

The University of Oxford

Skills that Predict Reading in Korean Primary School Children at Year 2

Trinity Term 2016

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A thesis submitted in partial fulfilment of the requirements for the degree of Master of Science (Child Development and Education) at the University of Oxford.

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Abstract

The present study explored the relationship between reading comprehension and the following predictors: vocabulary, phonological awareness and rapid automatized naming (RAN). It is acknowledged that decoding skills exert an important influence in early reading while language skills take its place in later stages. However, the majority of studies on the predictors of reading comprehension have focused on children learning to read English, a deep orthography. Accumulated evidence on the development of reading comprehension in orthographies other than English suggest that underpinning reading skills may develop at a different pace for children learning to read Korean, a language with a highly transparent orthography and unique alphabet.

Forty-eight children in Year 2 were sampled from three schools in the suburbs of Taegu, South Korea. The children were assessed on reading comprehension, receptive vocabulary, phonological awareness and rapid automatized naming (RAN). Nonverbal intelligence and age in months were used as a covariate. It was hypothesized that if results of the data analyses showed vocabulary to be as important, or more important, than phonological awareness in predicting reading comprehension, it would suggest that decoding skills are reaching a ceiling and language skills are starting to exert an important influence on reading comprehension for the Korean children.

Results of the multiple regression analyses showed that vocabulary and phonological awareness had an equal effect in predicting reading comprehension scores, respectively explaining 15.8% and 13.3% of added variance after nonverbal intelligence and age in months had been controlled for. Rapid automatized naming did not have a significant predictive effect on reading comprehension with any of the statistical models. The findings support the emergence of oral language skills as an important determinant of early reading comprehension in Korean. The equal importance of phonological awareness suggests that phonological principles are of universal importance for early reading, regardless of the simplicity of the orthography. The findings of the effect of RAN added to the discrepancies in the literature (Word count: 17484).

Introduction

1.1. Background

Studies of the development of reading comprehension are fewer in number than studies of word reading. Moreover, the precise relationship between reading comprehension and its underpinning skills is neither clear-cut nor has been explored systematically (Oakhill & Cain, 2008; Roth, Speece, & Cooper, 2002). However, it is possible to identify a general trend of development in reading comprehension across readers of all orthographies; word identification and phonological skills limit reading comprehension in the early stages of reading, as children struggle to map orthographic units to their respective sounds. Such influence of decoding skills tends to diminish with age as the process of decoding becomes automatized (Parrila, Kirby, & McQuarrie, 2004; Willson & Rupley, 1997). As comprehension of written language approximates the comprehension of spoken language (Hoover & Gough, 1990), language skills, such as vocabulary, morphology, syntax and higher-order discourse skills, emerge as an important factor in predicting reading comprehension (H. W. Catts, Hogan, & Adolf, 2005; Gough, Hoover, & Peterson, 1996; Storch & Whitehurst, 2002; Tabors, Snow, & Dickinson, 2001; Vellutino, Scanlon, Small, & Tanzman, 1991).

The majority of studies examining the relationship between reading comprehension and underpinning reading skills which account for individual differences in reading have focused on participants learning to read in English. However, a growing number of studies on reading in orthographies other than English suggest that literacy skills may develop at a different pace for these orthographies (Cossu, Shankweiler, Liberman, Katz, & Tola, 1988; de Jong & van der Leij, 2002; Ellis, Natsume, Hoxhallari, van Daal, & Polyzoe, 2004; Georgiou, Parilla, & Papadopoulos, 2008; Megherbi, Seigneuric, & Ehrlich, 2006; Öney & Durgunoğlu, 1997; Patel, Snowling, & de Jong, 2004; Thorstad, 1991; X. Wang, 2015; Wimmer & Goswami, 1994). For alphabetic orthographies that are shallower than the English orthography such as those of Dutch, Italian, Turkish and Finnish, studies have demonstrated that decoding skills, such as phonological awareness or word recognition, reach a ceiling and language skills exert a strong influence on reading comprehension even in the first one or two years of schooling (Cossu et al.,

1988; de Jong & van der Leij, 2002; Müller & Brady, 2001; Öney & Durgunoğlu, 1997).

It is hypothesized that orthographical depth affects the rate at which children become fully proficient at decoding written language; subsequently, it might be anticipated that decoding, and phonological factors related to decoding, will account for less of the variance in learning to read in earlier stages than is expected in readers learning to read in English. In its place, language skills may emerge as an important factor as more cognitive resources could become available for higher-level processes of text integration and comprehension (Müller & Brady, 2001).

Special attention is focused on the attributes of the orthography of Korean in this dissertation. The writing system of Korean is a highly transparent orthography with a one-to-one correspondence between grapheme and phoneme. Also, the Korean alphabet, Hangul, provides access to phonological information in its very design, in that the letters depict or symbolize the activities made by the vocal tract when the sound is articulated, that consonants and vowels are easily differentiated by the forms of the letters, and that consonants and vowels are arranged in a set pattern by grouping phonemes in syllable blocks. It is hypothesized that these features will make decoding words in Korean relatively easier. Studies on the development of reading comprehension Korean suggest that this may indeed be true, demonstrating an emergence of oral language skills as strongly influential on reading comprehension of children in Years 1 to 2 (A. Kim, Yoo, Hwang, Kim, & Koh, 2010; Yoon, 2015). However, the limited number of studies on the topic requires further investigation of the profiles of the relative contribution of literacy skills to reading comprehension in this age group.

Based on examination of the literature, the present study aimed to explore the relationship between reading comprehension in Year 2 Korean children and the following predictors: vocabulary, phonological awareness, and rapid automatized naming (RAN). Vocabulary, one of the best predictors of reading comprehension (Thorndike, 1973), was selected from the domain of oral language skills; phonological awareness was selected from the domain of decoding skills in regard to its crucial importance in the decoding process. Rapid automatized naming (RAN), a

predictor receiving recent attention in the field of literacy development (de Jong & van der Leij, 2002; D. Kim, Park, & Lombardino, 2015; Landerl & Wimmer, 2000; Müller & Brady, 2001; H. Park & Uno, 2012), was also selected as worthy of investigation; this decision was made as the literature suggested that RAN is strongly linked to reading comprehension in both the early and later stages of reading in transparent orthographies (Müller & Brady, 2001; Wimmer, Landerl, & Schneider, 1994; Yoon, 2015). Also, RAN was thought to be differentiated from vocabulary and phonological awareness, thus making the results of the analyses of the effects of RAN independent from possible comparisons between the effects of vocabulary and phonological awareness. There were many other predictors of reading comprehension that may have been selected for this study, but time constraints prohibited this.

If results of the data analyses identified vocabulary to be as effective, or more effective, than phonological awareness in predicting reading comprehension, it would suggest that decoding is reaching a ceiling and language skills are emerging as an important force in predicting reading comprehension in Korean. This would suggest such changes take place at an earlier stage for Korean children than is expected of children learning to read in English

1.2. Structure of the Dissertation

This chapter introduces the background of this study, with definitions of the terminology. Chapter 2 discusses the body of accumulated research on the development of reading comprehension, the different rates of development observed in children learning to read in orthographies other than English, the characteristics of the Korean writing system, and findings of studies on Korean children. Chapter 3 describes the methodology, design, measures and procedures that were decided as most appropriate for the purposes of the research. Chapter 4 describes the main results of the data analyses and its contribution to the proposed hypotheses. The findings presented in Chapter 4 are critically discussed in light of the literature. The dissertation is completed by the final chapter which considers the limitations and contributions of the present study, and presents suggestions for further research and classroom practice.

1.3. Terminology

Reading Comprehension: is the process of constructing meaning, or a mental representation from written language via an active and constructive process (Perfetti, Landi, & Oakhill, 2005, p.22; Snow, Griffin, & Burns, 2005). It is conventionally viewed as the ultimate 'end' goal of reading (Lai, George Benjamin, Schwanenflugel, & Kuhn, 2014). Reading comprehension is operationalized as encompassing both sentence and passage comprehension in this study.

Vocabulary: is knowledge about word meanings; breadth in the knowledge of word meanings, as well as relations and associations between individual words, is essential to understanding fully the sentences in a text and particular nuances of meaning (Cain, 2010d)

Phonological Awareness: is an awareness of the smallest units of sound that allow speakers of a language to differentiate among words. Noticing, thinking about, or manipulating phonemes in words shows phonological awareness (Snow et al., 2005).

Rapid Automatized Naming (RAN): are tasks that require the participant to name arrays of familiar items such as letters, digits, colours and objects, as quickly as possible. It is thought that rapid automatized naming, although clearly differentiated from phonological awareness, taps into the skills important for the phonological recoding of letter skills that enables access to meaning (Cain, 2010b).

Decoding or phonological decoding: is a process of reading an unfamiliar word by translating the graphemes into their corresponding phonemes and blending these sounds together to pronounce the word (Cain, 2010c)

Orthography: is a way of representing the spoken language by written graphemes, and includes a set of widely applicable grapheme-phoneme conventions such as word spellings, some based on morphology, etymology, and the history of the language (Snow et al., 2005).

2. Literature Review

This chapter begins with an introduction to the skills that contribute to reading comprehension. In Section 2, the changes in the contribution of literacy skills to subsequent reading development are described in detail. In Section 3, characteristics of the orthographies of English and Korean are introduced, along with research on the relative contribution of literacy skills to reading comprehension in orthographies that are more transparent than the orthography of English. The findings of the studies on the development of reading comprehension in Korean children are described in detail. The chapter is completed with the rationale for the design of the present study based on consideration of the relevant literature.

2.1. Literacy Skills Contributing to Successful Reading Comprehension

In order to read and comprehend text, the reader must decode visual orthographic units into phonological units, which taps into the orthographic and phonological skills of the reader (Perfetti et al., 2005). Reading comprehension also draws on many different oral language skills. According to Cain and Oakhill (2006), these include lower-level lexical skills such as word reading efficiency, morphology and vocabulary, sentence-level skills such as knowledge of syntax, and higher-level text processing skills such as inference generation, comprehension monitoring and working memory capacity. Efficient lower-level lexical skills such as vocabulary facilitate reading comprehension by enabling more resources to be used for higher-level processes, while higher-level skills help the reader make necessary integrative and inferential links to construct a meaning-based representation of the text.

This section describes the predictors (called ‘underpinning skills’) of reading comprehension selected for this study: phonological awareness, vocabulary, and rapid automatized naming (RAN). The contributions of these skills to reading comprehension are described, followed by an outline of the trends in the predictive power of the respective skills to reading comprehension, with age and reading progress.

2.1.1. Phonological Awareness

Phonological awareness is an important foundation for effective and efficient decoding of written text, word identification and subsequent comprehension;

extensive evidence demonstrates its link to word-level reading (Perfetti et al., 2005). Because of this, phonological awareness is a powerful determinant of early literacy acquisition. Research on the contribution of phonological awareness to early reading shows mixed results, possibly because of differences in the nature of the comprehension assessment and in particular, its reliance on word recognition skills (Oakhill & Cain, 2008). However, a positive effect of phonological awareness on reading comprehension can be found across the literature. For example, Manis, Seidenberg and Doi (1999), in their work on the relationship between phonological skills, rapid automatized naming (RAN) and the development of word reading and comprehension in first and second grade, found that their measure of phonological awareness (sound deletion) accounted for substantial variance in reading comprehension at the end of first grade, with the autoregressive effect of earlier comprehension taken into account. Phonological processing tasks have also predicted passage comprehension significantly, even after controlling for earlier reading comprehension scores and word reading ability (Hansen & Bowey, 1994; Kirby & Parrila, 1999).

The influence of phonological awareness on reading comprehension has shown to decrease as children progress in reading. Willson and Rupley (1997), in a longitudinal study assessing performance across grades at four different time points, found that reading comprehension was primarily driven by phonemic knowledge and background knowledge of the topic of the text in the early grades (2-4), but not in the later grades (4 and 6). Parrila, Kirby and McQuarrie (2004) in their longitudinal study of children from first to third grade found that phonological awareness measured at kindergarten predicted passage comprehension in all three grades, but in line with other studies, its influence declined across grades.

2.1.2. Vocabulary

Vocabulary facilitates reading comprehension by providing the semantic building blocks needed for construction of a mental representation; it is a good predictor of reading comprehension development, with Thorndike (1973) finding correlations of between .66 and .75 between reading comprehension and vocabulary knowledge (Cain, 2010d). Understanding of individual words is essential for fully understanding the sentences in a text and particular nuances of meaning. Tabors,

Snow and Dickinson (2001) found consistent correlations between receptive vocabulary measured at age 5 and reading comprehension at fourth- and seventh-grade. Out of a number of reading skills chosen as predictors of reading comprehension in the study, receptive vocabulary was a notably strong determinant of later reading comprehension.

Vellutino, Scanlon, Small and Tanzman (1991)'s findings also suggest that vocabulary is a strong determinant of reading comprehension, emerging as a strong force in the later school years rather than earlier years, where initial decoding skills are more important. Vellutino et al. (1991) found that neither vocabulary nor grammatical measures distinguished good and poor readers in second- and third-grade. This was consistent with Vellutino et al. (1996)'s finding of no group differences between normal and poor readers on semantic measures in kindergarten and first-grade. However, both vocabulary and grammatical measures differentiated good and poor groups at sixth and seventh grades, suggesting a rise in the importance of vocabulary in the later stages of reading.

2.1.3. Rapid Automatized Naming

Rapid automatized naming (RAN) refers to the rapid retrieval of phonological codes from permanent memory, typically names of items such as pictures of common objects, colors, digits, or letters (Wagner et al., 1997). Wagner et al. (1997) explain that when reading, the efficiency with which children retrieve phonological codes associated with letters, word segments, and whole words influence the success on the use of phonological information in decoding. Basic rapid processing of symbols and words is necessary for developing fluent reading skills; RAN draws from working memory, processing speed and long-term retrieval (Dehn, 2006); it is described as a specific type of long-term retrieval that involves associations between print (graphemes) and sound (phonemes) (Dehn, 2006).

RAN is an independent processing ability which differentiates itself from phonological awareness; studies have identified RAN to correlate with both accuracy and comprehension indices of reading skill, independent of the total number of words a child can identify correctly, or speed of identification (Bowers & Swanson, 1991; H. W. Catts, Fey, Zhang, & Tomblin, 1999; Parrila et al., 2004). Especially, it has been found in studies of transparent orthographies that RAN has a stronger and more

lasting effect than phonological awareness in predicting reading comprehension in later years (Landerl & Wimmer, 2000; Müller & Brady, 2001; Yoon, 2015); also, suggestions have been made that deficits in RAN, rather than phonological awareness, characterize the poor reader learning to read in transparent orthographies (Wimmer & Goswami, 1994). However, few studies have studied the effect of RAN on reading comprehension, underscoring the importance of further studies including RAN as a predictor (Yoon, 2015).

2.2. Development of Reading Comprehension and Changes in the Contribution of Underpinning Reading Skills

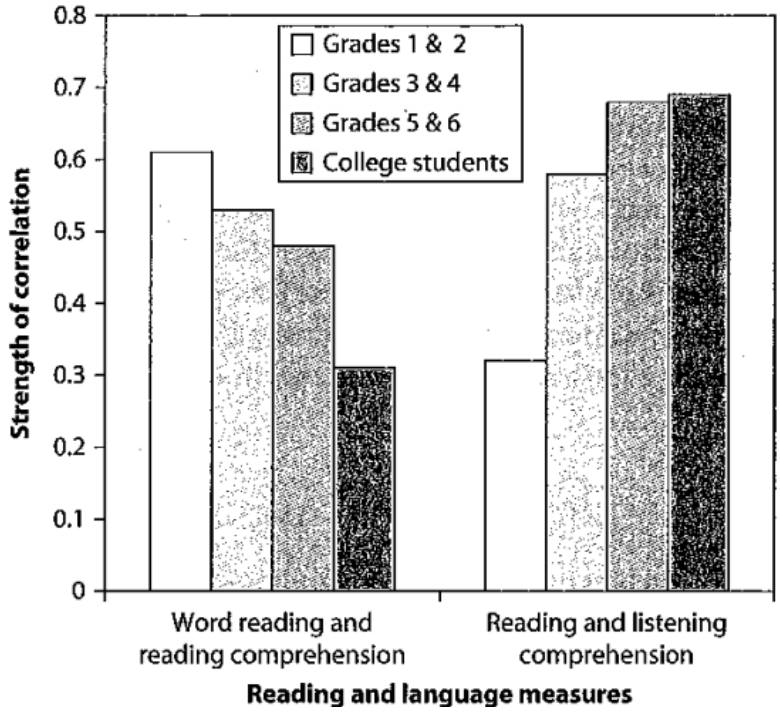
Hoover and Gough (1990) suggest that reading comprehension is comprised of two components: decoding skills and oral language skills. According to this view, reading comprehension development is a process of written language approximating the comprehension of spoken language (Perfetti et al., 2005). At the earlier stages of reading, children are learning to decode and identify words, which make decoding processes a limit to reading and thus an important aspect of it. However, when children move beyond the beginnings of learning to read, language skills become the dominant predictors of success of reading comprehension.

Accumulated evidence on reading comprehension show that the influence of decoding skills, with phonological awareness playing the crucial role, diminish with age and reading progress; and that language abilities emerge as a strong direct force later in the process of learning to read. Storch and Whitehurst (2002) found with children in second grade that reading was still heavily determined by code-related skills acquired by the end of kindergarten, and reading comprehension was also highly correlated with both word and non-word reading tasks. However, when the same children reached third and fourth grades, the pattern of influence changed substantially as reading accuracy and reading comprehension could be reliably separated, with language skills emerging as important predictors in explaining reading comprehension.

An influential study by Gough, Hoover and Peterson (1996) found in a meta-analysis of normally developing monolingual English readers in primary school that the correlation between decoding and reading comprehension declined with grade

level while the correlation between reading comprehension and listening comprehension, a composite of language skills, was generally consistent with the increase with grade level: the correlation coefficients between decoding skill and reading comprehension was .61, .53 and .48 at grade levels 1-2, 3-4 and 5,6 while the correlation coefficients between listening comprehension and reading was .41, .50 and .71 at respective grade levels. This shows clearly the diminishing importance of decoding skills on reading comprehension, and the increasing importance of language skills as reading comprehension becomes less a matter of translating orthographic units into words and more of higher-order comprehension.

Figure 1. The Changing Relations Between Word Reading (Decoding), Reading Comprehension and Listening (Oral Language) with Age. Adapted from Reading Developments and Difficulties (p.97)



A similar trend of the decreasing importance of decoding skills and increasing importance of language skills is found in the work of Roth, Speece and Cooper (2002). Roth, Speece and Cooper (2002) found the correlation between reading comprehension at Grade 1 and receptive vocabulary measured at kindergarten to be .38 while the correlation with reading comprehension at Grade 1 and phonological awareness measured at kindergarten was .71. At Grade 2, the effects of

phonological awareness decreased while the effects of receptive vocabulary increased, with the correlations being respectively .51 (receptive vocabulary) and .66 (phonological awareness).

Graph 1. The Correlation Coefficient Between Reading Comprehension and the Predictors Phonological Awareness and Receptive Vocabulary from the findings of Roth et al. (2002)

	Grade 1	**Grade 2**
Phonological Awareness	.71	.66
Receptive Vocabulary	.38	.51

This pattern is observed not only for normally developing children, but also for children with reading disabilities. Catts, Hogan and Adolf (2005) found in a longitudinal study of poor readers (children preforming at least 1 SD below the mean on reading comprehension) that listening comprehension accounted for 9% of the unique variance in reading comprehension at 2nd grade, but for increasing amounts at 4th grade (21%) and eighth grades (36%). The opposite pattern was observed for decoding skills such as word recognition, which accounted for a large amount of unique variance in 2nd grade (27%), less in 4th grade (13%), and only a small amount of variance in 8th grade (2%).

2.3. The Trajectories of the Development of Reading Skills Across Different Orthographies

The majority of studies on the underlying contributors of individual differences in reading comprehension have been carried out with children learning to read in English, a deep orthography. A growing number of studies of reading in orthographies other than English suggest that underpinning reading skills develop at a different pace for shallower orthographies (Müller & Brady, 2001).

It is possible to put orthographies on an orthographic depth continuum by the varying degree of phoneme-grapheme correspondence; transparent, or shallow orthographies have an almost perfect mapping of phonemes and graphemes while with deep orthographies, the same letter can represent different phonemes and the same phoneme can be represented by different letters (Frost, 1993). This section explains the following: the characteristics of the English orthography and the Korean orthography which lie on the two ends of this continuum, the advantages that

transparent orthographies may have, and the evidence accumulated on reading comprehension in Korean.

2.3.1. Characteristics of the orthography of English

English is regarded as having a deep, or opaque orthography, the main source of the complexity being that the vowel system, consisting of about 15 vowels, are represented by phonemes fewer in number (Snowling & Hulme, 2013). The reason is that the English orthography contains many words that are either irregular or inconsistent: that is, the conformity of a given letter cluster does not regularly match grapheme-phoneme rules, and words which are spelled in the same way can often be pronounced differently. An example of irregularity would be the pronunciations of *yacht* and *chef*, and an example of inconsistency would be *moth* and *both*.

2.3.2. Characteristics of the orthography of Korean

2.3.2.1. The Korean Writing System

Korean Hangul is a transparent alphabetic system in which letters are mapped directly to sounds; for example, the letter ㅏ can only be pronounced as /a/, and likewise the phoneme /a/ can only be spelled as the letter ㅏ (M. Wang, Ko, & Choi, 2009). Especially, Hangul is notable in that the consonants depict or symbolize the activities made by the vocal tract when the sound is articulated, that the letter forms of consonants and the letter forms of vowels are clearly distinguishable from the other group, and that it is written by grouping phonemes in blocks, in which consonants and vowels are arranged in a fixed pattern.

However, Hangul cannot said to be completely shallow as there are a few exceptions in which the written word is not pronounced exactly as the individual letter-phoneme correspondences would otherwise require, because the word is written in a morphophonemic way: i.e. some words retain spellings that reflect their etymology and morphology rather than their present-day pronunciation. Morphemes are made transparent in Korean orthography by re-syllabication and use of particles: for example, a verb stem 깊 (meaning “deep”) /gip/ + a noun suffix 이 /i/ is written using the two morphemes’ underlying representations, 깊이, although its

pronunciations is changed to /gi pi/ (기피 meaning “avoidance”) (Mcbride-Chang, Cho, & Park, 2008). This requires Korean children to learn the phonological “alterations” of the Korean languages triggered by re-syllabification, simplification in coda, consonantal assimilation, and palatalization from primary school (Mcbride-Chang et al., 2008)

2.3.2.2. Characteristics of Korean Hangul

The Korean alphabet, Hangul, is unique in that it was designed by literate experts with clear reference to Korean phonology. The consonants, which are shapes with angles and circles, depict the activities made by the vocal tract when the sound is articulated (C. Lee, Simpson, & Kim, 2006). The vowels, composed of long vertical or horizontal lines and dots, are not only visually clearly different from consonants but represent the concept of “vowel harmony”, which is often thought to be one of the most important characteristics of Altaic languages (Kim-Renaud, 1997a). Also, it is written by grouping phonemes in a set pattern by blocks of syllables; this makes the initial consonant, vowel and final consonant easily distinguishable as well as the number of syllables in a word. These features suggest that Hangul may provide for rapid access to phonological information to a degree not seen in most other language (C. Lee et al., 2006).

2.3.2.2.1. Letters

The following letters and clusters of letters are found in the modern script. The consonants and vowel letters differ clearly in that consonants are geometric shapes with angles and circles, and vowel letters are composed of long vertical or horizontal lines:

- 14 Consonant letters: ㄱ ㄴ ㄷ ㄹ ㅁ ㅂ ㅅ ㅇ ㅈ ㅊ ㅋ ㅌ ㅍ ㅎ
- 6 Vowel letters: ㅏ ㅐ ㅑ ㅒ ㅓ ㅔ ㅕ ㅖ ㅗ ㅘ ㅙ ㅚ ㅛ ㅜ ㅝ ㅞ ㅟ ㅠ ㅡ ㅢ

2.3.2.2.1.1. Consonants

Consonants are subcategorized depending on their place of articulation and their strength category. They are “iconic” of the phonemes they represent because they are either a depiction of articulatory activity or a symbolic representation of the place of articulation (Kim-Renaud, 1997b)

Figure 2. The Depiction of Articulation or Symbolic Representation of the Place of Articulation Featured in Letterforms of Hangul Consonants. Adapted from The Korean alphabet: Its history and structure (p.279)

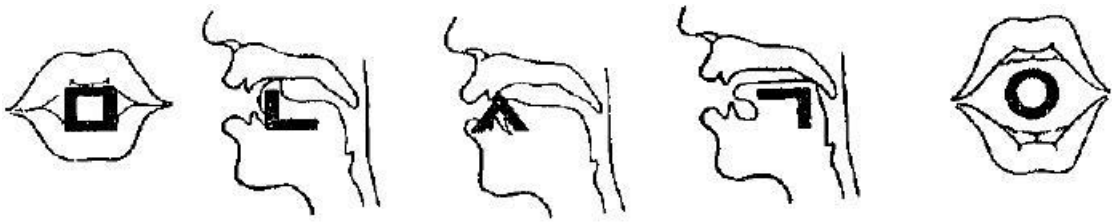


Table 2. The Five Basic Consonants of Korean Hangul and Its Variants by Increasing Strength of Sound. Adapted from The Korean alphabet: Its history and structure (p.164)

Basic		Stronger		Strongest
ㄱ /k/	→	ㅋ /k^{h}/		
ㄴ /n/	→	ㄷ /t/	→	ㅌ /t^{h}/
ㅁ /m/	→	ㅂ /p/	→	ㅍ /p^{h}/
ㅅ /s/	→	ㅈ /c/	→	ㅊ /c^{h}/
ㅇ /ɦ/	→	ㆆ /ʔ/	→	ㅎ /h/

The consonant letters ㄴ /n/ and ㄱ /k/, respectively, imitated the tongue shapes during articulation (with the speaker facing left) (Kim-Renaud, 1997a). The shape of ㄴ /n/ shows the tongue-tip raised to touch the front of the palate, while the shape of ㄱ /k/ shows indicates that the back of the tongue touches the rear of the palate (J. Kim & Davis, 2006). The consonants ㅁ /m/, ㅅ /s/, and ㅇ /-/, were signs representing shapes of the points of articulation (Kim-Renaud, 1997a). In the case of ㅁ, the basic letter shape adopted was like the Hanja (Chinese character) 口, which originally adopted the shape of the mouth (Kim-Renaud, 1997a).

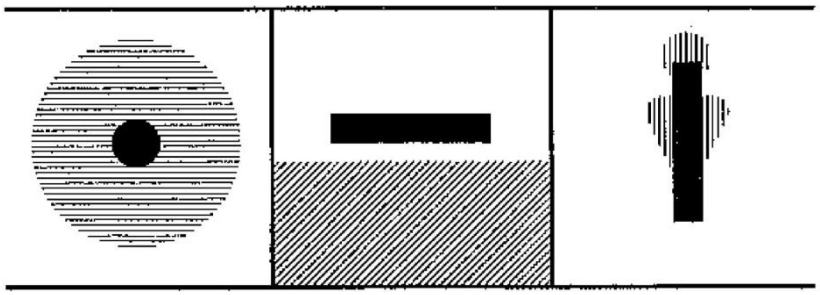
Variations on the basic theme were carried out in a systematic way (Kim-Renaud, 1997b). The five basic letters, chosen from the most gentle/soft series among the consonants, were expanded with a set of systematically added strokes to create sounds that were made in the same location of the vocal tract but were pronounced more roughly (strongly) (Kim-Renaud, 1997b). For instance, because ㅋ

/kʰ/ is an aspirated derivative of ㄱ /k/, a stroke was added to ㄱ to form ㅋ, as was the way ㅌ /tʰ/ was formed from ㄷ /t/, ㅊ /cʰ/ from ㅈ /c/ and ㆆ /ʔ/ from ㅇ /ɦ/.

2.3.2.2.1.2. Vowels

Vowel letters are constructed from three symbols representing three basic elements in traditional East Asian cosmology. The roundness of ㆍ represents the Sun in the heavens, the essence of *yin*. A horizontal line, ㅡ, represents the flat Earth, the essence of *yang*. A vertical line, ㅣ, represents the upright human, the neutral mediator between the Heaven and Earth. These three symbols were combined to produce a variety of vowels.

Figure 3. The Letterforms of Hangul Vowels. Adapted from The Korean alphabet: Its history and structure (p.280)



	Symbol of Heaven-Round dot	Symbol of Earth-Horizontal line	Symbol of Man Vertical line
	Basic	First Derivation	Second Derivation
Bright (Yang)	ㆍ	ㅏ ㅗ	ㅑ ㅛ
Dark (Yin)	ㅡ	ㅓ ㅜ	ㅕ ㅠ
Neutral	ㅣ		

A reflection to traditional cosmology as such did not only result in easy reception from the part of Koreans of the time, but also embodied iconically the semantic contrast that exists among vowels in Korean (Kim-Renaud, 1997b). In Altaic languages, the major feature for categorization of vowels are the two harmonic

groups, bright and dark vowels (Kim-Renaud, 1997b). In Hangul vowels, “bright”, or *yang* vowels, ㆍ, ㅗ, ㅏ, are visually distinguished by the dots on the *yang* directions of ‘up’ and ‘right’, on a basis of the neutral ㅣ. “Dark”, or *yin* vowels, ㅡ, ㅜ ㅓ, is an addition of the neutral ㅣ and dots on the *yin* directions of ‘down’ and ‘left’.

2.3.2.2.2. Syllable Blocks

All Hangul letters are grouped into syllabic blocks of at least two and often three: (1) a consonant, (2) a vowel and optionally, a consonant at the end of the syllable, for which the placement within a block follows a set pattern (C. Park, 2006). The placement or "stacking" of letters is as follows: a vowel letter is placed on the right-hand of the initial consonant, and a (optional) consonant is placed under the consonant and vowel. This makes phonological information- the initial consonant, the vowel, and final consonant- visually distinguishable by its position within the syllable block (C. Park, 2006).

Figure 4. Example of a Syllable Block with One Consonant and a Vowel



Figure 5. Example of a Syllable Block with an Initial Consonant, a Vowel and a Final Consonant



2.3.3. Reading comprehension development in a transparent orthography

2.3.3.1. Advantages of learning to read in a transparent orthography

Cross-linguistic studies on the alphabetic writing systems have shown that

orthographic transparency may affect learning to read. Schwanenflugel and Knapp (2015) describe that learning to decode words in a more transparent orthography is relatively easier because doing so is learning rules of translating the graphemes into phonemes that are much simpler than those that apply to a deep orthography.

Although few studies have made direct comparisons between readers of different orthographies via a systematic approach, there is accumulated evidence showing that children learning a transparent writing system read and spell more quickly than children learning an opaque system such as English (Hulme & Snowling, 2013). Studies have shown that children learning relatively transparent writing systems not only appear to learn basic phonological spellings more quickly but also demonstrate more advanced conventional spelling skills than those learning English (X. Wang, 2015). Ellis, Natsume, Hoxhallari, van Daal and Polyzoe (2004) found that 7-year-old English speaking children could read only 60% of sampled words accurately, while the percentage of young Albanian readers who could read words with similar meaning and frequencies came up to 80%. Patel, Snowling and de Jong (2004) found that children learning to read in Dutch were able to name words with greater accuracy and speed than English readers of a similar age and experience. A study comparing the non-word reading skills of English and German-speaking children found that the German-speaking eight years olds were able to read at a faster rate and made only a fifth of the reading errors as the English-speaking children (Frith, Wimmer, & Landerl, 1998). In a comparative study of English-speaking children and Italian-speaking children, Italian children were shown to acquire the same fluency in reading after one year that English children typically achieve after three to five years (Thorstad, 1991).

2.3.3.2. A shift in the relative importance of skills predicting reading comprehension

The ease with which children learning to read in shallower orthographies acquire decoding skills suggests that phonological awareness may be less important for learning to read in orthographically transparent writing systems than in deep and inconsistent ones, because transparent systems would place a smaller demand on young readers (Schwanenflugel & Knapp, 2015). For children who struggle to learn to read in English, teaching letter sounds is not nearly enough phonics knowledge;

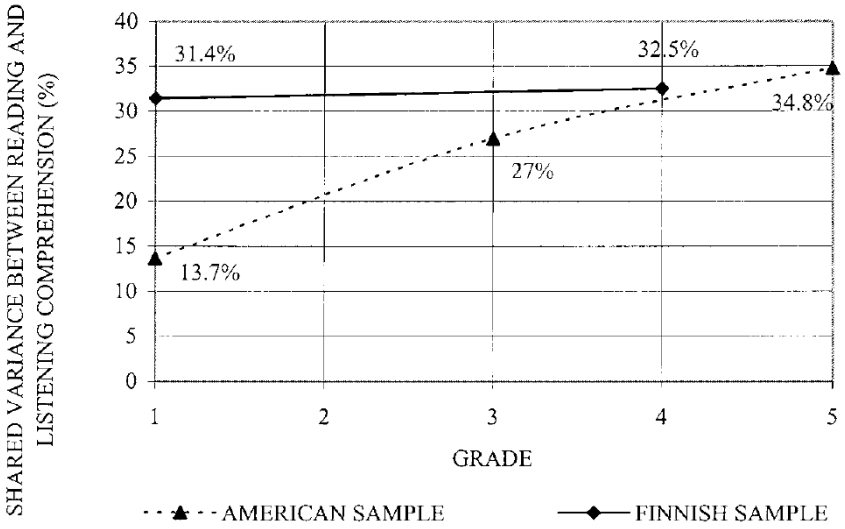
children truly need to have a deep understanding of the phoneme system to be able to map various letter combinations to their respective sounds. However, children learning to read in a transparent orthography will be able to learn the necessary phonics patterns within a year a so, even for children who struggle (Schwanenflugel & Knapp, 2015).

The reciprocal relationship between phonological awareness and the development of literacy found in the alphabetic language systems needs to be taken into account as a possible explanation for an earlier proficiency in phonological awareness tasks found in learners of transparent orthographies (Hulme & Snowling, 2013). Morais, Cary, Alegria and Bertelson (1979) found that illiterate adults could not add nor delete a phoneme at the beginning of a word, while literate adults with similar environment and childhood experiences could do so easily. This suggests that phonological awareness may improve as a result of being trained to read and spell. It is hypothesized that children learning to read in transparent orthographies improve their phonological awareness earlier as a result of more experience in reading and spelling activities, compared to their counterparts in the same developmental stage learning a deep orthography.

Due to this, it is possible that transparent alphabetic writing systems may shift the relative importance of skills that are necessary for, or predictive of reading comprehension (Florit & Cain, 2011). Müller and Brady (2001) suggest that for children learning to read Finnish, a transparent orthography with a high regularity between spoken phonemes and graphemes, the effects of phonological awareness may diminish and the effects of oral language skills may emerge as important predictors earlier in the stages of reading comprehension development. With regard to Hoover and Gough (1990), Müller and Brady (2001) made a comparison of the relation between reading comprehension and listening comprehension, a composite of language skills, in Finnish and English. These results, although tentative as not the same measures were used for respective samples, show that listening comprehension and reading comprehension in the Finnish sample shared roughly one third of their variance in both grades, whereas American children reached a similar level of association between listening and reading comprehension in the fifth grade, and not at a younger grade (Figure 6). An earlier importance of language

skills as such suggests that decoding skills may be mastered earlier in the Finnish children than for the American children, which would subsequently make language skills become a more important determinant of reading comprehension.

Figure 6. Percentage of shared variance between reading comprehension and listening comprehension in the Finnish and American sample at different grades (Stanovich, Cunningham, & Feeman, 1984)



Such trends have also been reported in Italian and Turkish, languages with highly regular writing systems (Cossu et al., 1988; Öney & Durgunoğlu, 1997). Especially with Turkish, Öney and Durgunoğlu (1997) found that after decoding skills were achieved in the first months of first grade, the importance of phonological awareness diminished rapidly. Öney and Durgunoğlu (1997) also investigated the relationship between reading comprehension and listening comprehension; results showed that reading comprehension at the end of first grade was more strongly predicted by listening comprehension than by phonological awareness (i. e. r=0.87 for listening comprehension and reading comprehension at the end of first grade).

Studies of reading in Dutch and French show that listening comprehension, rather than decoding skill, is also an important factor of reading comprehension even in the first year or two of reading instruction (de Jong & van der Leij, 2002; Megherbi et al., 2006). In a longitudinal study tracking children from Years 1 to 3, de Jong and van der Leij (2002) found that listening comprehension measured at the end of Year 1 had a higher correlation coefficient with reading comprehension than with

phonological awareness (respectively .61, .53). In a single-time point study with French children in Years 1 and 2, Megherbi et al. (2006) found that listening comprehension was a more powerful predictor of reading comprehension that decoding abilities via means of hierarchical regression analyses.

2.3.4. Development of reading comprehension in Korean

Although there are a large number of studies on early predictors of literacy in alphabetic orthography and a growing number of studies on Chinese, a non-alphabetic script, little is known about the development of reading comprehension in Korean (Taylor & Taylor, 1995). As with the literature in English, there have been a number of studies on the predictors of single word reading in Korean but very limited research on the predictors of reading comprehension (A. Kim et al., 2010).

However, it is possible to estimate a relationship between language skills and subsequent reading development which can be likened to the development of readers in English. M. Kim and Pae (2012) found on comparisons of reading skills between good and poor readers that poor readers in the later stages of reading do not differ in decoding skills compared to normal readers, but show deficits in oral language skills such as listening comprehension. Poor readers in the earlier stages of reading differed both in decoding skills and language skills with good readers, suggesting that decoding plays an important part in early reading and oral language emerges as an important factor in later reading for Korean as well as English.

Only two studies have investigated the predictors of reading comprehension in Korean across the school years via means of a multiple regression. In the first study, Kim et al. (2010) found in a study involving students from first to sixth years of primary school that oral language skills were important predictors of reading comprehension even at the first and second years of school instruction. Kim et al. (2010) found that sentence recall, listening comprehension, and reading fluency were significant predictors of reading comprehension for Year 1 children when entered with other predictors into a multiple regression model, and that listening comprehension, sentence recall, and vocabulary were significant predictors of reading comprehension for Year 2 children. In the second study, Yoon (2015) found in a collective group of children spanning Years 1 to 3 that not only word decoding

and rapid automatized naming, but receptive vocabulary was the predictor of reading comprehension.

Results of both studies were consistent with de Jong and van der Leij (2002) and Megherbi et al. (2006)'s findings of oral language skills emerging as predictors of reading comprehension even in the first one or two years of schooling in transparent orthographies. However, there were limitations in the findings of Kim et al. (2010) and Yoon (2015). Kim et al. (2010) excluded receptive vocabulary from the model in analyses of the data of children in Year 1, and phonological awareness from the model of children in Year 2, thus limiting a rigorous investigation of the relative importance of competing predictors. Yoon (2015) merged children from Year 1 to 3 into a single group, which did not elucidate the profiles of children at narrower age ranges.

A master's thesis written in Korean has attempted to investigate the predictors of reading comprehension of children in Year 2, despite the limitations in the use of measures. Yoon (2004) explored the correlation between phonological awareness, rapid automatized naming (RAN) and other skills with reading comprehension, finding a positive correlation between reading comprehension and the predictors of interest. However, the instrument developed for measurement of reading comprehension had limitations in terms of concurrent validity, as the reading assessment tool with which the instrument was correlated to measured children's ability to select the most appropriate word out of three to fit into a sentence. This method was not effective in measuring comprehension on a deeper level.

2.4. Rationale for the Current Study

This study is motivated by the lack of evidence on development of reading comprehension and the contribution of underpinning skills in Korean. Few studies have investigated the predictors of reading comprehension in South Korean schoolchildren; the emergence of oral language skills at the earliest years of primary school is notable from these results, necessitating the need for closer investigation of the predictors of reading comprehension at the first or second year of schooling.

A special interest was taken in the profiles of children in Year 2, not only because studies on reading comprehension of this age group were very few

compared to studies on children in Year 1 (D. Kim, Kim, & Lee, 2007; D. Kim et al., 2015; H. Park, 2013), but also as the importance of this age group was thought to be underestimated. Some studies conducted in South Korea suggest that this age range may be a critical period in which decoding skills are completed and oral language skills emerge as a strong force in predicting reading comprehension.

A correlational design at one age point was decided as appropriate. Neither a longitudinal nor a cross-sectional design was possible due to time constraints.

There were many skills that might have been selected as interest of this study. But as it was not possible to include all variables that may contribute to reading comprehension, it was decided to choose a variable each from the domains of decoding and oral language skills. Phonological awareness was chosen from the domain of decoding as it has been shown to play a crucial part in word decoding. Vocabulary was chosen with regards to the fact that it is one of the most important oral language skills for reading comprehension; vocabulary provides semantic foundations for efficient concept building processes, facilitates word recognition and has shown to be an important predictor of reading in later stages (Oakhill & Cain, 2008). Also, rapid automatized naming (RAN) was chosen for the following reasons; RAN has a unique contribution to reading apart from both decoding and oral language skills. RAN draws on working memory, processing speed and long-term retrieval and has been identified to be a stronger predictor than phonological awareness in predicting reading comprehension in transparent orthographies (de Jong & van der Leij, 2002; Landerl & Wimmer, 2000; Yoon, 2015). Also, RAN has an independence from the domains of vocabulary or phonological awareness, eliminating the need to take interaction effects into consideration.

Control variables were necessary as variables independent of language have been identified to be predictive of reading comprehension; previous studies have found that nonverbal intelligence explained around 80-90% of variance in academic performance and had a high correlation with reading comprehension (Jensen, 1992, 1993; Thorndike, 1985, 1986). Subsequently, studies on Korean children's reading comprehension have controlled for nonverbal intelligence (H. Park & Uno, 2012; Yoon, 2015). Age in months was also chosen as a covariate as the age differences

in children spanned a full calendar year and as the reading comprehension measure was not age-standardized.

3. Methodology

This chapter describes the methodology employed for this study. Section 1 briefly outlines the research design. Section 2 describes the background for the research and the hypotheses build on previous research findings. Section 3 describes the sample and the sampling description. Section 4 justifies the choices of instruments and prevents a brief introduction of them. The pilot study is described in Section 5. The research procedures are documented in detail in Section 6. Section 7 contains the measures taken to ensure research ethics.

3.1. Design

This study is a within-subject, single time point study in which a battery of measures was administered to a sample of mainstream primary school children. The study aimed to explore the relationship between reading comprehension and the skills that underpin it. The dependent measure was reading comprehension, and predictors were phonological awareness, vocabulary, and rapid automatized naming (RAN). There were many predictors that may have been selected for this study, but time constraints prohibited this. The covariate was age in months and nonverbal intelligence as measured by Ravens' Coloured Progressive Matrices. Age was co-varied because children's age in months spanned a full calendar year, and the reading comprehension measure was not age standardized.

3.2. Hypothesis and Background

According to the literature review, empirical evidence found in Korean children suggests that vocabulary may be predictive of reading comprehension at an earlier age than children learning a deep alphabetic orthography. This may result from an earlier mastery of decoding due to the characteristics of Hangul, the Korean alphabet.

Recalling the question stated in the Introduction, this study aims to investigate the relationship between reading comprehension and the following: vocabulary, phonological awareness and rapid automatized naming (RAN). This study hypothesizes that:

Hypothesis 1.

Vocabulary, operationalised as receptive vocabulary, will have a positive effect in predicting reading comprehension.

Hypothesis 2.

Phonological awareness will have a positive effect in predicting reading comprehension.

If the results of the regression analyses show that receptive vocabulary was as effective as, or more effective in predicting reading comprehension than phonological awareness, this may suggest that the shift of the importance of vocabulary may occur earlier in Korean children, although this is not put forth as a formal hypothesis.

3.3. Sample

3.3.1. Sampling procedure

Due to the limitation of the given time frame, the sample was recruited through a convenience method. The sample may differ from the general population of South Korea, which may therefore limit the generalisability of the findings of this study.

Table 1. Description of Sample Characteristics

		Frequency	Percentage
Gender	Male	22	45.8
	Female	26	54.2
	Total	48	100.0
School	“A”	21	43.8
	“B”	10	20.8
	“C”	17	35.4
	Total	48	100.0
Age (months)	84-89	4	8.3
	90-95	23	47.9
	96-101	21	43.8
	Total	48	100

3.3.2. Sample description

Participants were recruited from three primary schools in the suburbs of Taegu, a metropolitan city in South Korea. There were 22 boys and 26 girls aged from 7 years 3 months to 8 years 4 months. All children spoke Korean as their first language. There were no known learning disabilities or cases of ADHD (Attention Deficit Hyperactivity Disorder). All children scored 75 or above on the normalized nonverbal intelligence instrument.

3.4. Measures

This section describes the instruments of choice, with particular attention to the reading comprehension instrument (KISE-BAAT) and the phonological awareness instrument, as the items for these instruments had to be chosen or modified from existing measures due to the lack of an appropriate instrument in Korean. The rationale for the choices made is described in detail.

3.4.1. KISE-BAAT

There are very few normalised instruments measuring reading comprehension in South Korea; also, BASA, the instrument used most often in the literature, does not measure reading comprehension on a deep level, as items ask the child to choose the most appropriate word to fit the context of a sentence out of three words (D. Kim, 2013) The KISE-BAAT was selected as the instrument of choice because of its items which clearly measured reading comprehension, and because generalisability of the results to the population was ensured by its normalisation procedure involving 5,997 children between 4 to 13 years of age (K. Park, 2004). The instrument was developed by the Korean Institute of Special Education under the Bureau of Education to measure children's proficiency in the sections of Reading, Writing, and Maths. The norm interval was set at one year interval and sampling was carried out by stratified sampling method, which took into account geographic region and gender.

The Reading section of KISE-BAAT (Korea Institute for Special Education – Basic Academic Achievement Test) is comprised of decoding, vocabulary, sentence completion and short paragraph comprehension. The short paragraph comprehension section is comprised of 30 items, and children under 4th grade are to

begin from item 1 and proceed until it is clear that items are too difficult for the child to answer. Because the test had a parallel test form meant to measure the child's development at a later time point (thus Test '가' and Test '나'), there were a total of 60 items in the short paragraph comprehension section. Administration is carried out 1:1, with correct items scored as 1 and incorrect items scored as 0. A total of 1,988 children were included in the norming of the Reading section.

As the age level for each item was not specified in the manual, and the given order of the items was not of increasing difficulty, items from the short paragraph comprehension section of the KISE-BAAT which were deemed suitable for children between 7-8 years of age were selected. The short paragraph comprehension section measured competency in five categories: 1) answering major facts from a short paragraph, 2) differentiating from fact and opinion, 3) understanding metaphors and symbolism, 4) understanding the meaning of proverbs and 5) guessing what will happen next.

Table 2. Sub-categories of the Short Paragraph Comprehension Section from the Original Version of KISE-BAAT

Number	Category
1	Answering major facts from a short paragraph
2	Differentiating from fact and opinion
3	Understanding metaphors and symbolism
4	Understanding the meaning of proverbs
5	Guessing what will happen next

Items that were not related to reading comprehension, such as items about traditional proverbs, were eliminated. Items related to literary education, such as items on the meaning of metaphors or the sentiment of songs and poetry were eliminated as well. As a result, only the items falling under the category 1) answering major facts from a short paragraph and 5) guessing what will happen next were selected. The remaining items were respectively compared with items in the reading comprehension section of the Wechsler Individual Achievement Test (Wechsler, 2005) and of the paragraph reading section of the York Assessment of Reading for Comprehension (Snowling et al., 2009) to approximate the appropriate age level for

them. After consulting formats of well-known reading comprehension tests, a total of 26 items were chosen as appropriate for children at age 7-8 years. After the pilot study on eight children, four of the most challenging items that had correct response rates below and including 10% were eliminated. Thus, the pilot study was very important in designing the reading comprehension measure.

The items were next grouped into five categories of increasing difficulty by the researcher on comparison with the WIAT-II and the YARC. The items in the 1st category (the easiest) had 8 items while the items in the 5th category (the most challenging) had 4 items. Also, the items were grouped into items measuring factual reading and items measuring inferential reading according to conventional definitions of reading comprehension (Tennent, 2014). The final instrument had a total of 22 items with 10 factual items and 12 inferential items.

Table 3. The Number of Literal and Inferential Items in the Final Instrument Derived from the Reading Section of KISE-BAAT

Difficulty	**1st**	**2nd**	**3rd**	**4th**	**5th**	**Total**
KISE-BAAT	8		8	2	4	22
Literal	8		2			10
Inferential			6	2	4	12

3.4.2. REVT-R

The instrument most frequently used in the South Korean literature to measure children's receptive vocabulary until recently has been the PPVT-R (Peabody Picture Vocabulary Test- Revised, 1994). However, the vocabulary used for the items of PPVT-R did not always match the vocabulary more commonly used in the context of the Korean language rather than the English language, and some of the old-fashioned words or the pictures in the PPVT-R (such as "pheasant") are no longer suitable for present day children. Also, only two administrative districts out of a total of seventeen were involved in the normalisation procedure. Because of such drawbacks, the recently developed REVT-R was selected as a more appropriate instrument to measure children's receptive vocabulary (Y.-T. Kim, Hong, & Kim, 2009).

The REVT (Receptive and Expressive Vocabulary Test, 2009) is an instrument that measures receptive and expressive vocabulary in Korean. The receptive vocabulary section of the REVT, the REVT-R was utilized in this study. The REVT-R is administered in the same method as the PPVT-R, and a ceiling is established when the child incorrectly identifies six out eight items. The researcher that headed the development of the REVT, Young-Tae Kim, had had experience in the normalisation procedure of the PPVT-R, thus making the administration and scoring format of the REVT-R very similar to that of the PPVT.

The vocabulary used for the REVT-R was selected by evaluation of pre-existing vocabulary instruments in Korean and research on Korean lexicology. Suitability for age level, as well as the ratio of parts of speech, frequency of use, and differences in gender, culture and regional differences in dialect were taken into account. The validity of the pictures was evaluated by fifteen students undertaking a Masters of Arts degree in speech pathology. A total of 5,195 subjects took part in the normalisation procedure of the REVT-R. Test-retest reliability was .823 and split-half reliability using the Spearman-Brown quotient was .884.

3.4.3. Phonological awareness instrument

An instrument to evaluate phonological awareness was developed for this dissertation due to the lack of a standardized Korean instrument. The theoretical basis for the development of the instrument was formulated on the criteria utilized in the studies by D. Kim, Kim, and Lee (2007) and H. Park and Uno (2012). D. Kim et al. (2007) used four subtests in developing a non-standardized phonological awareness battery for Korean schoolchildren in Year 1. The subtests, based on the Phonological Awareness Literacy Screening and Mann and Foy (2003)'s phonological awareness screening system, measured competency in the following areas and consisted of 5 items each:

- *Phoneme judgement:* children listened to three single-syllable words and found one word that started or ended with a different phoneme.
- *Phoneme deletion:* children listened to a word and deleted the first phoneme or the last phoneme from the word.
- *Phoneme blending:* children listened to a series of phonemes and were

asked to say the word that resulted when the phonemes were blended together.

- *Phoneme substitution:* children were asked to say a word, and to say the words after substituting the initial or final phoneme.

Syllable deletion was not included as a subtest as it was deemed too easy regarding the fact that Hangul is spelled in syllable blocks.

H. Park and Uno (2012) used the following subtests to measure phonological awareness in Year 3 Korean schoolchildren.

- *Syllable deletion:* children were asked to orally delete syllables from a three-syllable word.
- *Onset deletion:* children were asked to delete the initial phoneme from the syllable stimulus item.
- *Coda deletion:* children were asked to delete the final phoneme from the syllable stimulus item.
- *Onset oddity:* children were required to select the one word that sounded different at the beginning (onset) of the word.
- *Coda oddity:* children were required to select the one word that sounded different at the ending (coda) of the word.

These two sets of criteria were compared with the corresponding subtests of the Phonological Assessment Battery 2nd Edition primary (PhAB) by Gibbs and Bodman, 2014). The age range specified for each subtest included in the PhAB was taken into account.

Subtests on onset oddity, coda oddity, onset deletion and coda deletion were selected as final measures for assessment of phonological awareness in Korean. Phoneme substitution was not selected because as phoneme substitution is a process of phoneme deletion and subsequent phoneme blending, an overlap in the competencies being measured was thought to result. Syllable deletion was not included for two reasons: first, a syllable is technically not a “phoneme” (Aarts, Chalker, & Weiner, 2014). Second, analysis on the response rates of syllable deletion tasks of H. Park (2013) and H. Park and Uno (2012)’s showed that Korean schoolchildren in Year 1 (n=102) were getting an average of 3.7 items correct out of

a total of 5 items with a standard deviation of 1.6 (H. Park, 2013) and children in Year 3 had correct response rates of 100%. This suggested possibility of a ceiling effect in Year 2 children.

Table 4. Criteria for Measurement of Phonological Awareness in Kim (2007) and Park (2012) Compared with the PhAB

Kim (2007)	Park (2012)	PhAB	PhAB target age range
Phoneme judgement	Onset oddity	Onset oddity	5-11
	Coda oddity	Coda oddity	
Phoneme deletion	Onset deletion	Onset deletion	7-11
	Coda deletion	Coda deletion	
Phoneme blending	-	Phoneme blending	5-6
Phoneme substitution	-	Phoneme substitution	7-11
-	Syllable deletion	-	-

Table 5. Correct Response Rates on Subtests of Phonological Awareness in Kim (2007) and Park (2012)

	Year 1 Children (n=34) in Kim (2007)	Year 3 Children (n=103) in Park (2012)
Onset oddity	76%	68%
Coda oddity		62%
Onset deletion	89%	84%
Coda deletion		91%
Phoneme blending	90%	-
Phoneme substitution	80%	-
Syllable deletion	-	100%

Five items comprised each subtest, making the final instrument a total of 20 items. Items measuring onset oddity, coda oddity, onset deletion and coda deletion were taken from appendixes from the studies of H. R. Park and Uno (2012), Lee (2014), Yoon (2004) and Hyang-ah Park (2000). Correct items were scored as 1 and incorrect items were scored as 0.

3.4.4. Rapid Automatized Naming (RAN)

Rapid Automatized Naming (RAN) can be measured in sub-areas of letter naming, object naming, colour naming and digit naming (Wagner, Orgesen, & Rasshote, 1999). Object Naming and Digit naming was chosen for the purposes of the study. The Object naming task was taken from the instrument used by D. Kim, Park and Lombardino (2015), who on their study of Korean schoolchildren in Year 1 adapted sections of the Comprehensive Test of Phonological Processing (CTPP) (Wagner et al., 1999) commonly used on RAN measures of English, for uses in Korean. D. Kim et al. (2015) chose the Object stimuli sun, cup, ball, book and dog for the following reasons;

> "First, a picture of a boat from the CTPP can lead children to use different words having the same meaning (e.g., one student read the picture representing boat as "배(/bæ/)" whereas another read it as "보트 (/boˉ-t/)" but both words "배 (/bæ/)" "보트(/bɔ-t/)" mean "boat"; also, one student read the picture representing fish as "생선(/sæŋ-sən/)", whereas others read it as "고기 (/gɔ-gɪ/)", "물고기 (/muːl-gɔ-gɪ/)" or "붕어(/buːŋ-ə/)," but all the words mean "fish"). In addition, single-syllabic words with high frequency were considered to avoid delayed reaction time." (pp. 450).

Because numbers used for the Digit naming task for the CTPP only comprised numbers from 1 to 5, the digit naming task from the Phonological Assessment Battery (PhAB) was used as it comprised numbers from 1 to 9. Administration followed the manual of the PhAB, and children were asked to perform each task twice. The total length of time taken in seconds was averaged.

3.4.5. Raven's Coloured Progressive Matrices

The Raven's Coloured Progressive Matrices is a version of Raven's Progressive Matrices adapted for children, and is a standardised instrument measuring nonverbal intelligence (Raven, 2004). This measure was included in all analyses as is standard practice in design of the type (H. Park & Uno, 2012; Yoon, 2015). The standardisation of the Raven's Progressive Matrices have been carried out on various ethnic groups of varying socioeconomic status in many regions, and

the in-between item difficulties correlations fall between .97 to 1.00 (Raven, 2004). When compared against concurrent intelligence tests, moderate to high correlations have been reported with the SPM (Raven, 2004).

According to Raven (2004), the thirty-six items are divided into three Sets, Set A, AB and B, of twelve items each and in each set the first item is designed to be as self-evident as possible. The items progress in difficulty by building on the logic of previous items, and the order in which the items are presented provide training for finding solutions to items that follow. Each item presented to the child a target matrix with a missing piece. Children are asked to choose the best figure to complete the target matrix from six choices. A correct item was scored as 1 and an incorrect one as 0. The maximum number of marks that a participant could achieve was 36.

3.5. Pilot Study

The instruments were piloted on eight schoolchildren over three days with the aim of sorting out inappropriate items from the reading comprehension instrument and the phonological awareness instrument, and to familiarise the researcher with the administration and the scoring of the instruments. Data from each child was collected through two 1:1 sessions with the researcher lasting from 20 to 30 minutes in a quiet area such as an empty classroom or school library. The division of the testing into two 20-30 minute sessions was decided as to minimize test burden.

Children were measured with the reading comprehension instrument in the first session and with the other instruments in the second session. However, the testing was stopped due to uncontrollable circumstances when all eight children had had the first session but only two had had the second session. From the data collected from the eight “first sessions”, four of the most challenging items in the reading comprehension instrument, or the items that had correct response rates under and including 10%, were eliminated so that the instrument could better suit the age level of the children. The items in the phonological awareness instrument were left intact as correct response rates for all twenty items were considered to be adequate.

3.6. Research Procedures

3.6.1. Data Collection

Data from each child was collected through two 1:1 sessions with the researcher lasting from 20 to 30 minutes in a quiet area such as an empty classroom or school library. The testing sessions were divided into two in order to minimize test burden. Prior to the assessments, verbal assent was obtained by the child by asking if they felt comfortable about participating in the study. Five children were either not fluent in Korean or could not read, so they were not measured with the reading comprehension instrument as it was thought to be overwhelming. Other than the reading comprehension instrument, they went through the same testing procedures as the other children although their data was not analysed.

Only the reading comprehension instrument was administered in the first session as the instrument was thought to pose the largest test burden on the children based on the experiences of the pilot study. In the second session, the phonological awareness instrument was administered first, followed by the vocabulary and nonverbal intelligence instrument. Children appeared to enjoy the tasks, and it was thought that the administration of the two instruments kept the children focused during the sessions. The rapid automatized naming tasks were administered last as they appeared to impose a large test burden on the children and seemed less enjoyable.

3.6.2. Scoring Procedure

The chronological age of children was calculated by converting the difference between the date of assessment and the child's date of birth in months. This served the function of a baseline for calculating standard scores in the Ravens' test based on age. The raw scores of the RCPM and REVT were converted to their respective standard scores according to their respective manuals. The time that the children took for two trials of the RAN tasks, along with the mistakes that they made while reading, were averaged.

3.6.3. Statistical Procedures

The data were cleaned on and analysed by SPSS version 23. The data was

analysed in three broad steps; description of the data, explorations of statistical assumptions, and finally inferential statistics to test the hypotheses put forth for the study. The results are reported in the next chapter.

3.7. Ethical Considerations

This research study was approved by the University of Oxford Central University Research Ethics Committee (CUREC) (See Appendix 5 and 6) and followed the CUREC Protocol 25 for participants under eighteen years old. The materials approved by the CUREC committee included the CUREC/1A Checklist for the Social Sciences and Humanities which described the rationale of the study, the instruments used, research procedures and any potential risks involved in the study. Samples of the letters inviting the headteachers to participate in the study as well as information sheets for the parents and the parental consent form were also submitted along with the CUREC/1A Checklist

After the approval from the University, letters explaining the study were sent to the headteachers of the schools. After the headteachers' consent, letters to the parents and consent forms were sent out. Headteachers were asked to select appropriate dates for the researcher's visit in order to avoid disruption to the schools' busy schedule during the month of May; Parents' Day, Teachers' day and Buddha's birthday for which teachers and children prepare for, and termly field trips are usually organised on May. The importance of confidentiality was emphasized in both the letters to headteachers and the letters to parents; the letters provided contact details of the researcher including e-mail addresses.

Data collection took place during after-school hours from May to June 2016. Because the after-school programs were mostly recreational, no harm resulted to children's schoolwork from missing the after-school hours. Children and parents were informed of their right to withdraw from the study, and children were asked whether they wanted to participate in the study before the sessions began. No child wanted to withdraw from the study. A summary of the findings was provided to the schools and parents with the names of the schools and children excluded.

All children were invited to participate in the study so that no child would feel left out. A total of five children who either were not fluent in Korean or were not able

to read at all took part in the study although their data was not analysed. The children's names were removed from the data sheet so that they were identified only by a number, and their data was not individually analysed. The data was kept strictly confidential in a computer protected by a password, and was only available to the researcher and the supervisor. All materials, including test scripts, will be destroyed in August 2015 after the research has been completed.

4. Results

This chapter presents the results of the data analyses. Section 1 reports the descriptive statistics, and Section 2 explores whether the collected data meets the assumptions for using inferential parametric tests. Section 3 evaluates the hypothesis that vocabulary and phonological awareness will have a positive effect in predicting reading comprehension after controlling for age and nonverbal intelligence.

4.1. Descriptive Statistics

A total of fifty-one children were tested on five measures. The mean, standard deviation, and range of the scores are reported in Table 1.

Table 1. The Descriptive Statistics of Age in Months, Raven's Coloured Progressive Matrices, Reading Comprehension, Receptive Vocabulary, Phonological Awareness and Rapid Automatized Naming (RAN) Tasks

	N	Mean	SD	Range	
				Min	Max
Age in Months	48	94.65	3.39	87	100
Raven's Coloured Progressive Matrices (Nonverbal IQ)	48	12.75	3.01	6	18
KISE-BAAT (Reading Comprehension)	48	87.65	14.95	62	127
REVT (Receptive Vocabulary)	48	10.46	4.14	4	20
Phonological Awareness	48	107.92	12.11	75	130
Rapid Automatized Naming- Digit	48	24.97	4.68	18.0	39.0
Rapid Automatized Naming- Object	48	50.67	10.97	31.0	84.0

Age in months was the child's chronological age in months at time of testing. The raw scores of the Raven's Coloured Progressive Matrices were converted to standard scores (mean=100, SD=15) according to the manual and supplementary documents (Raven, 2004). Children were able to score a total of 22 for the reading comprehension instrument, the KISE-BAAT. The raw scores for the receptive vocabulary instrument, the REVT, were used because the REVT provides average scores of an age group, percentiles of age group and an age equivalent but not a precise standardized score. The highest possible score for the phonological awareness instrument was 20. Children were given two trials for respective rapid automatized naming tasks and the time taken for each trial was averaged to provide

a mean score.

4.2. Exploring the Data for Subsequent Inferential Statistics

Because use of Pearson's coefficient and multiple regressions require that the data is normally distributed (Tabachnick & Fidell, 2013), all the variables including age in months, nonverbal IQ, reading comprehension, receptive vocabulary, phonological awareness and rapid automatized naming were screened for normality.

Results of the Kolmogorov-Smirnov tests on all measures showed that the distribution of the data for the Nonverbal Intelligence instrument did not meet the test for non-normality, $D(48)=.000$, $p<.001$. Also, because the Kolmogorov-Smirnov test can only provide information on whether the distribution is significantly different from a normal curve (Field, 2013), the normality of all variables was checked again by the z-scores of skewness and kurtosis. The z-scores of skewness and kurtosis were calculated by dividing the skewness or kurtosis by its standard error; if the absolute value of the z-score is below 1.96, this is indicative of a skewness or kurtosis that is not significantly different from 0 (Field, 2013). Results of the analyses presented in Table 2 showed that the data of the rapid automatized naming Digit task had a positive skewness and kurtosis, and that the data of the rapid automatized naming Object tasks had a positive skewness. Details of the distribution of the data for the Nonverbal Intelligence instrument and the rapid automatized naming tasks are provided in Appendix 7.

The existence of extreme outliers was checked by calculating Cook's distance. Cook's Distance is able to indicate the presence of outliers by measuring the effect of a single case on the model. As Cook and Weisberg (1982) suggest that values greater than 1 may be cause for concern, results of the Cook's distance statistics were checked for values over the threshold of 1. The statistics for the Cook's distance were also obtained from the previous multiple regression, showing a minimum value of .000 and a maximum value of .145 with a mean of .024. This indicated that there was no major concern of extreme outliers.

Conducting multiple regressions analyses requires the absence of multicollinearity. Multicollinearity exists when a strong correlation between two or more predictors in a regression model threatens the statistical model: this can be

identified by scanning the correlation matrix for a correlation of more than 0.9 between two variables (Pallant, 2007). The results of a bivariate correlation between all the variables is reported in Table 3, showing that the inter-correlations between variables were all below the threshold. Although Pearson's correlation requires the variables to be entered to have a normal distribution, the variables at risk of non-normality (the nonverbal intelligence test and the rapid automatized naming tasks) were included in the correlation as studies have shown that Pearson's correlation is robust to violations of non-normality (Edgell & Noon, 1984), and also because it was decided from visual scans of normal Q-Q plots that the distributions of these variables did not deviate alarmingly from a normal distribution (Appendix 7).

Table 2. The z-scores of Skewness and Kurtosis of Age in Months, Raven's Coloured Progressive Matrices, Reading Comprehension, Receptive Vocabulary, Phonological Awareness, and Rapid Automatized Naming (RAN)

	Skewness			**Kurtosis**		
	Statistic	SE	*z-score*	Statistic	SE	*z-score*
Age in Months	-.296	.343	-0.862	-.792	.674	-1.175
Raven's Matrices (Nonverbal IQ)	-.603	.343	-1.758	.180	.674	0.267
KISE-BAAT (Reading Comprehension)	-.392	.343	-1.141	-.473	.674	-0.702
REVT (Receptive Vocabulary)	.165	.343	0.482	-.090	.674	-0.134
Phonological Awareness	.400	.343	1.166	-.657	.674	-0.974
Rapid Automatized Naming- Digit	1.192	.343	3.472	1.811	.674	2.685
Rapid Automatized Naming- Object	.892	.343	2.599	1.257	.674	1.863

The multicollinearity of the predictors was further examined by entering all the predictor variables into a multiple regression with reading comprehension scores as the dependent variable and scanning the results of the collinearity diagnostics. The collinearity diagnostics of Age in Months, Nonverbal Intelligence (RCPM), Receptive Vocabulary (REVT), Phonological Awareness (PA) and the two rapid automatized naming tasks, with the scores on the modified Reading Comprehension

instrument (KISE-BAAT) as an outcome variable, are reported in Table 4.

Table 3. Inter-correlations between Age in Months, Raven's Coloured Progressive Matrices, Receptive Vocabulary (REVT), Phonological Awareness (PA), Rapid Automatized Naming (RAN) Digit and Object, and Reading Comprehension

	RCPM	REVT	PA	RAN Digit	RAN Object	Reading
Age	-.026	.301*	.409**	-.068	-.129	.486**
RCPM		.044	.045	-.090	-.137	-.163
REVT			.618**	-.018	.021	.517**
PA				-.256	-.179	.522**
RAN Digit					.669**	-.056
RAN Object						-.108

Note: *p<.05, ** p<.01.

Table 4. The Collinearity Diagnostics of the Predictors

	Age	RCPM	REVT	PA	RAN Digit	RAN Object
Tolerance	.813	.975	.590	.510	.523	.535
VIF	1.230	1.026	1.695	1.959	1.911	1.869

Table 4 reports the Variance Inflation Factor (VIF) and tolerance statistic of the predictors. The values of the VIF of all predictors ranged between 1 and 2. Although Bowerman and O'Connell (1990) suggested that multicollinearity may bias the regression model if the average VIF is over 1, Myers (1990) suggested that a value of 10 is a value at which to worry. The tolerance factor, a reciprocal of the VIF (i.e. 1/VIF), ranged from .510 to .975, with Menard (2002) suggesting that a value below 0.2 is a cause of concern. From the results of the bivariate correlation and examination of the collinearity diagnostics, it was decided multicollinearity was not such of a matter as to violate the assumptions of inferential statistics.

Multiple regression analyses also require that the residuals in the model follow a random, normal distribution with a mean of 0 (Field, 2013) . In order to analyse the distribution of the residuals, a Normal Probability Plot of the standardised residuals was obtained from the previous diagnostic multiple regression. The plot follows a linear distribution, which suggests that there is no

major deviation from a normal distribution (Appendix 8).

The homoscedasticity of residuals was checked by the scatterplot between the standardized residuals and the predicted value of the standardised residuals from the diagnostic regression. The residuals were in a rectangular distribution (Appendix 9) without a significant trend, showing that the data did not violate the assumption of homoscedasticity.

For all two observations on the data the residual terms should be uncorrelated; the data should lack autocorrelation. A Durbin-Watson test is able to test for serial correlations between errors by testing whether adjacent residuals are correlated; a value near 2 may indicate that the residuals are not correlated (Field, 2013). The data met the assumption of independent errors (Durbin-Watson value = 1.821)

4.3. Inferential Statistics

Hypothesis 1:

Vocabulary, operationalised as receptive vocabulary, will have a positive effect in predicting reading comprehension.

Before testing this hypothesis, the possible predictors including receptive vocabulary were correlated with the outcome variable, reading comprehension. From correlation Table 3, the following predictors were shown to have a significant correlation with reading comprehension: age in months, receptive vocabulary (REVT) and phonological awareness. The following predictors did not have a significant correlation with reading comprehension: nonverbal intelligence (RCPM), rapid automatized naming (Digit), rapid automatized naming (Object).

Next, simple regression analyses were conducted to identify the effect of predictors on the outcome variable. As shown in Table 5, age in months, vocabulary and phonological awareness were significant predictors of reading comprehension scores, respectively explaining 23.7%, 26.8% and 27.3% of variance in reading comprehension.

Subsequently, multiple regression analyses were conducted with age in

months, receptive vocabulary and phonological awareness as predictors. It was necessary to control for age in months as the reading comprehension measure is not age-normed. Rapid automatized naming tasks were excluded from the regressions as neither the results of Pearson's R nor of the simple regressions showed them to be significantly predictive of reading comprehension. Although nonverbal intelligence was also not significantly correlated with reading comprehension, it was entered in the regression as designs of studies on early reading generally use nonverbal intelligence as a covariate (H. Park & Uno, 2012; Yoon, 2015). Although the distribution of the data of the nonverbal intelligence test raised concerns of non-normality, it was put into the regression as previously done, as visual scans of normal Q-Q plots that the distributions of these variables did not deviate alarmingly from a normal distribution (Appendix 7).

Table 5. Simple Regressions Predicting Reading Comprehension by Age in Months, Raven's Coloured Progressive Matrices, Receptive Vocabulary (REVT), Phonological Awareness (PA) and Rapid Automatized Naming (RAN) Digit & Object

Variable	B	$SE\ B$	β	ΔR^2
Age in months	.432	.114	.486	.237***
Nonverbal Intelligence	-.041	.036	-.163	.027
Vocabulary	.104	.025	.517	.268***
Phonological Awareness	.380	.092	.522	.273***
RAN Digit	-.036	.095	-.056	.003
RAN Object	-.030	.040	-.108	.012

Note: *p<.05, ** p<.01, *** p<.001.

It is generally accepted that there needs to be more than ten cases per predictor if a multiple regression model is to be considered valid (Field, 2013). Green (1991) points out that a sample size of 50+8k, where k is the number of cases, is needed to test the overall fit of the regression model, and a sample size of 104+ k to test individual variables. However, as this was not possible due to the limited time frame and resources of the data collection, the "rule of thumb" was selected as the rationale of the sample size put into the regression model.

As illustrated in Table 6, age in months predicted reading comprehension (β =.301; p<.05) as did vocabulary (β =.225, p<.05). Phonological awareness was not

significant in predicting reading comprehension, with the significance level at 0.145.

Table 6. Linear Multiple Regression Predicting Reading Comprehension by Age in Months, Nonverbal Intelligence, Vocabulary and Phonological Awareness

Variable	B	$SE\ B$	β	p
Age in months	.267	.111	.301	*
RCPM	-.044	.028	-.178	
Vocabulary	.060	.029	.296	*
PA	.164	.110	.225	

Note: *p<.05.

To test the effect of vocabulary in predicting reading comprehension while controlling for age in months and nonverbal intelligence, a hierarchical regression was conducted. After entering the confounding variables in Step 1, it would be possible to attribute the additional variances in the model (change in R^2) to the variables entered in Step 2. Tabachnick and Fidell (2013) contend that the change in R^2 is a better measure than the regression coefficients to compare the effect of each variable independently of each other. In standard regression, only the areas of each explanatory variable that uniquely overlaps with the dependent variable contribute to the overall estimation of how much the variable explains the dependent variable: because of this, if two explanatory variables are very highly correlated, they may appear to contribute very little to the regression model in spite of being highly correlated with the dependent variable (Larson-Hall, 2010)

In Step 1, age in months and nonverbal intelligence significantly predicted reading comprehension scores F(2,45)=55.341, p<.01. The two predictors accounted for 25.9% of the total variance in readier comprehension scores. Among the control variables, only age in months made a statistically significant contribution to reading comprehension (p<.001).

In Step 2, vocabulary significantly accounted for a further 15.8% of variance in reading comprehension scores F(1,44)=11.944 (p<.01). In this model, age in months and vocabulary made a significant contribution to reading comprehension (p<.01). The results of the hierarchical regression analysis confirmed Hypothesis 1 that vocabulary, operationalised as receptive vocabulary, will have a positive effect in

predicting reading comprehension.

Table 7. Results of the Hierarchical Regression Analysis Predicting Reading Comprehension by Vocabulary

Variable	$\boldsymbol{B}$	$\boldsymbol{SE\ B}$	β	$\boldsymbol{\Delta R^2}$
Step 1				
Age in months	.429***	.114	.482	
Nonverbal Intelligence	-.037	.032	-.151	.259**
Step 2				
Age in months	.316**	.107	.356	
Nonverbal Intelligence	-.043	.029	-.172	
Vocabulary	.084**	.024	.418	.158**

Note: *p<.05, ** p<.01, *** p<.001.

It is possible that two factors which predict a single dependent variable may influence each other, thus distorting the predictive power of a regression model. There are two methods to counter the possibility of an interaction effect: the first is to compute an interaction variable by multiplying the two variables of interest and examine the effect of the interaction variable on the outcome variable by putting it into the second step of a hierarchical regression (Chan, 2015). The second is to control for one of the variables of interest in the first step and to put the other in the following step. In this study, the second is chosen as the means to examine the sole contribution of a single factor.

In order to examine the sole effect of receptive vocabulary on reading comprehension while controlling for a possible interactions between receptive vocabulary and phonological awareness, a hierarchical regression was conducted with the initial confounding variables- age in months and nonverbal intelligence- and phonological awareness in Step 1. In Step 2, vocabulary was entered into the model.

In Step 1, age in months, nonverbal intelligence and phonological awareness significantly predicted reading comprehension scores F(3,44)=9.461, p<.001. The three predictors accounted for 39.2% of the total variance in readier comprehension scores. Among the control variables, age in months (p<.05) and phonological awareness (p<.01) made a statistically significant contribution to reading comprehension.

In Step 2, vocabulary significantly accounted for a further 5.4% of variance in reading comprehension scores F(4,43)=8.648 (p<.001). In this model, age in months and vocabulary made a significant contribution to reading comprehension (p<.05). The results of the hierarchical regression analysis controlling for interaction effects between the predictors confirmed Hypothesis 1 that vocabulary, operationalised as receptive vocabulary, will have a positive effect in predicting reading comprehension, while controlling for the possible interaction effect between vocabulary and phonological awareness.

Table 8. Results of the Hierarchical Regression Analysis Predicting Reading Comprehension by Vocabulary Controlling for a Possible Interaction

Variable	$\boldsymbol{B}$	$\boldsymbol{SE\ B}$	β	$\boldsymbol{\Delta R^2}$
Step 1				
Age in months	.283**	.115	.318	
Nonverbal Intelligence	-.043	.029	-.173	
Phonological Awareness	.291***	.094	.400	.392***
Step 2				
Age in months	.267*	.111	.301	
Nonverbal Intelligence	-.044	.028	-.178	
Phonological Awareness	.164	.110	.225	
Vocabulary	.060*	.029	.296	.054***

Note: *p<.05, ** p<.01, *** p<.001.

Hypothesis 2:

Phonological awareness will have a positive effect in predicting reading comprehension.

As Illustrated in Table 6, phonological awareness was not a statistically significant factor in predicting reading comprehension. However, regression coefficients vary greatly from sample to sample, are affected by the size of their standard deviations, and do not measure the effect of each variable independently of one another, which makes it difficult to interpret these coefficients (Larson-Hall, 2010).

A stepwise hierarchical regression was conducted with the confounding factors age in months and nonverbal intelligence entered in Step 1, and phonological

awareness in Step 2. For Step 1, age in months and nonverbal intelligence significantly predicted reading comprehension scores F(2,45)=55.341, p<.01. The two predictors accounted for 25.9% of the total variance in readier comprehension scores.

For Step 2, phonological awareness significantly accounted for a further 13.3% of variance in reading comprehension scores F(1,44)=9.621 (p<.01). In this model, age in months and phonological awareness made a significant contribution to reading comprehension (p<.01). The results of the hierarchical regression analysis confirmed Hypothesis 1 that phonological awareness will have a positive effect in predicting reading comprehension.

Table 9. Results of the Hierarchical Regression Analysis Predicting Reading Comprehension by Phonological Awareness

Variable	$\boldsymbol{B}$	$\boldsymbol{SE\ B}$	β	$\boldsymbol{\Delta R^2}$
Step 1				
Age in months	.429***	.114	.482	
Nonverbal Intelligence	-.037	.032	-.151	.259**
Step 2				
Age in months	.316**	.107	.356	
Nonverbal Intelligence	-.043	.029	-.172	
Phonological Awareness	.291**	.094	.400	.133**

Note: ** p<.01, *** p<.001.

In order to examine the sole effect of phonological awareness on reading comprehension while controlling for a possible interaction between receptive vocabulary and phonological awareness, a hierarchical regression was conducted with the initial confounding variables- age in months and nonverbal intelligence- and vocabulary in Step 1. In Step 2, phonological awareness was entered into the model.

In Step 1, age in months, nonverbal intelligence and vocabulary significantly predicted reading comprehension scores F(3,44)=10.506, p<.001. The three predictors accounted for 41.7% of the total variance in readier comprehension scores. Among the control variables, age in months (p<.01) and vocabulary (p<.01) made a statistically significant contribution to reading comprehension.

In Step 2, phonological awareness significantly accounted for a further 2.8% of variance in reading comprehension scores F(4,43)=8.648 (p<.001). In this model, age in months and vocabulary made a significant contribution to reading comprehension (p<.05), but phonological awareness did not have an effect strong enough to be significant.

Table 10. Results of the Hierarchical Regression Analysis Predicting Reading Comprehension by Phonological Awareness Controlling for a Possible Interaction

Variable	$\boldsymbol{B}$	$\boldsymbol{SE\ B}$	β	$\boldsymbol{\Delta R^2}$
Step 1				
Age in months	.316**	.107	.356	
Nonverbal Intelligence	-.043	.029	-.172	
Vocabulary	.084**	.024	.418	.417***
Step 2				
Age in months	.267*	.111	.301	
Nonverbal Intelligence	-.044	.028	-.178	
Vocabulary	.060*	.029	.296	
Phonological Awareness	.164	.110	.225	.028***

Note: *p<.05, ** p<.01, *** p<.001.

Comparisons

As illustrated in the multiple regression with age in months, nonverbal intelligence, vocabulary and phonological awareness as predictors (Table 6), age in months predicted reading comprehension (β =.301; p<.05) as did vocabulary (β =.225, p<.05). Phonological awareness was not significant in predicting reading comprehension, with the significance level at 0.145.

Comparisons of the first two hierarchical regressions showed that receptive vocabulary explained 15.8% of additional variance while controlling for age in months and nonverbal intelligence, while phonological awareness explained 13.3% of the additional variance. The power of receptive vocabulary and the power of phonological awareness were nearly equal in explaining reading comprehension, with receptive vocabulary explaining 2.5% more of the variance in reading comprehension.

Also, comparisons of the two hierarchical regressions controlling for a

possible interaction effect showed that receptive vocabulary explained 5.4% of additional variance while controlling for age in months and nonverbal intelligence, while phonological awareness explained 2.8% of the additional variance. The power of receptive vocabulary and the power of phonological awareness was nearly equal in explaining reading comprehension, with receptive vocabulary explaining 2.6% more of the variance in reading. A summary of the comparisons of the two hierarchical regressions controlling for a possible interaction is reported on the next page in in Table 12.

Table 11. Summary of Hierarchical Regression Analyses Predicting Reading Comprehension

Variable	$\boldsymbol{B}$	$\boldsymbol{SE\ B}$	β	$\boldsymbol{\Delta R^2}$
Step 1				
Age in months	.429***	.114	.482	
Nonverbal Intelligence	-.037	.032	-.151	.259**
Step 2 (Hypothesis 1)				
Age in months	.316**	.107	.356	
Nonverbal Intelligence	-.043	.029	-.172	
Receptive Vocabulary	.084**	.024	.418	.158**
Step 2 (Hypothesis 2)				
Age in months	.283*	.115	.318	
Nonverbal Intelligence	-.043	.029	-.173	
Phonological Awareness	.291**	.094	.400	.133**

Note: All N=48. *p<.05, ** p<.01, *** p<.001.

Table 12. Summary of Hierarchical Regression Analyses Predicting Reading Comprehension Controlling for a Possible Interaction

Variable	$\boldsymbol{B}$	$\boldsymbol{SE\ B}$	β	$\boldsymbol{\Delta R^2}$
Hypothesis 1				
Step 1				
Age in months	.283**	.115	.318	
Nonverbal Intelligence	-.043	.029	-.173	
Phonological Awareness	.291***	.094	.400	.392***
Step 2 (Vocabulary)				
Age in months	.267*	.111	.301	
Nonverbal Intelligence	-.044	.028	-.178	
Phonological Awareness	.164	.110	.225	
Vocabulary	.060*	.029	.296	.054***
Hypothesis 2				
Step 1				
Age in months	.316**	.107	.356	
Nonverbal Intelligence	-.043	.029	-.172	
Vocabulary	.084**	.024	.418	.417***
Step 2 (PA)				
Age in months	.267*	.111	.301	
Nonverbal Intelligence	-.044	.028	-.178	
Vocabulary	.060*	.029	.296	
Phonological Awareness	.164	.110	.225	.028***

Note: *p<.05, ** p<.01, *** p<.001.

5. Discussion

This chapter discusses the main findings of the study in the context of the previous literature, and also the study's limitations and contributions. In Section 1, the results of the analyses are presented with possible explanations. In Section 2, the limitations of this study are discussed with suggestions for future studies. In Section 3, implications for future classroom practices are discussed in light of the literature and the findings of the study. Lastly, the chapter is closed with consideration of the modest contribution of the work.

The key findings of the study are as follows. First, receptive vocabulary had a positive effect on reading comprehension scores of children in Year 2. Second, phonological awareness had a positive effect on reading comprehension scores of children in Year 2. Third, rapid automatized naming (RAN) was not a significant predictor in reading comprehension; neither the results of Pearson's correlations between RAN and reading comprehension nor a simple regression with rapid automatized naming as the only predictor was able to detect the influence of rapid automatized naming as statistically significant. This puzzling finding will be discussed in the following sections.

5.1. Possible Explanations for Research Findings

5.1.1. Hypothesis 1

Vocabulary, operationalised as receptive vocabulary, will have a positive effect in predicting reading comprehension.

Hypothesis 1 was supported by the following key analyses of the study. Receptive vocabulary had an effect on reading comprehension scores of children in Year 2, and explained 15.8% of additional variance after age in months and nonverbal intelligence had been controlled for. It still explained 5.4% of additional variance in reading comprehension scores when controlling for possible interaction effect between receptive vocabulary and phonological awareness.

These findings are similar to the existing correlational studies of Korean children which found that vocabulary was a significant predictor of reading comprehension in the early years of schooling. The importance of receptive vocabulary echoed the findings of Kim, Yoo, Hwang, Kim, & Koh (2010) who found

receptive vocabulary to be significant in predicting reading comprehension, along with oral language skills such as listening comprehension and sentence recall. It was also in line with the findings of Yoon (2015) that found receptive vocabulary as a significant factor in predicting reading comprehension in a group of children in Years 1 to 3. The findings were also consistent with research on children in other transparent orthographies as Dutch, French or Turkish which found oral language skills an important predictor of reading comprehension even in the first one or two years of schooling (de Jong & van der Leij, 2002; Megherbi et al., 2006; Öney & Durgunoğlu, 1997).

5.1.2. Hypothesis 2:

Phonological awareness will have a positive effect in predicting reading comprehension.

Hypothesis 2 was supported by the following key analyses of the study. Phonological awareness had an effect on reading comprehension scores of children in Year 2, and explained 13.3% of additional variance after age in months and nonverbal intelligence had been controlled for. It still explained 2.8% of additional variance in reading comprehension scores when controlling for possible interaction effect between receptive vocabulary and phonological awareness.

This was in line with the two studies of reading comprehension development in Korean which reported the influence of decoding abilities on reading comprehension in the early stages of reading. Although phonological awareness was not entered into Kim et al. (2010)'s model for children in Year 2, results showed that letter name, also a decoding skill, was a significant predictor of reading comprehension. Similar results were found by Yoon (2015), who reported word decoding as a predictor of reading comprehension in children in Years 1 to 3. Müller & Brady (2001) also reported a strong link between phonological awareness and reading comprehension in Finnish children, underscoring the importance of phonological decoding abilities for readers across all orthographies.

5.1.3. Comparisons between effects of vocabulary and phonological awareness

Results testing Hypotheses 1 and 2 showed that the additional variance

explained by receptive vocabulary and phonological awareness was nearly identical, with receptive vocabulary explaining 15.8% of additional variance and phonological awareness explaining 13.3% of the additional variance while controlling for age in months and nonverbal intelligence. When controlling for a possible interaction effect, receptive vocabulary explained 5.4% of additional variance and phonological awareness explained 2.8% of the additional variance controlling for age in months and nonverbal intelligence,

It is worthwhile to compare these results with the findings of Park (2013) who reported that phonological awareness explained more unique variance than vocabulary on reading comprehension of Korean children in Year 1, when the two predictors were entered into a model with reading comprehension as the dependent variable. The β coefficients of the respective predictors were at .376 and .185. This allows a possibility of a comparison of the relative contribution of vocabulary and phonological awareness to reading comprehension across two age groups, Korean children at Year 1 and Year 2; it can be observed that the importance of decoding decreases as children progress in reading, while the importance of oral language skills increases.

The findings of the study confirmed the importance of oral language skills at early stages of learning to read in a transparent orthography, as hypothesized by educational psychologists and evidenced in readers of Dutch, French and Turkish (de Jong & van der Leij, 2002; Megherbi et al., 2006; Öney & Durgunoğlu, 1997). The importance of phonological awareness as shown by the results is especially underscored; research on early reading comprehension in other transparent orthographies have shown mixed results on the importance of phonological awareness. In Italian and Turkish, a significant relation with phonological awareness has been found only for initial stages of reading acquisition in the beginning of Year 1 (Cossu et al., 1988; Müller & Brady, 2001; Öney & Durgunoğlu, 1997), while for Finnish, an orthography with very similar attributes to Turkish, phonological awareness accounted for a noteworthy percentage of reading in early stages (Müller & Brady, 2001). The contribution of phonological awareness found in this study highlights the inconsistencies in the literature on the importance of phonological awareness on early reading comprehension in transparent orthographies. It is

emphasized that the unique characteristics of Korean Hangul orthography is taken into account foremost, as opposed to stressing the commonalities shared between disparate transparent orthographies.

5.1.4. Rapid Automatized Naming

The results of the inferential statistics did not find a significant effect of rapid automatized naming (RAN) on reading comprehension; neither the results of Pearson's correlations between RAN and reading comprehension nor a simple regression with rapid automatized naming as the only predictor was able to identify the influence of rapid automatized naming as statistically significant. Although studies of the Dutch and Finnish orthographies have found RAN to be a significant predictor in early reading, as well as in later reading for the latter, studies on reading comprehension in Korean have been mixed. Yoon (2015) found that RAN predicted reading comprehension in a group of early readers from Years 1 to 3 as well as in a group of readers in the later stages of reading from Years 4 to 6, contrary to Kim et al. (2010), who did not find RAN as a significant predictor throughout the six school years. Such discrepancies among research findings necessitate future studies as to clarify the relationship between RAN and reading comprehension. It is possible that differences in the statistical procedures can account for these discrepencies.

5.2. Limitations and Suggestions for Future Research

Although attempts were made to address possible drawbacks in the design of the present study, it has limitations in its design, sample and choice of variables.

5.2.1. Research design

As this is a correlational study, it is not possible to attribute causality through the findings of this study. However, it should be noted that the nature of the research topic and participants did not allow for an experimental design. Longitudinal studies are ideal for future investigation on the course of changes in reading comprehension; a longitudinal study can provide important information about the timing and relative importance of the component skills of comprehension, and thus about the course of development (Oakhill & Cain, 2008).

A longitudinal study of children learning to read in Korean has been carried out by Y.-S. Kim (2015), which investigated the relationship between text-reading

fluency, word-reading fluency and reading comprehension. However, the age range of interest was of the preschool years, 5 years 2 months to 6 years 1 month, which did not cover the range of the primary school years. A study covering the underpinning reading skills and subsequent reading development during the early years of school may provide information about the different trajectories of development that children learning to read in Korean may take. It is necessary, however, that the findings be interpreted with caution as it may be difficult to differentiate whether language abilities influence reading or whether reading influences language abilities (Hugh W Catts, Fey, & Zhang, 2009).

An ability-match design or an intervention study may also be informative of causal relations between reading comprehension and its underpinning skills (Cain, 2010a). Although ability-match designs are being employed in a scattering of studies on children learning to read Korean, more rigorous measures would need to be taken to investigate the causality between reading comprehension and numerous predictors known to take part in the comprehension process. An intervention study that trains children in a particular underpinning reading skill and measures improvements in the target skill and reading comprehension scores may also illuminate other facets of the development of the predictors of reading comprehension in Korean (Cain, 2010a).

5.2.2. Sample

The sample used in this study was taken from schools in the suburbs of Taegu, South Korea, which cannot said to be representative of the population of the children at Year 2 in South Korea. Random sampling or stratified sampling is required to take into account the diversities of the socioeconomic differences that the population will have. Also, children who were for various reasons unable to read or were not fluent enough in Korean were not included in the study. Especially, there is a growing population of multicultural families in South Korea, in which mothers of the family typically speak another language to the children at home; profiles of these bilingual children will need separate investigation.

5.2.3. Choice of variables

Numerous factors, whether they are language skills, decoding skills or demographic variables, influence the outcome of reading comprehension. Because

of limitations of the time frame and resources allocated for this study, other predictors known to be highly related to reading comprehension were not included in the design of this study, due to the limitation of resources.

Specific decoding skills which were not included in the study are measures such as print awareness, letter name or letter sound; although these were considered to be not challenging enough for the sample of Year 2 children employed for the study, further investigation may have been meaningful as letter name was found to be predictive of reading comprehension in Year 2 children in the research of A. Kim et al. (2010). As for oral language skills, morphology is a good indicator along with vocabulary of a child's knowledge of semantics on the word level (Cain, 2010d), although this was not able to be included in this study. Syntactic skills were also not included; defined as knowledge of the organization of words and grammar, syntax is informative of language skills at the sentence level. The contribution of higher-order skills, or discourse skills such as inference and integration, comprehension monitoring, and knowledge and use of story structure, all need further investigation in the development of reading comprehension in Korean children.

Also, future studies may include measures of single word reading as well as measures of reading comprehension, as word reading cannot be separated from reading comprehension (Cain, 2010a). Reading comprehension operates on three levels: word reading, sentence reading, and passage reading. However, few studies have included reading on all three levels as the outcome measures in research of reading comprehension (Cain, 2010d). Although the range of resources allocated for a study may limit the possibility of operationalizing reading comprehension on all three levels, taking theoretical consideration into account will add sophistication to models.

5.3. Implications for Classroom Practices

The results of the study showed that vocabulary and phonological awareness are equally important factors in the acquisition of early reading comprehension in Year 2 Korean children. However, such findings must be interpreted with care as the importance of vocabulary and phonological awareness does not translate into the efficacy of a vocabulary or phonics instruction programme. Such decisions may only be made in the light of accumulated evidence showing the effectiveness of carefully

designed interventions. Research on interventions aiming to improve discrete language skills of Korean have not been carried out systematically, necessitating the need for future study.

The idea of a vocabulary-based intervention requires special caution, as vocabulary and reading comprehension have long been thought to have a reciprocal relationship, presumably through a process of acquiring new knowledge and inferring novel meanings from context (Oakhill & Cain, 2008). This implies that a rote instruction of vocabulary may not have the desired effect, when there is an obviously better alternative of learning vocabulary from the target that the intervention aims to improve: reading comprehension. Providing a classroom environment with easy access to reading comprehension materials rich with vocabulary, carefully designed to allow children to infer meanings from context, would constitute good practices a classroom teacher should follow to facilitate reciprocal growth in vocabulary and reading comprehension.

Phonics intervention is worthy of attention in the respect of the unique situation of early literacy instruction in South Korea. After learning letter names and corresponding sounds, children are expected to read via a “whole language approach”, i.e. children are given whole words and texts to comprehend with little attention paid to further instruction on phonics. This may impede early literacy acquisition for struggling readers, causing them to fall behind as reading instruction progresses; this group of children will potentially benefit from appropriate, evidence-based phonics interventions.

The spotlight on the importance of phonological awareness points to the value of early screening and of direct instruction on decoding concepts. Korean children, although benefitting from high motivations of parents to assist in the achievement of literacy outcomes, may still require systematic guidance in learning and mastering the principles of phonological awareness and decoding.

5.4. Conclusion

This study was an exploratory study investigating the contributions of vocabulary and phonological awareness to reading comprehension in a group of Korean schoolchildren in Year 2. The study was motivated by the following hypotheses: as the Korean writing system is a highly transparent orthography, with

the Korean alphabet Hangul providing rapid access to phonological information to a degree not seen in most other languages, it was anticipated that this should influence the correlates of early reading and the pattern of reading development. Studies of other transparent orthographies found that oral language skills, typically predictors known to exert strong influence on later reading rather than earlier reading for deep orthographies, may be predictive of reading comprehension as early as the first one or two years of formal education. The small number of studies on Korean children revealed this to be true, with both oral language skills and decoding skills identified to be predictive of the reading comprehension of children in Years 1 and 2. Children aged from seven to eight years, or in the second year of schooling, were selected as the group of interest of this study not only because there was a dearth of studies on this age group; the importance of this age group was thought to be underestimated, as studies conducted in Korea suggested that this age range may be a critical period in which decoding skills are completed and oral language skills emerge as a strong force in predicting reading comprehension.

Results of the data analyses found the contribution of vocabulary and phonological awareness to be equal in predicting reading comprehension, even after controlling for possible interaction effects between vocabulary and phonological awareness. This confirmed the emergence of the importance of oral language skills in early reading of a transparent orthography, a phenomenon which has been found to occur at an earlier stage than in deep orthographies. Phonological awareness was shown to continuously exert a strong influence on reading comprehension, contradicting the findings of Öney & Durgunoğlu (1997) which found that in Turkish, a transparent orthography, a significant relation with phonological awareness was shown only for initial stages of reading in the beginning of first grade. The implication emerging from these findings may be that phonological awareness is an important principle for learners of *all* alphabetic writing systems, regardless of the transparency of the orthography (Müller & Brady, 2001). Understanding the phonemic composition of spoken words and the principle of how phonemes map onto letters serves as a sound foundation for learning to read in all alphabetic writing systems. This study supports the value of early screening and systematic assistance in learning phonological principles even for Korean, a language with high literacy success levels and one of the most transparent writing systems across all orthographies.

Rapid automatized naming (RAN), a predictor identified to have a strong and lasting effect on reading comprehension in transparent orthographies, was not shown to have a significant correlation with or predictive effect on reading comprehension. Studies on the contribution of RAN to reading comprehension in Korean have been mixed; it has been found as predictive of reading comprehension across the school years or not predictive of reading comprehension at all. Such discrepancies require further investigation as to clarify a clear-cut relationship between RAN and other correlates of reading comprehension.

This study filled a gap in the literature about the predictors of reading comprehension of Korean children in Year 2. The study identified an equal importance of both oral language skills and decoding skills at a transitory period in reading development in Korean: a period when decoding skills start to reach a ceiling but still exert a strong influence on reading, and linguistic skills start to emerge as important determinants of higher-order comprehension. The study also contributed to the accumulating knowledge of the development of reading comprehension in transparent orthographies, and implied that phonological awareness is an important foundation for learners of *all* alphabetic writing systems, regardless of the degree of transparency of the orthography. Future studies may take a longitudinal approach in tracking the trajectory of reading skills and subsequent reading comprehension development in early readers of Korean. Also, there is a need for intervention studies for learners of all abilities to test the efficacy of specific training in decoding skills.

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Appendix

List of Appendixes:

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Appendix 1

Invitation letter to the headteachers



University of Oxford
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In May 2016, I am starting a study about reading in Korean and the skills that can contribute to it and I would like to ask if you are interested in supporting with your school's participation.

Reading is a complex process that involves sounds, letters and comprehension which makes it a challenge for children. Understanding the skills that a child needs for fluent reading can be the basis for improvements to the teaching of reading in primary schools. I have developed some literacy tasks that measure the skills needed in fluent reading. I would like to work with the children in your school to learn more about their literacy skills and I hope to improve teaching. This study draws on research about reading in alphabetical languages such as English, and it is important to study parallel skills in Korean.

In practical terms, I would like to work with children in Year 2 between May and June 2016. During this time I would carry out tasks that measure reading, vocabulary and phonological awareness. The children who agree to participate will be given literacy tasks over two 20-30 minute sessions a week apart. In the sessions children will asked to point to pictures that match the spoken words or find words that begin with the same sound, which will make the children more aware of the language they use every day and improve their discreet literacy skills.

I will consult the class teachers and arrange for the best times that fit into their time table so that there is minimal disruption. Each child will be asked if they are willing to participate. I will seek parental consent via a letter. On May, I would meet with the class teachers to discuss any specific circumstances relevant to their children. I would then work with approximately 4-5 children each day for five weeks until June.

I have a teaching credential from [redacted] to work with children in schools. All information will be confidential in accordance with the UK data protection

requirements. The data will be used only for research purposes and will be kept in a locked file in the research office in the University. Access to the information is restricted to the research student and the children's name will be replaced by a number on electronic files to protect their identity. Analysis will only be performed on a group level and will not be carried out on an individual child. No information about children will be made available to anyone other than the research team.

A report of the research findings will be sent to the school once the study is completed and parents are welcome to have copies of this.

The research will be carried out by an M. Sc. student from the Department of Education, University of Oxford, and has been approved by the University Ethics Committee. I will contact you within a few days to ask whether you would like your schools to participate in this project or you may prefer to complete the attached form to indicate initial interest. If you have any questions you would like to ask before replying, please contact me or my supervisor by emailing [redacted] or Professor [redacted]

Thank you for your time and consideration of this project. I hope it may of interest to you and if so, I look forward to hearing from you.

Kind regards

[redacted]

Appendix 2

Invitation letter to parents and parental consent forms



University of Oxford
Department of Education
15 Norham Gardens, Oxford OX2 6PY
Director: Ernesto Macaro
Tel: +44 (0)1865 [number] Fax: +44 (0)1865 [number]

Dear Parent/Guardian

We are starting a study in child development about reading in Korean and the skills that can contribute to it. Reading is a complex process which makes it a challenge for children learning to master it. Understanding the skills that help with and predict the efficacy of Korean reading can be the basis in developing interventions that can promote children to read in Korean.

Who is conducting this study?

The research will be carried out by an M. Sc. student from the Department of Education, University of Oxford, and has been approved by the University Ethics Committee. The researcher has a teaching credential from [redacted] that qualifies her to work with children in schools. The headmaster of your school has given formal consent to work with the children in your child's school and the classroom teacher will be helping the researcher to fit schedules into the children's time table.

What will happen if my child takes part?

I will be working with your child between May and June 2016. During this time your child will play games with the researcher and perform tasks related to skills in reading, vocabulary or phonetics. The tasks will carried out in two sessions with the researcher lasting no more than 25 minutes each and a break will be given in between the sessions. In the sessions children will perform tasks such as pointing to pictures that are appropriate or circling answers to questions on a sheet of paper.

What happens to the results of the study?

The information collected will be confidential in accordance with the UK data protection requirements. The data will be used only for research purposes and will be kept in locked in the research office in the University. Access to the information is restricted to the research student and the children's name will be replaced by a number to protect their identity. Analysis will only be performed on a group level and will not be carried out on an individual child. No information about children will be made available to anyone other than the research team. A report of the research findings will be provided to the school once the study is completed and you are very welcome to have copies of this.

You and your child may withdraw from the study at any time. If you have any questions you would like to ask before replying, please contact me or my supervisor by emailing [redacted] or Professor [redacted]

Thank you for your time and consideration of this project.

Kind regards

[redacted]

Opt- Out Form

If you **DO NOT** wish for your child to take part in the research, please fill out the form below and return it to your school office by [DATE]. If we do not receive an opt-out form from you, your child may be invited to take part in the study described in the information sheet above and you do not need to send this form to us.

I hereby **DO NOT** give permission for my child to take part in the above study.

Name of Child: . . . . . .

Name of School: . . . . . .

Name of Parent/guardian: . . . . . .

Signature: . . . . . Date: . . . . . .

Appendix 3

Reading comprehension instrument

무당벌레는 날개 무늬가 여러 가지입니다.

① 검은 바탕에 빨간 점이 두 개 있는 날개

② 검은 바탕에 빨간 점이 네 개 있는 날개

③ 빨간 바탕에 검은 점이 여러 개가 촘촘히 있는 날개

④ 검은 바탕에 빨간 점이 여러 개가 촘촘히 있는 날개

질문	**아동 반응**	**점수**
③의 내용에 맞는 그림을 찾아보세요.		1 0 NR
④의 내용에 맞는 그림을 찾아 보세요.		1 0 NR

우산 가게에는 여러 가지 우산이 있습니다.

① 파란 바탕에 흰 점이 있고 네모난 손잡이가 있는 우산

② 파란 바탕에 빨간 점이 있고 구부러진 손잡이가 있는 우산

③ 빨간 바탕에 흰 점이 있고 구부러진 손잡이가 있는 우산

④ 빨간 바탕에 파란 점이 있고 네모난 손잡이가 있는 우산

질문	**아동 반응**	**점수**
②의 내용에 맞는 그림을 찾아보세요.		1 0 NR
④의 내용에 맞는 그림을 찾아 보세요.		1 0 NR

한수는 물 속에서 눈을 떠보았습니다. 물뱀 한 마리가 부리나케 저 쪽으로 달아나는 모습이 보입니다. 돌 밑으로 살금살금 숨는 가재도 보입니다. 송사리들도 어지럽게 헤엄치고 있습니다. 다슬기들은 나 죽었다 하고 돌 옆으로 벌렁 드러누워 있습니다.

질문	**아동 반응**	**점수**
돌 밑으로 숨는 것은 무엇인가요?		1 0 NR
한수가 물 속에서 본 것(생물)을 모두 말해 보세요.		1 0 NR

산꼭대기에 오르니, 참 시원하였습니다. 멀리 바다가 보이고, 넓은 들판도 보였습니다. 산 아래 쪽에는 오밀조밀한 모습의 집들도 모였습니다. 달리는 자동차는 마치 장난감처럼 보였습니다.

질문	아동 반응	점수
장난감처럼 보인다고 한 것은 무엇인가요?		1 0 NR
내가 산꼭대기에서 본 것을 모두 말해 보세요.		1 0 NR

한 영국 신사가 오후 산책으로 지팡이를 짚고 공원을 한가롭게 거닐고 있었다. 곱게 다듬어진 잔디밭 부근을 지나는데 웬 꼬마가 서서 울고 있었다. "얘야, 왜 여기서 울고 있느냐? 혹시 길을 잃었니? "아니에요, 저기 내 모자를 잃었어요." 신사는 꼬마가 가리키는 잔디밭을 보았다. 잔디밭 가운데쯤 정말 조그만 모자가 던져져 있었다. "얘야, 저기 모자가 있구나. 가서 가져오면 되지 않니!" 그 때 꼬마는 잔디밭 귀퉁이에 조그맣게 세워져 있는 팻말을 손가락으로 가리켰다. 그 곳에는 _____라고 작은 글씨로 씌어져 있었다. 꼬마가 울고 있는 이유를 알아낸 신사는 지팡이를 이용해 모자를 꺼내 주었다.

질문	아동 반응	점수
이 글의 밑줄 친 곳에 들어갈 알맞은 말을 말해 보세요		1 0 NR

미국 어느 마을에 한 소년이 살고 있었습니다. 소년은 집안이 가난하여 마을의 조그만 가게에서 점원으로 일하게 되었습니다. 어느 날 저녁 물건 판돈을 계산하는데 이상하게도 10센트의 돈이 남는 것이었습니다. 곰곰이 생각해 보니 산 넘어 살고 계신 할머니 한 분께 거스름돈을 덜 드린 것을 깨닫게 되었습니다. 소년은 그 할머니가 살고 계신 곳을 알고 있다는 것이 너무나 다행스러웠습니다. 소년은 그 밤에 4km가 넘는 산길을 걸어 거스름돈을 전하고 잘못을 사과했습니다. 깜짝 놀란 할머니는 10센트 때문에 밤길을 걸어온 소년을 오히려 나무랐습니다. "10센트가 아니고, 1센트라도 돌려 드려야지요." 이렇게 말한 소년을 보고 '_____아이"라는 별명을 붙여 주었습니다. 이렇게 명예로운 별명을 가졌던 소년은 훗날 많은 사람들의 존경을 받는 훌륭한 인물이 되었습니다.

질문	아동 반응	점수
이 글의 밑줄 친 곳에 들어갈 알맞은 말을 말해 보세요.		1 0 NR

대한학교는 지난 12월 3일에 고아원 아이들을 돕기 위한 '자선 바자회'를 열었다. 이 날 행사를 위해 전교생, 선생님을 비롯해 학부모와 지역 인사들이 학교 체육관에 모였다. 자선 바자회에는 학생들이 각자 준비해온 책과 학용품, 장난감, 각종 운동용품 등이 전시되어 판매되었다. 또 바자회와 함께 불우이웃 돕기를 위한 성금 모금도 이루어졌다. 학생들은 "우리의 작은 정성을 모아 어려운 친구들에게 용기와 희망을 선물하고 싶어요,"라는 말로 자신들의 뜻을 전했다.

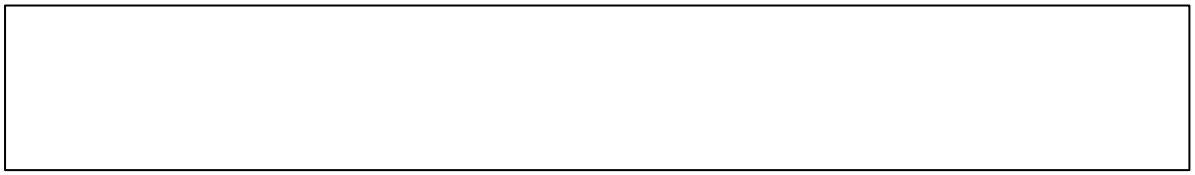
질문	아동 반응	점수
바자회에서 어떤 물건들이 전시되어 판매되었나요? 모두 말해 보세요.		1 0 NR
바자회가 언제, 어디서 열렸나요?		1 0 NR

'쓰레기 없는 피서지 만들기' 운동이 지난 일요일 시민 공원에서 열렸다. 이 날 참석한 시민 자체 및 초, 중, 고, 학생들은 피서지에서 밥 해먹지 않기, 나무젓가락, 종이컵 등 일회용품 사용 줄이기, 음료 캔이나 빈 병 분리해 버리기, 쓰레기 태우지 않기 등 쓰레기 문제 해결을 위한 실천 방법이 써 있는 홍보책자를 나누어 주며 시민들에게 실천을 당부했다. 이 행사에 참석한 초등학교 한 어린이는 "올 여름에는 가족과 함께 바다에 갈 계획인데, 가족들과 함께 쓰레기 없는 휴가를 보내고 올 거에요"라고 다짐했다.

질문	아동 반응	점수
쓰레기없는 피서지를 위해서 실천해야 할 일은 무엇인가요? 모두 말해 보세요.		1 0 NR
'쓰레기 없는 피서지 만들기 운동'은 언제, 어디서 열렸나요?		1 0 NR

며칠 전부터 경수는 어머니께 새 자전거를 사 달라고 졸랐습니다. 그러나 어머니께서는 "요즘은 힘들구나. 누나도 컴퓨터를 사 달라고 하는데 못 사주고 있잖니?" 하시며 들어 주지 않으셨습니다.

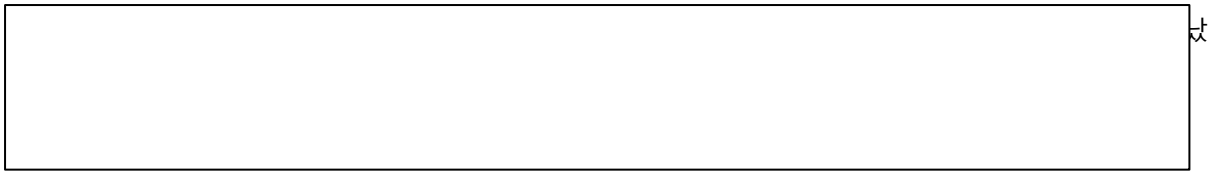
그런데 어제, 어머니께서 중고 물건 광고지를 보시며 이곳 저곳에 전화를 하고 계셨습니다.



경수는 볼멘 소리로 말했습니다. "나, 이 자전거 안 탈래요." 어머니께서는 어쩔 줄 몰라 얼굴이 빨개지셨습니다.

질문	아동 반응	점수
네모 안에 들어갈 내용은 무엇일까요?		1 0 NR

"경민아, 일요일인데 오늘도 달리기 연습하러 가니?" 어머니께서 걱정스럽게 말씀하십니다. "사고로 다리가 불편하지만 이번 운동회에서만큼은 최선을 다하고 싶어요. 이제는 어머니께 제 멋진 모습을 보여 드리고 싶어요." 경민이는 환한 표정을 지으며 어머니를 안심시켜 드렸습니다. 드디어 운동회 날. '탕'하는 신호에 따라 경민이를 포함한 친구들이 달리기 시작했습니다. 그런데 운동장 반쯤 지났을 때 경민이가 그만 넘어지고 말았습니다.



결승점에서 초조하게 지켜보시던 어머니께서 달려오는 경민이를 와락 끌어 안으셨습니다. 끝까지 최선을 다한 경민이의 모습이 너무나 자랑스러웠습니다.

질문	**아동 반응**	**점수**
네모 안에 들어갈 내용은 무엇일까요?		1 0 NR

- 유의사항: 문항 자체를 이해하지 못하는 경우 제시한 글 중간의 네모 안에 어떤 내용이 들어가야 함을 다시 한번 주시시킨다.

남을 돕는 구두쇠

옛날 어느 마을에 한 부자가 살고 있었습니다. 그 부자는 동네에서 소문난 구두쇠였습니다. 어떤 물건도 부자의 손에 들어가면 함부로 버려지는 일이 없었습니다. 그는 물건을 고치고 고쳐서 다시 썼습니다. 돈이 많은데도 이렇게 아껴쓰는 부자를 사람들은 이해할 수 없었습니다. "세상에.... 저렇게 아껴서 무엇을 하려고 그러지?" 동네 사람들은 부자를 보며 수근거렸습니다. 어느 날, 부자에게 한 청년이 찾아왔습니다. 그 청년은 어려운 살림에도 불구하고 불우한 이웃을 돌보아 주는 사람이었습니다.

질문	**아동 반응**	**점수**
이 글의 다음에 이어진 내용은 어떤 것일까요?		1 0 NR
이어질 내용을 예상하게 한 부분을 말해보세요.		1 0 NR

- 유의사항: 제대로 답을 하지 못하는 경우 전체적으로 다시 한번 읽어보라고 안내한다.

한지는 옛날부터 우리 조상들이 사용해 온 종이입니다. 한지는 닥나무 껍질을 삶아서 만들기 때문에 닥종이라고도 부릅니다. 부드러우면서도 잘 찢어지지 않고 질기기 때문에 오래 사용할 수 있습니다. 또한 습기를 흡수하는 능력이 뛰어나며 통풍이 잘 된다는 것도 큰 장점입니다.

이런 이유로 한지는 서민들의 생활 속에서 많이 이용되어 왔습니다. 우리 조상들은 한지로 책을 만들고 바람을 막기 위해 문종이로 사용했습니다. 그 외에 생활 용품으로 장판, 부채, 바구니 등을 만들기도 했습니다.

오늘날에도 한지의 은은한 아름다움과 장점 때문에 공예품의 재료로 다양하게 쓰이고 있습니다.

질문	**아동 반응**	**점수**
이 글에서 우리 조상들이 한지를 사용하던 예를 찾아 보세요.		1 0 NR
이 글의 중심 내용을 말해 보세요.		1 0 NR

피는 우리 몸의 구석구석을 다니며 여러 가지 일을 합니다.

피는 우리가 숨을 쉴 때에, 몸 속으로 들어온 공기를 몸 전체로 보내 줍니다. 나쁜 공기는 몸 밖으로 내보낼 수 있도록 옮겨 줍니다. 또, 좋지 않은 물질은 땀이나 소변을 통해 몸 밖으로 내보낼 수 있도록 옮겨 줍니다.

피는 우리가 먹은 음식에 들어 있는 영양분을 몸 전체에 보내 주기도 합니다.

그리고 병균 같은 것이 몸 속으로 들어오면 병균을 껴안고 죽습니다. 그렇기 때문에 병균이 우리의 몸에 퍼지지 않는 것입니다.

질문	**아동 반응**	**점수**
이 글에서 피의 기능을 찾아 보세요.		1 0 NR
이 글의 중심 내용을 말해 보세요.		1 0 NR
	문항 총점수	

Appendix 4

Phonological awareness instrument

음소판별 (Onset, coda oddity)

첫음소판별 (Onset Oddity)

Onset Oddity		Score 0 or 1	Incorrect Response	Comments
A.	칼, 컵, **복**			
B.	손, 실, **짐**			
1	**눈**, 공, 길			
2	봄, 발, **등**			
3	곰, **말**, 공			
4	해, **새**, 혀			
5	달, **별**, 닭			
	Subtotal			

끝음소판별 (Coda Oddity)

Coda Oddity		Score 0 or 1	Incorrect Response	Comments
A.	돈, 문, **밤**			
B.	등, 성, **각**			
1	**불**, 몸, 밤			
2	**곰**, 컵, 밥			
3	들, **목**, 일			
4	꿈, 곰, **국**			
5	입, **풀**, 탑			
	Subtotal			
	Total			

음소삭제 (Onset, coda deletion)

첫음소삭제 (Onset Deletion)

Onset Deletion		Score 0 or 1	Incorrect Response	Comments
A.	'매' - **'ㅁ'** = 'ㅐ'			
B.	'코' - **'ㅋ'** = 'ㅗ'			
1	'배' – **'ㅂ'** = 'ㅐ'			
2	'돈' – **'ㄷ'** = '온'			
3	'숨' – **'ㅅ'** = '움'			
4	'곰' – **'ㄱ'** = '옴'			
5	'활' – **'ㅎ'** = '왈'			
Subtotal				

끝음소삭제 (Coda Deletion)

Coda Deletion		Score 0 or 1	Incorrect Response	Comments
A.	'떡' - **'ㄱ'** = '떠'			
B.	'산' - **'ㄴ'** = '사'			
1	'입' – **'ㅂ'** = '이'			
2	'달' – **'ㄹ'** = '다'			
3	'땀' – **'ㅁ'** = '따'			
4	'박' – **'ㄱ'** = '바'			
5	'빵' – **'ㅇ'** = '빠'			
Subtotal				
Onset+Coda				
Oddity+Deletion				

Appendix 5

Ethical Approval of University of Oxford Central University Research Ethics Committee (CUREC)

Dear [redacted]

Skills that Predict Reading in Korea Primary School Children at Two Age Levels

The above application has been considered on behalf of the Departmental Research Ethics Committee (DREC) in accordance with the procedures laid down by the University for ethical approval of all research involving human participants.

I am pleased to inform you that, on the basis of the information provided to DREC, the proposed research has been judged as meeting appropriate ethical standards, and accordingly, approval has been granted.

If your research involves participants whose ability to give free and informed consent is in question (this includes those under 18 and vulnerable adults), then it is advisable to read the following NSPCC professional reporting requirements for cases of suspected abuse

http://www.nspcc.org.uk/globalassets/documents/information-service/factsheet-child-abuse-reporting-requirements-professionals.pdf

Should there be any subsequent changes to the project which raise ethical issues not covered in the original application you should submit details to research.office@education.ox.ac.uk for consideration.

Good luck with your research study.

Yours sincerely,

Nigel

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01865 274259
www.education.ox.ac.uk

UNIVERSITY OF OXFORD
DEPARTMENT OF EDUCATION

Notification of Title Form

All MSc Students

Please provide the proposed title for your dissertation below, approved by your supervisor, and return this form **electronically** to the Higher Degrees Office by the end of **Week 1, Trinity Term.**

Once the title has been approved, any further changes must be notified using form for Application for Change of Thesis Title. You may not submit change of thesis titles later than 1st of August.

NAME OF STUDENT:	
NAME OF SUPERVISOR:	
COURSE:	
TITLE OF DISSERTATION: Skills that predict reading in Korean primary school children at Year 2	
SUPERVISOR APPROVAL Please check this box to confirm you have discussed this title with your supervisor and received his/her approval for it: ☒	

Appendix 6

CUREC/1A Checklist

The University of Oxford places a high value on the knowledge, expertise, and integrity of its members and their ability to conduct research to high standards of scholarship and ethics. The research ethics clearance procedures have been established to ensure that the University is meeting its obligations as a responsible institution.

They start from the presumption that all members of the University will take their responsibilities and obligations seriously and will ensure that their research on human subjects is conducted according to the established principles and good practice in their fields and in accordance, where appropriate, with legal requirements. Since the requirements of research ethics review will vary from field to field and from project to project, the University accepts that different guidelines and procedures will be appropriate.

Please check the **CUREC flowchart and NHS flowchart** first to see if you need ethics approval.
Please complete this form using a word processor and email it, together with your supporting documents, to your **Departmental Research Ethics Committee (DREC)** (**if applicable**). If you don't have a DREC please email this form to **ethics@socsci.ox.ac.uk** using your official **ox.ac.uk email** address. **Only emailed applications will be accepted.**

WHAT THIS CHECKLIST IS DESIGNED FOR
This **CUREC 1A checklist** is designed largely for research that falls within the Divisions of Social Sciences and Humanities where ethical issues are relatively few and straightforward. Interviews, field work and oral history are also included in the CUREC process. The **full CUREC 2 application** is only required where certain project characteristics (e.g. type of participants, or procedures) result in a more complex set of ethical issues. It is expected that only in a limited number of cases will it be necessary for researchers to complete a CUREC 2 application. The checklist below will direct you to a CUREC 2 application if needed.

WHAT THIS CHECKLIST WILL NOT ASSESS
This checklist does not cover research governance, satisfactory methodology, or compliance with the requirements of publishers when administering their tests or questionnaires. As principal researcher, it is your responsibility to ensure that requirements in these areas are met. CUREC does not review studies classed as **audit** (see Glossary and Decision Flowchart for CUREC on our website). Further information on the University's research ethics procedures are available from the CUREC website: www.admin.ox.ac.uk/curec.

SECTION A: Filter for CUREC2 application

This section determines whether your study raises more complex issues which require the completion of a full application for ethical review, known as the CUREC 2 application.

(Please mark 'X' in the Yes/No column as appropriate to indicate your response.)

1. Are research participants classed as **people whose ability to give free and informed consent is in question**? (This may include those under 18 (though see "competent youths" in **FAQ C12**), prisoners, or adults "at risk".) Your attention is drawn to the University's **Safeguarding Code of Practice** and its implications for researchers involving children or adults at risk, including the need for the work to be risk assessed and for researchers to undertake related training. (**Note**: If any of your participants are aged 16 or under, please answer 'Yes' here **and** also answer question 4 below.)	Yes x	No
2. By taking part in the research, will participants be at serious risk of criminal prosecution (e.g. by providing information on drug abuse or child abuse)?	Yes	No X
3. Does the research involve the **deception** of participants?	Yes	No X

If you have answered 'No' to all of the questions above please go to **Section B**. If you have answered 'Yes' to any question above continue to question 4 below.

4. Is your project covered by a CUREC approved procedure (formerly known as "CUREC Protocols")?	Yes X	No
If yes, please give research procedure number(s):		

If you answered '**Yes'** to ANY of questions **1-3**, **and** answered '**No'** to question **4**, **please stop completing this checklist and do not submit it for ethical review**. Instead, please complete the CUREC 2 application form from the CUREC website. Then submit the CUREC 2 form for ethical review.
If you answered 'Yes' to ANY of questions 1-3, **and** answered 'Yes' to question 4, please go on to **Section B**.

SECTION B: Contact details and project description (NB: must be typed not handwritten)

Contact details:

1. **Principal researcher/**supervisor (title and name) (if student research):	
2. Name of student (if student research):	
3. Degree programme, e.g. DPhil, BA, MPhil, BSc, MSc (if student research):	
4. Department or Institute name:	
5. Address for correspondence (if different from 4 above):	
6. University e-mail (**not** private email) and telephone contact:	
7. Name and status of others taking part in the project, e.g. third year undergraduate; postdoctoral research assistant:	n/a

SECTION B continued	
Project description:	
8. Title of research project:	Skills that predict reading in Korean primary school children at two age levels
9. List of location(s) where project will be conducted:	South Korea
10. If your research involves overseas travel or fieldwork, by the time the research starts, will you have completed and returned a travel risk assessment form? (This has to be approved by your department before you travel. If you are travelling overseas, you are strongly advised to take out University travel insurance.)	Yes X No N/A
11. Anticipated duration of research project overall:	3
12. Anticipated start and end dates of the research project involving human participants:	From: (1/04/2016) To: (31/08/2016) Please note that you will need ethics approval **before** you start your research. CUREC1As may take up to 30 days to process.
13. Title and very brief and simple lay description of **research** (about 150 words), plus description (about 200 words) of the nature of participants.	
a) Title and brief lay description of research (150 words). When describing the research, please include your methodology, how you are applying professional guidelines, and the use to which results/data will be put. **Please also declare any conflicts of interest here.**	

Title: Skills that predict reading in Korean primary school children at two age levels

Aim of Research: The aim of this study is to investigate the difference in two age groups of the contribution of cognitive and linguistic skills that predict Korean reading in Korean primary school children. In alphabetic languages, the contribution of skills that predict reading such as vocabulary and phonological awareness differ between younger and older children. For example, phonological awareness is a stronger predictor of English reading than vocabulary in Grade 1 children while the opposite is true for Grade 5 children. This study investigates whether such a difference can also be observed in Korean.

Method: The proposed study will follow a cross sectional within-child design in which each participant will be tested in a range of measures. To measure receptive vocabulary, children will be orally presented words and asked to select a picture on a projector that corresponds to the given word. They will also circle the number of the picture on a sheet of paper. To measure phonemic awareness, they will be presented words on a card and asked to delete syllables and phonemes or find a phoneme that is different from the other two phonemes. The answers will be obtained orally and recorded by the researcher. They will also be asked to name objects as quickly as possible. A nonverbal cognitive test will be carried out asking children to point out patterns. Assessments will be carried out with individual children and will be divided into two sessions lasting no more than 25 minutes.

Participants: They will be recruited from a primary school in Seoul, South Korea. From this school, a class in Grade 1 and a class in Grade 4 will be selected. Only children who are fluent in Korean will be included in the analysis but will not be left out in the assessment as they may feel excluded.
Informed consent: Consent forms will be obtained by the school headmaster and classroom teachers. The headmaster of the primary school will be contacted by mail to ask for his or her consent for the school to take part in the study and for agreement to send opt-out forms to teachers and parents. The consent form sent to the parents will contain an outline of the aim, procedures and their right to withdraw along with an opt-out form. From each child verbal assent will be obtained prior to the start of assessment and they will also be informed of their right to withdraw.

SECTION B continued

b) Description of participants and obtaining informed consent (200 words). When describing participants, please include

- criteria for inclusion/exclusion
- method of recruitment
- processes for consent to participate

Please ensure you attach as separate documents (if applicable, in English translation):

- your recruitment and advertisement material e.g. a poster or brief invitation letter/ email
- information for participants to read (or hear) before they agree to take part e.g. written participant information sheets or (only if applicable) oral information scripts
- a document to record informed consent. Templates for written consent forms and/or oral consent scripts (in case of an oral consent process) are available from the CUREC website
- a guide to interview questions (this may be a list of questions to be asked, or a preliminary scope of questions), or a sample of other instruments (such as a sample questionnaire)
- (if relevant) debriefing document after participants have taken part

14. What are the ethical issues connected with your research and what steps have you taken to address them? Please do not answer 'none'. The committee needs to see evidence that you have identified potential ethical issues with respect to your research and have taken steps to address them. These issues could relate to:

- your own physical and psychological safety as a researcher (please see the University's and Social Science Division's Safety in Fieldwork guidance
- participant burdens and/or risks, and
- data protection/ confidentiality.

For more guidance on ethical issues, please see www.admin.ox.ac.uk/curec/resources/.

Participants of this study will not include children that have special educational needs who typically will be in separate classes, or children who are not fluent in Korean. These children will not be left out of the study but their data will not be analysed. All children will be sent letters to home inviting them to take part in the study and assessments will be carried out with them in the same way as other children, but their results will not be analysed. Children will not receive any comments regarding their performance and they will be informed that they can stop whenever they feel uncomfortable with the procedure.

Section B continued

15. Will you obtain informed consent according to CUREC guidelines and good practice in your discipline before participation?	Yes X	No

If you have marked '**No**', please give a brief explanation and justification for this decision here:

16. Will your research involve discussing sensitive issues? This could be information relating to race or ethnic origin, political opinions, religious beliefs, physical/mental health, trade union membership, sexual life or criminal activities.	Yes	No X

If you have marked '**Yes**', please make sure that you have included some **supporting information** (as directed in question 13 of this section) showing the range of questions covering these issues.

17. Will you ensure that **personal data** collected directly from participants or via a **third party** is held and processed in accordance with the provisions of the Data Protection Act?	Yes X	No

18. How will you ensure that any personal or sensitive data are captured, transferred and stored securely?

In particular if data are to be captured electronically, please consult with your local IT department and, with respect to University IT security policies, please comment on how you will capture such data in the first instance, how you will transfer them over networks or via portable media and how and where data will be stored. For more information please see the University's web pages on research data management:

http://researchdata.ox.ac.uk/university-of-oxford-policy-on-the-management-of-research-data-and-records/

All data will be kept confidential and stored securely; it will be protected from inappropriate disclosure. Hard copies with confidential information will be stored in a locked space. Children will not be identified by their names but will be identified only by a numeric code to keep results anonymous. Also, results will not be analysed on a personal level and will only be done so in group levels. A brief summary of research findings will be provided to the schoolteachers and parents upon request.

SECTION C: Methods and procedures to be used

Method used: Please ensure you have addressed any potential ethical issues related to these methods in Section 14 and in your Participant Information Sheet	**Please mark 'X'**
1. Analysis of existing records	
2. Snowball sampling (recruiting through contacts of existing participants)	
3. Use of casual or local workers e.g. interpreters	
4. Participant observation	
5. Covert observation	
6. Observation of specific organisational practices	
7. Participant completes questionnaire in hard copy	
8. Participant completes online questionnaire or other online task	
9. Using social media	
10. Participant performs paper and pencil task	X
11. Participant performs verbal or aural task (e.g. for linguistic study)	X
12. Focus group	
13. Interview	
14. Audio recording of participant (you will generally need specific consent from participants for this)	
15. Video recording of participant (you will generally need specific consent from participants for this)	
16. Photography of participant (you will generally need specific consent from participants for this)	
17. Others (please specify):	

SECTION D: Professional guidelines and training		
In this section, please mark 'X' against at least one of the following professional guidelines you aim to adhere to. You should use the principles listed in your chosen guideline(s) in conducting your own research. **Note**: this is not an exhaustive list.		**Please mark 'X'**
Research specialism/ methodology	**Association and guidance document**	
Anthropology	Association of Social Anthropologists of the UK and Commonwealth	
Criminology	British Society of Criminology: Code of Ethics for Researchers in the Field of Criminology	
Education	British Educational Research Association Ethical Guidelines for Educational Research	X
Geography	Association of American Geographers Statement on Professional Ethics Royal Geographical Society: Research Ethics and Code of Practice	
History	Oral History Society of the UK Ethical Guidelines	
Internet-based Research	British Psychological Society: Conducting Research on the Internet Association of Internet Researchers Ethics Guide Also see our Best Practice Guidance on internet-based research	
Law (Socio-Legal)	Socio-Legal Studies Association: Statement of Principles of Ethical Research	
Management	Academy of Management's Professional Code of Ethics	
Political Science	American Political Science Association (APSA) Guide to Professional Ethics in Political Science	
Politics	Political Studies Association. Guidelines for Good Professional Conduct	
Psychology	British Psychological Society Code of Ethics and Conduct British Psychological Society: Conducting Research on the Internet Also see "Internet-based Research" guidance above	
Social Research	Social Research Association: Ethical Guidelines	
Sociology	The British Sociological Association: Statement of Ethical Practice	
Visual Research	ESRC National Centre for Research Methods Review Paper: Visual Ethics: Ethical Issues in Visual Research	
Other professional guidelines. Please specify the other guidelines used here*:*		

1. Please indicate what training in research ethics the researchers involved with this study have received, e.g. the title of the course and date completed (online training available at www.admin.ox.ac.uk/curec/training).

If no formal training has been undertaken, please indicate any discussions of research methodology between researchers and supervisors here.

Foundations of Education course on the 11th of November, 2015 by Nigel Fancourt

SECTION E: Signatures

- 'Electronic signatures' sent as email confirmations from a University of Oxford email address can be accepted. Separate emails should come from each of the relevant signatories as outlined below, indicating acceptance of the relevant responsibilities.
- If you have obtained handwritten (wet-ink) signatures, please scan them and the rest of the checklist pages to create a single PDF document and email through.

Please ensure this checklist is signed by:

For staff research:	**For student research**:
1. **Principal researcher**	1. **Principal researcher (project supervisor)**
2. **Head of Department (or nominee)**	2. **Head of Department (or nominee)**
	3. **Student researcher**

1. **Principal researcher signature/supervisor signature (if student research)**

I understand my responsibilities as **principal researcher** as outlined in the CUREC glossary and guidance on the CUREC website.

I declare that the answers above accurately describe the research as presently designed, and that a new checklist will be submitted should the research design change in a way which would alter any of the above responses so as to require completion of CUREC 2 (involving full scrutiny by an IDREC). I will inform the relevant IDREC if I cease to be the principal researcher on this project and supply the name and contact details of my successor if appropriate.

Signature: ……..

Print name (block capitals): …….. **Date**: ……10/03/2016……...

2. **Departmental endorsement signature**

I have read the research project application named above. On the basis of the information available to me, I:

(i) consider the principal researcher to be aware of her/his ethical responsibilities in regard to this research;
(ii) consider that any ethical issues raised have been satisfactorily resolved or are covered by relevant professional guidelines and/or CUREC approved procedures, and that it is appropriate for the research to proceed (noting the principal researcher's obligation to report should the design of the research change in a way which would alter any of the above responses so as to require completion of a CUREC 2 full application);
(iii) am satisfied that: the proposed project design and scientific methodology is sound; the project has been/will be subject to appropriate **peer review**; and is likely to contribute to existing knowledge and/or to the education and training of the researcher(s) and that it is in the **public interest**.

Signed by Head of Department or nominee *(example nominees for student research include the Director of Graduate Studies/ Director of Undergraduate Studies)*:

Signature: ……..

Print name (block capitals): ……..... **Date**: .....10/03/2016……...

3. **Student signature (if student research)**

I understand the questions and answers that have been entered above describing the research, and I will ensure that my practice in this research complies with these answers, subject to any modifications made by the principal researcher properly authorised by the CUREC system.

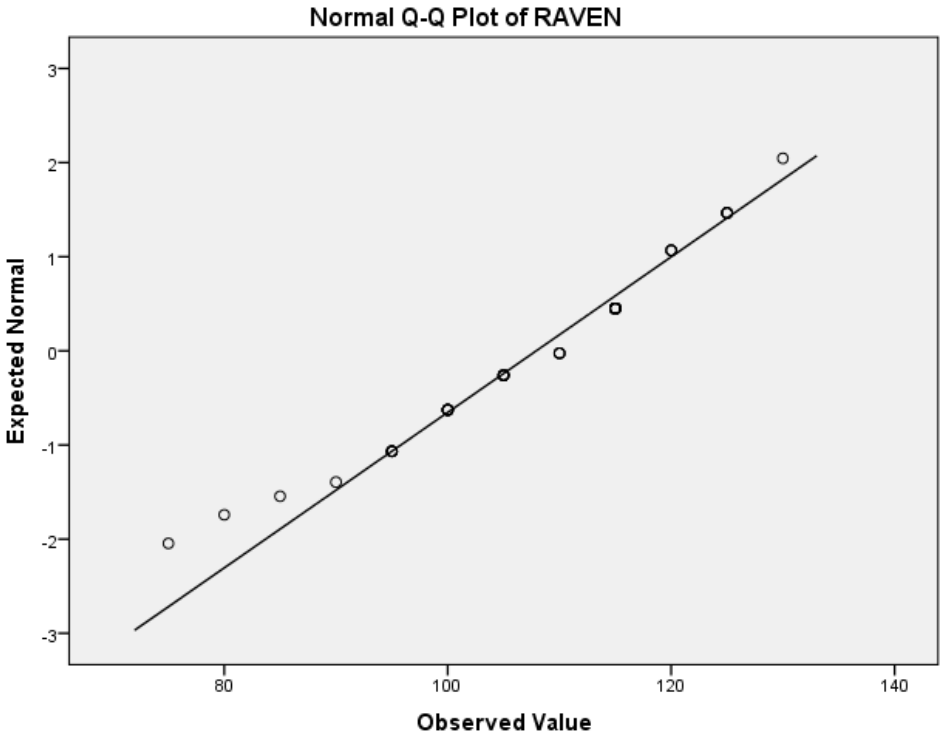
Signed by student: …….

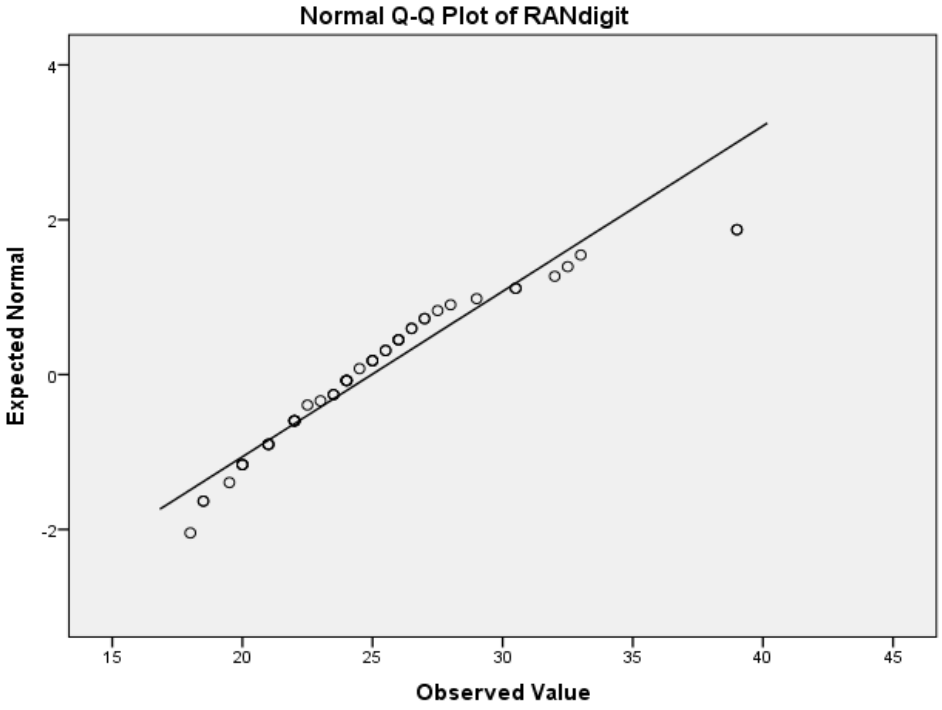
Print name (block capitals): ……..... **Date**: .....10/03/2016……...

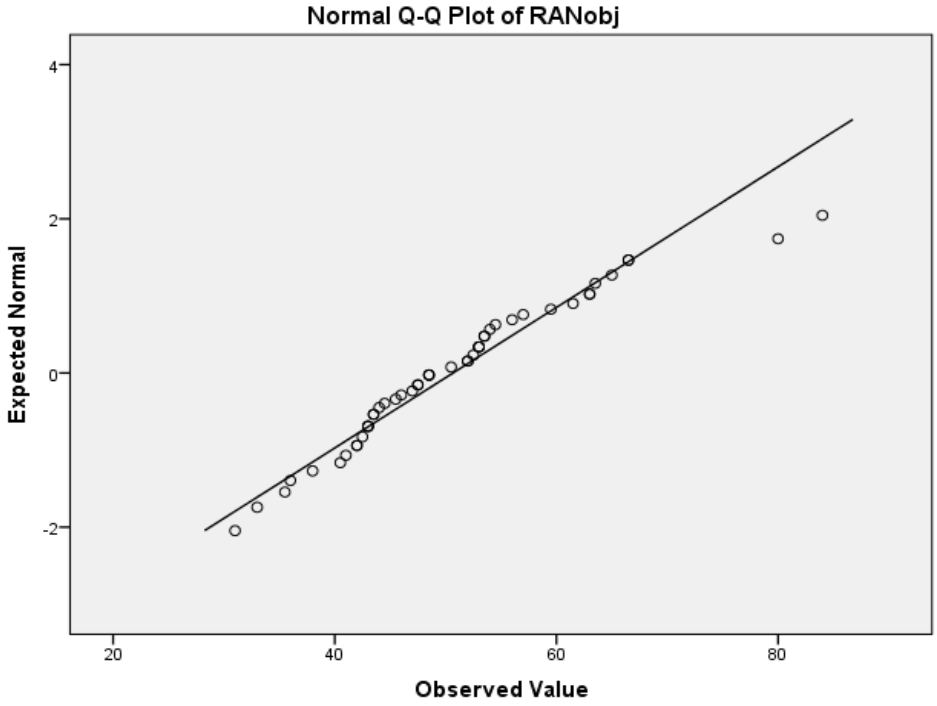
SECTION F: SUBMITTING THE COMPLETED CHECKLIST	Please mark 'X'
1. Check you have completed all sections (A-E)	X
2. Ensure your application is signed by you, your supervisor (if student) and department	X
3. **Please attach all supporting documents (see section B, question 13b for details).** If the appropriate supporting documentation is not included with your application, you will then be asked to provide this separately. **This may well delay the ethical review process, and thus the start of your research.**	X
4. Ensure you have declared conflicts of interest (if any) in Section B, question 13.	X
5. If your department has a Departmental Research Ethics Committee (DREC), submit this checklist and supporting information to the appropriate departmental officer.	X
6. If your department does not have a DREC, submit the checklist and supporting information to the SSH IDREC (email ethics@socsci.ox.ac.uk).	X
7. Applications must be sent by email from your official ox.ac.uk email account. Please do not send applications by post.	X

Appendix 7

The normal Q-Q plot for the Nonverbal Intelligence test (Raven's Coloured Progressive Matrices) and the Rapid Automatized Naming (RAN) Digit and Object

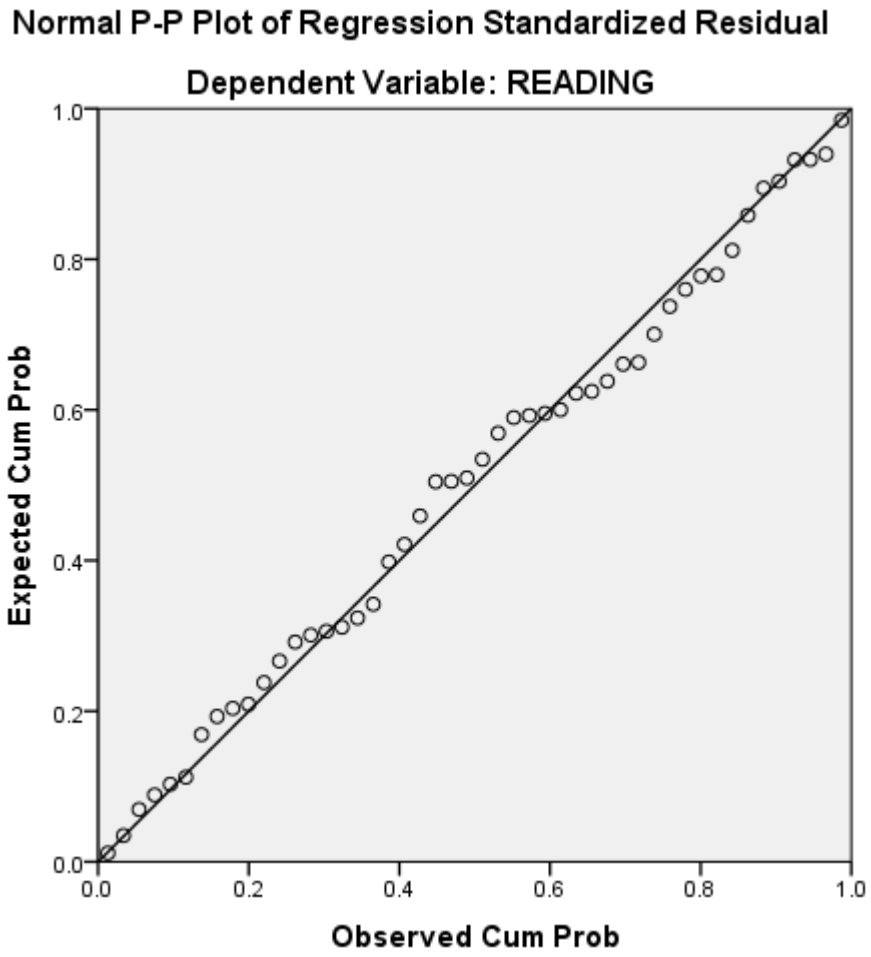





Normal Q-Q Plot of RANobj
Expected Normal
4
2
0
-2
20
40
60
80
Observed Value

Appendix 8

The Normal Probability Plot of the standardized residuals of Reading Comprehension (KISE-BAAT), from the diagnostic multiple regression including Age in Months, Raven's Coloured Progressive Matrices, Reading Comprehension, Receptive Vocabulary, Phonological Awareness, and Rapid Automatized Naming (RAN) Digit and Object



Appendix 9

The Scatterplot between the standardized residuals and the predicted value of the standardized residuals of the reading comprehension instrument, from the diagnostic multiple regression including Age in Months, Raven's Coloured Progressive Matrices, Reading Comprehension, Receptive Vocabulary, Phonological Awareness, and Rapid Automatized Naming (RAN) Digit and Object

