.

▶ 예시: 아래와 같이 문제를 풉니다.

do l o ve my t wo t r ee why

※주의 사항

1. 틀린 경우, 지우개 사용하지 마시고 아래와 같이 표시하세요.

do l o ve my t wo t r ee why

2. 한 줄을 통째로 건너뛰지 마세요.

3. 철자 경계를 정확하게 표시하세요.

do l ove my t wo t r ee

▶ 연습: 아래 연습문제를 풀어봅니다.

dolovemytwotreewhy/ ofgoyeswhatgreen/

▶ 본 활동: 제한시간 3 분동안 최대한 **빠르고** **정확하게** 응답하세요. 선생님께서 '시작' 하면 뒷면에서 시작합니다.

onatgetruncarisfunbluebiglikeand/
saydowillmakethisnohaveyouseeback/
eachmuchtruckzooapplefarflywouldway/
underbirdfoundegglunchyardlivestay/
girlcakeofbutpetroomlightverypull/
dayiceoldeightlargewolfkeyfix/
straightwildgrewaboveswimtroubleset/
drivequickkickrollbottlejuniorsky/
fewdesertfaultgazepressrootclient/
stemjudgehealthtightbuiltcoachfresh/
agebendawfulmountselvesbirthwake/
swungmethodrentguestgraspbreeze/
nursesaucequitnavymurderzeroguilty/
kettletigercouncilfolktickplum/
junglerhythmlimblinkrolemothlung/
fueldebatemercysymbolboltcredit/
blindhullgermthriveneglectnotion/
fleshlegalvarietygriefquizstaff/

APPENDIX 2. Orthographic Processing

※ 아래 영어 단어를 보고 철자의 조합이 실제 영어 단어처럼 생겼으면 Y, 그렇지 않으면 N에 표시하세요. 모두 실제로 존재하지 않는 단어입니다.

▶ 예시: 아래와 같이 문제를 풉니다.

	Words	YES	NO		Words	YES	NO		Words	YES	NO
1.	rup	(Y)	N	**2.**	qru	Y	(N)	**3.**	hirr	Y	(N)

▶ 연습: 아래 연습문제를 풀어봅니다.

	Words	YES	NO		Words	YES	NO		Words	YES	NO
1.	qru	Y	N	**2.**	hirr	Y	N	**3.**	rup	Y	N

▶ 본 활동: <u>제한시간 2 분동안</u> 최대한 <u>빠르고</u> <u>정확하게</u> 응답하세요. 선생님께서 '시작' 하면 뒷장에서 시작합니다.

	Words	YES	NO		Words	YES	NO		Words	YES	NO
1.	pim	Y	N	35.	dess	Y	N	69.	svsw	Y	N
2.	bq	Y	N	36.	ncio	Y	N	70.	prain	Y	N
3.	lat	Y	N	37.	nya	Y	N	71.	psfgi	Y	N
4.	uxw	Y	N	38.	fet	Y	N	72.	dreef	Y	N
5.	eeor	Y	N	39.	rhpy	Y	N	73.	erwgs	Y	N
6.	zl	Y	N	40.	bave	Y	N	74.	strone	Y	N
7.	ip	Y	N	41.	depate	Y	N	75.	trisk	Y	N
8.	rw	Y	N	42.	eaji	Y	N	76.	zint	Y	N
9.	ig	Y	N	43.	rppjp	Y	N	77.	yinmd	Y	N
10.	vds	Y	N	44.	skree	Y	N	78.	bloot	Y	N
11.	ko	Y	N	45.	stip	Y	N	79.	kelm	Y	N
12.	fk	Y	N	46.	alera	Y	N	80.	crpons	Y	N

Due to the copy right of the original author (Yamashita, 2013), only part of the material was presented.

APPENDIX 3. Vocabulary Knowledge

※ ① ~ ⑥의 영어 단어에 설명하는 의미 옆에 해당 번호를 넣으세요.

▶ 예시: 아래 예시와 같이 답을 표시합니다.

1.

① cute ② nice	3	값이 싼
③ cheap ④ dry	1	귀여운
⑤ happy ⑥ fat	6	뚱뚱한

▶ 연습: 위 예시 대로 아래 연습문제를 풀어보세요.

1.

① nice ② cute		값이 싼
③ fat ④ dry		귀여운
⑤ happy ⑥ cheap		뚱뚱한

▶ 본 활동: <u>9분동안</u> 응답하세요. 선생님께서 '시작' 하면 뒷면에서 시작합니다. 선생님께서는 칠판에 시작과 종료시간을 써주세요

1.

① boy		사람, 사물의 크기
② rent		
③ report		버스, 기차의 역 혹은 정거장
④ size		
⑤ station		소년
⑥ thing		

2.

① ear		편지
② gold		
③ lake		사람들
④ letter		
⑤ office		사무실
⑥ people		

3.

① fellow		농담
② hat		
③ ice		친구, 동료
④ joke		
⑤ light		모자
⑥ system		

4.

① date		소식
② forest		
③ mistake		숲
④ news		
⑤ record		실수, 잘못
⑥ shop		

5.

① bar		이웃
② conversation		
③ neighbor		쓰레기
④ rain		
⑤ garbage		셔츠
⑥ shirt		

6.

① continue		잡아당기다
② cook		
③ phone		계속하다
④ pull		
⑤ sail		공유하다, 나눠 갖다
⑥ share		

7.

① enter		끝내다
② finish		
③ happen		안으로 들어가다
④ own		
⑤ sing		소유하다
⑥ worry		

8.

① arrive		흘깃보다, 훑어보다
② collect		
③ consider		도착하다
④ glance		
⑤ need		고려하다
⑥ pack		

9.

① affordable ② beautiful ③ boring ④ dry ⑤ rough ⑥ tall		키가 큰
		거친, 매끈하지 않은
		지루한

10.

① closed ② dirty ③ empty ④ musical ⑤ orange ⑥ sad		비어 있는, 공허한
		지저분한, 더러운
		슬픈

11.

① capital ② career ③ committee ④ exam ⑤ fence ⑥ option		선택
		직업
		시험

12.

① guard ② lesson ③ library ④ license ⑤ monkey ⑥ soup		수프, 국물요리
		경비요원
		도서관

13.

① brick ② crown ③ hero ④ language ⑤ mission ⑥ tale		왕관
		업무, 임무
		벽돌

14.

① affair ② carrot ③ damage ④ desert ⑤ shelter ⑥ thief		도둑
		대피처
		사막

15.

① advice ② hobby ③ industry ④ soil ⑤ steak ⑥ storm		폭풍
		흙
		조언

16.

① burst ② cheat ③ develop ④ operate ⑤ presume ⑥ wander		(사실일 것이라고) 추정하다
		터지다,파열시키다
		작동시키다

17.

① direct		주다, 공급하다
② identify		
③ improve		소유하다, 지니다
④ possess		
⑤ provide		향상시키다, 나아지다
⑥ sew		

21.

① element		목표
② jail		
③ joint		인물사진, 초상화
④ objective		
⑤ portrait		감옥
⑥ variety		

18.

① complain		증가하다, 늘다
② increase		
③ pray		알아보다, 인식하다
④ produce		
⑤ recognize		생산하다
⑥ whip		

22.

① coincide		후회하다
② derive		
③ devote		(시간, 노력, 돈)을 바치다
④ permit		
⑤ publish		동시에 일어나다
⑥ regret		

19.

① curious		다양한
② defensive		
③ energetic		불안해하는
④ nervous		
⑤ various		호기심 있는
⑥ wicked		

23.

① assault		공격
② bargain		
③ compete		저지하다, 억누르다
④ dedicate		
⑤ nominate		경쟁하다
⑥ restrain		

20.

① advanced		고급의, 선진의
② cruel		
③ lone		잔혹한
④ stiff		
⑤ typical		혼자인, 단독의
⑥ upset		

24.

① fundamental		기본적인
② humorous		
③ interior		많은
④ numerous		
⑤ prompt		신속한, 시간을 엄수하는
⑥ religious		

APPENDIX 4. Morphological Decomposition

※ 주어진 영어 단어를 구조에 맞게 분해하세요.

▶ 예시: 아래와 같이 영어 단어는 분해될 수 있습니다.

teac/her

un/happy

rain/y

▶ 연습: 위와 같이 주어진 단어를 적절하게 분해하고 그 경계를 빗금 '/'으로 표시하세요. 빗금이 철자에 겹치지 않게 정확히\그어 주세요! teacher(X)

	Words
1.	unkind
2.	windy
3.	worker

▶ 본 활동: 4분동안 응답하세요. 선생님께서 '시작' 하면 뒷면에서 시작합니다. 선생님께서는 칠판에 시작과 종료시간을 써주세요.

	Words		Words
1.	darkness	13.	warmth
2.	return	14.	expensive
3.	national	15.	unsafe
4.	playful	16.	exercising
5.	dangerous	17.	helper
6.	quietly	18.	disobey
7.	magician	19.	glasses
8.	agreeable	20.	misuse
9.	enjoyment	21.	appearance
10.	impolite	22.	characterize
11.	curiosity	23.	artist
12.	correction	24	classify

이번 영역 끝.

APPENDIX 5. Syntactic Structure

※ 영어 문장이 설명하는 그림을 A, B, C, D중에 고르세요.

▶ 예시: 아래 예시와 같이 답을 표시합니다.

1. This is an apple.
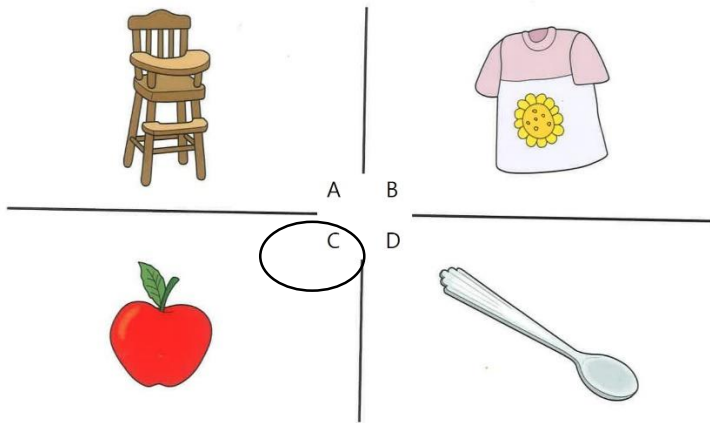
SS

Demo and Trial 1

▶ 연습: 위 예시 대로 아래 연습문제를 풀어보세요.

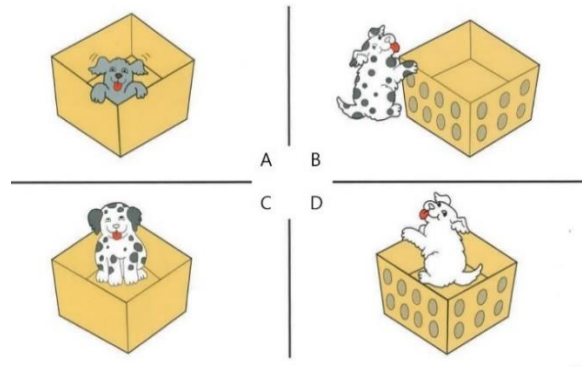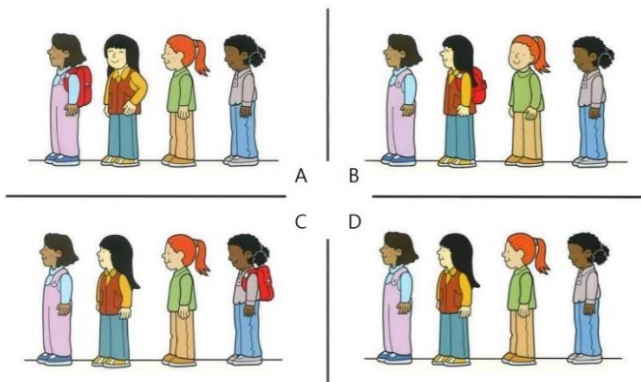1. The boy has a ball.

2. The girl lost her balloon.
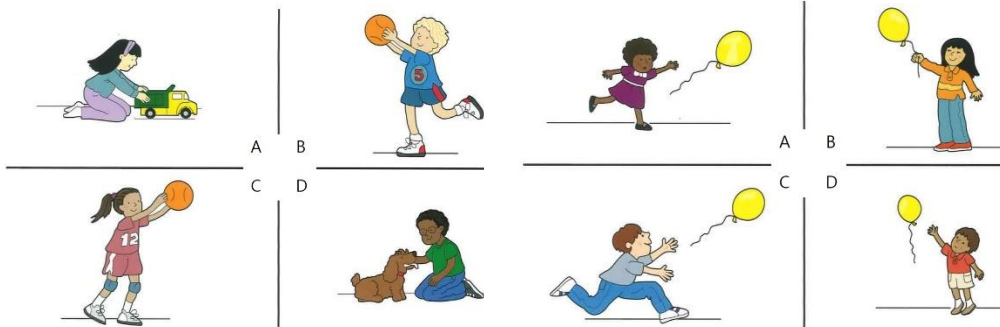
SS

SS

▶ 본 활동: <u>10분동안</u> 응답하세요. 선생님께서 '시작' 하면 뒷면에서 시작합니다. 선생님께서는 칠판에 시작과 종료시간을 써주세요.
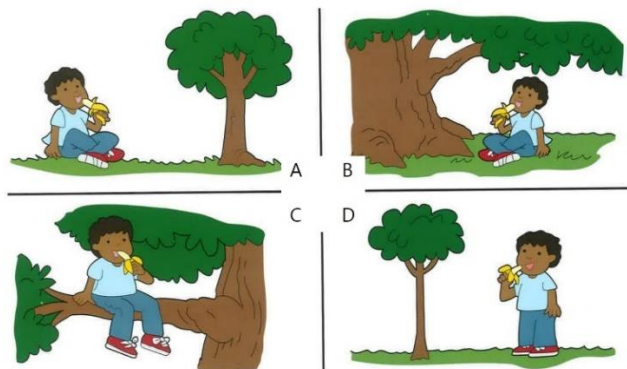
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1. The spotted dog is in the box.

2. The girl who is standing in the front of the line is wearing a backpack.

3. The boy who is sitting under the big tree is eating a banana.

4. The girl took some flowers to her mother.

Due to copy right of the authors (Semel et al., 2003), only part of the measure was presented.

APPENDIX 6. Grammatical Error Detection

※ 문장이 어법상 맞으면 "No Error", 어법상 맞지 않으면 틀린 곳을 선택지에서 고르세요.

▶ 예시: 아래 <보기>와 같이 문제를 풉니다.

<보기>

1. A snake bit <u>she</u> on the leg.			2. The dinner <u>the man</u> burned.		
① A	② ⓢhe	③ No Error	① The dinner	② ⓣhe man	③ No Error

▶ 연습: 아래 <연습> 문제를 풀어봅니다.

<연습>

1. Susan <u>is</u> making some <u>cookies</u> for us.

   ①   is   ②   cookies   ③   No Error

2. <u>A</u> snake bit <u>she</u> on the leg.

   ①   A   ②   she   ③   No Error

3. Did Bobbie <u>stayed</u> at home <u>last</u> night?

   ①   stayed   ②   last   ③   No Error

▶ 본 활동: 8분동안 응답하세요. 선생님께서 '시작'하면 뒷장에서 시작합니다. 선생님께서는 칠판에 시작과 종료시간을 써주세요.

1. John but I are good friends.
　① but　　　② friends　　　③ No Error

2. Mary will go to Europe next year.

　① go　　　② next　　　③ No Error

3. The boy is speak to a policeman.
　① speak　　② a　　　③ No Error

4. Come to my house before you have lunch.
　① Come　　② my　　　③ No Error

5. I received a letter writing in English from Cathy.
　① received　② writing　③ No Error

6. The boat that my father bought it sunk.
　① it　　　② sunk　　③ No Error

7. The man allows his son watch TV.
　① Man　　② watch　　③ No Error

8. The girls are enjoying playing games.

　① girls　　② playing　③ No Error

9. The boy feeds the rabbits carrots.
　① feeds　　② carrots　③ No Error

10. The students to the movies went.
　① The　　② went　　③ No Error

11. He was became a doctor.
　① was　　② a　　　③ No Error

12. We have never been to Paris yet.
　① been　　② yet　　③ No Error

13. The girls who are drinking milk are my friends.
　① milk　　② are　　③ No Error

14. What Martha is bringing to the party?
　① Martha　② to　　　③ No Error

15. It isn't very cold outside.
　① It　　② outside　③ No Error

16. Tom wants to know what have I done.

　① to　　② have　　③ No Error

17. A lot of food was prepared for the party.
　① was　　② for　　③ No Error

18. Mike wrote the letter but didn't send it.
　① wrote　② it　　③ No Error

19. The woman the policeman asked a question.
　① the policeman　② a　　③ No Error

20. The woman talking with Kate is my mother.
　① talking　② is　　③ No Error

21. The children play with the dog.
　① play　② the　　③ No Error

22. You must make not any noise in the library.
　① not　② in　　③ No Error

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APPENDIX 7. Listening Comprehension

엎드리지 마시고 바른 자세로! ^^

※ 들려오는 대화 혹은 안내를 듣고 아래 물음에 답하세요. (1-15)

1. 다음을 듣고, 내일의 날씨로 가장 적절한 것을 고르시오.
① 맑음   ② 비   ③ 눈   ④ 진눈깨비   ⑤ 우박

2. 대화를 듣고, 여자가 만들 응원배너를 고르시오.

①	②	③	④	⑤
JENNY	JENNY ❤	Go! Jen!	JEN	JENNY

3. 다음을 듣고, 안내방송에서 언급된 것을 고르시오.
① 관람 인원
② 출연 배우
③ 공연 장소
④ 입장권 가격
⑤ 관람 시 준수 사항

4. 대화를 듣고, 두 사람이 만나기로 한 장소로 가장 적절한 곳을 고르시오.
① 공원   ② 수영장   ③ 여자네 집   ④ 지하철 역   ⑤ 버스 정류장

5. 대화를 듣고, 여자가 지난 주말에 한 일로 가장 적절한 것을 고르시오.
① 야구장 가기   ② 소풍 가기   ③ 병원 가기
④ 동생과 놀아주기   ⑤ 방 청소하기

6. 대화를 듣고, 여학생이 충고한 내용을 고르시오.
① 병원에 가기
② 새 컴퓨터로 바꾸기
③ 목 스트레칭 하기
④ 컴퓨터 게임 그만하기
⑤ 고장 난 컴퓨터 고치기

7. 대화를 듣고, 여자의 심정으로 알맞은 것을 고르시오.
① 부럽다   ② 슬프다   ③ 그립다   ④ 행복하다   ⑤ 불안하다
8. 대화를 듣고, 여자가 지불할 대여료를 고르시오.

① 15,000원   ② 20,000원   ③ 25.000원   ④ 30,000원   ⑤ 35,000원

9. 대화를 듣고, 여자가 자기소개서에서 수정해야 할 사항을 고르시오.
① 문단 순서   ② 학업 계획   ③ 문법 오류
④ 과거 경험   ⑤ 미래 계획

10. 다음을 듣고, 영화에 관한 내용으로 옳지 **않은** 것을 고르시오.
① 이야기 구성이 훌륭하다.
② 무명 영화감독이 연출했다.
③ 많은 스타 배우들이 출연한다.
④ 큰 성공을 거둘 것으로 기대된다.
⑤ 최신 컴퓨터 그래픽 기술이 사용 됐다.

11. 대화를 듣고, 두 사람이 만나는 시간을 고르시오.
① 5:30   ② 6:00   ③ 6:30   ④ 7:00   ⑤ 7:30

12. 대화를 듣고, 여자의 직업으로 가장 적절한 것을 고르시오.
① 작가   ② 기자   ③ 블로거   ④ 연예인   ⑤ 출판사 직원

13. 대화를 듣고 남자의 직업으로 가장 적절한 것을 고르시오.
① 사진작가   ② 심리 치료사   ③ 간호사   ④ 건축가   ⑤ 퍼스널 트레이너

14. 대화를 듣고, 여자가 대화 직후에 할 일을 고르시오.
① 식사하기
② 쓰레기 버리기
③ 침대에 눕기
④ 거실 바닥 쓸기
⑤ 방 청소 하기

15. 대화를 듣고, 남자가 전화를 건 이유를 고르시오.
① 제품 환불을 받으려고
② 제품 고장을 신고하려고
③ 제품을 교환 받으려고
④ 제품 기능을 물어보려고
⑤ 제품 기능에 대해 항의하려고

※ 들려오는 대화를 듣고 아래 16번과 17번에 답하세요. (16-17)
16번. 대화에서 여자가 하려고 하는 것은 무엇인지 고르시오.
① 파티   ② 운동회   ③ 전시회   ④ 여행   ⑤ 쇼핑

17번. 대화를 듣고, 여자가 하려고 하는 것 중에서 가장 초점을 두는 것을 고르시오.
① 가격　　　② 장소　　　③ 음식　　　④ 시간　　　⑤ 손님 수

Script

1　　W: This is the weather forecast from CBC. I'm sure that you are enjoying this mild weather today. It will be sunny and warm throughout the whole day. However, it will start to get cloudy very early tomorrow morning, and it'll rain all day long. Thank you.

2　　M: Mina, what are these drawings for?
　　W: I'm thinking over the design for my banner. I need one to cheer for Jenny when she's on the stage in the school festival.
　　M: Oh, yeah, I heard about that. Let me see.
　　W: Here. I'll make it in black and white, but I can't decide whether to use her real name or nickname. Also, do you think it's better to put an image on it?
　　M: I think simple is best. It's really dark inside the auditorium, so a banner that has only her real name 'Jenny' in the center without any images will stick out even from the stage.
　　W: I see your point. I'll follow your advice.

3. 다음을 듣고, 안내방송에서 언급된 것을 고르시오.

M: The musical will start in 30 minutes. Be sure to be seated at least 10 minutes before the show begins. Your seat number is written on your ticket. We recommend checking the seating map and finding where your seat is in advance. Show your ticket to the staff at the door. Remember that photography is not allowed during the show.

M: Hi, Minji. Do you want to go swimming tomorrow?

W: Ok! When shall we meet?

M: How about at 10 o'clock at the swimming pool?

W: I don't know where it is. How about meeting at the subway station near my home?

M: Okay. See you there.

W: Jason, what did you do last weekend?

M: I went to the baseball park with my friends. It was exciting! How was your weekend?

W: I was going to go picnic with my family, but my brother was sick.

M: Oh, that's too bad.

W: My parents went to the hospital with him and I cleaned my room at home.

M: I'm sorry to hear that.

6   G : What's wrong with your eyes? They're red.

B : I know. And my neck hurts, too.

G : Did you play computer games until late last night again?

B : Yeah.

G : I'm worried about your health. You'd better stop playing them.

B : Alright, I will.

7

M : Hi, Sujin. Where are you going?

W : I'm going to Kyungyang Art Hall.

M : Why are you going there?

W : I'm going to watch the musical 'Hero'. And I really want to watch it.

M : Sounds great.

8   W: Hello, how much does it cost to rent ice skates?

M: The rental price depends on the size. All shoes in children's size are 5,000 won, while those in

adult's size are 10,000 won.

W: Then, I'd like to rent 2 pairs, one for me and the other for my 5-year-old daughter.

M: Do you have your own helmets? You are not allowed to enter the ice rink without them.

W: Oh, then, I should rent 2 helmets as well.

M: No problem. One helmet costs 5,000 won.

9

M: Henna, I read your self-introduction letter. Overall, it is pretty well-organized. All the paragraphs are smoothly connected.

W: Thank you.

M: I only corrected some small mistakes like spelling errors.

W: I didn't review the paper thoroughly because I was a bit rushed. I'll check it again.

M: Good, but I want you to edit the last part. Clearly state what kind of journalist you want to be, as in which area you want to work and with what goal. That way, you can be more specific about your dream.

10

W: It's time to introduce the latest hot movie. Our pick for this week is "Turn It Up." It is a new movie by the famous action movie director Peter Smith. He took 2 years to complete this film. With an all-star cast, a good story plot, and up-to-date computer graphic effects, "Turn It Up" is expected to be a huge success.

11   M: Yuna, I got 2 tickets for the movie "Maze Runner" tonight. Do you want to go see a movie with me?

W: Cool, sounds like a plan.

M: The movie starts at 7:30. We can have dinner before then.

W: Dinner is on me. A new Vietnamese restaurant downtown looks nice. Let's go there.

M: Fair enough. Do you think 1 hour is enough for having some food?

W: Plus an extra half an hour to get to the theater.

M: Okay. Then, the movie starts at 7:30, but I'll see you at the restaurant an hour and a half before the movie begins.

12   M: How come you started sharing your stories on the Internet at first?

W: I felt very lonely when I moved to Denmark for my husband's work. I wanted to talk to people, but I didn't have any friends. So instead, I wrote about my everyday life with pictures, sometimes posted about Danish culture, and gave tips for traveling here on my webpage.

M: It attracts many people. Haven't you thought of publishing a book or making a video log on Youtube?

W: I'm considering doing that, but maybe later on.

13 M: How are you feeling today?

W: Great. I'm having a day off from work.

M: Good. Let's check what you ate today and yesterday.

W: Here. I took pictures of all my meals.

M: Well, it seems like you follow the dietary regulations perfectly as promised. I'm glad. Did you feel tired after we met last time?

W: I had some pain in my legs, but I'm okay now.

M: That's the process of building muscles, so don't give up or be lazy even if the pain annoys you. Let's start today's workout.

14 M: Suji, are you going to lie in bed all day long?

W: Alright, daddy. I'll start my house work by taking out the trash.

M: And please sweep the floor in the living room, too.

W: Okay, but can I have lunch first? Your soup seems to be almost ready. I'll set the table.

M: No problem.

15 *(The phone rings.)*

W: This is LT Electronics customer service center. How may I help you?

M: Hi, I bought a vacuum cleaner last week, but it stopped working this morning.

W: Before I put your name on the repair demand list, let me ask you a few questions. Did you check the battery?

M: I charged it fully, and the power is on.

W: Then, how about the dust container? The vacuum cleaner is set not to work when the dust container is full.

M: I'll see. Umm... Oh, that was the problem. It's working now! I don't need a repairman. Thank you.

16~17

W: I'd like to make my birthday special.

M: Are you planning to go on a trip or...?

W: I'll have a party at my house!

M: That's not common these days, but it sounds fun.

W: Yes, I want to eat all my favorite foods as a present to myself. So, I thought it would be better to stay at home and have food delivered.

M: Haha. That makes sense. What foods are you thinking of?

W: Pad thai, rice noodles and Korean fried chicken must be included, but other items are still not decided. I'll invite some friends and ask them about the menu, too.

M: Wow. What a food festival. I'm looking forward to it.

APPENDIX 8. Sentence Reading Comprehension

※ 문장을 읽고 그 내용이 일반적으로 진실이거나 문장이 의미가 통하면 Y, 그렇지 않으면 N에 표시하세요.

▶ 예시: 아래와 같이 문제를 풉니다.

Sentence	YES (네)	NO (아니 오)
Dogs have four legs. *(개는 다리가 네 개이다)*	(Y)	N
Airplanes are made of dogs. *(비행기는 개로 만들어진다)*	Y	(N)
The map shows how far it is to India. *(그 지도는 인도가 얼마나 멀리 있는지 보여준다)*	(Y)	N
A monkey can fly. *(원숭이는 날 수 있다)*	Y	(N)

▶ 연습: 아래 문제를 풀어봅니다.

	Sentence	YES	NO
1.	The map shows how far it is to India.	Y	N
2.	Airplanes are made of dogs.	Y	N
3.	Dogs have four legs.	Y	N
4.	A monkey can fly.	Y	N

▶ 본 활동: <u>5분동안</u> 응답하세요. 선생님께서 '시작'하면 뒷장에서 시작합니다. 선생님께서는 칠판에 시작과 종료시간을 써주세요.

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	Sentence	YES	NO
1.	Peter's dream is to become a theater.	Y	N
2.	This computer tastes so sweet.	Y	N
3.	She thinks a clean classroom to be important for studying.	Y	N
4.	They broke him president of the company.	Y	N
5.	He advised me to see a doctor right now.	Y	N
6.	Mr. Bans ordered us to finish the river by Monday.	Y	N
7.	The window made me fly for hours.	Y	N
8.	I smelled something burning in the kitchen.	Y	N
9.	The restaurant has already taught.	Y	N
10.	English newspapers can be used by students to study English.	Y	N

Due to the copy right of the original author (Oh, 2016), only part of the material was presented.

APPENDIX 9. Passage Reading Comprehension

※ 1번에서 2번까지 아래 이야기를 읽고 물음에 답하시오.

Sally

   I really needed to wash my puppy. She had grass and mud all in her hair. She kept running away from me inside the house.

   "Stop. Sally!" I said as she jumped up on the couch.

   "Get down. Sally!" I said and she ran fast to my bedroom. She ran around my room, and then she ran outside through the kitchen.

   "Oh, what are you going to do now?" I asked. I saw her roll and roll in the grass and mud. Then, she came right to me and sat down. "Now, you really need a bath!" I said.

---

1. 윗글의 Sally의 특성으로 가장 알맞은 것을 고르시오.
  ① 남을 잘 보살핀다.
  ② 장난치는 것을 좋아한다.
  ③ 깔끔하다.
  ④ 화를 잘 낸다.

2. 윗글의 흐름상 화자가 바로 다음 할 일로 가장 적절한 것을 고르시오.
  ① 부엌으로 갈 것이다.
  ② 머리 손질을 할 것이다.
  ③ 강아지를 목욕시킬 것이다.
  ④ 강아지와 풀밭에서 놀 것이다.

The Great Escape

"I promised we would escape," the old elephant told her friends. A younger elephant said, "Yahoo, no more zoo!" Each animal looked happy. The animals had to ⓐtiptoe, not to make the sleeping zoo keeper awake.

"We're free!" Two donkeys shouted.

"But I'm hungry," one of the lizards said. "Who will feed us?"
The animals looked at each other.

"I'm tired," said the penguin, "and I miss my bed." ⓑNobody knew what to say.

Then the gorilla made a speech. "This was fun," he said. "Now, shall we tiptoe back inside?"

The animals cheered and shouted, "Let's go home!"

---

3. 동물들이 어디로부터 탈출했는지 고르시오.
① 정글에서
② 동물원에서
③ 서커스 단에서
④ 대형선박에서

4. 밑줄 친 ⓐtiptoe와 바꾸어 쓸 수 있는 말로 가장 적절한 것을 고르시오.
① walk nicely
② walk happily
③ walk quietly
④ walk beautifully

5. 윗글의 흐름상 밑줄 ⓑNobody knew what to say의 이유로 가장 적절한 설명을 고르시오.
① 사육사가 알아차려서
② 예상과 다르게 현재 행복하지 않아서
③ 도마뱀과 펭귄의 불평이 어이가 없어서
④ 하고 싶은 것이 너무나 많아 기대에 부풀어서

Planning a Mural

The students in the art club were making plans. They wanted to paint a mural on the outside of the town's recycling center. Their teacher offered to help them write a letter. The letter would describe the plans for the mural. It would ask for permission to paint. The students would ask people in town to sign the letter. If enough people signed, the students would take it to Town Hall.

The students had begun to argue over ideas for the mural. They had very different ideas. Sammy hoped to paint a picture of the town. Jessie wanted to show a rainy day and a sunny day. Mina just wanted to paint puppies. She loved puppies! But　ⓐLorry's choice was the winner. Everyone agreed it was the perfect idea. Their mural at the recycling center would show people recycling!

6. 윗글의 내용으로 보아 'Mural'은 무엇인지 고르시오.
① a plan　　② a letter　　③ a big painting　　④ a recycling center

7. 학생들이 시청(Town Hall)에 가야 되는 이유로 가장 적절한 설명을 고르시오.
① 아이디어를 얻기 위해
② 작업에 대한 허락을 받아야 하므로
③ 편지 작성을 위한 도움을 받기 위해
④ 사람들의 서명을 받기 위해

8. 밑줄 ⓐ는 무엇인지 고르시오.
① 재활용하는 지역주민　　　② 귀여운 강아지
③ 우리 동네 모습　　　　　④ 비오는 날과 맑은 날

Running with Jennifer

Tara sat at her front window. She gazed out at the school track across the street and thought of her friend Jennifer. She thought of all the long runs they had taken together. Jennifer lived far away now. Without her friend, Tara just felt bored when she ran.

The girls still talked by phone from time to time, but it was not the same as when they had run together. Back then, they would chat about everything. Spending time together had made the running fun. Their friendship had been closer then, too.

Tara watched her younger sister cross their front yard, talking on her cell phone. Then, Tara had **an idea.** The next day, Tara and Jennifer had a running date. They talked and laughed as they ran along. They weren't exactly side by side. Jennifer was in another city, but thanks to their cell phones, their running was going strong again. So was their friendship.

9. Tara의 여동생은 어디에 있는지 고르시오.
① 학교 운동장   ② 집 앞마당   ③ 다른 도시   ④ 집 안

10. Tara의 고민은 무엇인지 고르시오.
① 학교 육상팀에 못 들어 간 것
② 동생과 다투고 화해를 못한 것
③ 친구와 연락할 핸드폰이 없는 것
④ 친구랑 함께 보냈던 시간이 그리운 것
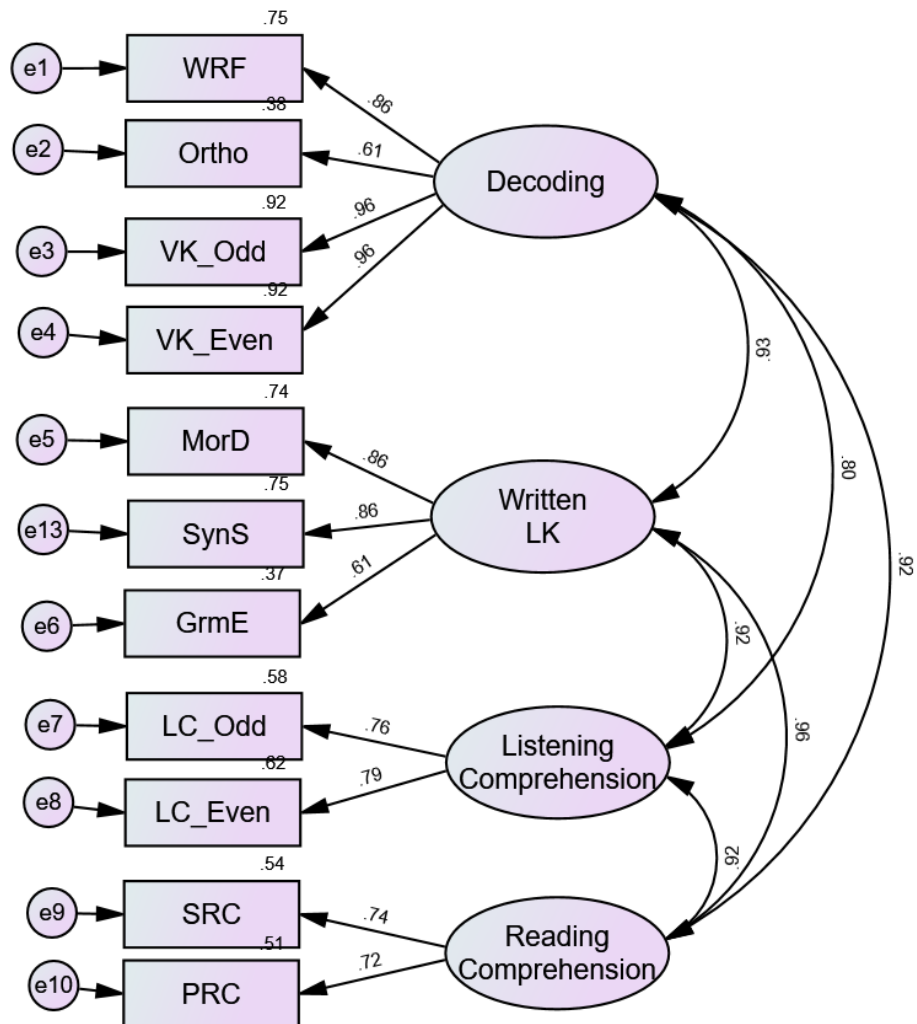
11. 윗글의 흐름상, 밑줄 an idea에 대한 내용으로 가장 적절한 것을 고르시오.
① 전화기를 편안하게 잡는 법
② 달리면서 전화를 할 수 있는 것

③ 여동생에게 전화 연락하는 것
④ 제니퍼에게 최근에 전화를 안 했던 것

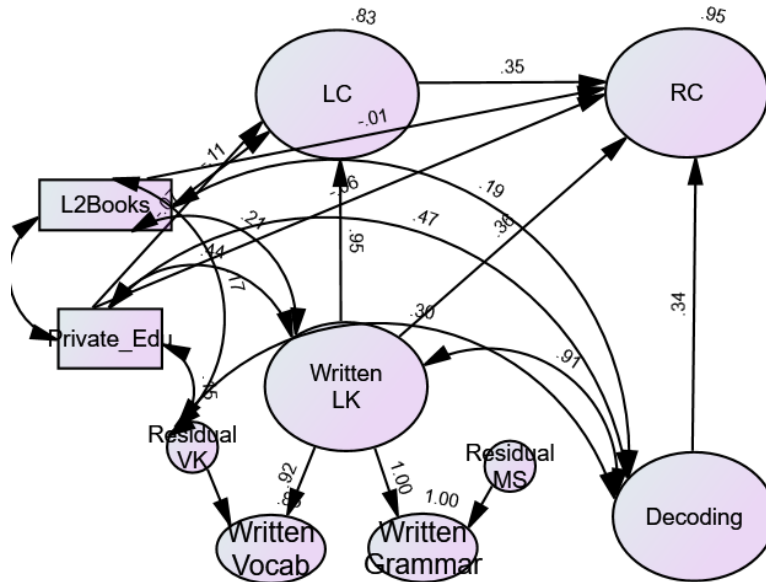12. Tara의 기분은 어떤 기분에서 어떤 기분으로 바뀌었는지 고르시오.
① 평화로움에서 불편함   ② 초조함에서 평안함
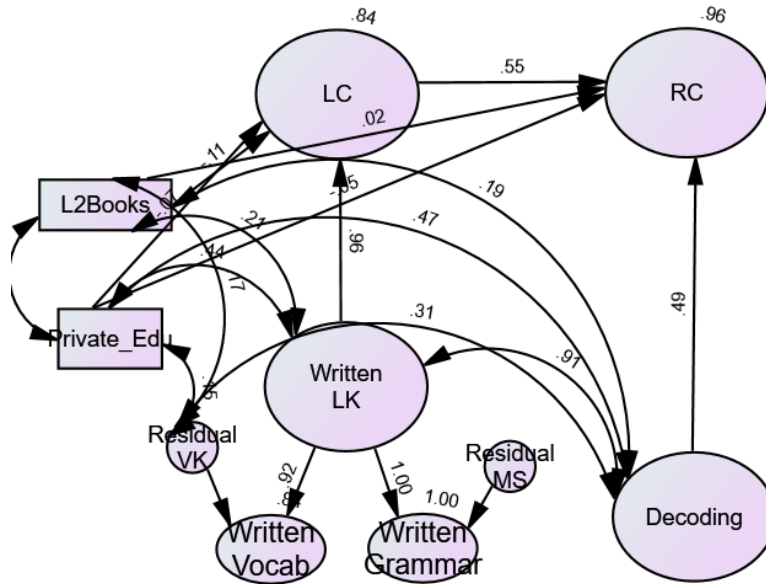③ 슬픔에서 행복함   ④ 기쁨에서 지루함

APPENDIX 10. A complementary CFA to test whether vocabulary variables are better represented under the L2 decoding

APPENDIX 11. Complementary Structural Models with Control Variables

Direct/Indirect Model with Control Variables

Indirect Model with Control Variables

국 문 초 록

문어적 외국어 언어 지식은 한국 중고등학교 영어 수업에서 주된 학습 요소인데, 외국어 학습 맥락에서 이루어지는 제 2언어 읽기 연구의 주요 변인으로 연구되고 있다. 그러나 언어 지식을 골자로 하는 외국어 읽기 능력에 대한 설명은 좀더 다양한 집단에서 폭넓게 지지 받고 있는 '단순 읽기 이론'에 상응하지 않는다. 이 이론은 읽기 능력을 해독 능력과 보통 청해 능력으로 정의되는 언어이해 능력, 이 두가지로 설명할 수 있다고 제안한다. 본 연구는 단순 읽기 이론의 틀 안에서 외국어 학습자의 문어적 언어 지식이 다른 변인과 어떤 관계를 갖고 제 2언어 읽기에서 어떤 역할을 하는지 규명하는 것이 목적이다. 이러한 연구 목적을 위해 문어적 언어 지식과 독해 능력 간의 직간접적인 관계를 가정하는 두가지 가설, 즉 직간접 모형과 간접 모형을 세우고 구조 방정식을 사용하여 외국어 학습맥락에서 제 2언어 읽기를 하는 학습자들의 읽기 능력을 가장 적합하게 설명하는 구조적 관계를 조사하였다.

연구 참여자는 한국의 서울과 그 주변지역에 중하위 소득 지역에 위치한 학교에 다니는 고등학교 1학년들이다. 250명의 데이터를 분석에 사용하였다. 9개의 측정도구를 사용하여 외국어 읽기 관련 능력을 측정하였으며 두번의 세션을 거쳐 자료를 수집하였다. 9개의 측정치 중 두개는 문항 꾸러미 방법을 통해 각각 두개의 측정치로 나누어 총 11개의 측정치를 구했다. 11개의 측정치를 확인적 요인분석을 통해 4개의 잠재 변인(해독 능력, 문어적 언어 지식, 청해 능력, 독해 능력)으로 만들었다. 이 중 문어적 언어 지식은 어휘 지식과 문법 지식을 공통으로 설명하는 상위구인으로 설정하였다. 이 4개의 잠재변인과 11개의 측정변인간의 관계를 나타내는 측정 모형은 여러 지표를 통해 그 타당성이 검증되었다.

문어적 언어 지식이 청해 능력을 거쳐 독해에 영향을 미칠 뿐 아니라 문어적 언어 지식이 독해 능력에 직접 영향을 미친다는 직간접 모형과, 문어적

언어 지식과 독해 능력이 직접적이지 않고 단지 청해 능력을 거쳐서만 독해에 영향을 미친다는 간접 모형의 모형 적합도를 도출하고 이 두 모형의 적합도와 간명성을 비교하였다. 그 결과 간접 모형이 모형 적합도 뿐 아니라 간명성을 갖춘 모형으로 판명되어 본 데이터를 가장 잘 설명하는 구조 모형으로 선택 되었다. 이 간접 모형은 기존의 단순 읽기 모형에 따라 외국어 맥락에서 제 2언어 읽기를 학습자는 외국어 학습자들의 독해 능력도 해독 능력과 청해능력으로 설명 될 수 있음을 보여준다. 더욱 중요한 것은 이 간접 모형에서 청해 능력이 문어적 언어 지식과 독해의 관계를 완전 매개한다는 점이다. 그리고 문어적 언어 지식은 외국어 학습자의 청해 능력과 상당히 큰 관계를 갖고 있었다.

이러한 연구 결과는 총 다섯 가지 측면에서 논의되었다. 문어적 언어 지식과 독해능력의 관계에서 청해 능력의 역할, 문어적 언어 지식이 청해 능력의 하부 구성요소로서의 역할, 문어적 언어 지식과 독해 능력의 관계가 직접적이지 않고 오로지 간접적으로만 나올 수 있는 원인, 본 단순 읽기 모형에서 추가된 문어적 지식의 특징, 마지막으로 단순 읽기 이론으로 설명 될 수 있는 고등학교 1학년 외국어 학습자의 영어 독해 능력의 특징에 대해 깊이 있게 논의 하였다.

본 연구의 이론적 함의점은 다음과 같다. 위의 연구 결과는 외국어 학습자를 대상으로 단순 읽기 이론의 적용 가능성을 다시 한번 확인하였으며, 나아가 기존의 단순 읽기 이론에 문어적 언어 지식을 새롭게 추가하여 그 관계가 변하는지 혹은 청해 능력과 문어적 언어 지식이 외국어 학습자의 영어 독해 능력에서 펼치는 역할이 무엇인지 보여주었다. 본 연구는 외국어 맥락에서 이루어진 선행 연구에서 종종 구별되지 않고 사용된 언어 지식적 변인과 구어 이해 능력을 구분하여 단순 읽기 이론에서 문어적 언어 지식의 역할을 밝히는 시도를 했다는 점에서 의의가 있다. 마지막으로 본 연구에서 제안한 구조 모형은 본 참여자와 같은 낮은 수준의 고등학교 영어 학습자들의 독해 능력을 90% 이상 설명한다는 점에서 외국어 읽기 모형으로 지지될 수 있다.

페다고지적 시사점도 제안 될 수 있다. 그 중 하나는 어휘와 문법과 같은 문어적 언어 지식이 여전히 중요하지만, 그 지도 방식이 본 연구에서 조작화된 방식처럼 이해를 위한 처리능력 향상에 중점을 두어야 한다. 또한 한국의 고등학교 1학년 영어 학습자들이 영어 단어 수준에서부터 해독 능력 향상을 위해 좀더 많은 연습을 할 수 있도록 지도할 필요가 있다. 연구의 제한점은 후속 연구 방향과 관련지어 논의 되었다.