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Component skill processing in second language reading

by

Youn Kyung Chung Kim

A Thesis Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of

MASTER OF ARTS

Department: English
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Signatures have been redacted for privacy

Iowa State University
Ames, Iowa

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# TABLE OF CONTENTS

## ACKNOWLEDGEMENTS  

### CHAPTER I. INTRODUCTION

### CHAPTER II. LITERATURE REVIEW  
- Comparison of L1 and L2 Reading  
- L2 Reading as Component Skill Processing  
- Eye Movement Research  
- Phonological Recoding  
- Relationships among L2 Reading Ability, L2 Proficiency, and L1 Reading Ability  
- Sinatra and Royer's Study  
- Present Study

### CHAPTER III. MATERIALS AND METHODS  
- Development of the Instruments (first version)  
- Pilot Testing

### CHAPTER IV. RESULTS  
- Results of Pilot Test I—Nine Korean Subjects  
- Revisions of the Instrument during/after Pilot Test I  
- Results of Pilot Test II—Four Korean Subjects from Pilot I  
- Results of Pilot Test III—Five Native Speakers  
- Results of Pilot Test IV—Three Korean Subjects  
- Results of Pilot Test V—Three Native Speakers

### CHAPTER V. CONCLUSIONS AND DISCUSSION  
- Criteria for the Development of the Instruments  
- Pilot Testing

## BIBLIOGRAPHY

## APPENDIX A. TASKS AND SAMPLE STIMULI IN SINATRA AND ROYER

## APPENDIX B. FIRST AND FINAL VERSION OF THE PSEUDOWORD LIST

## APPENDIX C. FIRST AND FINAL VERSION OF THE CATEGORY MATCH ITEMS

## APPENDIX D. KOREAN COMPREHENSION ITEMS - THE ORIGINAL AND BACK-TRANSLATED VERSION

## APPENDIX E. FINAL VERSION OF THE INSTRUMENTS
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CHAPTER I. INTRODUCTION

Reading is an important skill for second language (L2) learners who want to study in countries where their first language (L1) is not spoken. As is commonly observed, however, L2 readers are usually not as fast and efficient as they are in their L1 reading. In recent L2 reading research, two questions are considered to be important. First, what factors contribute to the differences in reading rates between L1 and L2 in the same individuals? Segalowitz, Poulsen, and Komoda (1991) report that even advanced L2 readers read the L2 30% or more slower than their L1. As the authors note, these differences may reflect the processes underlying L2 reading. The second question is whether problems in L2 reading are due to the lack of proficiency in the L2 or to poor L1 reading ability. Bernhardt (1991b) argues that L1 literacy is a significant component in L2 reading, and many other researchers also argue that L1 reading ability is related to L2 or foreign language reading ability. At the same time, L2 readers usually do not have native-like control over the L2 linguistic system (Bernhardt, 1991b). Discovering the relative roles of L2 language proficiency and L1 reading ability in L2 reading is important in understanding the L2 reading process.

Keeping these questions in mind, first of all, we have to decide how to define the reading process or system. Perfetti
(1985) views the L1 reading process as consisting of lexical access and comprehension, both of which are executed in the limited processing resource of working memory. Lexical access refers to finding a word in permanent memory. The comprehension process is divided into two parts: local processing and text modeling. In local processing, the reader constructs elementary meaning units (propositions) from a text within a relatively short time. Again, local processing is divided into two parts: semantic encoding, in which the meaning of a word is encoded in a way that is appropriate for its context, and integration of propositions, the process of combining successively occurring propositions with each other. Text modeling is the process by which the reader integrates various types of knowledge with the results of local processing to form a representation of the text meaning.

Bernhardt (1991a) views the reading process as integrating two perspectives: 1) cognitive processing, which is a text-driven operation, and 2) social processing, which is a (background) knowledge-driven operation. Cognitive processing occurs because the brain is preset to receive certain kinds of information, while social processing derives from experience and is used to interpret what one reads.

These views on reading can be restated within the framework of the "component skill processing" view of reading. Much of recent L1 reading research looks at the fluent reading
process in terms of a set of component skills (Grabe, 1991). Sinatra and Royer (1991) quote Perfetti and Curtis (1986), whose general model of reading was based on the assumption that "reading is a cognitive activity described by component processes in interaction" (p. 3). Although there are differences between models, most of them include the same component processes, which are divided into two levels: lower and higher. According to Sinatra and Royer (1991), the lower level processes include "feature extraction, pattern recognition, letter identification, spelling pattern identification, and lexical access" (p. 3). The higher level processes include "concept activation, syntactic analysis, propositional encoding, sentence comprehension, intersentence integration, and activation of prior knowledge or schemata" (p. 3). Sinatra and Royer take the position that the lower level processes are encapsulated and modularized, that is, they take place without reference to other on-going processes. On the other hand, the higher level processes are regarded as interactive. The lower level components operate very fast and are less resource-consuming in a skilled reader, so that a large amount of resources is available for the higher level processes. Much of the recent L2 reading research tends to draw on the L1 reading research carried out in the framework of component skill processing theory. The purpose of the present study is to prepare instrumentation for a study which
will use Sinatra and Royer's basic framework to investigate the component skill processing in L2 reading and the relationships among L1 reading, L2 language proficiency, and L2 reading.
CHAPTER II. LITERATURE REVIEW

In this chapter, the differences between L1 and L2 reading, the effects of different orthographic systems on reading, L2 reading as component skill processing, eye movement research, phonological recoding, and the relationships among L2 reading, L2 language proficiency, and L1 reading ability will be discussed.

Comparison of L1 and L2 Reading

While there are similarities between L1 and L2 reading, there are also important differences. In general, the differences can be defined in terms of the learner and linguistic differences. With respect to learner differences, first, many adult L2 readers are already literate in their L1 when they begin to read the L2, but lack native-like control over the L2 linguistic system (Bernhardt, 1991b). Second, adult L2 readers begin their L2 reading process with very different knowledge from child L1 readers in terms of vocabulary, world knowledge, and metacognitive strategies. Finally, adult L2 readers may encounter a different cultural value system from that underlying their L1 reading. The linguistic difference is that L2 readers have to face different orthographic, phonological, syntactic, and semantic systems from those of their L1 when they read the L2. A sizeable body of research has investigated the effect of a
different orthographic system on L2 reading. This work is reviewed in the next section.

Orthographic effects on L2 reading

The difference in orthographic systems between L1 and L2 seems to affect lower level processing in L2 reading. In order to find the effects of orthographic factors among readers whose native language has a non-alphabetic writing system, Haynes and Carr (1990) investigated how Chinese readers of English as their L2 learn new words from an English text. The Chinese subjects consisted of two groups: freshmen and seniors in a Taiwanese university. In the first and second sessions, two types of component skills were measured: visual efficiency and language proficiency skills. The visual efficiency tasks included timed same-different matching of numbers, words, pseudowords (orthographically regular non-words), and nonsense words (letter-strings that do not have English orthographic structure). The language proficiency tasks included listening, grammar, vocabulary range tests, a synonym/antonym matching task, and L1 reading tests. All these tasks required pencil-and-paper responses. In the third session, the subjects were allowed 20 minutes to write a free recall after reading a passage (500 words) copied from a text on medical treatment of injury. Afterwards they were asked to reread the text, underlining any words which had
confused them on the first reading. They were then asked to write definitions of 15 key words plus any that they had underlined.

The authors defined "orthography effect" as the amount of benefits each reader derived from orthographic regularity. "Orthography effect" was calculated by subtracting the nonsense word (letter-string) matching efficiency (the number of correct responses per minute) from the pseudoword matching efficiency for each individual. This effect was thought to be a measure of readers' progress in mastering the visual-structural properties of the English writing system. The authors found that performance in speeded word-level tasks generally correlated with reading speed more than with comprehension. However, the orthography effect in visual matching correlated with comprehension but not with speed. The orthography effect was also an important predictor of new word learning while reading a text. The results of the study were consistent with the idea that writing system knowledge is important to visual word processing among L2 readers, and such knowledge continues to influence their reading success. The authors suggested that while higher order linguistic and conceptual knowledge is needed for reading success, lower level, perceptually-based linguistic knowledge—writing system knowledge—is important as well.

Haynes and Carr (1990) also noted that differences in
orthography between L1 and L2, i.e., differences among alphabetic, syllabic, and logographic systems, can negatively affect L2 reading. The authors cite Henderson (1983), who found large differences in reading speed and comprehension of English text when comparing the Arabic readers of English with Spanish readers of English and with English L1 readers. The Spanish L1 readers read English at about half the rate of the English L1 students, who were American, with 25% less comprehension. The Arabic L1 group's reading speed of English was at about one fourth the rate of Americans, with even poorer comprehension than the Spanish L1 group. Haynes and Carr suggested that the difference in orthographic systems and visual symbols between L1 and L2 was one of the factors responsible for the result. That is, Spanish L1 readers were familiar with the Roman alphabet used in English, while Arabic L1 readers were not.

Haynes and Carr also cite Brown and Haynes (1985), who compared performance differences between groups of Arabic, Spanish, and Japanese readers in identifying pairs of English words and orthographically regular non-words as "same" or "different." Contrary to an expectation that the Japanese group would be slowest due to the different orthographic system, they were the fastest of all (the Spanish L1 group was faster than Arabic group, as expected). However, in the task which required the subjects to pronounce English words and
non-words, the Japanese group was slower than either the Spanish or the Arabic readers of English. Considering the fact that both Arabic and Spanish readers were trained in alphabetic writing systems that have fairly regular grapheme-phoneme correspondences, the result might mean that the phonological process of recoding is automatized for the Arabic and Spanish readers. Phonological recoding can be defined as a speech process in which the visual input (printed word) is transformed into a spoken form, and is mediated during the process of lexical access. However, the Japanese writing system is not alphabetical, so that the Japanese might have more difficulty with alphabetic mapping between spoken and written English (the grapheme-phoneme correspondence in English). The fast performance of the Japanese group for the visual identifying task was attributed to the multiple pronunciation of Kanji logographic characters, one of the three symbol systems of Japanese, which might lead Japanese readers to favor a visual route in lexical access rather than phonological recoding. Haynes and Carr also reported on the work on L1 reading of Chinese characters. Chinese L1 readers did not indicate evidence of phonological recoding in reading individual characters and relatively simple sentences, except when the reading involved complex sentences or groups of characters, or when tasks required memory for lists. These results are in accordance with Grabe's (1991) explanation that
logographic writing systems seem to favor lexical access through direct recognition of word forms (holistic approach), though the phonological process appears to play an important role in word recognition among fluent L1 readers of Japanese and Chinese. Grabe cites Rayner and Pollatsek (1989), who argue that orthographic differences in languages may affect the routes the reader takes in lexical access, direct or indirect with phonological recoding, but readers in every language in some way combine direct lexical access with phonological recoding of words.

Orthographic systems can be compared according to their degree of orthographic transparency or regularity of spelling-to-sound correspondence. For example, Spanish has a "shallow" orthographic structure, i.e., regular sound-letter correspondences, whereas English has a "deep" orthographic structure with quite irregular sound-letter correspondences (Grabe, 1991). Segalowitz and Hebert (1990) cite Feldman and Turvey (1983) and Naish (1980), who investigated phonological effects in languages with highly regular spelling-to-sound patterns (Serbo-Croatian, Hebrew) and found evidence for automatic phonological recoding. Segalowitz and Hebert, in a lexical decision study and a sentence verification (SVT) study for skilled English/French bilinguals (described in detail in a later section), also found that, in the L1 data, the French L1 group did not produce a greater number of errors or slower
responses to homophones or homophone sentences than to control words or sentences for both of the tasks, whereas English L1 group did (French has a quite regular grapheme-phoneme pattern compared to English). The authors suggested that this difference could be understood in terms of the differences between the languages in their patterns of grapheme-to-phoneme correspondences.

**L2 Reading as Component Skill Processing**

Much of recent L2 reading research concentrates on component skill processing in reading, drawing on L1 reading research. Recent L2 reading research in component skill processing has stressed the importance of automaticity in lower level identification skills in fluent reading. Automaticity may be defined as occurring when the reader is unaware of the process, not consciously controlling the process, and using little processing capacity, so that the capacity can be used for higher level processing. Segalowitz et al. (1991) report a common observation that advanced L2 readers are unable to perform reading tasks as easily or as quickly in their L2 as in their L1. The observable skill difference is in the speed and ease of functioning in the L2 as compared to the L1. The authors view reading in terms of component skill processing, dividing the components into lower and higher levels. They state that the lower level components
operate in an encapsulated (modularized) manner, and that the processes are automatized—they operate without interference, and hence are very fast and relatively effortless. In contrast with the encapsulated and automatized lower level component processing, the higher level processes require interactive processing with reference to information derived from other on-going processes, which is very resource consuming. This notion is consistent with that of Sinatra and Royer (1991). Segalowitz et al. (1991) report two studies which suggest that automaticity is less developed in L2 reading than in L1. In the first, Favreau and Segalowitz (1983) investigated advanced bilinguals' abilities to determine the degree of independence (modularity) of word recognition from higher level top-down strategic influences. The subjects were required to do a primed lexical decision task (e.g., the prime is the category BIRD, the target string is ROBIN, and LOBIN is a non-word), in which prime-target semantic relatedness was set against subjects' expectations of a particular target given a certain prime. The subjects who read their L2 more slowly than their L1 showed significantly weaker automaticity effects in their L2. Thus, the slower L2 reading in otherwise advanced bilinguals was found to be related to reduced automaticity of word recognition in L2, that is, they had not yet acquired the modularity evident in their L1. In the other study reported, Favreau, Komoda, and
Segalowitz (1980) investigated advanced bilinguals' abilities to utilize orthographic redundancy in letter recognition, using the word superiority effect paradigm. The subjects were asked to identify target letters that were embedded in either words or non-words. The results showed that while word superiority effects (i.e., more accurate identification of target letters embedded in a word than in a non-word) were found with stimuli in L1, when subjects received stimuli in L2 either no effects were found, indicating that subjects could not make use of orthographic redundancies, or more processing time was required in the L2 condition for such efforts to appear, showing less efficient processing of orthographic information.

These results indicate that the slow reading of otherwise advanced bilinguals may be associated with poor processing in lower level components that may be involved in basic word recognition, emphasizing the importance of automaticity of lower level skills in skilled reading. They also argue that one factor of the different reading performance between L1 and L2 can be attributed to automaticity in word recognition.

Dissatisfied with approaches in reading instruction which encouraged readers to guess at words whose meaning they did not know, Haynes (1993) conducted a study which shed further light on the word recognition process in L2 reading. Her ESL subjects were asked to read two English passages, each
including two nonsense words, retell the story, point out problem words, and discuss those words with an interviewer. The meaning of one of the nonsense words in each passage could be guessed locally by referring to the immediate sentence context; the other required global integration of information throughout the passage. On the whole, local guessing appeared easier for L2 readers of English than global guessing. An interesting finding was that, in addition to dealing with the nonsense words, the subjects frequently analyzed an unfamiliar word to find a familiar morpheme in it, which indicated bottom-up processing. For example, the word "tapped" was related to tap-dancing by one subject, "campfire" was related to fire and an outdoor place. One subject analyzed "campfire" as "a place with many people like military camp", so that the subject guessed its meaning as a "battlefield". Some subjects misrecognized some words, e.g., "swam" was misrecognized as "swan" and some subjects saw "top" in "tapped", while another saw "tape". Two Japanese subjects guessed that "splendid" meant "spread". Those misrecognitions may indicate the importance of word-form for second language reading. Haynes stated that the processes responsible for such mismatches are probably both top-down and bottom-up. They are relatively bottom-up in that the graphic shape (word form) of individual words strongly influence the guesses. At the same time, however, they may be considered as top-down, since students'
background knowledge—such as their L1 phonology and graphophonemic mapping of the L1—may cause them to misrecognize the graphic stimulus in the process of lexical access. But Haynes argues that these mismatches are under the influence of the L1 and still not top-down guesses in the usual sense of deriving from the reader's higher level linguistic and world knowledge. Especially, the patterns of guessing an unfamiliar word by looking for a familiar morpheme within it and of misrecognizing words, where the word the reader accessed in memory was spelled and/or pronounced differently from the word on the page, indicated that recognition of the word shape (a lower-level skill) overrode the reader's ability to attend to syntactic relations in higher level processing in a text.

Bernhardt (1991a) views the reading process as comprising two perspectives: 1) reading as a cognitive process and 2) reading as a social process. Bernhardt (1991b) elaborates on this notion, viewing the reading system as involving three components: the language component, the literacy component, and the knowledge component. The language component includes letter and word recognition, lexical knowledge, syntax, etc. The literacy component includes intrapersonal variables such as purpose for reading, intention, preferred level of understanding, and L1 reading ability. Bernhardt argues that the more literate the reader is in the L1, the higher the probability of employing first language strategies on any
second language task. The knowledge component includes background information. Bernhardt's view on the reading system may be restated in the framework of the component skill processing theory. Bernhardt (1991a) posits a dynamic model for the reading system or process: as more language is input, the model changes and grows. In other words, there is explicit language input, and there is inferencing involved. This inferencing process helps to fill in the unstated or redundant information that is not explicit in the text, thereby helping the text "make sense." The model corresponds to how the lower and higher level component skills work in cooperation in the reading system.

Eye Movement Research

Research on eye movement in reading supports the component skills model. According to Grabe (1991), the L1 reading research on eye movement while reading shows that proficient readers read most words on a page rather than guessing or sampling words selectively. These studies show that some 80% of content words and 40% of function words are directly focused on in reading. It is argued that reading is a very precise and rapid skill, and the reason for fast reading is not because readers guess well as earlier thought (see, e.g., Goodman (1967), who referred to reading as a "psychological guessing game") but because they can recognize
the majority of words automatically.

Bernhardt (1991a) reports a study in which she compared the eye movement protocols of native readers of English with those of nonnative readers of English. The results illustrated that a nonnative reader of English fixated more densely over a fairly simple text in English than a native reader. Furthermore, in a study investigating eye movement of a nonnative, yet knowledgeable, reader of German, the experienced nonnative reader's fixations consisted of groupings of fixation on sections of the lines, which indicated that the nonnative experienced reader processed constituents making up the line rather than the entire line as a gestalt ("feel"), reflecting lower level skill processing in L2 reading.

**Phonological Recoding**

A central and controversial issue in reading research on component skill processing is whether phonological recoding is involved during lexical access. De Soto and De Soto (1983) examined the relationship between reading achievement and verbal processing ability in high- and low-ability L1 children readers. They measured the knowledge of grapheme-phoneme association by evaluating the ability to pronounce nonwords with acceptable English spelling patterns. One of the findings was that the ability to pronounce such pseudowords
was a strong predictor of reading achievement. While lexical access clearly does not take place in the pronunciation of non-words, this study suggests that phonological processes do play a part in reading achievement.

Segalowitz and Hebert (1990) present a summary of the three general points of phonological recoding research in L1. The first is that phonological recoding is probably not normally involved in lexical access by skilled L1 readers of English. A second general point is that phonological recoding is probably automatic, but does not normally occur fast enough to affect lexical access. The third point is that, regardless of whether phonological recoding affects lexical access, phonological codes are more stable than visual codes and are useful in determining the correct referent in memory.

Segalowitz and Hebert examined phonological effects in lexical access in both L1 and L2 reading of skilled bilinguals. The subjects were two groups of English/French bilinguals: an English L1 group and a French L1 group. Each group was divided into two types of bilinguals: one composed of bilinguals who read two languages at the same rate (equal reading rate bilinguals) and the other of bilinguals who read their L2 more slowly than the L1 (unequal reading rate bilinguals). The research consisted of two studies, one involving phonological recoding in a lexical decision task, and the other involving phonological recoding in a sentence
verification (SVT) task. The studies examined whether the observed slower L2 reading rate for fluent bilinguals is related to indirect lexical access involving phonological recoding. In the lexical decision study, English and French lists of 36 homophones (e.g., "poll" in English and "vante" in French), 36 non-homophone control words (e.g., "moss" in English and "tarde" in French), 36 pseudowords, i.e., word strings pronounced like real words (e.g., "grean" in English and "eigle" in French), and 36 control non-words (e.g., "trean" in English and "eible" in French) were constructed. The subject was to decide whether a word appearing on the computer screen was a real word or non-word. Longer latencies or increased error scores for phonologically ambiguous items compared to unambiguous items would be considered as evidence of phonological processes in the lexical decision task. In the SVT study, the subjects were to judge whether or not sentences presented on the computer screen were meaningful. Half the sentences were meaningful and half were not. Half the meaningful sentences were "homophone sentences" that contained a homophone (e.g., she said the weather was fair outside), and half were "control sentences" that did not contain a homophone (e.g., she said the weather was nice outside). Half the meaningless sentences were "congruent sentences" that contained an inappropriate but congruent sounding homophone (e.g., she said the weather was fare
outside), and the other half of the meaningless sentences were "incongruent sentences" that contained an incongruent sounding homophone (e.g., she said the weather was hair outside). Comparisons of latencies and error scores in judging phonologically ambiguous sentences versus the appropriate control sentences provided a means of determining the effects of the phonological properties of the sentences, i.e., if the subjects showed longer latencies or made more errors on judging sentences containing a phonologically ambiguous word, it would constitute evidence of phonological processing in the SVT task. In the L2 data, in the lexical decision task, neither French nor English bilinguals in equal or unequal reading rate groups produced significant homophone effects (a greater number of errors for homophones than for control words, or slower response to homophones), which was interpreted as indicating that slower reading rates may not be related to phonological recoding. In the SVT task, in L1, native speakers of English showed a homophone effect with English sentences whereas native speakers of French did not with French sentences. In L2, equal reading rate subjects behaved like native speakers, that is, French subjects showed a homophone effect in English whereas English subjects did not in French. But both French and English unequal reading rate bilinguals produced a homophone effect in L2 sentences. These findings indicated that processing demands of sentence
comprehension in the L2 cause the unequal reading rate bilinguals to depend on phonological codes, and that unequal reading rate bilinguals have more difficulty in L2 than do equal reading rate subjects with phonological codes in working memory.

Haynes (1990) cites Seidenberg (1985) suggesting that even readers of languages as different as Chinese and English use similar processes, including phonological recoding. Seidenberg argues from a naming latency study that, for readers of both languages, high-frequency words are encoded visually, without reference to spoken word forms, while lower frequency items require more speech-based processing. Perfetti (1985) also notes that, in children reading in their L1, high-ability readers are more accurate at decoding and they are faster at it, and suggests that their advantage in accuracy may be restricted to low-frequency words and to pseudowords that conform to orthographic rules and are pronounceable. Their advantage in decoding speed is general, but it increases for uncommon words and pseudowords. It also increases for longer words. These findings can be understood in Perfetti's (1985) view that high frequency words are represented as patterns in memory, which are accessed visually, and low frequency words need assists from phonological recoding to be matched to the correct referent in memory, which will take longer. In advanced readers, the
process of phonological recoding operates very rapidly and automatically.

**Relationships among L2 Reading Ability, L2 Proficiency, and L1 Reading Ability**

Since the question of whether reading in a foreign language is more related to the level of L2 language proficiency or to the level of L1 reading ability was raised by Alderson (1984), it has been open to a great deal of debate. Bossers (1991) quotes Alderson's (1984) two hypotheses regarding these relationships:

1. Poor reading in a foreign language is due to a poor reading ability in the first language. Poor first-language readers will read poorly in the foreign language and good first language readers will read well in the foreign language.
2. Poor reading in a foreign language is due to inadequate knowledge of the target language (p. 46).

Bossers suggests a third hypothesis, which combines elements of Alderson's proposals:

Poor foreign language reading is due to reading strategies in the first language not being employed in the foreign language, due to inadequate knowledge of the foreign language. Good first-language readers will read well in the foreign language once they have passed a threshold of foreign language ability (p. 47).

Bossers cites an earlier study by Clarke (1979) comparing L1 and L2 reading ability. Clarke suggested that good L1 readers who are poor readers in the L2 may simply revert to poor reader strategies because of their limited proficiency in the
L2, implying that a certain amount of L2 language control is needed before transfer of L1 reading strategies can possibly occur. This "certain amount" of language control was referred to as a "language ceiling" by Clarke, a term similar to "threshold level of linguistic competence" used by Cummins (1979). Below this critical level of language control, transfer of L1 reading strategies does not occur.

Bossers reports three studies by Hacqueboard (1989), Carrell (1991), and Bossers (1989, forthcoming), which investigated the same issue. Hacqueboard investigated the relation between L1 reading and L2 reading on the one hand, and that between L2 knowledge and L2 reading on the other. The subjects were approximately 50 Turkish students enrolled in vocational and secondary schools in the Netherlands, most of whom had immigrated to the Netherlands before the age of four. The subjects were tested twice within a period of two and a half years. Subjects were requested to do three reading tests with varying levels of linguistic complexity in both L1 and L2. Comprehension was assessed by 12 statements per passage, to which the subjects were to respond either "true" or "false". Additionally, a multiple choice test of 50 items was given to assess vocabulary knowledge of the L2. The scores obtained on the L2 reading test and vocabulary test were correlated. The same was done with the scores obtained on the L1 and L2 reading tests. The results indicated a
developmental pattern. At the beginning stages, the L2 reading ability was strongly related to L2 knowledge, and moderately related to L1 reading ability. At a later stage, L2 reading ability of the subjects showed a moderate relationship only with the L2 vocabulary test, and the influence of L1 reading ability vanished. According to Hacquebord, L1 reading ability ceased to influence L2 reading due to L1 loss. At the same time, the influence of vocabulary knowledge decreased substantially to finally stabilize at a level similar to that of the native readers. The former finding supported Alderson's (1984) prediction that, at early stages, L2 knowledge plays a crucial role in L2 reading. The latter finding indicated the reverse of Alderson's prediction, which is presumably because, in this situation, the learners were losing proficiency in the L1. According to Alderson, one would expect the influence of L1 reading ability to increase as soon as the L2 reader has acquired sufficient control over the target language. However, transfer of L1 skills may require active use of that language.

Carrell (1991) predicted that both L1 reading ability and L2 language knowledge would play a significant role, and formulated the following model:

\[ \text{L2 reading} = \text{L1 reading} + \text{L2 language Proficiency} \]

The subjects were two groups of students. The first group was 45 Spanish L1 readers studying in a U.S. college (second
language setting). The second group consisted of 75 English L1 speakers studying Spanish in the U.S.A. (foreign language setting). L1 reading ability was measured by two reading passages and ten multiple-choice questions for each passage. L2 reading ability was measured in the same way as the L1. The L2 proficiency level was estimated on the basis of actual instructional level. The results supported Carrell's model above. L1 reading ability as well as L2 knowledge substantially contributed to L2 reading. With regard to their relative importance, the outcomes were not the same for the two groups: for the Spanish L1 group, L1 reading was a stronger predictor of L2 reading than L2 proficiency, whereas for the English L1 group, the reverse was true. These differences might either come from differential effects on L2 reading of second versus foreign language acquisition (in the second language setting, the language threshold may be lowered due to its environment), or from differences in the absolute level of L2 proficiency between the groups (the L2 proficiency of the English L1 group was at a slightly higher level than that of the Spanish L1 group).

Bossers' (1989) study was carried out to determine the relation among L1 reading, L2 reading, and L2 knowledge, and to discover whether a language threshold could be demonstrated. The subjects were 50 native speakers of Turkish learning Dutch as a second language. Their L2 proficiency
ranged from intermediate to advanced. The subjects had a high level of L1 proficiency. The subjects were tested twice in both the L1 and L2. L1 and L2 reading ability was assessed by a reading passage in each language and 16 multiple-choice questions per passage. L2 knowledge was assessed by means of grammar and vocabulary tests, each consisting of 60 items. The results indicated that, first, both L1 reading and L2 knowledge play a significant role in L2 reading. However, the importance of L2 knowledge for L2 reading outweighed that of L1 reading. Secondly, differences between the least skilled L2 readers were predicted only by differences in L2 knowledge. Thirdly, L1 reading came into play as a significant predictor variable only at a relatively high level of L2 reading. In other words, L2 knowledge played a dominant role initially, and L1 reading became a prominent factor at a more advanced level. These findings support the language threshold hypothesis: direct transfer of L1 reading skills occurs only when a certain amount of L2 knowledge has been acquired.

Summarizing the results of the three studies, Bossers drew three conclusions. Firstly, the results are in support of Alderson's suggestion that reading in a foreign language is both a language and a reading problem. Secondly, the evidence that was examined suggests that it is more a language problem than a reading problem for low levels of foreign language competence. Thirdly, the results support the language
It might be possible to relate the language threshold to the point in the component skill processing mechanism where the lower level component skills have reached maturation, so that the higher level skills can be processed more effectively and efficiently.

**Sinatra and Royer's Study**

All of the above work suggests, in one way or another, that the development of component skills is important in L2 reading. Since Sinatra and Royer (1991) investigated the development of cognitive component processing skills that support skilled L1 reading in elementary school children, and since their work provides the basis for the present study, it is described in detail here. Their research consisted of two studies (study 1 and the follow-up study) which were done with one year separation, providing a longitudinal as well as a cross-sectional examination. In designing their studies, Sinatra and Royer built on Perfetti's Verbal Efficiency theory (Perfetti, 1988), in which lower level components in the reading system function as modules in the skilled reader, whereas the higher level functions operate interactively. Sinatra and Royer were interested in the development of component processing skills, and made two predictions of possible courses of their development. In the first
prediction, if the component process develops in a bottom-up fashion, there should be a pattern of interaction among tasks in the performance data: in other words, there should be relatively small differences between grades on lower level tasks such as letter perception and word naming, and relatively large differences between grades on higher level tasks such as concept activation, syntactic analysis, and semantic analysis, because lower level skills develop first and automate, and they should have matured to a considerable extent even in relatively young readers. However, higher level skills may be poorly developed in many second grade readers and highly developed in older fourth and fifth grade readers. In the second prediction, if the component skills mature simultaneously (primitive processes develop to a point where they can begin to provide input to higher level processes, and beyond that point development of all the processes occurs simultaneously), the pattern of data would result in general improvement in all tasks as the grade of children increases, and there should be no interactions among the tasks in the data.

In study 1, the subjects were 112 students in grades 2-5. A battery of computer tasks was administered to each subject, including a simple response time task, a letter recognition task (the Posner letter match task), two word level tasks (word naming and pseudoword naming), a concept activation task
(category matching), and two sentence processing tasks (involving syntactic analysis and semantic analysis) (Examples of each item type are shown in Appendix A).

In the simple response time task, the subjects were asked to press one button for a series of asterisks (***), and the other for a series of pluses (+++), presented in the screen. This task was to provide an index of response time performance on a purely perceptual task.

In the Posner letter match task, the subjects were required to decide whether two letters presented simultaneously had the same or different names (e.g., Aa, Bd, CC, Gh). This task is to measure speed of access to long term memory, and has been shown to discriminate between skilled and less-skilled readers.

In the word naming tasks, the subjects were instructed to pronounce lists of real words and pseudowords (pronounceable non-words) out loud as quickly as they could. These vocalization latency tasks were used to demonstrate automatic word recognition and decoding ability. The pseudoword naming task was considered to display the ability of phonological recoding or the ability to apply grapheme and phoneme correspondence rules.

In the category match task, the subjects were presented with two words simultaneously side by side and asked to decide whether they come from the same category, e.g.,
carrot/broccoli (same), or truck/bucket (different). Before the performance trial, the subjects were given the category labels to be used and examples of same and different responses. The category match task was used to assess speed of access to conceptual memory.

In sentence level tasks, the subjects were presented with a sentence containing a missing word indicated by an underlined blank space, and asked to choose the best word to fill in the blank from two alternatives. The two alternative words appeared with the sentence, one above and one below the blank. In the syntactic test, one of the two choices was syntactically correct and the other was syntactically incorrect. In the semantic task, the two choices were of the same part of speech, but only one of the two alternatives completed a semantically correct sentence. These sentence level tasks were used to assess application of syntactic and semantic knowledge.

In the follow-up study, the subjects were 59 of the 112 students who had participated in study 1 (grade 3-6), and the tasks and procedures were identical to those used in study 1.

For both of the studies, the data were analyzed in terms of accuracy and speed of response time. The results of study 1 substantially conformed to both of the predictions above, i.e., there was a pattern of interaction among tasks in the data and a tendency for performance to improve as the grade of
children increased as well. The authors conclude that component processing skills mature, at least in part, from the bottom-up. This conclusion is supported by the fact that the only difference in the letter perception and word and pseudoword processing task (lower level component processing) was between Grade 2 and the higher grades. In contrast, significant differences between Grade 3 and Grades 4 and 5 were noted in the data for the concept activation task (higher level component processing). These data are in accordance with the interpretation that letter and word perception skills had already reached maturation in students in Grade 3 and beyond, but the skills were still developing in Grade 2 students. In comparison, it appeared that the higher level skills were still improving in Grade 3 students and perhaps students in higher grades. The performance of the subjects in the follow-up study generally improved, compared with study 1. The results of the follow-up study were also generally consistent with the interpretation of study 1.

Summarizing the results of these two studies, the authors suggest that competence in letter and word processing (lower level processing) advances to the point of automatization, whereupon increasing competence in those activities slows down, but higher level processing skills continue to develop and become more efficient. Part of the reading skill develops in a bottom-up fashion and part by interaction. Higher level
skills may be developing along with lower level skills, but lower level skills must reach a threshold level of performance before efficient processing at the higher level can occur.

**Present Study**

The purpose of the present study was to develop instruments with which to investigate component skill processing in L2 reading and the relationships among L1 reading, L2 reading, and L2 language proficiency in the same individuals, adult Koreans studying English in the U.S.

Korean adult readers of English would well demonstrate the processes underlying L2 reading which have been discussed in this chapter. As adult L2 readers studying in a university in the U.S., these Koreans are expected to be literate and to have well-developed world knowledge and metacognitive strategies because they have finished secondary or post-secondary education in Korea. However, they would likely have poorer comprehension and a slower reading rate in English than in their Korean reading because of their limited proficiency in English. Also contributing to their difficulties are differences between the linguistic systems of Korean and English. Especially, the orthographic differences between the two languages could cause problems in lower level processing for Koreans. Korean writing symbols are radically different from English writing symbols.
Lee (1989) describes characteristics of the Korean alphabet as it was created by King Sejong in 1443 A.D. The first characteristic was that the Korean alphabet was based on articulatory phonetics. The shape of the basic letters was modelled on the actual shape of the articulatory organs involved in pronouncing the sounds represented by the letters. Secondly, although the Korean alphabet was formulated on a phonetic basis, it was actually phonemic, i.e., one symbol stood for a cluster of related but complementary sounds. Finally, in the spelling principle decreed by the king, letters were prescribed to be combined into syllable blocks and not in a linear succession. Lee defined the Korean alphabet of the 15th century as "a phonemic alphabet based on phonetic principles and spelt syllabically" (p. 3). Although the writing symbols of Korean and English are very different, the writing systems of the two can be said to be similar in the sense that they are phonemic.

The present Korean alphabet has 10 vowels and 14 consonants. According to Lee, the present Korean alphabet of 24 letters is essentially the same as that of the 15th century except that four letters have been deleted and the shape of some graphemes has slightly changed. The most important change is that the present spelling principle is morphemic, i.e., each word or morpheme is represented by an invariant base form, even when affixing occurs. However, the
pronunciation of the base form may change according to the affix. This morphemic spelling principle contributes to a slightly irregular spelling-to-sound correspondence in Korean. This irregularity might cause Koreans to be slowed by phonological factors in L1 reading because the phonological recoding process is not automatized for Koreans. Of course, English has similar, more pervasive irregularities which can cause problems for all non-native readers.

Korean phonology is also different from English. In some cases, several separate phonemes in Korean converge into a single phoneme in English. For example, in Korean, aspiration is a distinctive feature determining an independent phoneme, whereas it is not in English. Thus, in Korean, [p] and [pʰ] are separate phonemes as in /pʰul/ meaning 'grass' and /pul/ meaning 'horn', while, in English, the voiceless aspirated sound [pʰ] in 'pin' and voiceless unaspirated sound [p] in 'spin' are allophones of the phoneme /p/. In other cases, the reverse is true. For example, [r] and [l] are allophones of a single phoneme in Korean, while they are separate phonemes in English. This lack of phonemic correspondence might be important in cases when phonological recoding occurs.

Likewise, the Korean syllable structure is different from that of English. Korean syllables can have only four combinations of vowels and consonants: C, CV, VC, and CVC (C stands for a consonant and V for a vowel). The syllable
structure does not allow consonant clusters, which are so common in English. According to Finegan and Besnier (1989), English allows many syllable types, e.g., VS, V, CCV, CV, CVC, CVCC, CCCVC, CVCCC, and CCCVCCC. Again, these differences could be important in situations of phonological recoding.

These linguistic differences could cause problems for Korean students in reading English as their L2. Additional differences between the two languages in lexicon and syntax are obvious. These also can be expected to cause problems for Koreans learning to read English.

The instruments developed in this research are an adult bilingual version of those used by Sinatra and Royer (1991). Five pilot tests were administered in order to provide validity evidence for the instruments. The instruments were also administered to native speakers of English to determine whether the instruments were required to be modified. The pilot testing provided a comparison of performance on the instruments between Korean subjects and native speaker subjects as well.
CHAPTER III. MATERIALS AND METHODS

Sinatra and Royer used five instruments in their study (simple response time task, Posner letter match task, naming tasks, category match task, and sentence level tasks). Of these five, two (simple response time task and Posner letter match task) were felt to be linguistically and culturally appropriate for the adult Korean L2 learners of English to be involved in this study, and three (naming tasks, category match task, and sentence level tasks) needed to be adapted. In the present study, the naming tasks, category match task, and sentence level tasks were adapted from Sinatra and Royer's battery of computer tasks described in the previous section.

In addition, comprehension measures were developed in order to assess overall reading ability of the subjects in their L1 (Korean) and L2 (English).

After the development of the first version of the instruments, five pilot tests of the adapted instruments and the comprehension tasks were administered to determine whether revisions were required and to get validity evidence for the instruments.

Development of the Instruments (first version)

The methods and rationale for developing the first version of instruments are described below.
Naming tasks

For the word-naming task, Sinatra and Royer used 40 three-letter words (20 as a practice trial) and 20 each of four-, five-, and six-letter words. These words were chosen from different difficulty levels. The three-letter words were chosen from Fry's list of Instant words (1972), which were thought to be at the second grade level. The four-, five-, and six-letter words were selected from Dale and O'Rourke's (1976) vocabulary inventory, which were considered as highly familiar to Grades 3, 4, and 5 students. In the present study, the same number of three-, four-, five-, and six-letter words were chosen. They were taken from English textbooks used in Korean secondary schools (middle and high school) published between 1985-1988. The selected words appear in the textbooks consecutively over two grade levels, which indicates that those words are likely to be quite familiar to Korean students. In order to differentiate the difficulty level, the three- and four-letter words were chosen from middle school textbooks, and the five- and six-letter words from high school textbooks.

In the second naming task, Sinatra and Royer used the same number of pseudowords as of real words, distributed in the same way by length. The pseudowords were formed from the real words used in the first naming task or words with the same familiarity levels, by replacing one or two letters of a
real word to make pronounceable non-words. Likewise, in this study, the number and distribution of pseudowords were the same as that for real words. Each pseudoword was formed by replacing one letter (except for 'bepper' from 'better') in a real word from the list above or from a word which appeared at least once in the Korean textbooks. In developing the pseudowords, the replaced positions were balanced, for example, out of 40 pseudowords of three letters, 14 replacements were in the first letter position (e.g., 'ree' from 'see'), 11 were in the second letter position (e.g., 'sar' from 'sir'), and 15 were in the final letter position (e.g. 'yeg' from 'yet'). The pseudowords did not include word strings that are pronounced like real words (e.g. 'brane') or strings that have ambiguous pronunciations (e.g. 'niture' - [ničə] or [naɪčə]). The pseudowords developed in this study were checked with The Random House Dictionary of the English Language, Unabridged (1987) in order to ascertain that they were not words. The first version of the pseudoword list is shown Appendix B.

Category match (concept activation) task

In the category match task, subjects are asked to tell whether two items belong to the same or different categories. In Sinatra and Royer, most categories were chosen from lists in Rosch (1975). Items from Rosch had high goodness-of-
example ratings. The task had eight practice and 30 performance items. In the present study, a pool of words in nine categories was created for Korean subjects. Four categories (Furniture, Vehicles, Sports, Clothing) were taken from Rosch (1975), and five others (Food, Animals, Body parts, Electronic products, and Musical Instruments) were added. Thirty matched and 30 mismatched pairs were created, making a total of 60 pairs, which were enough to permit counter-balancing of items. In a matched pair, two items were drawn from the same category (e.g., "head/eyes" from the category of "Body parts"), and in a mismatched pair, the two items were drawn from different categories (e.g., "wolf/belt" from the categories of "Animals" and "Clothing" respectively). In the categories taken from Rosch, most words in the pool were high in their prototypicality rating. For the five non-Rosch categories, only items thought to be highly prototypical were selected. At the same time, the words and categories were also chosen on the basis of familiarity to Koreans. For example, "soccer" is not a prototypical sport in Rosch's sports category, but it is a popular sport in Korea, so it was selected. Again, "radio", "stereo", and "TV" that Rosch classified under the category "Furniture" appear here under the category of "Electronic products," which seems more reasonable to Koreans. All words in both the matched and mismatched pairs were drawn from the pool described above.
However, no word appears more than once overall, i.e., in the 30 matched and 30 mismatched pairs, a given word occurs only once (refer to Appendix C for the categories and the first version of the items).

Sentence tasks

At the sentence level, Sinatra and Royer used a syntactic and a semantic task. Each task contained five practice sentences and 20 performance sentences, presented with one word replaced by a blank and two choices for filling the blank. The choices in the syntactic and the semantic tasks varied in syntactic and semantic correctness respectively. In the present study, the sentence level tasks include three sub-tasks: 1) a syntax task; 2) a semantic task; and 3) a syntax/semantic task. The syntax/semantic task was added to measure the ability to comprehend sentences in terms of parts of speech and meaning of the sentence, also thought to be important in L2 reading ability. Each sub-task has 25 sentences of five to eight words in length containing a blank where a word is missing, and two alternatives presented with each sentence, one above the blank and one below the blank. To ensure the appropriateness of the sentence for the Korean subjects in terms of vocabulary and content, almost all sentences in these tasks were chosen from the middle and high school Korean textbooks, and adapted to fit the above format.
Syntax task. According to the Description of Middle School English Curriculum (1988) published by the Educational Department of the Korean Government, the grammar points which should be taught in middle school are the basic English sentence types, classes of words, questions, negation, imperatives, gerunds, infinitives, noun phrases (pronouns, proper nouns, articles, and the countable/noncountable distinction), verb phrases (auxiliaries, voice, and tense), that-clauses, relative clauses, and comparatives. According to the Description of High School English Curriculum (1989), the emphasis in the high school English curriculum is an expansion of the scope of application of the grammar taught in middle school. The grammar points covered in this syntax task involve almost all categories which are supposed to be taught in middle and high school in Korea.

For each item, one of the two alternatives is syntactically correct and the other is syntactically incorrect. The grammatical points included and the number of items testing each one are subject-verb agreement (2), tense (2), negation (2), question formation (2), choice of prepositions (1), gerund versus infinitive (1), choice of article (1), passive voice (2), transitive versus intransitive verb (2), relative clause formation (1), nonreferential subject (it) (1), countable/noncountable noun (2), comparatives (1), infinitives (1), auxiliary verbs (1),
reflexive pronoun (1), that-clause (1), and adjective phrase as object complement (1).

**Semantic task.** For each item, the two alternatives are of the same part of speech, one completing a semantically correct sentence, and the other making a semantically odd one. Only one of the alternatives in each item fits the context of the sentence (e.g., "I get/stand up early in the morning.").

**Syntax/Semantic task.** For each item, one alternative correctly completes the sentence syntactically and semantically while the other fails syntactically because it is the wrong part of speech although it is related semantically to the context of the sentence (e.g., "Who speaks English best/fluent in your class?").

**Comprehension passages and questions**

One Korean and one English passage were selected to determine the reading proficiency levels of the subjects. The English passage was adapted from chapter 11 in *Time's Arrows* (1985), a book about different concepts of time and space over the centuries, by Richard Morris. The Korean passage was adapted from chapter 3 in the Korean translation of *Time's Arrows*, published in Korea in 1990. The two passages were chosen from the same text in order to make them as similar as
possible in terms of content, style, and level of difficulty. Both passages have almost an equal length of approximately 600 words.

For each passage, ten multiple-choice comprehension (sentence completion) items were developed. Four choices were provided for each item. The items are of several types depending on how the answers can be determined: items that can be answered with information from a single sentence (S), items that can be answered with information available in a single paragraph (P), items that require information from more than one paragraph (AP), items that require subjects to extract the main idea (MI), and items requiring inferences (I). Expected levels of difficulty for these question types were determined according to the amount of information a reader needs to get the correct answer. The expected difficulty of these question types is $S<P<AP<I<MI$, with S the easiest and MI the hardest. An example of each question type is shown in Figure 1.

The comprehension items for the Korean passage were developed in English first and then translated into Korean by the researcher. The accuracy of the Korean translation was tested by having another fluent Korean-English bilingual translate the items back into English. On the first step of this back translation, the second translator read only the Korean version of items, and then translated them into English. After she had completed this step, she read the
Freud once noted that dreams, and therefore the unconscious, contained no concept of the negative. Since he believed the unconscious to consist solely of desire, he assigned the ability to say "no" to the conscious and the ego. Negation, Freud claimed, was the origin of intellectual judgement. Its source lay in the oldest of human impulses, the oral impulses. Beginning with such decisions as whether or not to eat something, or whether to swallow something or spit it out, the negation mechanism became, in time, able to distinguish what is real and what is not. The ego decided whether an image in a person's consciousness could also be "rediscovered in perception," that is, whether or not it was "real." Judgement was thus defined as the "intellectual action" that takes in what is acceptable and tests it to see if it is real.

Freud's remarks left a great deal unanswered. For instance, in the course of development, when does the ego acquire the ability to negate? Is saying "no" connected to the acquisition of language? Freud did not stress that the ability to negate is directly connected to the development of the self. The first thing someone says "no" to is something outside the self that the person refuses to take inside. For the infant and, by extension, for all human beings, saying "That is not me" is an affirmation of identity. Thus, "no" on one level becomes "yes" on another. (from Listening to TOEFL: Workbook (1987), p. 128)

[S] 1. In the passage, the phrase "rediscovered in perception" is used in order to show that -- the impressions in the human conscious tend to be vague (lines 11-13).

[P] 2. According to the passage, saying "no" can serve a positive function because it -- defines the self (lines 19-26).

[AP] 3. According to the passage, the source of negation is NOT the same as the source of -- people's dreams (lines 1-5 & 17-21).

[I] 4. According to the passage, which of the following questions might be answered in future investigations? -- How are negation and verbal expression related? (lines 16-19).

[MI] 5. What is the main idea of the passage? -- Freud's study on negation is valuable but incomplete.
Korean passage from which the items were produced, and then made some changes in the vocabulary she used in her first version (see Appendix D for the original English questions for the Korean passage and the final results from the back translation).

**Pilot Testing**

Five pilot tests were administered to see how the instruments worked and whether revisions were needed. After pilot tests I and III, some revisions were made.

**Pilot test I**

**Subjects.** The subjects for the first pilot test were nine Korean students at Iowa State University who were thought to be from a range of reading abilities. Four of them were undergraduate students, four were graduate students, and one was a student at the intermediate level of the Intensive English and Orientation Program (IEOP) at ISU.

**Procedure.** This pilot study consisted of three trials. After each trial, some revisions were made. Each trial included three different subjects' pencil-and-paper performance on all tasks described in the previous section. Subjects were individually tested. The subjects were also
asked to make comments on their familiarity with the real words and the vocabulary in the category match task and sentence level tasks and on the difficulty levels of the two comprehension passages. The subjects' performance on the naming tasks and comments on the instruments were tape-recorded. The time taken for each subject to do the test and to make comments on the instruments ranged from 50 minutes to one hour.

In the naming tasks, the subjects were given typed word and pseudoword lists. Real words were presented first, beginning with all the three-letter words followed by all the four-letter words, etc. The pseudowords followed, again from shorter to longer words. A cover sheet with a square hole large enough to reveal a single word was provided. The subjects were asked to pronounce each word as fast as they could, moving the covering paper downward themselves to display successive words.

In order to make a 30-item task as in Sinatra and Royer, the 60 matched and mismatched pairs in the category match task were divided into two sections: test A and test B. Each test of the category match task included 15 matched and 15 mismatched pairs of the nine categories. Subjects were given two practice items using the category of 'school supplies,' which is not one of the nine categories, and one food item not used in the main test ("notebook/pencil" (matched) and
"staple/broccoli" (mismatched)) before actual testing began. The subjects were presented one pair at a time by use of a cover sheet similar to that used for the naming task, and asked to write down "O" beside the pair if the pair was matched and "X" if the pair was mismatched. In the first and second trials, each subject did only one of the two sections of the test. In the third trial, each subject did both sections.

In the sentence level tasks, the subjects were asked to circle the alternatives which completed each sentence correctly.

In the comprehension tasks, the subjects read the passage, and then answered the questions. They were allowed to look back at the passage while answering the comprehension questions.

Revisions (to be described in Chapter IV) were made in the pseudoword lists after this pilot test on the basis of problems in the restricted range of vowel sounds and of vowel-consonant combinations involved in the pseudowords. Some revisions were also made on the category match task, the syntax/semantic task, and the comprehension measures during this pilot test.
Pilot test II

**Subjects and procedure.** The revised pseudoword naming task was piloted with four Korean subjects who had been involved in pilot study I (S1, S3, S7, S8). The four subjects were selected on the basis of availability and the range of their scores on the pseudoword naming task in pilot test I (the scores for the subject were 98, 80, 97, 97, respectively). They were tested individually, and their performance was also tape-recorded.

Pilot test III

**Subjects and procedure.** In order to provide a comparison in performance on the instruments between the Korean subjects and native speakers of English, all tasks except for the Korean comprehension measure were administered to five native speakers of English, four undergraduates and one graduate student at ISU. The instruments were slightly different from the first version because of the revisions during and after pilot test I. The subjects were tested individually, and they were instructed in the same way as the Korean subjects in pilot test I. The native speakers' performance on the naming tasks was tape-recorded.

Further revisions in the pseudoword naming task
(described in Chapter IV) were made after this pilot test.

Pilot test IV

Subjects and procedure. All tasks were administered to three Korean subjects who had not previously been tested in order to measure the time required for each task. One subject was a graduate student at ISU, one was an undergraduate, and the third came from a high level class of IEOP. They were selected to represent a range in reading ability. The instruments were different from the ones used in pilot test III only in the pseudoword naming task (two pseudowords were replaced). The subjects were instructed in the same way as in pilot test I. They were tested individually, and their performance on the naming tasks was tape-recorded.

Pilot test V

Subjects and procedure. All tasks except for the Korean comprehension measure were administered to another three native speakers of English, undergraduate students at ISU. The purpose of this pilot test was to measure the time required for native speakers to do each task. The subjects were instructed in the same way as in pilot test I. They were tested individually, and their performance on the naming tasks
was tape-recorded.

The detailed results of the pilot tests and the revisions made on the basis of each pilot test's results are discussed in chapter IV.
CHAPTER IV. RESULTS

The results of each pilot test and the changes based on these results are described below.

Results of Pilot Test I—Nine Korean Subjects

The results of all three trials in pilot test I are reported together here. In the word naming task, subjects' performance and comments indicated that the real words were familiar to them. They made a few pronunciation errors, the most common of which was "hop" as [hop] (6). (The number in the parentheses is the number of the subjects who produced the error.) Two subjects substituted [r] for [l] and vice versa, e.g., "run" [ran] (1), "red" [red] (1), "let" [ret] (1), "blue" [bru] (1), "leg" [reg] (1), and "let" [ret] (1).

While subjects did not hesitate much in pronouncing pseudowords, some subjects pronounced them incorrectly according to English grapheme-phoneme patterns. The errors were usually on vowel sounds. The errors on vowel sounds can be categorized into 7 types:

i) diphthongization of a vowel sound (e.g., "hik" as [haik](1), "spind" as [spaind](2), "bine" as [bains](1), "skirit" as [skairit](1), and "fream" as [freim](1));

ii) undiphthongization of a vowel sound (e.g., "gry" as [grí](3), "tey" as [ti](1), "sive" as [sív](2), "wike" as [wik](1), "pime" as [pím](3), "stape" as [step](2),
"prive" as [ privé ](1), and "skyle" as [ skil ](4));

iii) raising of a vowel sound (e.g., "ren" as [ rın ](1), "mep" as [ mıp ](1), "ameng" as [ âmın ģ ](1), "bepper" as [ bıpə ](1), and "forbet" as [ forbi t ](1));

iv) backing of a vowel sound (e.g., "gup" as [ gıp ](3) and "gack" as [ gak ](1));

v) lowering of a vowel sound (e.g., "frem" as [ frem ](1) and "skay" as [ skai ](1));

vi) producing tense vowel [ o ] for the letter "o" (e.g., "jop" as [ jıp ](2), "ogg" as [ og ](1), "gog" as [ gıp ](2), and "mox" as [ mık ](3)); and

vii) idiosyncratic errors (e.g., "mirl" as [ mıl ](2), and "gog" as [ gug ](1)).

Several subjects failed to make the distinction between [ r ] and [ l ] in pseudowords like "ree [ lı ]"(1), "clant [ krı n t ]"(3), "arripe [ əlaıp ]"(1), "delend [ dı śı nd ]"(2), and "plendy [ prı śı ndı ]"(2). In general, the subjects who were low level readers (as determined by the English comprehension task) were responsible for most of the errors, with some particular error patterns consistent throughout the pseudoword naming. On the other hand, three subjects pronounced most of the pseudowords correctly according to the English grapheme-phoneme pattern.

In the category match task, most words again appeared to be familiar to the subjects. The words "harp", "jet", "racing", and "wrestling" provided some difficulty because
some subjects were unfamiliar with the spelling of those words even though they knew the referents. Some subjects commented on "vagueness" in some matched pairs.

The sentence level tasks worked well. The words in the tasks were familiar to the subjects, and the grammar points were clear to them.

In the comprehension measures, the subjects got six to nine items correct out of the ten questions for the Korean passage and two to ten items correct out of the ten questions for the English passage. The mean score for the Korean passage was 7.8, and for the English passage, 5.9. The item data for comprehension items for each passage are shown in Table 1 and 2. The same subjects (S4, S5, and S8) were high on both passages. The subjects lowest in the English comprehension task (Subjects 2 and 6 with scores of 3 and 2 respectively) were moderately low on the Korean task (with scores of 7).

In the Korean comprehension task, question 10 of type I was most difficult as expected, whereas the other two I type questions were not difficult (Q2 and Q7). However, both subjects who read the passage after a change in translation (described in a later section) got question 10 correct, which suggested that item data should be looked at again.

In the English comprehension task, the hardest question was not of type MI, as had been expected. Instead, questions
Table 1. Item data for comprehension questions for the Korean passage in pilot test I

<table>
<thead>
<tr>
<th>Question</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(P)</td>
<td>(I)</td>
<td>(P)</td>
<td>(P)</td>
<td>(P)</td>
<td>(AP)</td>
<td>(I)</td>
<td>(P)</td>
<td>(S)</td>
<td>(I)</td>
<td></td>
</tr>
<tr>
<td>Subject</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>S1</td>
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<td>7</td>
</tr>
<tr>
<td>S2</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>7</td>
</tr>
<tr>
<td>S3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
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<td>S4</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
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<tr>
<td>S6</td>
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<td>0</td>
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<td>8</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

0 = correct response

a I = inference question
S = answer found within a sentence
P = answer found within a paragraph
AP = answer found in more than one paragraph

b These two correct answers were obtained after the retranslation of the last sentence in the passage.
Table 2. Item data for comprehension questions for the English passage in pilot test I

<table>
<thead>
<tr>
<th>Subject</th>
<th>Question</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>S1</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>S2</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>5</td>
</tr>
<tr>
<td>S4</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
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<td>S5</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>S7</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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</tr>
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<td>S9</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Total 6 9 6 4 6 8 4 2 3 5

0 = correct response

* MI = question on main idea
  S = answer found within a sentence
  P = answer found within a paragraph
  AP = answer found more than one paragraph
of type P were the hardest (Q8 and Q9). Validity concerns suggested that the responses of Americans should be looked at to see whether they follow the same patterns.

In the first trial, two problems were noted in the comprehension tasks: one in the Korean passage and the other in the correct alternative of a comprehension item for the English passage. Some subjects commented on the last sentence of the Korean passage, which did not seem clear in meaning and was odd in Korean grammar. In the English comprehension task, some subjects seemed to be misled by alternative (b) in question number 4, "stars contain the chemical products from the explosion", in which the subject, "stars", did not seem to cover the general idea presented in the passage.

Four subjects said the English passage was more difficult than the Korean one, four subjects said the Korean passage was more difficult than the English one, and one subject said the difficulty of the two passages was almost equal. However, almost all of them said that the English passage was not more difficult than the comprehension passages in TOEFL.

Scores for all tasks are shown in Table 3. Subjects' scores on the reading section of the ISU English Placement Test (EPT), the reading portion of the placement test used for placement in IEOP, and TOEFL are also shown as external indicators of proficiency. While the correlation between proficiency measures is not perfect, rough correspondences
Table 3. Raw scores for the tasks in pilot test I

<table>
<thead>
<tr>
<th></th>
<th>Real word (100)</th>
<th>Pseudo word (100)</th>
<th>Cat. match (30)</th>
<th>Syn. task (25)</th>
<th>Sem. task (25)</th>
<th>Syn/sem task (25)</th>
<th>Eng. Q. (10)</th>
<th>Kor. Q. (10)</th>
<th>EPT® (rdg)</th>
<th>TOEFL (35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>98</td>
<td>98</td>
<td>30</td>
<td>24</td>
<td>25</td>
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<td>21</td>
<td>520</td>
</tr>
<tr>
<td>S2</td>
<td>97</td>
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<td>30</td>
<td>22</td>
<td>23</td>
<td>22</td>
<td>3</td>
<td>7</td>
<td>19</td>
<td>510</td>
</tr>
<tr>
<td>S3</td>
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<td>25</td>
<td>23</td>
<td>24</td>
<td>5</td>
<td>8</td>
<td>26</td>
<td>573</td>
</tr>
<tr>
<td>S4</td>
<td>100</td>
<td>83</td>
<td>30</td>
<td>25</td>
<td>24</td>
<td>24</td>
<td>8</td>
<td>9</td>
<td>19</td>
<td>547</td>
</tr>
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<td>25</td>
<td>25</td>
<td>8</td>
<td>9</td>
<td>26</td>
<td>570</td>
</tr>
<tr>
<td>S6</td>
<td>95</td>
<td>70</td>
<td>29</td>
<td>17</td>
<td>23</td>
<td>23</td>
<td>2</td>
<td>7</td>
<td>50/100</td>
<td>460</td>
</tr>
<tr>
<td>S7</td>
<td>97</td>
<td>91</td>
<td>27</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>7</td>
<td>8</td>
<td>28</td>
<td>600</td>
</tr>
<tr>
<td>S8</td>
<td>100</td>
<td>97</td>
<td>30</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>10</td>
<td>9</td>
<td>28</td>
<td>560</td>
</tr>
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<td>24</td>
<td>23</td>
<td>23</td>
<td>5</td>
<td>6</td>
<td>33</td>
<td>543</td>
</tr>
</tbody>
</table>

Mean 97.5 87.2 29 23.6 24 23.8 5.9 7.8

a English Placement Test at ISU

b the total number of items

c score of the reading section in the placement test used in the Intensive English and Orientation Program (IEOP)

d The number is the mean score of two sections of the category match task.
exist, e.g., Subject 2 and 6 are the lowest on TOEFL and the English comprehension measure developed for this study, while Subjects 5, 7, and 8 are near the top on TOEFL, the EPT, and the English comprehension measure.

Revisions of the Instrument during/after Pilot Test I

Revisions were made after each trial according to the subjects' performance and comments. The summary of the revisions for the entire pilot test I is shown in Table 4.

Psuedoword naming task

While subjects did not have great difficulty in pronouncing pseudowords, closer inspection of the list showed that some vowels and vowel-consonant combinations were overrepresented. Since one reason for using the pseudoword naming task is to determine whether subjects are familiar with the phoneme-grapheme relationships in English, the list was revised to include a wider range of sounds after pilot test I. In the new list, as many of the following 15 vowel sounds as possible for three-, four-, five-, and six-letter pseudowords were included: [i], [I], [e], [E], [æ], [ʌ], [θ], [u], [ɔ], [a], [o], [ay], [oy], and [aw]. Insofar as possible, the number of pseudowords for each vowel sound was balanced. (The number of three-letter pseudowords with tense vowels is limited.)
Table 4. Summary of the revisions during/after pilot test I

<table>
<thead>
<tr>
<th>Task</th>
<th>Revisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudoword naming</td>
<td>revised to include a wider range of vowel and consonant sounds</td>
</tr>
<tr>
<td>Category match</td>
<td>Deletions: 'racing', 'wrestling', 'harp', 'jet'</td>
</tr>
<tr>
<td></td>
<td>Additions: 'golf', 'softball', 'pig', 'owl'</td>
</tr>
<tr>
<td></td>
<td>Replacements:</td>
</tr>
<tr>
<td></td>
<td>TV/stereo + tape-recorder/undershirt = TV/undershirt + tape-recorder/stereo</td>
</tr>
<tr>
<td></td>
<td>tape-recorder/stereo + CD player/banana + TV/undershirt + video/radio = CD player/stereo + radio/banana + tape-recorder/undershirt + TV/video</td>
</tr>
<tr>
<td></td>
<td>cow/lion + dog/bear = bear/lion + cow/dog</td>
</tr>
<tr>
<td></td>
<td>duck/rabbit + pig/owl = duck/owl + pig/rabbit</td>
</tr>
<tr>
<td></td>
<td>feet/ears + hands/stomach + head/eyes + neck/corn = eyes/ears + hands/feet + head/neck + stomach/corn</td>
</tr>
<tr>
<td>Syntax task</td>
<td>no revision</td>
</tr>
<tr>
<td>Semantic task</td>
<td>no revision</td>
</tr>
<tr>
<td>Syn/sem task</td>
<td>no. 7 was changed (from &quot;He talked eagerly/about King Sejong&quot; to &quot;The news of the success surprised him/greatly&quot;)</td>
</tr>
<tr>
<td>Korean passage</td>
<td>The last sentence was retranslated to make the meaning clear. A word in alternative (b) in question 10 was changed (from a word meaning 'separate' in 'causing people to view time as separate from human experience' to a word meaning 'independent'.)</td>
</tr>
<tr>
<td>English passage</td>
<td>Alternative (b) in question 4 was changed (from 'stars contain the chemical products from the explosion' to 'the universe contains the chemical products from the explosion')</td>
</tr>
</tbody>
</table>
A range of standard English consonant sounds was also used. Beginning consonant sounds of three-, four-, and five-letter pseudowords and beginning consonant sounds of the stressed syllable of six-letter pseudowords were balanced to include a variety of consonant sounds. The consonant sounds ending words were also balanced. In the pseudowords with the same vowel sound, different spelling patterns were used, e.g., "veace" and "sleed" for [i] and "skyle" and "prike" for [ay]. Still, each pseudoword was formed by replacing one letter in a real word (except for 'oss' from 'odd' and 'bepper' from 'better'), as in the first version. However, the original criterion of balancing the replaced positions in the pseudoword naming task had to be abandoned in this revision because it was not compatible with the criterion of including as many phoneme-grapheme relationships as possible.

Category match task

The words "racing" (from "raincoat/racing"), "wrestling" (from "wrestling/parka"), "harp" (from "harp/trumpet"), and "jet" (from "volleyball/jet") were deleted. New words "pig" and "owl" (from category "Animals") and "softball" and "golf" (from category "Sports") were added, making new pairs of "raincoat/golf", "softball/parka", "pig/rabbit", "duck/owl", and "volleyball/trumpet". These new pairs caused no difficulty for the subjects in the third trial.
Some items in the category of "Electronical Products", "Body Parts", and "Animals" were exchanged across pairs in order to avoid vagueness and confusion in the relationship between items in a pair. In the category of "Animals", revisions were made so that a matched pair including a mammal and a bird or a wild animal and a domestic animal did not occur. In the category of "Electronical Products", something to be watched (e.g. "TV") was not matched with something to be listened to (e.g., "stereo"). Some revisions were also made in the category of "Body Parts" in order to make the two words in matched pairs more closely related, e.g., "hands/stomach" was changed to "hands/feet".

The final version of the category match task has the same number of matched and mismatched pairs as that of the first version. The items in the final version are shown in Appendix C.

Sentence level tasks

No revision was made in the syntax and semantic tasks. In the syntax/semantic task, item 7 was changed after the second trial, i.e., "He talked eagerly/about King Sejong" was replaced with "The news of the success surprised him/greatly" since the original item was asking about the same grammatical aspect as item 2 in the task (i.e., "They talked about/continuously this and that").
Comprehension tasks

After the first trial, some revisions were made on both of the comprehension tasks, based on subjects' comments and the problems described in the section on the results of pilot study I. First, the last sentence of the Korean passage was unclear and grammatically odd. It was retranslated so that it more closely followed the English version.

Second, a minor change in wording was made in alternative (b) in item 10 in the Korean comprehension task. In the Korean version of "causing people to view time as separate from human experience", the Korean word for "separate" was changed to the Korean word for "independent".

Third, in item 4 in the English comprehension questions, alternative (b), the correct response, was revised. Because subjects indicated that this alternative did not cover the general idea described in the passage, the alternative "stars contain the chemical products from the explosion" was changed to "the universe contains the chemical products from the explosion."

Results of Pilot Test II--Four Korean Subjects from Pilot I

In this pilot test, only the revised pseudowords were tested. The subjects' scores on the first and revised pseudoword naming tasks are shown in Table 5. The scores on the revised version were generally lower than those on the
Table 5. Raw scores on the first and revised version of the pseudowords naming task

<table>
<thead>
<tr>
<th></th>
<th>First version</th>
<th>Revised version</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>98</td>
<td>93</td>
</tr>
<tr>
<td>S3</td>
<td>80</td>
<td>76</td>
</tr>
<tr>
<td>S5</td>
<td>97</td>
<td>88</td>
</tr>
<tr>
<td>S8</td>
<td>97</td>
<td>99</td>
</tr>
<tr>
<td>Mean</td>
<td>93</td>
<td>89</td>
</tr>
</tbody>
</table>

first version, perhaps because the revised version had a wider range of vowel and consonant sounds which elicited more errors.

The error pattern of backing of the vowel sound [a] was observed in two subjects: "yag" as [yag] (2), "gak" as [gak] (2), "fask" as [fask] (2), "zad" as [zad] (1), "ank" as [ank] (1), "pafe" as [pafe] (1), "clant" as [klant] (1), "hamily" as [hamili] (1) (the number in the parentheses indicate the number of subjects making the error). The error pattern of undiphthongization was seen in one subject, i.e., "kly" as [klI] (1), "bry" as [brI] (1), "wike" as [wIk] (1), "prike" as [prIk] (1), and "advike" as [advIk] (1). Another error pattern in two subjects was pronunciation of the spelling "o" as the back tense vowel [o] instead of [a] or [o]: "gok" as [gok] (1), "zop" as [zop] (2), "goctor" as [goktër] (2), "ogg" as [og] (1), "oss" as [os], and "mox" as [moks] (1). The
other errors on vowel sounds were "ras" [ræs] (1), "foat" [fɔt] (2), "spiris" [spaɪrɪs] (1), "koe" [ki] (1), "mirl" [miəl] (1), "bepper" [bɪpə] (1), and "pround" [prɒnd] (1). The errors on consonant sounds were "clant" [klænt] (1), "plass" [præs] (2), "nooth" [nuk] (1), "rup" [lʌp] (1), "lef" [lɛf] (1), and "hust" [hʌst] (1).

Results of Pilot Test III—Five Native Speakers

The unexpected pronunciations in the pseudoword naming task were "yag" as [yag] (1), "pafe" as [pafe] (2), "sug" as [sug] (1), "juk" as [juk], "firsk" as [fɪrsk] (1), "fex" as [fez] (1), "voo" as [vo] (1), "dut" as [dut] (1), "veace" as [veɪs] (1), "moint" as [mont] (1), and "hamily" as [hæˈpɪli] (1).

The comparison of mean scores for all tasks between the Korean subjects in pilot test I and the native speakers of English in pilot test III is shown in Table 6. Generally, the native speaker subjects got slightly better scores than the Korean subjects in all tasks. However, both groups of subjects appear capable of performing these tasks accurately.

Revisions

After the native speakers' performance, the pseudoword "pafe" and "spiris" were replaced by "tade" and "streel" respectively, since the original pronunciations were
Table 6. Comparison of the performance of the Korean and native speaker subjects

<table>
<thead>
<tr>
<th>Task</th>
<th>Mean raw scores</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Korean</td>
<td>NS</td>
</tr>
<tr>
<td>Real word naming (100)</td>
<td>97.5 (97.5%)</td>
<td>100 (100%)</td>
</tr>
<tr>
<td>Pseudoword naming (100)</td>
<td>89 (89%)</td>
<td>96.5 (96.5%)</td>
</tr>
<tr>
<td>Category match (30)</td>
<td>29 (96.7%)</td>
<td>29.8 (99.3%)</td>
</tr>
<tr>
<td>Syntax task (25)</td>
<td>23.6 (94.4%)</td>
<td>24.8 (99.2%)</td>
</tr>
<tr>
<td>Semantic task (25)</td>
<td>24 (96%)</td>
<td>24.8 (99.2%)</td>
</tr>
<tr>
<td>Syntax/Semantic (25)</td>
<td>23.8 (95.2%)</td>
<td>25 (100%)</td>
</tr>
<tr>
<td>Comprehension tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English (10)</td>
<td>5.9 (59%)</td>
<td>8.8 (88%)</td>
</tr>
<tr>
<td>Korean (10)</td>
<td>7.8 (78%)</td>
<td>-</td>
</tr>
</tbody>
</table>

ambiguous. Items on this final version of the pseudoword naming task are shown in Appendix B.

Results of Pilot Test IV—Three Korean Subjects

The times and scores for each Korean subject on each task and the Korean and English comprehension scores are presented in Table 7. The subjects' English reading proficiency as assessed by the comprehension measure spreaded over a fairly wide range (scores were 5 to 10). Subject 1, whose reading proficiency score was the highest, was faster than the other two subjects in the real word naming task and the category match task, but not on pseudoword naming and the sentence
<table>
<thead>
<tr>
<th></th>
<th>Subject 1</th>
<th>Subject 2</th>
<th>Subject 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>time(min.)/score</td>
<td>time(min.)/score</td>
<td>time(min.)/score</td>
</tr>
<tr>
<td>Real word naming (100)(^a)</td>
<td>1.13/99</td>
<td>1.20/95</td>
<td>1.67/98</td>
</tr>
<tr>
<td>Pseudoword naming (100)</td>
<td>1.63/84</td>
<td>1.55/76</td>
<td>2.00/90</td>
</tr>
<tr>
<td>Category match task (30)</td>
<td>.96/30</td>
<td>1.37/30</td>
<td>1.23/29</td>
</tr>
<tr>
<td>Syntax task (25)</td>
<td>1.90/25</td>
<td>2.10/25</td>
<td>1.42/24</td>
</tr>
<tr>
<td>Semantic task (25)</td>
<td>1.95/25</td>
<td>2.08/23</td>
<td>1.53/25</td>
</tr>
<tr>
<td>Syntax/semantic (25)</td>
<td>1.90/25</td>
<td>2.55/25</td>
<td>1.66/25</td>
</tr>
</tbody>
</table>

Korean comp. score                  9   8   7
English comp. score                 10  5   8

\(^a\) The total number of items
level tasks. Subject 2, whose reading proficiency score was the lowest, showed the slowest processing in the category match task and the sentence level tasks (higher level skills), compared to the performance of the other subjects, while his times on the naming tasks were quite fast. However, his accuracy on the pseudoword naming task was relatively low.

In order to determine whether the expected difficulty levels of the question types in the Korean comprehension task were confirmed in this pilot test, the item data for the comprehension task in pilot IV are provided in Table 8.

Table 8 shows that, despite the change in translation of the Korean passage designed to clarify Q10 (I), this item remained difficult. Consistent with the data from pilot test I, question 5 of type P remained difficult, whereas the other two inference questions (Q2 and Q7) were not difficult.

Table 8. Item data for the Korean comprehension task in pilot test IV

<table>
<thead>
<tr>
<th>Question Subject</th>
<th>Q1 (P)</th>
<th>Q2 (I)</th>
<th>Q3 (P)</th>
<th>Q4 (P)</th>
<th>Q5 (P)</th>
<th>Q6 (AP)</th>
<th>Q7 (I)</th>
<th>Q8 (P)</th>
<th>Q9 (S)</th>
<th>Q10 (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
Results of Pilot Test V—Three Native Speakers

The times and scores for each task and the English comprehension scores for each American subject are shown in Table 9. In this pilot test, the native speakers' L1 reading proficiency, as assessed by the comprehension measure, was relatively low. Native speaker 2, whose reading proficiency score was the lowest, showed the slowest performance on the sentence level tasks, compared with the other two native speakers. Native speaker 3 was significantly slower than the other two on the pseudoword naming task, even slower than the Korean subjects in pilot test IV. The mean times and raw scores of Korean subjects in pilot test IV and native speaker subjects in pilot test V are compared in Table 10.

In order to determine whether there existed an agreement in performance patterns for the English comprehension task between Korean subjects and the native subjects, the item data for the comprehension task for the native speaker subjects who participated in pilot tests III and V are provided in Table 11. The data indicated a similar performance pattern for the English comprehension task for the Korean and native speaker subjects. Generally corresponding with the item data obtained in pilot I, the item data showed that question 8 of type P was the hardest one, and questions 4 and 9 (type AP and P respectively) were difficult. Contrary to expectation, question 10 of type MI was not the hardest one.
<table>
<thead>
<tr>
<th>Task</th>
<th>NS 1 time(min.)/score</th>
<th>NS 2 time(min.)/score</th>
<th>NS 3 time(min.)/score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real word naming (100)</td>
<td>.95/100</td>
<td>.88/100</td>
<td>.85/100</td>
</tr>
<tr>
<td>Pseudoword naming (100)</td>
<td>1.22/99</td>
<td>1.32/91</td>
<td>2.22/98</td>
</tr>
<tr>
<td>Category match task (30)</td>
<td>.92/30</td>
<td>.97/30</td>
<td>.88/30</td>
</tr>
<tr>
<td>Syntax task (25)</td>
<td>.97/25</td>
<td>1.70/25</td>
<td>1.28/25</td>
</tr>
<tr>
<td>Semantic task (25)</td>
<td>1.03/25</td>
<td>1.55/25</td>
<td>1.02/25</td>
</tr>
<tr>
<td>Syntax/Semantic task (25)</td>
<td>1.07/25</td>
<td>1.62/25</td>
<td>1.20/25</td>
</tr>
<tr>
<td>English comprehension score (10)</td>
<td>7</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>
Table 10. Mean times and raw scores for Korean and native speaker subjects in pilot tests IV and V

<table>
<thead>
<tr>
<th></th>
<th>Korean time(min.)/score</th>
<th>NS time(min.)/score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real word naming</td>
<td>1.33/97.3</td>
<td>0.89/100</td>
</tr>
<tr>
<td>Psuedoword naming</td>
<td>1.73/83.3</td>
<td>1.59/96</td>
</tr>
<tr>
<td>Category matching task (100)</td>
<td>1.18/29.7</td>
<td>0.92/30</td>
</tr>
<tr>
<td>Syntax task (25)</td>
<td>1.81/24.7</td>
<td>1.32/25</td>
</tr>
<tr>
<td>Semantic task (25)</td>
<td>1.85/24.3</td>
<td>1.20/25</td>
</tr>
<tr>
<td>Syntax/Semantic task (25)</td>
<td>2.04/25</td>
<td>1.30/25</td>
</tr>
<tr>
<td>English comprehension score</td>
<td>7.7</td>
<td>7</td>
</tr>
</tbody>
</table>
Table 11. Item data for the English comprehension task for native speaker subjects in pilot tests III and V

<table>
<thead>
<tr>
<th>Subject</th>
<th>Question</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(P)</td>
<td>(P)</td>
<td>(AP)</td>
<td>(AP)</td>
<td>(AP)</td>
<td>(S)</td>
<td>(P)</td>
<td>(P)</td>
<td>(P)</td>
<td>(MI)</td>
</tr>
<tr>
<td>Pilot III</td>
<td>NS 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>NS 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>NS 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>NS 4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>NS 5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pilot V</td>
<td>NS'1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>NS'2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>NS'3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>Total</td>
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<td>8</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>


Thus, the expected difficulty levels of the questions in the two comprehension tasks were not confirmed in pilot testing, although in the Korean comprehension task, question 10 was the hardest one as expected. Obviously, factors other than question type are operating here.

The final version of all the instruments is shown in Appendix E including the comprehension tasks (passages and items).
CHAPTER V. CONCLUSIONS AND DISCUSSION

The purpose of the present study was to develop instruments with which to investigate component skill processing in the English L2 reading of Korean adults. The instruments from Sinatra and Royer's (1991) study of component skills in children were adapted to make an adult bilingual version. Comprehension measures were also developed in order to assess overall reading proficiency of the subjects in their L1 (Korean) and L2 (English). In order to provide validity evidence for the instruments and determine whether some revisions were needed, five pilot tests were administered. According to the subjects' performance and comments, some revisions were made in the instruments, as discussed in the previous section.

The validity of the instruments can be demonstrated in two ways: by the criteria established for the development of the instruments and by the results of the pilot testing.

Criteria for the Development of the Instruments

The criteria for the development of the instruments to ensure their comprehensiveness and familiarity to Koreans are discussed below. The familiarity to the subjects was important because the instruments will be used to assess the processes of the components in L2 reading, not vocabulary size, amount of L2 knowledge, or strategies.
Tasks assessing component skills (predictor tasks)

The real words in the naming tasks were taken from the textbooks used in Korea, which contributed to making the words familiar to the subjects. Three- and four-letter words were taken from the middle school textbooks, and five- and six-letter words were taken from the high school textbooks in order to involve different difficulty levels.

The bases of the pseudowords in the naming tasks were also taken from the Korean textbooks. The pseudoword naming task was revised to involve a wide range of standard English vowel sounds and a variety of consonant sounds, and different spelling patterns for a sound were used as well.

In the category match task, four categories were taken from Rosch (1975) and five categories were added which were thought to be familiar to Korean students. In the categories taken from Rosch, only words with higher prototypicality ratings were selected. In the other five categories, only items thought to be highly prototypical were selected. The words were also chosen on the basis of familiarity to Koreans.

In the sentence level tasks, the sentences were taken from the Korean textbooks, again, because these were thought to be familiar to the Korean subjects. The syntax task involves a range of the grammatical points indicated in the Description of Middle School English Curriculum (1988) and Description of High School English Curriculum (1989) published
by the Educational Department of the Korean Government.

**Comprehension measures for reading proficiency (criterion measure)**

The passages in both of the comprehension tasks were taken from the same text, which contributed to control of the style and difficulty levels across the passages.

The multiple-choice items were carefully constructed to avoid ambiguity. In order to measure a range of skills in reading ability, questions at different levels of difficulty from S to MI were used. Expected levels of difficulty for these question types were determined according to the amount of information a reader needs for the correct answer. However, the results of the comprehension measures did not correspond to the expected levels. One possible factor for this lack of correspondence between the expectation and results might be that, in some parts of the passage (e.g., paragraphs 2-4 and paragraph 7 in the English passage), the rhetoric of the text did not proceed according to the readers' expectations, thus causing the questions of type S, P, or AP that need information from those parts of the text to be more difficult to answer than they had been expected. Another possible factor might be that, if the question could be answered by incorporating background or world knowledge, it might be easier to select the correct answer than had been
expected.

The translation of the comprehension items in the Korean comprehension task was checked with back translation, which demonstrates the accuracy of the translation.

**Pilot Testing**

The construct validity of the instruments was investigated throughout the five pilot tests. Korean subjects and the native speaker subjects with different levels of reading ability participated in the pilot tests. In the pilot tests, familiarity of the items in the instruments to the Korean subjects was examined.

According to the subjects' performance and comments, some modifications were made on the instruments. Revisions were made on the pseudoword list to avoid ambiguities observed in the subjects' responses. In the category match task, some words were deleted, added, or exchanged across pairs, in order to avoid vagueness in the relationship between items in a pair. One revision was made on the syntax/semantic task in order to make each item assess a different grammatical and/or semantic aspect. In the Korean comprehension measure, the last sentence of the passage was retranslated because of its lack of clarity and oddness in Korean grammar. In the English comprehension measure, the correct alternative in an item was changed to better cover the general idea described in the
Based on the scores for each task in pilot test I (as shown in Table 3), the rank orders of the subjects for each task were determined as shown in Table 12. (The rank orders are shown only for the tasks where there were more than 3 points variation in score.)

There were general correspondences among the scores for Subjects 2, 3, 4, 5, 6, 7, 8, and 9. The exceptions in these correspondences were in the category match task for Subjects 2, 6, and 7, the pseudoword naming task for Subject 4, the real word naming task for Subject 9, and the syntax task for Subject 3. Although Subject 4's rank orders on the real word naming task, category match task, syntax task, and English comprehension measure were high, his ranking on the pseudoword naming task was low, which may be because he made many systematic pronunciation errors that did not interfere with reading.

Subjects 5 and 8 were almost at the top in all tasks, and Subject 6 was near the lowest in most tasks. Subject 1's performance data can not be explained with the data obtained in this study.

The scores on the pseudoword (lower level processing) naming task corresponded to the category match task (higher level processing) for Subjects 1, 3, 5, 8, and 9. The scores on the pseudoword naming task corresponded to the performance
Table 12. The ranking of Korean subjects' scores for each task in pilot test I

<table>
<thead>
<tr>
<th>Real word naming</th>
<th>Pseudoword naming</th>
<th>Category match</th>
<th>Syntax task</th>
<th>English Q.</th>
<th>Korean Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S8 (100)</td>
<td>S1 (98)</td>
<td>S1</td>
<td>S3</td>
<td>S8 (10)</td>
<td>S4</td>
</tr>
<tr>
<td>S4</td>
<td>S5 (97)</td>
<td>S2</td>
<td>S4</td>
<td>S4 (8)</td>
<td>S5 (9)</td>
</tr>
<tr>
<td>S5 (99)</td>
<td>S8 (30)</td>
<td>S4 (25)</td>
<td>S5 (8)</td>
<td>S8</td>
<td></td>
</tr>
<tr>
<td>S9 (91)</td>
<td>S7 (28)</td>
<td>S3 (5)</td>
<td>S7 (7)</td>
<td>S3 (8)</td>
<td></td>
</tr>
<tr>
<td>S1 (98)</td>
<td>S2 (86)</td>
<td>S8 (29)</td>
<td>S1 (24)</td>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>S2 (97)</td>
<td>S4 (83)</td>
<td>S6 (22)</td>
<td>S2 (3)</td>
<td>S6</td>
<td></td>
</tr>
<tr>
<td>S7 (95)</td>
<td>S3 (25)</td>
<td>S3 (17)</td>
<td>S6 (2)</td>
<td>S9 (6)</td>
<td></td>
</tr>
<tr>
<td>S6 (93)</td>
<td>S6 (70)</td>
<td>S7 (17)</td>
<td>S6 (2)</td>
<td>S9 (6)</td>
<td></td>
</tr>
</tbody>
</table>

on the syntax task (higher level processing) for Subjects 5, 6, 8, and 9. The scores for the English comprehension measure were generally consistent with the performance on the pseudoword naming and syntax task in the latter group of subjects.

In the results of pilot test IV (as shown in Table 7), Korean Subject 2, whose English reading proficiency was the lowest as assessed by the comprehension measure (5), took a significantly longer time for the sentence level tasks and the category match task (higher level skills) than the other two subjects, while he was quite fast on the naming tasks. The developmental status of Subject 2 might be at the point in
bottom-up processing where his lower level skill processing had matured, but his higher level skills processing had not yet been fully enough developed to operate effectively in interaction. Korean Subject 1, whose score on the English comprehension measure was highest (10), was quite fast in the naming tasks and category match task, but his performance for the sentence level tasks were not so fast, compared with Korean Subject 3 whose score on the English comprehension measure was 8.

It should be noted that, in pilot tests IV and V, differences among subjects in response times were more pronounced than those in accuracy. However, since these pilots required paper-and-pencil performance, the measurement of response time may not be highly precise. In future studies making use of these instruments, the tasks will be administered by computers in a way that will permit highly accurate measurement of response times.

One important problem was encountered in the pseudoword naming task, namely, that some Korean subjects made a systematic pronunciation substitution of [r] for [l], or vice versa, and that other inaccurate pronunciations in vowels were consistent, a fact that will need to be considered in future scoring of the pseudoword naming task. (In the present study, these substitution and inaccurate pronunciations were counted as errors.)
Another problem arose in the comprehension measures, in which the expected levels of difficulty for the question types were not confirmed in the results. Thus, validity and the reliability of the comprehension questions needs to be re-examined. It would also be helpful to develop one more passage (including questions) for each comprehension measure (Korean and English) in order to obtain a better measure of subjects' reading proficiency. Additionally, development of the Korean version of each of the component skills tasks would be useful to assess these processes in the L1, and would contribute to a better understanding of the factors underlying the differences between L1 and L2 reading.

Despite problems, the care taken in construction of instruments and the results of the pilot test suggest that the instruments are reasonably valid, i.e., they provide reasonably accurate measures of component skill processing in Korean students' reading English, and can be used in further studies investigating component skill processing of Korean subjects in the L2 reading of English.
BIBLIOGRAPHY


APPENDIX A

TASKS AND SAMPLE STIMULI IN SINATRA AND ROYER

<table>
<thead>
<tr>
<th>Task</th>
<th>Sample Stimuli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posner Letter Match Task</td>
<td></td>
</tr>
<tr>
<td>1) physical identity</td>
<td>AA, bb, DD; ee</td>
</tr>
<tr>
<td>2) name identity</td>
<td>Aa, Bb, Dd, Ee</td>
</tr>
<tr>
<td>3) different</td>
<td>AB, ba, DE, Gh</td>
</tr>
<tr>
<td>Word Naming</td>
<td></td>
</tr>
<tr>
<td>1) three-letter words</td>
<td>you, are but, one</td>
</tr>
<tr>
<td>2) four-letter words</td>
<td>show, goes, jump, help</td>
</tr>
<tr>
<td>3) five-letter words</td>
<td>table, story, horse, cover</td>
</tr>
<tr>
<td>4) six-letter words</td>
<td>dinner, banner, carton, fought</td>
</tr>
<tr>
<td>Pseudoword Naming</td>
<td></td>
</tr>
<tr>
<td>1) three-letter</td>
<td>baw, ret, teg, bex</td>
</tr>
<tr>
<td>2) four-letter</td>
<td>pold, nast, soat, stip</td>
</tr>
<tr>
<td>3) five-letter</td>
<td>nable, frint, glope, flide</td>
</tr>
<tr>
<td>4) six-letter</td>
<td>neeper, sorbid, nouly, larton</td>
</tr>
<tr>
<td>Concept Activation</td>
<td></td>
</tr>
<tr>
<td>1) matched</td>
<td>car/truck, arm/leg, socks/shirt</td>
</tr>
<tr>
<td>2) mismatches</td>
<td>bus/stool, nose/apple, bird/bed</td>
</tr>
<tr>
<td>Syntactic Analysis</td>
<td>These two flowers are/is mine.</td>
</tr>
<tr>
<td></td>
<td>Mary was/were writing a letter.</td>
</tr>
<tr>
<td></td>
<td>She ate three slices of/at cheese.</td>
</tr>
<tr>
<td>Semantic Analysis</td>
<td>The boy drank/ate his milk.</td>
</tr>
<tr>
<td></td>
<td>The school bell rang/blew.</td>
</tr>
<tr>
<td></td>
<td>The farmer planted/played the corn.</td>
</tr>
</tbody>
</table>
APPENDIX B

FIRST AND FINAL VERSION OF THE PSEUDOWORD LIST

First Version

Three-letter pseudo words

First letter changed

fly -- kly   sad -- zad   cry -- gry   big -- tig
boy -- poy   zoo -- koo  toy -- doy   cup -- gup
beg -- feg   boy -- moy  see -- ree  egg -- ogg
fox -- mox   dog -- gog

Second letter changed

hat -- het   ran -- rin  job -- jeb   hen -- hin
toy -- tey   fox -- fex  ran -- ren   box -- bex
map -- mep   sir -- sar  job -- jub

Third letter changed

arm -- arn   let -- lef   pen -- pem   and -- ank
job -- jop   hen -- hes   hit -- hik   net -- nen
yet -- yeb   let -- lep   bet -- bep   wit -- wif
set -- seg   win -- wim  yes -- yeg
Four-letter pseudo words

First letter changed
milk -- dilk    team -- peam    trip -- brip    girl -- mirl
back -- gack    time -- pime

Second letter changed
stay -- skay    step -- spep    bank -- benk    stop -- spop

Third letter changed
from -- frem    spot -- spet    side -- sive    wise -- wike

Fourth letter changed
help -- helk    meet -- meeg    swim -- swik    fast -- fask
lend -- leng    meet -- meep
Five-letter pseudo words

First letter changed
plant -- clant peace -- veace point -- doint
since -- bince dream -- fream

Second letter changed
space -- stace speed -- sleed style -- skyle
avoid -- adoid

Third letter changed
among -- ameng extra -- exprea order -- orper
spend -- spind

Fourth letter changed
stage -- stace pride -- prive stage -- stafe
pride -- prike

Fifth letter changed
spend -- speng point -- poing event -- evenk
Six-letter pseudo words

**First letter changed**
Spirit -- skirit  better -- ketter

**Second letter changed**
nature -- noture  manner -- menner

**Third letter changed**
depend -- delend  remain -- refain  repeat -- reveat
better -- bepper  expect -- extect

**Fourth letter changed**
forget -- forbet  origin -- oribin  invest -- invist

**Fifth letter changed**
arrive -- arripe  advise -- advike  plenty -- plendy

**Sixth letter changed**
afraid -- afraig  invent -- inveng  effort -- efforg
result -- resulk  expork -- export
Final Version

Three-letter pseudowords

    wiv      fex
    tig      yeb
    hib      kes
    jix      seg

    ank      rup      ner
    ras      dut      jur
    yag      juk
    gak      sug

[u] voo  [o] ogg  [a] arn  [o] koe
    jor      sar
    vaw      mox
    oss      zop
    gok

[ay] bry  [øy] moy
    kly      doi
Four-letter pseudowords

     spet

     mirl

     yark  vool  torm

     soin
Five-letter pseudo words

[i]  veace    [I]  hince    [e]  expra    [ə]  ameng
sleed         grick

plass         firsk

[u]  nooth    [o]  smory    [ɔ]  brawg
        trote

[a]  spart    [ay]  skyle    [ɔy]  adoid
prike         moint
Six-letter pseudowords

[i] redate
streeel

[I] winish

[e] inveng
afraig

[ε] ketter
bepper

[æ] zattle
hamily

[ʌ] resultk
lundle

[a] jarmer
tarber
goctor

[u] remuse

[ɔ] noture
afforg

[ɔ] oribin

[ay] advike

[aw] pround
APPENDIX C

FIRST AND FINAL VERSION OF THE CATEGORY MATCH ITEMS

First Version

Furniture
Match: chair/table sofa/bed
Mismatch: apple/cabinet desk/nose

Electronic Product
Match: TV/stereo video/radio
Mismatch: CD player/banana tape recorder/undershirt

Food
Match: orange/grape rice/bread tomato/potato
Mismatch: cherry/hat strawberry/bowling cucumber/fox

Vehicle
Match: car/bus taxi/truck train/airplane
Mismatch: motorcycle/arm boat/ham bicycle/lemon

Animal
Match: horse/cat dog/bear cow/lion duck/rabbit
tiger/elephant
Mismatch: eagle/subway monkey/shoes snake/watermelon
wolf/belt   sheep/onion

Sports
Match: baseball/tennis   basketball/hockey
      boxing/skiing   soccer/swimming
Mismatch: volleyball/jet   skating/peach
         handball/pear   wrestling/parka

Clothing
Match: pants/shirt   skirt/sweater   suit/jacket
      coat/dress
Mismatch: blouse/football   raincoat/racing   socks/beef
         panty/bookcase

Body parts
Match: toes/fingers   feet/ears   hands/stomach
      head/eyes
Mismatch: elbow/lamp   mouth/overcoat   heart/ice cream
         neck/corn

Musical instrument
Match: piano/violin   harp/trumpet   harmonica/flute
Mismatch: guitar/ship   pajama/drum   clarinet/egg
Final Version

**Furniture**
Match: chair/table  sofa/bed
Mismatch: apple/cabinet  desk/nose

**Electronic Product**
Match: CD player/stereo  video/TV
Mismatch: radio/banana  tape recorder/undershirt

**Food**
Match: orange/grape  rice/bread  tomato/potato
Mismatch: cherry/hat  strawberry/bowling  cucumber/fox

**Vehicle**
Match: car/bus  taxi/truck  train/airplane
Mismatch: motorcycle/arm  boat/ham  bicycle/lemon

**Animal**
Match: horse/cat  dog/cow  bear/lion  duck/owl  
tiger/elephant  pig/rabbit
Mismatch: eagle/subway  monkey/shoes  snake/watermelon  
wolf/belt  sheep/onion
Sports

Match: baseball/tennis    basketball/hockey
       boxing/skiing    soccer/swimming
Mismatch: volleyball/trumpet    skating/peach
           handball/pear    softball/parka

Clothing

Match: pants/shirt    skirt/sweater    suit/jacket
       coat/dress
Mismatch: blouse/football    raincoat/golf    socks/beef
           panty/bookcase

Body parts

Match: toes/fingers    eyes/ears    hands/feet
       head/neck
Mismatch: elbow/lamp    mouth/overcoat    heart/ice cream
                     stomach/corn

Musical instrument

Match: piano/violin    harmonica/flute
Mismatch: guitar/ship    pajama/drum    clarinet/egg
For each statement or question, choose the one best completion or response.

1. In Western society, the invention of the clock
   a. focused people's attention on eternity.
   b. caused people to live by the rhythms of nature.
   c. contributed to the development of science.
   d. caused mathematics to become an independent discipline.

2. By "worldly time," the author means
   a. time which goes on forever.
   b. time associated with the movement of the moon or planets.
   c. time associated with the events of nature.
   d. hours, minutes, and seconds in everyday life.

3. Select the statement which is true of 13th century clocks.
   a. Their movements could not be closely controlled.
   b. Weights were not used in their construction.
   c. They did not contain toothed wheels.
   d. They usually provided accurate time.
4. The "verge and foliot escapement" mechanism in a clock
   a. contained a balance wheel.
   b. regulated the speed of the clock.
   c. consisted of a toothed wheel and a foliot.
   d. prevented the clock from "ticking."

5. Most of the early 14th century clocks
   a. had dials that showed hours and minutes.
   b. were used in churches and cathedrals.
   c. kept very good time.
   d. had bells that rang every hour.

6. Many late 14th century clocks
   a. were very accurate timepieces.
   b. could easily show subdivisions of the hour.
   c. were placed in public places.
   d. did not use escapement mechanisms.

7. The example about King John of Aragon is included in the passage to show that
   a. 14th century clocks were complicated but unreliable.
   b. it was necessary for palace clocks to have bells.
   c. the king was rich enough to hire men to strike the bells.
   d. clocks in Aragon and Paris were constructed the same way.
8. According to the passage, one reason that clockmaking became a major industry in the 14th century was that

a. clock had become cheaper and more people could own one.
b. each city wanted to have a fancy clock for its cathedral.
c. clocks had become quite accurate and reliable.
d. more people became interested in becoming clockmakers.

9. According to the passage, people liked clocks to show the movement of the planets because

a. they thought the planets make the clocks more beautiful.
b. they were becoming more interested in natural science.
c. they wanted to own a fancy clock in order to be important.
d. They believed personal success was related to this movement.

10. According to the passage, the invention of the clock changed 13th and 14th century culture by causing people

a. to relate time to the natural seasons.
b. to view time as external to human experience.
c. to value the accurate measurement of time.
d. to describe planetary movements in terms of time.
Choose the answer that best completes the open statement, or choose the one that is the most appropriate to the question.

1. In Western Society, the invention of clock brought
   a. people's attention to be focused on eternity.
   b. people to live by the rhythm of nature.
   c. contribution to scientific development.
   d. mathematics to become an independent subject of studies.

2. What does the author mean by "worldly time"?
   a. Time that continues eternally.
   b. Time that's associated with movements of the moon and planets.
   c. Time that's related to natural phenomena.
   d. hours, minutes, and seconds of daily life.

3. The clocks of the 13th century
   a. were not accurately controlled.
   b. did not have weights in the process of clock making.
   c. did not have a toothed wheel.
   d. usually provided accurate time.

4. The verge and foliot escapement of a clock
   a. had a balance wheel.
   b. regulated the speed of a clock.
   c. was constructed with a toothed wheel and a foliot.
   d. eliminated 'tick-tack' noise.
5. Most of the clocks in the early 14th century
   a. had dials to indicate hours and minutes.
   b. were used at cathedrals and churches.
   c. were accurate.
   d. had a bell to sound each hour.

6. Many of the clocks in the late 14th century
   a. were quite accurate time measuring pieces.
   b. were able to easily show subdivisions of time.
   c. were located in public areas.
   d. did not use the verge and foliot escapement.

7. What's the implication of the above story about King John of Aragon?
   a. The clocks of the 14th century were quite complicated and yet not trustworthy.
   b. The clocks at the palace needed bells.
   c. The king was rich enough to hire someone to strike the bell.
   d. The clocks of Aragon and Paris were constructed by the same method.

8. According to the previous passage, clock making in the 14th century became a primary industry because
   a. more people were able to own clocks due to its price reduction.
   b. every city wanted to have a stylish clock at it's cathedral.
   c. clocks became quite accurate and reliable.
   d. more people happened to have interest in becoming
9. According to the previous passage, people preferred clocks showing the movements of planets because

a. those planets make the clocks look more beautiful.
b. they became more interested in natural science.
c. they wanted to own stylish clocks in order to become primary figures.
d. they believed their personal success is related with the movement of those planets.

10. How did the invention of clock change the culture of the 13th and 14th century?

a. The invention of clock helped people to associate time with seasons of nature.
b. People began to consider time as independent from human experience.
c. More emphasis was given to the accuracy of time measurement by people.
d. The invention of clock led people to explain the movement of planets in terms of time.
## APPENDIX E

### FINAL VERSION OF THE INSTRUMENTS

**WORD NAMING TASK**

### Three-letter words

<table>
<thead>
<tr>
<th>hat</th>
<th>toy</th>
<th>hop</th>
<th>map</th>
</tr>
</thead>
<tbody>
<tr>
<td>run</td>
<td>sky</td>
<td>off</td>
<td>sir</td>
</tr>
<tr>
<td>box</td>
<td>try</td>
<td>fly</td>
<td>hen</td>
</tr>
<tr>
<td>bag</td>
<td>boy</td>
<td>cup</td>
<td>dog</td>
</tr>
<tr>
<td>sad</td>
<td>see</td>
<td>zoo</td>
<td>for</td>
</tr>
<tr>
<td>can</td>
<td>job</td>
<td>get</td>
<td>set</td>
</tr>
<tr>
<td>big</td>
<td>red</td>
<td>let</td>
<td>ant</td>
</tr>
<tr>
<td>act</td>
<td>yet</td>
<td>net</td>
<td>win</td>
</tr>
<tr>
<td>pen</td>
<td>sun</td>
<td>fox</td>
<td>old</td>
</tr>
<tr>
<td>eat</td>
<td>leg</td>
<td>car</td>
<td>too</td>
</tr>
</tbody>
</table>
Four-letter words

milk       step    
sing       stay    
team       from    
back       ship    
blue       wise    
long       help    
bank       
stop       
spot       
side       
must       
meet       
swim       
fast       
Five-letter words

major       space
title       movie
truth       avoid
plant       since
speed       dream
peace      
sport      
stage      
price      
style      
point      
event      
skill      
among      
spend
Six-letter words

spirit  expect
origin  arrive
effort  advise
remain  manner
public  nature
report
depend
result
afraid
export
import
repeat
custom
common
nation
### PSEUDOWORD NAMING TASK

#### Three-letter pseudowords

<table>
<thead>
<tr>
<th>ree</th>
<th>jix</th>
<th>seg</th>
<th>vay</th>
</tr>
</thead>
<tbody>
<tr>
<td>zad</td>
<td>gub</td>
<td>ert</td>
<td>voo</td>
</tr>
<tr>
<td>ogg</td>
<td>arn</td>
<td>koe</td>
<td>bry</td>
</tr>
<tr>
<td>moy</td>
<td>rin</td>
<td>lef</td>
<td>ank</td>
</tr>
<tr>
<td>rup</td>
<td>ner</td>
<td>jor</td>
<td>sar</td>
</tr>
<tr>
<td>tig</td>
<td>yeb</td>
<td>ras</td>
<td>dut</td>
</tr>
<tr>
<td>vaw</td>
<td>mox</td>
<td>kly</td>
<td>doi</td>
</tr>
<tr>
<td>hib</td>
<td>kes</td>
<td>yag</td>
<td>juk</td>
</tr>
<tr>
<td>oss</td>
<td>gok</td>
<td>sug</td>
<td>gak</td>
</tr>
<tr>
<td>wiv</td>
<td>fex</td>
<td>zop</td>
<td>jur</td>
</tr>
</tbody>
</table>
Four-letter pseudowords

meeg  fong
dilk  wike
foat  gowl
soin  torm
tade  zoid
leng
fask
yark
hust
vool
hurn
spet
mirl
smop
prue
### Five-letter pseudowords

<table>
<thead>
<tr>
<th>moint</th>
<th>firsk</th>
</tr>
</thead>
<tbody>
<tr>
<td>veace</td>
<td>grick</td>
</tr>
<tr>
<td>expra</td>
<td>trote</td>
</tr>
<tr>
<td>hince</td>
<td>skyle</td>
</tr>
<tr>
<td>ameng</td>
<td>sleed</td>
</tr>
<tr>
<td>prike</td>
<td></td>
</tr>
<tr>
<td>nooth</td>
<td></td>
</tr>
<tr>
<td>clant</td>
<td></td>
</tr>
<tr>
<td>dunch</td>
<td></td>
</tr>
<tr>
<td>grook</td>
<td></td>
</tr>
<tr>
<td>smory</td>
<td></td>
</tr>
<tr>
<td>spart</td>
<td></td>
</tr>
<tr>
<td>brawg</td>
<td></td>
</tr>
<tr>
<td>adoid</td>
<td></td>
</tr>
<tr>
<td>plass</td>
<td></td>
</tr>
</tbody>
</table>
Six-letter pseudowords

noture streel
redeat advike
lundle oribin
goctor jarmer
winish bepper
ketter

tarber
inveng
pround
afforg
zattle
afraig
remuse
hamily
resulk
handball/pear
chair/table
ccoat/dress
CD player/stereo
cherry/hat
monkey/shoes
basketball/hockey
motorcycle/arm
guitar/ship
taxi/truck
raincoat/golf
tomato/potato
suit/jacket
horse/cat
tape recorder/undershirt
orange/grape

car/bus

heart/ice cream

wolf/belt

apple/cabinet

baseball/tennis

volleyball/trumpet

eagle/subway

pants/shirt

boat/ham

elbow/lamp

bear/lion

boxing/skiing

cucumber/fox

dog/cow
socks/beef
rice/bread
desk/nose
skirt/sweater
snake/watermelon
piano/violin
stomach/corn
video/TV
duck/owl
hands/feet
softball/parka
blouse/football
train/airplane
mouth/overcoat
harmonica/flute
toes/fingers
panty/bookcase
bicycle/lemon
radio/banana
sheep/onion
tiger/elephant
clarinet/egg
strawberry/bowling
soccer/swimming
head/neck
pig/rabbit
pajama/drum
eyes/ears
sofa/bed
skating/peach
SENTENCE LEVEL TASKS

Syntax task

1. John has ________ friends in school.
   - many
   - much

2. He is interested in ________ English.
   - studies
   - studying

3. This is the boy ________ broke the window.
   - which
   - who

4. ________ took me 30 minutes to go there.
   - It
   - That

5. Would you like something ________ to drink?
   - drinking
   - to drink

6. We must help ________ in this matter.
   - us
   - ourselves

7. I should do ________ things before bedtime.
   - a few
   - a little

8. He ________ fourteen years old now.
   - is
   - was

9. There ________ two little bags on the chair.
   - are
   - is

10. She told us ________ her idea.
    - into
    - about

11. ________ your brother go to school?
    - Does
    - Do
12. The boy _likes_ in the city.

13. The bridge was _built_ by Korean engineers.

14. We have _studied_ English for two years.

15. We have _not_ read that book.

16. We _aren't_ live in Seoul.

17. _A_ moon travels around the earth.

18. The cake _had_ eaten by the boys.

19. _Are_ you walk to school everyday?

20. They _gave_ us the candy yesterday.

21. They told him _that_ she was safe.

22. Tom is _smarter_ than the other boys.

23. _Are_ you preparing the dinner?
24. You should **kept** your promise.
    keep

25. He wanted to **go** there.
    going

Semantic task

1. Your heart is **beating** now.
    hitting

2. The room is too **heavy** to see anything.
    dark

3. I'm sorry to have **pleased** you.
    bothered

4. I'm so **bored** that I can't eat anymore.

5. It was a very **serious** bus.
    crowded

6. He **entered** the army last week.
    became

7. He had a **good** time last Sunday.

8. The doctor is not **available** now.
    possible

9. I **take** the bus to school everyday.
10. The chemicals pollute the sea.

11. I get up early in the morning.

12. I'd like to have a cup of bread.

13. Did you watch the book yesterday?

14. She was writing a letter last night.

15. He's riding a bicycle outside.

16. He put on his hat at the door.

17. I couldn't hear the sign in the distance.

18. I need a small amount of sugar.


20. All the factories have made the air dirty.

21. She was wearing her red shoes.
22. The apples are not _ripe_ enough to eat.
   _rapid_

23. I couldn't understand his fast _voice_.
   _speech_

24. The farmer _planted_ the corn.
   _played_

25. You must turn the light _over_ at bedtime.
   _off_

Syntax/Semantic task

1. People _fast_ from one country to another.
   _travel_
   _about_

2. They talk _continuously_ this and that.
   _warm_
   _closely_

3. Feathers keep birds _warm_ in winter.
   _finding_

4. Do you _remember_ the date now?
   _happy_
   _satisfy_

5. You don't look _happy_ this morning.
   _satisfy_

6. We are ready to _already_ dinner.
   _have_

7. The news of the success surprised _greatly_
   _him_
8. Today is too ______ for window shopping.
   someday

9. German is ______ to learn.
   need
difficult

10. Who speaks English ______ in your class?
    best
    fluent

11. Last night Jane and Mary enjoyed the ______.
    really
    music

12. ______ to foreigners is great fun.
    Interesting

13. He is ______ a rest now.
    want
    taking

14. Today is not as ______ as yesterday.
    cold
    wind

15. He found English ______ to learn.
    interest
    easy

16. He was very proud of ______ skill.
    quickly
    his

17. The colleges are ______ in Korea.
    proudly
    famous

18. Body language is not ______ easy.
    always
    the

19. Let's find ______ interesting to do.
    very
    something
20. There are some people ______ for the bus.

21. He ______ that the lady wanted help.

22. I feel ______ this morning.


24. There is some work ______ me to do.

25. This is the man who ______ Jane.
The Evolution of the Universe

Astronomers are not sure exactly how old the universe is. However, there is virtually universal agreement that the universe began in a big bang, for there is a sense in which the big bang can still be seen. Even though this explosive event took place something like 15 billion years ago, its traces are still visible today.

There are three important kinds of evidence for the big bang. First, the universe is expanding, or becoming larger. Observations of distant galaxies indicate that this expansion has been going on for billions of years. Thus the universe must have been in a relatively compressed state at some time in the past. In fact, if one looks at the present expansion and works backward, it is hard to avoid the conclusion that the universe must have originally exploded out of a hot, dense fireball.

If this fireball existed, two important consequences follow. First, the light from the fireball should still be observable. Astronomers know of nothing that would keep it from continuing to travel through space during the 15 billion or so years that have passed since it was emitted. Second, the existence of a fireball at one time implies that the universe should have a certain kind of chemical composition. It can be deduced that certain kinds of nuclear reactions would have taken place within the fireball. The products of these reactions should still exist in the universe today.

Both of these predictions of the big bang theory have been confirmed. It is possible to see the light from the creation event, and the universe does have the kind of composition that it should have.

While astronomers tend to agree on the origin of the
universe, they disagree on the question of whether the
universe is open or closed. If the universe is closed, there
may be not only a beginning but also an end of time.
Astronomers have not been successful in determining whether
the expansion of the universe would stop, so that it is not
possible to say when the universe would begin to contract, or
grow smaller.

However, assuming that the contraction occurs, it will
begin very slowly. But then, as galaxies (large groups of
stars) move closer and closer together, gravitational
attraction will become stronger, and the collapse will proceed
at an ever-increasing rate. As the big crunch continues,
matter in the universe will become more and more compressed.
Eventually, all of the matter and energy in the universe will
be crushed into nothing, and it is likely that space-time
itself will cease to exist.

If, on the other hand, the universe is open, the present
expansion will continue indefinitely. Galaxies will continue
to recede from one another; one by one, the stars will burn
out. New stars will be created, but the supplies of
interstellar gas from which stars are formed will eventually
be used up. Random collisions will also cause the galaxies to
lose some of their stars by galactic evaporation. This
process is similar to the evaporation of molecules from a
liquid. In each case, collisions cause some material to gain
enough energy to escape from the attractive forces exerted by
the rest. As these stars—perhaps as many as 90 percent in a
typical galaxy—fly off into intergalactic space, the
remaining stars will be drawn into the galactic cores.

After about $10^{18}$ (a million trillion) years, nothing will
be left of the universe but the remains of collapsed galaxies
and the various objects that will then be scattered through
space: dead stars, stellar-sized black holes, planets, and
smaller objects such as comets.
Comprehension Questions for "The Evolution of the Universe"

For each statement, choose the one best completion.

1. Astronomers generally agree that

   a. the universe is less than one billion years old.
   b. the universe is composed of unknown materials.
   c. the universe was created in a sudden blast.
   d. the universe is slowly becoming closed.

2. One piece of evidence for the "big bang" is that

   a. the universe continues to grow larger.
   b. the universe was compressed at some time in the past.
   c. the universe was originally very hot.
   d. the universe contains a number of galaxies.

3. Another piece of evidence for the "big bang" is that

   a. light can travel for billions of years.
   b. light from the original fireball is still visible.
   c. new stars are still being created.
   d. intergalactic space is very hot.

4. A third piece of evidence for the "big bang" is that

   a. a nuclear reaction took place in that explosion.
   b. the universe contains chemical products from the explosion.
   c. all stars and planets have the same chemical composition.
   d. nuclear reactions continue to occur in the universe.
5. If the universe is closed,

   a. the expansion of the universe would continue forever.
   b. contraction would bring galaxies nearer to each other.
   c. contraction would begin but then slow down.
   d. the force of gravity would become less important.

6. The author suggests that, in a closed universe, space-time would likely cease to exist because

   a. the universe could not support life anymore.
   b. no new galaxies would be formed.
   c. gravitational force would no longer exist.
   d. all material and energy would disappear.

7. If the universe is open,

   a. the universe would become larger and larger.
   b. new galaxies would continue to provide interstellar gas.
   c. collisions between stars would become more frequent.
   d. most stars would become part of the galactic cores.

8. "Galactic evaporation" refers to the process in which

   a. new stars are created from interstellar gas.
   b. stars break loose from their galaxies.
   c. stars collapse into their galactic cores.
   d. stars collide with each other and burn out.

9. According to the passage, one final result of an open universe would be

   a. containing expansion of the universe.
b. the end of time and space.
c. a new "big bang."
d. a variety of dead objects floating in space.

10. The main idea of the passage is that

a. Astronomers have a lot of evidence about how the universe began.
b. The universe began in a big bang and will end with galactic evaporation.
c. Astronomers know how the universe began but are not sure how it will end.
d. After $10^{18}$ years, the universe will consist only of the remains of collapsed galaxies.
KOREAN COMPREHENSION TASK

추상적 시간

기계 시계의 발명과 발달은 서양 사회에 일어난 가장 중요한 기술적 진보의 하나였다. 사회사가 투어스 발포트가 지적한 것처럼 시계는 자연의 리듬에서 시간을 분리해 냈다. 또한 과학의 발달에 있어서 불가결한 ‘기억적으로 측정 가능한 계열이라고 하는 독립된 세계에 대한 선염을 낳는데 도움을 주었다.’ 세속적인 시간의 중요함을 증가시키고, 영원에 대한 중세의 선박관을 경영하게 한 것은 시계였다. 그리고 시간이 그 본질에서 시, 분, 초의 계열로 생각할 수 있는 추상적 체제임을 발현한 것도 시계였다.

시계는 이미 13세기 후반에 만들어져 있었지만 처음에는 그 다지 정확한 장치가 아니었다. 하루에 몇 시간이라 빠르거나 늦은 것은 보통이었다. 문제는 시계가 가는 속도를 조절하는 방법을 고안해 내지 못하는 데 있었다. 시계사들은 시침이 시계추에 의해서 움직이는 것을 잘 알고 있었고, 몽니바퀴를 만드는 방법도 알고 있었다. 그러나 영국인 리查드가 1271년에 발안한 것처럼, 시계들은 그 일을 완성시킬 수 없었다.

시계의 움직임을 조정하는 문제는 13세기 말이 되어 관형 달진기(冠形 脫進機)가 발명되었을 때에 해결되었다. 그것은 시계가 돌아가는 속도를 제어하는 기구였는데, 몽니바퀴의 움직임을 제어하는 기계와 현대의 시계에 있는 평형문(平衡輪)과 같은 기능을 하는 봉(榫) 레バー로 되어 있다. 시계가 ‘계작 계작’ 하고 소리를 내는 것은 이 달진기의 작용 때문이다.

달진원리를 이용한 최초의 시계 대부분은 14세기에 수도원으로 만들어졌다. 현대의 시계와도 다를 뿐더러 글자판이 없었다. 그것은 한 시간마다 줄을 치는 장치에 불과했다. 그것이 어느정도의 정밀도를 가졌는지 정확하게 말할 수는 없으나, 하루에 30분 이내의 정확도를 유지했다고 보기는 어렵다.

14세기 중 뒤에 가시는 글자판이 있는 시계가 나타나기 시작한데, 그 대부분은 공공 시계였으며, 교회나 대성당에 걸렸다. 처음에는 시계방에 없었다. 한 시간을 세분해서 가리키는 분침을 고안한 것은 15세기라고 되어져 있었다.
14세기에 만들어진 시계의 정확도는 벌 것이 아니었다. 당시에는 그렇게 정확하게 시간을 측정하기가 쉽지 않았던 것 같다. 아무리 중세의 시계들은 탄진 장치의 움직임을 조절하는 방법을 찾아내는 것보다 끝이나 톱니바퀴를 넣어서 기계를 유>(),가하게 만드는 것에만 끝이 있었다. 그런데도 14세기 시계의 대부분은 주목할 만한 것이다. 어떤 것에는 움직이는 달력이 달려 있어서 해와 닝과 행성의 위치를 가리키는 천문학적인 장치도 만들어져 있다. 당연히 이렇게 복잡한 장치는 고장을 일으키기 쉬웠다. 그래서 시계의 움직임을 감시하고, 정기적으로 시간을 맞추는 '장인'을 고용해야 했다. 때로는 그것도 충분하지 않았다. 1387년에 아라곤 국왕 존은 시계가 정확하게 시간을 알리지 않기 때문에 시보의 중을 치는 남자 두 사람을 고용했다. 거의 같은 시기에 파리의 왕궁 시계가 너무나 시간이 안 맞았기 때문에 다음과 같은 노래가 만들어질 정도였다. '왕궁의 시계는 제멋대로 간다.'

 초기의 시계는 일체없이 손을 놓아두는 부정확하고 갑작한 장치였지만, 시계 제작은 14세기의 주요 산업의 하나가 되었다. 확실히 거기에는 몇 가지 이유가 있었는데, 각 도시마다 자랑거리로 자랑하는 심리도 그 하나였다. 각 도시는 대성당에서 복잡한 시계를 설치하려고 서로 경쟁했다. 이 시대에는 잠았적이 부활하고 있었기 때문에 많은 시계에 의한 행성의 운행을 표시하게 한다는 것도 중요했다. 행성의 위치에 관한 지식이 여่าย가지 사업의 성공을 위해서 불가결한 것이었다. 생 각할 것이다.

 시계의 급증은 중세 후기 및 로네상스 초기의 문화적 적지 않은 영향을 끼쳤다. 시간의 경과는 감자기 누구나 가 맞아가는 것이 되었다. 시계의 잠들어 금산바위에서 들어가는 것을 보고만 있으면 시간을 '볼수'가 있는 것이다. 시간은 더 이상 단순히 경험의 연속이 아니었다; 시간은 경험하는 시간, 분, 초로 측정될 수 있는 것이 되었다.
Korean Comprehension Questions

각 문제의 미완성 문장이나 질문에 대하여, 그 문장을 가장 잘 완성시킨 구절이나, 그 질문에 가장 적절한 답을 고르시오.

1. 서양사회에서, 시계의 발명은
   a. 사람들과의 관계를 없애 영원성에 집중하게 했다.
   b. 사람들과 자연의 리듬에 따라 살게 했다.
   c. 과학 발전에 공헌하였다.
   d. 수학이 특별한 학문 분야가 되게 했다.

2. 끝 과의 “세속적인 시간”으로 작가가 의미하는 것은
   a. 영원적이고 지속되는 시간이다.
   b. 태어나 행성들의 음직임과 연관된 시간이다.
   c. 자연 현상과 연관된 시간이다.
   d. 일상 생활의 시각. 본. 초이다.

3. 13세기의 시계에 대하여 옳은 것을 고르시오.
   a. 시계의 음직임이 세밀하게 조절될 수 없었다.
   b. 시계가 시계 제조에 사용되지 않았다.
   c. 시계는 톨니 바퀴를 갖고 있지 않았다.
   d. 시계는 대개 정확한 시간을 제공했다.

4. 시계의 관행 탐진 기는
   a. 평형관을 갖고 있었다.
   b. 시계의 속도를 일정하게 제어했다.
   c. 톨니 바퀴와 톨 템포로 구성되었다.
   d. 제작거리는 소리가 나지 못하도록 했다.

5. 대부분의 14세기 초반의 시계들은
   a. 시간과 분을 보여주는 클라판을 갖고 있었다.
   b. 교회와 대성당에 사용되었다.
   c. 시간이 잘 맞았다.
   d. 시간보다 음리는 종을 갖고 있었다.

6. 14세기 후반의 시계들은
   a. 매우 정확한 시간을 제는 기구였다.
   b. 시간의 세분을 쉽게 보여 줄 수 있었다.
   c. 궁중 장소에 설치되었다.
   d. 관행 탐진기를 사용하지 않았다.
7. 옛 글의 아라곤 국왕 존에 대한 예화는 무엇을 보여 주는가?

a. 14세기의 시계는 복잡했지만 믿을 만하지 못했다.
b. 궁전의 시계는 질을 필요로 했다.
c. 그 왕은 중지하는 사람을 고용할 만큼 부자였다.
d. 아라곤과 파리의 시계들은 같은 방법으로 제조되었다.

8. 옛 글에 따르면, 시계 제조가 14세기의 주요 산업의 하나가 된 이유 중 하나는

a. 시계 가격이 저렴해져서 더 많은 사람들이 시계를 소유하게 되었기 때문이다.
b. 각 도시마다 도시 대성당에 펼쳐 시계를 갖고 살여했기 때문이다.
c. 시계가 완 정착하고 믿음을 받게 된기 때문이다.
d. 더 많은 사람들이 시계가 되는 데 관심을 가졌기 때문이다.

9. 옛 글에 따르면, 사람들이 행성들의 흔직임을 보여 주는 것을 좋아 했는데, 왜냐하면 사람들이

a. 그 행성들이 시계들 더 아름답게 만든다고 생각했기 때문이다.
b. 자연 과학에 더욱 관심을 갖게 되었기 때문이다.
c. 중요 인물들이 되기 위하여 펼쳐 시계를 소유하고 살여했기 때문이다.
d. 개인적인 성공이 이 흔직임과 관련이 있다고 믿었기 때문이다.

10. 옛 글에 따르면, 시계의 발명은 어떻게 하여 13세기와 14세기의 문화를 변화시켰는가?

a. 사람들은 하여금 시간을 자연적 계절과 연관시키기 함으로써
b. 사람들은 하여금 시간을 인간 경험로부터 독립적인 것으로 보게 함으로써
с. 사람들은 하여금 정확한 시간 측정을 중요시 하게 함으로써
d. 사람들은 하여금 행성의 흔직임을 시간적으로 설명함으로써