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Interactive Use of Reading Strategies:
Seven Cases in Second Language Reading

by

Hyeran Choi

A thesis submitted to
The Faculty of Graduate Studies and Research
In partial fulfillment of
The requirements for the degree of

Master of Arts

School of Linguistics and Applied Language Studies

Carleton University
Ottawa, Ontario
January 1999

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acceptance of the thesis*

***INTERACTIVE USE OF READING STRATEGIES: SEVEN CASES IN SECOND
LANGUAGE READING***

submitted by HYERAN CHOI

*in partial fulfilment of the requirements for
the degree of Master of Arts*

A handwritten signature in black ink, consisting of a large, stylized 'D' followed by a series of loops and a sharp upward stroke, positioned above a horizontal line.

Thesis Supervisor

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ABSTRACT

This study focused on uncovering the on-line reading strategies of second language readers. Think-aloud protocol analysis was used to examine the strategies of seven participants. The participants were Korean students, studying English as a second language or engaged in postgraduate university study. The participants' ESL experience and language proficiency were considered in their relation to reading strategy usage. As well, the factors contributing to adequate reading comprehension, specifically, the types of processing strategies, and their interactions were investigated. It was found that readers employ a variety of processing strategies, not necessarily always leading to effective comprehension. Rather, the metacognitive ability to actively self-monitor comprehension to confirm or reject initial hypotheses of meaning at the word, sentence, or text level, and to take action to correct these hypotheses through alternative processing strategies, played an important role in facilitating second language readers' reading comprehension.

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Chapter One

Introduction

1. Background

Over the last few decades, considerable research in second language and foreign language (L2/FL)¹ reading has been conducted that has provided numerous insights for L2 reading theories and reading instruction. Specifically, attempts to address the needs of learners in L2 settings who pursue academic goals have led to the argument that greater emphasis needs to be placed on the importance of reading skills (Ostler, 1980; Carrell, 1988). This argument has resulted in the expansion of research interest in L2/FL reading processes.

The substantial improvements in L2 reading theories and practice may be attributed to multiple sources including the educational paradigm shifts from the grammar/translation method to more communicative language teaching. As educational paradigms have changed, the emphasis in L2/FL reading has evolved from text-driven, passive, decoding type processing to reader-driven, top-down² processing. In the traditional grammar/translation method, translating each individual word and sentence in the target language into a native language equivalent was the primary goal in reading classes (Brown, 1994). Audiolingualism was prominent next, with language programs

¹ Second Language: The target language learned in a community where the target language is spoken.
Foreign Language: The target language learned in learners' own country, but not spoken there.

² Terms like top-down or bottom-up are used as metaphors for the complex mental process of reading. *Top* refers to higher order mental concepts such as the reader's world knowledge, and *bottom* refers to printed letters on the page in text (Eskey & Grabe, 1988, p. 223).

all but ignoring the instruction of reading, while focusing mainly on oral fluency. In the audiolingual approach, reading was regarded as “speech written” down and “automatic, habit-induced responses to written texts” (Silberstein, 1987, pp. 28-30). In other words, written texts were usually associated with spoken language patterns. Because of the dissatisfaction with this approach to reading of both L2 learners and teachers, the focus shifted to a reader’s active role in constructing meaning from text with the goal of improving strategic, sociolinguistic and discourse competence (Scarcella & Oxford, 1992).

However, clearly the major source of improvement in L2/FL reading research has been the growing understanding of the theoretical foundations of first language (L1)³ reading models. As it was acknowledged that successful comprehension required more than a mechanical text-driven decoding of the target language, a great deal of second language research have accepted psycholinguistic models of L1 reading developed by Goodman (1967) and Smith (1971) and adapted this so called reader-driven, top-down processing approach to L2 reading. In this reader-driven model of reading, it is believed that readers bring their background knowledge to a text to make predictions, select the text and confirm their prediction with inferences from their background knowledge. This view of reading has led to the development of reader-driven, top-down models of L2/FL reading. This notion of using prior knowledge in L2/FL reading has significantly influenced L2/FL reading research.

In line with the findings of L1 reading studies on both types of information

³ First Language: Learners’ native language

processing, however, L2 reading studies have shown that over-reliance on a single processing mode, either text-driven processing or reader-driven processing, does not always lead to successful comprehension. Some L2 reading studies found that L2 readers may not effectively use reader-driven processing for reading comprehension processes because of exclusive use of text-driven processing (Carrell, 1983; Carrell & Wallace, 1983). On the other hand, other L2 studies provided evidence of L2 reader's over-reliance on reader-driven processing, which can also be a source of reading difficulties in L2 reading comprehension (Steffensen et al., 1979; Johnson, 1981).

Efficient readers simultaneously make use of both these types of processing (Carrell & Eisterhold, 1983). When these two processes interact with each other, successful reading comprehension can be facilitated. Based on interactive L1 reading models (Adams & Collins, 1979; Rumelhart, 1977; Stanovich, 1980), L2 interactive reading models include a critical role of higher-level processing abilities and a basic contribution of lower, text-driven processing to good reading (Grabe, 1988). Over-reliance on one processing in L2 reading studies can be explained in a Stanovich's (1980) interactive-compensatory L1 reading model, in which one type of processing is used to compensate for the weakness in the other type processes in reading.

Reading comprehension strategies, which the reader deliberately selects to effectively process information in a text, have received increasing focus in L2/FL reading research from the higher-level, reader-driven perspective on reading. Readers' prior knowledge helps them process information more automatically, so that their working memory can be used more for cognitive, conscious comprehension strategies when they

encounter comprehension difficulties (Afflerback, 1990). Research investigating readers' cognitive strategies that can be consciously reported shows that less proficient readers use fewer strategies and their use of strategies seems to be less efficient for reading comprehension (Pardon & Waxman, 1988). Conversely, good L2 readers utilize comprehension strategies more efficiently than poor L2 readers (Carrell, 1989b; Devine, 1987). However, recent reading studies reveal that a set of particular type strategies do not always guarantee L2/FL reader's successful comprehension in reading (Sarig, 1987; Anderson, 1991). Individual differences in reading abilities play a role in selecting and using strategies effectively. Additionally, the important role of comprehension monitoring using metacognitive abilities has recently been of interest for orchestrating a variety of reading strategies including two types of information processing, reader-driven or text-driven. Through self-monitoring, a reader can determine whether a particular type of strategy is appropriately used so that s/he can take strategic actions if any reading problems occur.

2. Rationale for Study

L1 reading strategies can be transferred to L2/FL reading processes, especially for adult L2/FL readers who are literate in their L1. However, some L2/FL researchers have argued that a limited L2/FL linguistic competence interferes with their ability to access the reading strategies that they have already developed in their L1 (Clarke, 1984; Alderson, 1984). Another notion that should be taken into account in successful strategy use is L2/FL readers' metacognitive abilities in determining the effectiveness of

the use of a type of strategy. Carrell (1989b) investigated the relationship between L2/FL subjects' metacognitive awareness of the types of strategies they use in reading and their reading comprehension results. However, relatively little research has been carried out to provide in-depth information about whether there are important differences in terms of the range of strategies used between L2 students exposed to ESL pedagogy emphasizing strategy use and those without any ESL pedagogy exposure, and whether there are any noteworthy differences in terms of the extent to which they adopt and actually use those newly learned strategies while reading academic, technical texts, considering their language proficiency level. Also, I am not aware of any studies providing on-line process information regarding how each type of processing strategy actually leads or misleads L2 reader's comprehension and what contributes to the appropriate use of each type of processing strategy in L2 readers' reading processes.

3. Research Questions

This research presents an exploratory study intended to address individual differences in the processing strategies used in L2/FL reading processes, considering levels of language proficiency and the amount of time exposed to ESL pedagogy. This involves four research questions. The first question addresses whether there are noteworthy differences in the range of reading strategy between L2 readers with intermediate level of English proficiency and those with highly advanced language proficiency. The second question considers the differences between the range of strategies used by students with ESL learning experiences, and those with only EFL

learning experiences. The third question asks whether L2 readers in general rely on one type of reading strategy, or utilize both types of strategies, reader-driven and text-driven, interactively. The last question asks if L2 readers use their metacognitive abilities during their reading comprehension process and what role they play.

Chapter One provides a review of the literature on L2/FL reading research, showing how it has evolved with the development of L1 reading research and how these issues have been dealt with in reading studies. In addition, recent issues in both L1 and L2/FL reading research, such as reading strategies and comprehension monitoring through metacognitive abilities are discussed. Chapter Two provides a brief review of L1 and L2/FL reading research methods; specifically, it explores some benefits of the think-aloud protocol analysis as a useful tool to gain on-line information on individuals' reading processes regarding these issues, as compared to other reading research methods. In the third chapter, the method, procedure and findings of this study are presented. The findings indicate that individual differences play a bigger role in L2 readers' use of processing strategies than their language proficiency and ESL learning experiences. In addition, it appears that comprehension monitoring links the different types of processing strategies, and leads to adequate reading comprehension by identifying reading problems, taking fix-up strategies and/or looking for further information to correct the problems. Pedagogical implications are offered in the fourth chapter based on the data of this study and findings from L2/FL reading studies.

Chapter Two

Review of Second Language Reading Research

Although educators may agree that reading skills are essential for both academic success and second language acquisition, views of reading vary widely depending on prevalent educational philosophies at a given time. In particular, a central issue in debates among first language (L1) and second/foreign (L2/FL) reading researchers has been whether more emphasis should be placed on either reader-driven or text-driven processing. Currently the interactive models of reading include both reader-driven and text-driven processing in order to explain the reader's simultaneous or interactive use of various levels of processing. It appears that the interactive models of L2 reading offer the most complete picture of the L2/FL reading process to date (Carrell, 1988).

As L1 and L2/FL reading processes share similarities in terms of the basic elements of reading, L1 reading models have provided numerous insights and theoretical foundations for L2 reading research. However, there are also differences between L1 readers and L2/FL readers in many aspects, and it is necessary to look at several factors influencing L2/FL readers' reading processes, such as cognitive development, purpose, linguistic competence, and cross-cultural orientation toward reading, in order to have a better understanding of L2/FL reading process.

A central component to the reading process in either L1 or L2/FL is a reader's

employment of her/his particular set of reading strategies. In some L2 reading studies, reading strategies of skilled L2/FL readers were identified in order to conceptualize the reading process of proficient L2/FL readers (Hosenfeld, 1977; Block, 1986; Anderson, 1991). As certain types of reading strategies do not always lead to successful reading, one strategy in particular, that of metacognitive awareness, has been posited as a necessary prerequisite to using reading strategies more effectively. Through monitoring and evaluating success of a particular strategy or particular processing, it is claimed, the reader can employ fix-up strategies for better understanding of a text (Cassanave, 1988).

In this chapter, I highlight the varying views of reading from the perspective of different language teaching methods, an important frame for assessing the practical importance of different theories of reading. I then discuss three different models of L1 reading and their influence on L2 reading research and reading models. Later, I discuss some recent issues in L2/FL reading research, such as reading strategies and metacognitive awareness, and their influence on L2/FL readers' use of strategic reading processing.

1. Overview of Emphasis in L2/FL Reading in Language Teaching Methods

The view of reading has changed from strictly text-driven processing to reader-driven processing in accordance with the paradigm shift in language teaching from the grammar/translation method to communicative language teaching. Changes in the main focus of reading have included moving the focus on either a text or a reader.

In the grammar/translation method, which was prevalent until the mid-

twentieth century and is still somewhat influential in teaching FL reading skills, the role of a reader was passive and less emphasized than the role of a text. There was little consideration for individual reader factors such as motivation, purpose of reading, differences in learning styles or cultural orientation. In most language learning situations where this method was used, readers were expected to memorize their native language equivalents for L2 vocabulary words and grammar rules without considering the context (Larson-Freeman, 1986, p 12). If the reader was able to translate from the target language to his/her native language, sentence by sentence, by applying his/her vocabulary and grammar knowledge, the most important goal for reading was considered to be achieved. The content of a text received little attention when reading under this approach (Brown, 1994, p. 53). As Brown has pointed out, since there was no solid theory or reading model underlying this method, it did not get much support from reading researchers.

During the 1950s and 1960s, under the influence of behaviorism and audiolingualism, reading was seen as a written mechanical decoding of speech (Bloomfield, 1942 cited in Silberstein, 1987). The main focus of L2/FL reading was to develop “automatic, habit-induced responses to written texts” (p. 30). Like the grammar/translation method, little attention was given to what the reader could bring to reading. Reading was not treated as an essential or active skill, and it was used as a vehicle to reinforce the spoken language patterns and provide a cultural context in which spoken language patterns could be practiced (p. 28). A weak emphasis on reading resulted in dissatisfaction with this approach among L2 advanced learners and L2 reading

researchers.

In a reaction to habit-forming views about reading, Krashen (1982) and Krashen & Terrell (1983) claimed that the importance of reading was to provide comprehensible input, argued to be vital for L2 acquisition. Specifically, comprehensible pleasure reading of personal interest was recommended to motivate L2 learners (p.164-165). In this Natural Approach, some individual factors of readers such as individual proficiency development and individual interests were taken into account in selecting reading materials in order to provide a meaningful, authentic learning environment (Krashen & Terrell, 1983).

With the advent of communicative language teaching, developed out of a dissatisfaction with the audiolingual and grammar/translation methods, other types of competence, such as strategic competence, sociolinguistic competence and discourse competence, have been added to grammatical competence as factors in improving language proficiency, including the development of effective reading skills (Scarcella & Oxford, 1992). This implies that understanding a text requires more than knowledge of grammar and vocabulary of the L2. The sociolinguistic dimension of the text including genre, register, topic and the author's purpose is considered. In addition, cohesive ties in a text should be used to develop the reader's discourse competence (p. 94). On the part of the reader, the importance of strategic competence was stressed to facilitate his/her comprehension. For example, if a particular strategy failed, other strategies needed to be used to compensate for that failure. This approach encompasses both differences in types of reader knowledge and differences in text types in reading.

As discussed above, the different approaches to language teaching have influenced views of L2/FL reading. With improvements in views of reading, the focus of L2/FL reading research has shifted from text to reader, and has more recently attempted to consider individual reader factors in reading. This evolution is mostly due to developments in L1 reading models, which have contributed significantly to the development and the focus shift in L2/FL reading theories.

2. Evolution of L1 Reading Models

In an attempt to conceptualize L2 reading processes, L2/FL reading researchers have looked at L1 reading models to gain insightful ideas about reading, as many of the basic issues in L1 reading models are similar to central issues in L2 reading models. Specifically, the models of L1 that have had the most dramatic influence on L2/FL reading evolved out of debates about text and reader factors that emerged in L1 research during the 1970's and 1980's. It is necessary to look at L1 models in order to have a better understanding of implications for further research questions in the field of L2/FL reading. Each of these L1 models has revealed different aspects of the reading process depending on its emphasis. For this reason, each model provides useful information about reading, yet the information is partial rather than complete. The focus among L1 models, and thus among L2/FL models as well, has evolved from the emphasis on either text-driven processing, reader-driven processing, or the interaction of both.

Text-driven Models of Reading

The text-driven reading models stress the importance of processing incoming

data from the text in reading; the reader's analysis and identification of small chunks of text occur before getting meanings from text (Barnett, 1989). Similarly, Gough's (1972) model, developed from eye fixation research, demonstrated how a reader arrived at meanings from the first sight of printed words. Gough argued that fluent readers identify letters quickly and automatically, then through a mental dictionary stored in the brain, the meaning is achieved from automatic identification of letters and words in a text.

Additionally, LaBerge and Samuels (1974) claimed that the reader's attention seemed to be on one thing at a time until many things could be processed automatically without paying precise attention to each letter. Fluent readers automatically process information from visual perception to attaining meaning.

These bottom-up reading models emphasize the role of automatic identification of letters and words in a text in addition to the importance of attention to the automatic decoding process in reading. In these models, the sequence of processing proceeds from the incoming printed stimuli to higher-stages of processing such as utilizing semantic knowledge through a series of discrete stages. Although these are important aspects of information processing in reading, the recognition that reading comprehension cannot be fully explained with these models led to the development of top-down, reader-driven models.

Reader-driven Models of Reading

The top-down models emphasize the reader's background knowledge brought to the reading process so that s/he can make predictions in the text. Goodman's (1967) psycholinguistic model of reading sparked researchers' emphasis on top-down (reader-

driven) approaches to reading. Goodman viewed reading as “a psycholinguistic guessing game” emphasizing an interaction between reader and written language so that the reader reconstructs the message from the writer (Goodman, 1967, p. 108). In this reading model, readers bring their knowledge to construct meaning from a text rather than passively identifying words in a text. Reading is a selective process, according to Goodman, and good readers sample the text to confirm or correct their predictions conceived from their background knowledge.

Smith (1978) elaborated on this model and claimed, “reading is asking questions of printed text, and reading with comprehension becomes a matter of getting your questions answered” (p. 105). According to Smith, a reader becomes active to find an answer in printed or written text. Both Goodman and Smith highlight the central role of knowledge driven by the reader in reading processes. These top-down models have had a huge impact on reading research development in terms of involving the reader as an active participant in the reading process.

Interactive Models of Reading

Interactive reading models include lower-level, text-driven processing in addition to the impact of higher level processing skills on lower level skills (Samuels & Kamil, 1988). For example, unlike other bottom-up models in which information is passed in only one direction from a lower stage to a higher stage, Rumelhart’s (1977) model indicated that higher semantic level knowledge may also influence lower letter-level processing or that they can interact with each other. For example, a pair of semantically related words, such as *bread-butter* or *doctor-nurse*, are more quickly

perceived than those are semantically unrelated, as in *bread-doctor* and *butter-nurse*. The distinctive feature of this model is that a reader simultaneously uses several knowledge sources depending on text content and available information sources in a text.

Stanovich (1980) developed another interactive model, which stressed the interactive-compensatory processing in reading. The Stanovich model integrates concepts from a variety of knowledge sources. According to this model, reading involves a process that can compensate for deficiencies at any other levels in a reader's ability (p. 36). For example, if a reader is poor at word recognition but has knowledge of the topic, top-down processing may compensate for this low-level deficiency so that the reader may decipher unknown words. On the other hand, a reader who is skilled at word recognition but knows little about the topic of a text may attempt to rely on bottom-up processes. Stanovich's model states that "a deficit in any knowledge results in a heavier reliance on other knowledge sources, regardless of their level in the processing hierarchy" (p. 63). Thus, interactions among various sources occur in the reading process for better understanding of the text.

Although these three L1 reading models have revealed important aspects of reading processes, these models can not be directly applied to L2/FL reading processes due to the differences between L1 and L2/FL reading. As a reader plays a central role in reading, it is necessary to consider some characteristics of L2/FL readers and how these characteristics may influence L2/FL reading. The following section discusses factors that should be taken into account in L2/FL reading research.

3. Characteristics of L2/FL Readers

There are several major differences between L1 readers and L2/FL readers, which make L2/FL reading more complicated than L1 reading. For example, most L2/FL readers begin their L2/FL reading with different cognitive abilities from L1 readers'; for example some begin studying an L2/FL when they are teenagers. Their cognitive abilities enable them to make logical inferences from the text based on their prior knowledge. Unlike L1 readers who begin L1 reading when they are very young, L2/FL readers can bring their world knowledge, learning styles, or reading strategies that they have already developed from reading in their native language.

One valuable cognitive ability that L2/FL readers can bring to L2/FL reading is their L1 reading skills if they are literate in their L1. Royer & Carlo (1991) demonstrated in their study that L1 reading skills can transfer to L2 reading. Lambert (1975, cited in Alderson 1984) also argued that once learners attain the ability to read in their L1, this ability transfers to their L2 so that they do not need to relearn all reading strategies (Lambert 1975). When they encounter problems understanding some phrases, they can use their well-developed cognitive resources to fill the comprehension gap. Additionally, because of this cognitive development, older and more advanced students may be able to monitor their L2 reading strategies and use their L1 reading strategies. Through monitoring, they may be able to see whether a particular strategy is efficient or not in comprehending a text in their L2 (Cassanave, 1988).

Another important factor influencing L2/FL readers in reading is their L2/FL language proficiency. Linguistic knowledge of L2 which L2 learners use when they begin

to read is different from a knowledge base of L1 beginner readers (Grabe, 1991). L1 readers often begin reading with knowledge of 5,000 to 7,000 words and intuitive knowledge about the basic syntactic structures of their native language (Singer, 1981), while L2 beginner readers do not have similar intuitive linguistic senses when they begin the L2 reading process.

In L2 reading research, Clarke (1984) argued that limited language proficiency may prohibit L2 learners from accessing their well-developed L1 reading strategies. In addition, Alderson (1984) claimed that reading ability in a second language (L2) largely depends on L2 proficiency; in order to transfer L1 reading skills to L2, “a threshold level of linguistic competence” is required (p. 18). Cziko (1978) supported the argument that a minimal level of linguistic competence is required in order to transfer L1 reading skills to L2. Cziko’s reading study showed that advanced readers were able to use both graphic and contextual cues in addition to general nontextual knowledge, while less proficient readers seemed to rely on lower-level skills, text-driven skills for processing information in a text. Devine’s (1987) findings correspond with those of Cziko. As the language competence of L2 readers increased, readers showed more syntactic and semantic acceptability in their oral reading miscues. Also, an increase in general language competence was positively related to an increase in reading ability. These studies support the idea that L2 proficiency is a strong influence on L2 reading.

Lack of confidence in a reader’s L2/FL proficiency seems to be another source of reading difficulty. Because L2 readers differ from L1 readers who begin formal reading instruction in schools with their intuitive syntactic knowledge and 5,000 to 7,000

vocabulary knowledge (Singer, 1981), and because reading is often considered as a vehicle of learning a language, especially in a FL context, they are led to feel that they need to know every new word to comprehend a text (Eskey, 1988). Subsequently, they often tend to read slowly, using a dictionary to understand any unfamiliar word. This lack of confidence may impede L2/FL readers' efficiency in processing information and accessing their L1 reading strategies.

The cultural orientation of L2/FL readers also plays a role in their interaction with text. Cultural orientation includes different perceptions on both discourse level knowledge and cultural-specific knowledge. Carrell (1984c) showed that L2 students' different cultural orientation pertaining to the perceived logical organization of the text seemed to affect comprehension of texts. In Johnson's (1981) study, L2 students' cultural background information had a greater impact on reading comprehension than syntactic or semantic complexity.

In addition, as Aebersold & Field (1997) suggested, cultural orientation includes readers' attitudes toward a text and their purpose for reading, and beliefs about the reading process (p. 24). Different expectations about reading and the use of texts in different social contexts may result in problems in academic reading comprehension (Grabe, 1991). For instance, students from different academic contexts, for example those who are used to memorizing factual knowledge from a text and who assume printed texts to represent truth, may have difficulty if they are expected to do critical reading in North American academic contexts because they are not familiar with reading for this type of purpose. These culturally developed attitudes in turn affect a L2/FL

reader's purpose for readings which they will be conscious of while reading.

Lastly, L2/FL readers often have different purposes for L2/FL reading. In FL situations especially, reading is often used as a means for learning a language or learning to read, rather than for authentic reasons that L1 readers have. L1 readers may read to learn facts or gain ideas from authors in real life situations such as reading newspapers or studying various subjects at school. Pleasure or entertainment can be another reason for them to read. These reasons are so called authentic reading, since reading is carried out in readers' daily lives to receive the message that a writer has tried to convey, rather than for learning a language (Nuttall, 1982, p. 3). L2 learners focus on word-by-word reading, for example, may be partially because they read to learn words. Thus the purpose for reading is another factor that influences L2/FL reading.

4. Evolution of L2/FL Reading Models

4.1 Text-driven (Bottom-up) L2/FL Reading Models

As discussed in section one, when L2/FL reading was under the influence of the grammar/translation method, its main focus was on improving L2/FL readers' syntactic and lexical knowledge. Text-driven, decoding processing was the main emphasis in L2/FL reading, as decoding written symbols and identifying text syntax were considered to be main processing in L2/FL reading. Text-driven models argue that the reader understands the author's intended meaning by recognizing words as meaningful units (Plaister, 1968).

A focus on the L2 reader's ability to automatically recognize words has led L2

reading research to emphasize the importance of syntactic knowledge as well as vocabulary knowledge in reading, because syntactic knowledge serves as a base from which to draw meanings of words (Berman, 1984; Carrell, 1989a; Eskey, 1988; Swaffar, 1988). Barnett's (1986) study demonstrated that both syntactic and vocabulary proficiency affect FL reading comprehension. But FL readers who lacked an adequate syntactic knowledge were less efficient in accurately using the vocabulary-building or inferencing skills than those who had more adequate syntactic knowledge (p. 346). Therefore, Barnett concluded that a continued attention to both grammar and vocabulary is needed to improve FL readers' reading skills.

For other researchers, syntactic factors play a bigger role in L2/FL reading than lexical factors. Berman's (1984) study investigating syntactic components of the FL reading process concluded that reading difficulties were caused by syntactic factors of a text rather than lexical or conceptual factors. Students who read a syntactically simplified text had less reading difficulties than those who read a similar, but unsimplified text. Also, L2/FL readers' native language structures influence their reading of L2/FL texts. L2/FL readers tend to perceive the target language structure from the point of their own language structures (Cowan, 1976). However, some research findings are contradictory. Ulijn's (1980) study showed that syntactic differences between Dutch and French languages interfered with their comprehension in the other FL only when they had difficulty understanding the conceptual content of the text. In this study, FL readers' conceptual analyses seemed to precede syntactic analysis. In contrast, Cziko (1978) argued that among syntactic, semantic and discourse constraints the development of a

sensitivity to syntactic constraints precedes the development of a sensitivity to semantic or discourse constraints in text (p. 486).

The complexity of text syntax often varies depending on the types of text. For instance, syntax found in academic textbooks and newspaper articles tends to be more complex than that of personal notes and short stories. In academic texts and articles, information is expressed with more complicated clauses and longer sentences, while personal notes use much simpler sentences. As well, texts describing processes are often written in passive sentences. In these sentences, it is important to note that they look superficially distinct from other sentences in terms of surface structure, but they imply the same idea in their underlying structure (See Yule, 1985). Therefore, the complexity of a syntactic factor is interwoven with the types of text.

From these examples, we can see that there is some overlap between text factors and reader factors. For example, rhetorical structure is an important text variable which connects text-based and reader-processing. The term 'rhetorical structures' refers to how information is organized in texts (Aebersold & Field, 1997, p. 11-12). Based on rhetorical structures, types of texts may be classified as (e.g.) description, classification, comparison, cause and effect, process, argument, and persuasion. For example, a newspaper article can be referred to as a description type of text, one that reports who did what, where, when, and how. In this type of text, the title of the article gives a general idea to attract readers' attention, and the main idea is given at the beginning, and specific details are given later. Another example is an academic article in a journal, which is often an argument type of text. An author's claim is illustrated and then followed by

supporting details. Different rhetorical text structures imply an interaction between syntax and reader expectations.

Textual cohesion is also an important linguistic feature that plays a role in connecting text-based to reader expectations. 'Cohesion' refers to "the way the ideas and meanings in a text are related to each other" (Aebersold & Field, 1997, p. 13). L2/FL readers need to be aware of the use of cohesive ties in order to grasp the flow of ideas interwoven in a text. Cohesive ties can be, according to Halliday and Hasan (1976, cited in Jonz, 1987, pp. 413-414) either grammatical or lexical. Grammatically expressed cohesion involves using ellipsis, substitution, or conjunction, while ideas can be expressed through lexical cohesion using same, similar or inclusive words. Jonz's (1987) study demonstrated that L2 students had more difficulty than L1 students with a passage in which redundant cohesive ties had been eliminated. When L2 students were provided with a passage with textual cohesion, they used cohesive ties to comprehend the text more than L1 students. It seems that the existence of textual cohesion affects L2/FL readers' construction of the text's meaning.

Text-driven models of L2/FL reading initially suggested that readers build textual meaning from the lower-level processing, but some more recent research showed contradictory or ambiguous results. Hudson (1982) and Johnson (1982) found that L2 students exposed to unfamiliar words before reading those words in a text did not improve their reading comprehension. These studies may imply that reliance only on lower level processing does not always lead to good reading comprehension. The reader's knowledge about a topic, as top-down models of reading claim, seems to be a

crucial part of understanding a text.

4.2 Reader-driven (Top-down) Models

Following the trend in L1 reading research, L2/FL reading focus shifted to the importance of the reader's background knowledge. Higher level processing such as activating background knowledge and making predictions in reading became critical notions in L2/FL reading research. As Goodman's (1967) top-down view of L1 reading has led to the emphasis of the role of readers' background knowledge in reading comprehension, this emphasis on the active role of the reader has strongly affected L2/FL reading research. Subsequently, text-based meaning processing in reading began to fall out of favor with L2 reading researchers.

Coady (1979) tried to incorporate Goodman's model in emphasizing the role of background knowledge in L2/FL reading, and suggested a model in which the L2/FL reader's background knowledge interacts with their intellectual resources and general language processing skills in order to comprehend a text (p. 7). Coady also suggested that background knowledge may compensate for L2/FL readers' lack of syntactic knowledge. Based on this perspective on reading, Clarke and Silberstein (1977) developed implications for L2 language reading. They considered reading to be an active process, and argued further that the reader constructs expectations about the text and then confirms or rejects them based on what s/he brings to reading:

The reader brings to the task a formidable amount of information and ideas, attitudes and beliefs. This knowledge, coupled with the ability to make linguistic predictions, determines the expectations the reader will develop as he reads (p. 137).

Carrell and Eisterhold (1983) have adapted this top-down view of reading in L2/FL

reading theory by emphasizing the role of readers' appropriate background knowledge or schema in comprehending a text:

The basic point is that much of the meaning understood from a text is really not actually in the text, per se, but in the reader, in the background or schematic knowledge of the reader. What is understood from a text is a function of the particular schema that is activated at the time of processing (i.e., reading) the text (p. 79).

As reading is seen as an interaction between reader and text, L2/FL readers bring and retrieve various types of prior knowledge and experiences to facilitate reading comprehension. This structural background knowledge is called a schema (Carrell, 1987). The recognition of the importance of a reader's schemata has led L2 researchers to identify several types of schemata: content, formal, and linguistic schemata.

According to Carrell (1987), one's 'formal schema' refers to background knowledge of the organizational forms and rhetorical structures of different types of written texts (p. 560). It is important to activate formal schemata when reading because it affects the reader's decision to use certain types of strategies depending on one's knowledge of the various types of texts. For example, a reader approaches an article in a newspaper differently from a novel since s/he knows that each is structured differently from the other. The formal schema that a reader brings consists of discourse level knowledge about rhetorical structures and level of formality.

Another type of schema that is activated is 'content schemata', or background knowledge of the content area of a text (p.560). It includes knowledge about different topics such as the economy of Asian countries, wedding customs in India, or Halloween customs in North America. The reader's knowledge about the topic can facilitate reading comprehension and can compensate for relatively weak vocabulary knowledge.

Johnson (1982) showed that L2 readers recalled a text on a familiar topic better than a similar text on an unfamiliar topic.

From research that explored the relationships between these schemata, Carrell reported that subjects who read a text with familiar content and familiar rhetorical forms understood the text better than those who read unfamiliar text. In addition, the content schemata affected reading comprehension more positively than formal schemata in mixed conditions (familiar content, unfamiliar form; unfamiliar content, familiar form). Although further studies are needed to generalize the results of this study, it provided empirical evidence of the importance of content schemata over formal schemata.

Other research has also shown the positive effects of content schemata on ESL reading comprehension. Johnson (1981) demonstrated that the cultural origin of a story had more a positive effect on the comprehension of the ESL students than did the level of rhetorical complexity. Through use of different types of schema, the reader seems to be better able to interact with text. These L2 reader-based reading theories have provided theoretical foundations for L2/FL pedagogy to put more focus on pre-reading activities and comprehension strategy training (Carrell, 1985; Floyd & Carrell, 1987).

4.3 Interactive Models

Top-down models of reading brought insights into L2/FL reading research and pedagogy by acknowledging the reader's active role in reading through making predictions as s/he proceeds through the text. However, overemphasis on top-down, reader-driven processing has led to the reconsideration of text-driven processing since L2/FL reading comprehension also depends on text variables. Some researchers, such

as Eskey (1988) and Segalowitz (1991), argued that the importance of automatic, text-driven processing in L2 reading should be reconsidered, especially for low-level L2/FL readers. As less proficient L2 readers are often preoccupied with so many unfamiliar words in a text, they are not able to rapidly sample the text and make predictions, which are important in reader-based, top-down models. According to Eskey (1988), when readers can identify words both rapidly and accurately, this “automaticity frees up the minds of fluent readers of a language to think about and interpret what they are reading”(p. 94). It seems that less proficient L2 readers need skillful decoding capabilities, so that they can develop other higher level skills to relate the information obtained from a text to their prior knowledge in order to understand the text better. According to bottom-up models of reading, reading problems often arise when the L2/FL reader does not rapidly and accurately recognize the words in a text. Without accurate interpretation of a word, use of higher level skills does not always compensate for text-driven processing deficiencies.

However, knowing a single meaning of a word is not always helpful because one word may carry a variety of meanings depending on a context. Thus, the reader needs to know not just a single meaning of a word form, but also its various potential meanings in different texts (Goulden, Nation, & Read, 1990; Aebbersold & Field, 1997). For instance, in these two sentences ‘The baby kicked the ball.’ and ‘The soccer player kicked the ball.’ (adapted from Anderson & Shiffrin, 1980, p. 331), the meaning of the noun ‘ball’ varies depending on the sentences in which it is used. Also, the verb ‘kick’ can convey different concepts based on who is doing the action. The action of the baby

cannot be the same as the action of the soccer player. If one single dictionary meaning of a word is given to the word without considering the context in which it is used, readers may misunderstand texts. In this kind of reading situation, the reader should be able to use contextual information to figure out the exact meaning that the writer expressed.

Heavy reliance on one type of knowledge or one level of processing may not ensure success in L2/FL reading comprehension. Bernhardt (1986) argued that successful reading comprehension depends on reader's skills rather than text features. In other words, in order to read proficiently, readers should be able to make appropriate decisions from the beginning of a passage, select important parts of a text for successful comprehension, and process them effectively (p. 27). Similarly, in Allen et al.'s (1988) study of American high school foreign language learners, complex interactions between the reader and the text occurred, but the text alone did not have any positive effect.

Clearly reading is such a cognitively complex process that an emphasis on only higher levels or only lower levels in reading can not fully explain what occurs in various reading situations. Considering different stages of L2/FL acquisition, various expectations for L2/FL reading and differences between L1 and L2/FL reading, interactive models may provide a better understanding of each stage and the different factors involved. For instance, within the framework of interactive models, it appears that the differences between L1 and L2/FL reading play a bigger role at earlier stages of L2/FL acquisition than at more advanced stages (Eskey & Grabe, 1988, p. 226).

Additionally, an interactive model can include the relatively important role of grammatical knowledge, which is often ignored in theoretical top-down models. Cohen

et al. (1980) identified three problem areas in FL readers' reading comprehension; one at the lexical level in which students tend to assign one single meaning to a word so that this reading habit often results in the misinterpretation of the word in a different text; a second problem area arose at the lexical-syntactical level when students are faced with a complex noun phrase. In the second problem area, subjects experienced difficulty understanding the sequence of a sentence and the cause and result of the sentence because of the complexity of the noun phrase. The third reading problem area occurs when the students cannot make full use of lexical cohesion markers which show logical relationships between parts of the text. This study showed that successful FL reading comprehension requires that the reader possess complex cognitive skills.

Those researchers proposing top-down models may argue that less successful readers do not sufficiently use the context, but research has shown that those readers spend much more time guessing from the context because of their lack of automatic decoding skills (Stanovich, 1980). However, over-reliance on guessing without accurate vocabulary knowledge may actually interfere with text comprehension. Thus, Eskey & Grabe (1988) placed an importance on developing both top-down and bottom-up skills and strategies, so that both can contribute directly to the successful comprehension of text in L2 reading (p. 227).

According to these interactive approaches, the reader should be able to use both bottom-up and top-down processes simultaneously or separately depending on the type of text, their background knowledge, language proficiency level, motivation, strategy use, and cultural influence on beliefs about the reading. In order to have an adequate

understanding, the reader should not only select an appropriate processing, but also effectively use other reading strategies to fill comprehension gaps during reading depending on her/his purpose for reading, a text type, or a reading task.

5. Recent Issues in L2/FL Reading Research

One of the recent issues in reading research into reading processes is that of reading strategies. Specifically, research has begun to focus on types of reading strategies that readers use to effectively manage their interactions with written text and how these strategies are related to reading comprehension. Although reading strategies are widely perceived as essential for proficient reading, there are variations in terms of the definition of reading strategy among researchers. One controversial issue with definitions of reading strategies lies in intentionality and consciousness, as reading processes involve unconscious and conscious reading behaviors. Paris et al.'s (1991) distinction between skills and strategies in L1 reading is useful to see how the issue of intentionality and consciousness is related to those skills and strategies in reading. Information-processing techniques that are automatic and unconsciously applicable to a text are referred, by these authors, to skills. In contrast, strategies are:

actions selected deliberately to achieve particular goals. An emerging skill can become a strategy when it is used intentionally. Likewise, a strategy can go underground and become a skill. Indeed, strategies are more efficient and developmentally advanced when they become generated and applied automatically as skills. Thus, strategies are "skills under considerations." Because they are conscious and deliberate, strategies are open to inspection; they can be evaluated for their utility, effort, and appropriateness privately and publicly (p. 610-611).

In this paper, the term 'strategies' is used to refer to deliberate actions used by a reader to

attain a specific goal for reading and therefore available for introspection or conscious report rather than unconscious cognitive behaviors. These are distinguished from unconscious reading processes which are applied to a text without the reader's conscious awareness. The types of conscious reading strategies focused on in this paper are explained in the following paragraphs which describe the diverse research on reading strategies.

In L2 reading studies focusing on reading strategies, there is a general consensus that strategies refer to conscious reading behaviors. However, there is a great deal of variation in how the concept of strategies is articulated and operationalized. Anderson (1991) defined strategies as "deliberate, cognitive steps that readers can take to assist in acquiring, storing, and retrieving new information" (p. 460). According to Barnett (1989), reading strategies refer to the problem-solving techniques readers employ to get meaning from a text (p. 36). Block (1986) included how readers conceive a reading task, what textual cues they attend to, how they get meaning from what they read, and what they do while reading (p. 465). In Carrell's (1991a) definition, reading strategies are "actions that readers select and control to achieve desired objectives or goals" (p. 167), in which the reader's active participation and performance is emphasized.

Reading strategies include a wide range of cognitive mental activities which include skimming a text to get the general idea, scanning a text for a specific piece of information, making contextual guesses about the meanings of unknown words, skipping unknown words during reading, tolerating ambiguity of unknown words, making predictions, confirming or disconfirming inferences, identifying the main idea, rereading,

and using cognates to comprehend (Carrell, 1998, p. 7). In addition, text-processing strategies such as activating prior background knowledge and recognizing text structure have also been recently added to the list of important strategic behaviors. Some researchers, such as Carrell (1989b), grouped these strategies as 'local', bottom-up, decoding types of reading strategies and 'global', top-down types of reading strategies, paralleling the 'text-driven processing' and 'reader-driven processing' distinction described earlier. Local strategies are those related to sound-letter correspondence, word meanings, sentence syntax, and text details. Global strategies are those having to do with text-gist, background knowledge and textual organization. This distinction is parallel to the text-driven and reader-driven types of information processing in the reading process.

Strategic reading is a central characteristic of skilled readers. Although reading strategy usage may vary depending on the individual, both L1 and L2 researchers have attempted to identify common features of the reading strategies which successful readers employ. L1 research has shown that younger and less proficient readers use fewer strategies, and that they use strategies less effectively than good readers do (Garner, 1987). Specifically, poor readers do not skim, scan, reread, integrate information, plan ahead, take notes, or make inferences as often as more skilled readers (Sullivan, 1978). Similar findings were reported in second language research using the think-aloud method with small numbers of individual readers. Early studies using the think-aloud method tried to identify certain types of strategies that successful readers used. In Hosenfeld's study (1977), successful readers (1) kept the meaning of the passage in mind during

reading, (2) read in broad phrases, (3) skipped words viewed as unimportant to total phrase meaning, and (4) had a positive concept of themselves as a reader (p. 120). Hosenfeld's study provided evidence that successful L2 readers use strategies more effectively than less successful readers do. Hosenfeld suggested that poor readers could improve their less efficient strategies by adopting the strategies that successful readers use. Block's (1986) study also identified characteristics of strategies employed by non-proficient readers.

Several other case studies have investigated similar relationships between various strategies and successful L2/FL reading (Hauptman, 1979; Knight, Pardron, and Waxman, 1985; Sarig, 1987). These studies also showed that successful readers used strategies more efficiently than less successful readers, yet there was little evidence to prove that use of particular strategies always led to successful reading comprehension. Specifically, Anderson's (1991) study concluded that there were no direct correlations between particular strategies and successful or unsuccessful reading comprehension. Individual differences in the use of the same strategy led to both successful comprehension and inadequate comprehension. Rather than a particular set of strategies contributing to successful reading comprehension, how readers used reading strategies was related to successful comprehension. However, those who used more varied strategies tended to have higher scores on the comprehension measures of the study.

Carrell's (1998b) study supported the findings of Anderson's study by claiming that the resulting variation that individuals achieved from either effective or ineffective use of the same strategy could be attributed to metacognitive awareness. In

order to use various sources of knowledge strategically, readers need to be able to be metacognitively aware what they do in reading as they strive to make sense of incoming information from a text. If readers are able to monitor whether their comprehension is consistent with other information in the text as they proceed through the text, using their metacognitive awareness, they can be flexible in using strategies to fill comprehension gaps resulted from deficiencies at other levels of knowledge.

Metacognitive awareness refers to “thinking about thinking” (Carrell, 1998b, p. 9). Specifically in reading, readers need to be consciously aware of what they think and do in order to monitor their comprehension. The importance of metacognition is evident in the tactics readers use to monitor comprehension. Flavell (1976) said “metacognition is crucial for active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive data on which learners bear to achieve some concrete goals” (p. 232). Flavell (1978) defined metacognition as “knowledge that takes as its object or regulates any aspect of cognitive behavior” (p.218). Flavell (1978) also identified two aspects of metacognitive ability: knowledge and regulation of cognition (p. 219). In other words, the reader needs to know about her/his knowledge resources and then needs to be able to control the various resources for better understanding of a text. Paris et al. (1983) added three components to knowledge about cognition; 1) declarative knowledge referring to “knowing what”, 2) procedural knowledge meaning “knowing how”, and 3) conditional knowledge referring to “knowing why” (p. 294). For example, a reader may know what scanning is, and how to scan a passage, but, s/he also needs to know the value of a particular strategy to

monitor whether the strategy is appropriate or not and if it is working effectively or not in a particular reading situation. Thus activating metacognitive abilities, including a variety of activities of planning, monitoring, testing, revising, and evaluating the strategies employed during reading, is essential for competent reading (Baker and Brown, 1984. P. 393). Baker and Brown said that "any attempt to comprehend must involve comprehension monitoring" (p. 344). Wagnor (1983) describes comprehension monitoring as "an executive function, essential for competent reading, which directs the reader's cognitive process as s/he strives to make sense of the incoming information (p. 344).

The role of comprehension monitoring in reading comprehension has recently been highlighted in reading research, as the misconception that less proficient readers often have of their understanding was found to lead to less proficient reading in L1 reading studies. For example, in Paris and Myers' (1981) study, students who were asked to underline those items in the text that did not make sense actually detected less than half of the their comprehension errors. Poor readers were able to detect as many cases that were inconsistent with other information in the text as good readers only when the passages were simplified. Garner and Kraus (1982) also found that poor readers had difficulties identifying inconsistencies in text.

In the field of L2/FL reading research, relatively few studies have been carried out. Indeed, Cassanave (1988) has called comprehension monitoring "a neglected essential" in L2 reading research. Cassanave cited the L2/FL reader's ability to monitor comprehension as a strong factor influencing reading comprehension. She argued that

successful reading comprehension depends on the reader's ability not only to use different types of knowledge, but also to monitor what they understand and to take appropriate strategic action to repair misused strategies. According to Cassanave, comprehension monitoring behaviors include the ability to evaluate one's current level of understanding, to plan how to remedy a comprehension problem, and to regulate strategies (p. 288). In order to compare the monitoring process between L1 and L2 readers, Block's (1992) study was carried out, using the think-aloud protocol analysis. Comprehension monitoring processes were discussed in terms of two specific problems including vocabulary and search for a referent. This study revealed that both L1 and L2 readers seemed to share the similar comprehension-monitoring process that operates in three phases: (1) the evaluation phases during which readers recognize problems and identify the problem sources, (2) the action phases during which readers make strategic plans and action/solution attempts, (3) and the checking phases during which readers check and revise (p. 335). As L2 readers already had had strategic cognitive resources, language-based problems did not interfere with using their resources to use fix-up strategies. Thus, differences in subjects' monitoring processes were related more to their reading proficiency than their language background. The less proficient L1 and L2 readers were less aware of problems and lacked the ability to take strategic actions when the problems were detected. Block concluded that the adequate ability to self-monitor comprehension and regulate strategies can help compensate for the less automatic and slower reading process of L2 readers (p. 336). As seen in this study, comprehension monitoring seems to be a valuable resource which L2/FL readers can draw on for

effective reading. Yet, little is known about the role of comprehension monitoring in L2/FL reading process.

Chapter Three

Reading Research Methodology

As L1 reading models have evolved to include a broad array of interactive processes including lower-level, word-recognition processes to higher level, reasoning and monitoring processes, L2/FL reading researchers look in that direction for insights and possible approaches for L2/FL reading models. However, once we consider the differences between L1 and L2/FL readers, L1 reading theories cannot be directly applied to L2/FL reading situations. Thus, L2/FL reading research has evolved out of a necessity to test and modify the current L1 and L2/FL reading theories in an attempt to address the diverse needs of L2/FL readers. L2/FL reading researchers examining the L2/FL reading processes have attempted to apply to their studies the multiple research tools used in L1 reading research.

As the focus in L1 reading research has shifted from the product of reading to the process of reading, research methods as diverse as experimental design, miscue analysis, and the think-aloud protocol analysis have recently been used in the field of L1 reading research. Those methods have also been utilized in L2/FL process-oriented reading research to provide on-line information about the reading processes. L1 and L2/FL reading methodologies have similar features in the evolution of the focus of their research. For example, on-line processing information and individual differences have been of increasing interests in reading research. In using these methods, it is important

to note that each method may reveal some aspects of the reading process, but each research method also has certain limitations that must be taken into account when assessing the results of the studies.

The strengths and limitations of the different research methods should be considered when choosing the best method for pursuing certain types of research questions. Experimental designs are appropriate in reading research for investigating causal relationships among variables of interest. Miscue analysis and cloze procedure is beneficial when identifying general patterns of reading strategies used in reading processes. Among the methods used in L2/FL reading research, the think-aloud protocol is highly relevant to my research questions because it provides direct data regarding mental activities of how a reader has arrives at an understanding of the text. Also, the method is useful to investigate interactive processing and individual differences in strategy use during L2/FL reading.

In this chapter, I highlight the three main types of research methods that have been most prevalent in L1 reading research. They are experimental design, miscue analysis, and the think aloud protocol analysis. In each of these, I will describe how they are carried out and give some examples of L1 and L2/FL studies which have been done and the results of these studies. In the following section, I discuss the use of these reading research methods in L2/FL reading research. I end the chapter with a discussion of the reasons for using think-aloud protocol analysis for my exploratory study.

1. L1 Reading Research Methods

Kieras and Just (1984) pointed out these evolving trends in L1 reading research. L1 reading research focuses more on the comprehending processes that are occurring during reading, rather than the product of reading which remains after reading (p. xiii). Thus, on-line measures reflecting the ongoing processes, such as eye-fixation and reading times, have been more popular than conventional measures of reading memory performance such as recall. Additionally, reading researchers currently try to investigate the multiple components of the processes of reading comprehension, and their interaction in individuals (p. xiv). Finally, individual differences in reading skills in terms of information processing that underlies reading have recently attracted the attention of reading researchers. L2 reading research also shares these trends.

In an attempt to reflect these trends in research, a variety of methods have been used to provide some insights into certain aspects of the processes of reading comprehension and individual differences. Recently, prevalent L1 reading research methods influencing L2/FL reading research methods are experimental design, miscue analysis and the think-aloud design.

1.1 Experimental Design

Among experimental designs used to conceptualize the process of reading, eye-movements have been favored in reading research focusing on the allocation of cognitive attention. As most eye-movement experiments measure the length of time the eye stops per fixation and reading speed time that a reader's attention is given to letters, syllables, words or sentences (Bernhardt, 1987), these experiments explore the reading processes

from the perspective of text-driven processing. Based on the data collected from observable reading behavior processing incoming text-features, cognitive processes and cognitive strategies are inferred. In the following section, eye-movement research is explained and its specific methods such as eye-fixation, rapid serial visual presentation and reading time are offered. On the other hand, experimental designs which focus on reader-driven processing have involved classroom-based studies to investigate instruction effects on readers' use of background knowledge. Some examples of classroom-based studies are illustrated later.

Among experimental designs using on-line measures to investigate the comprehending processes, the eye-movement method has been used as a research tool to capture observable reading behavior that can be quantified and analyzed. An analysis of data collected during reading is used to characterize underlying reading processes. Specifically, data of subjects' eye-fixation are collected to examine on which words the eye fixes, how long the eye fixes on these words, and on which words does the eye refixate (Just & Carpenter, 1984, p. 151).

Eye-movement research has shown that reading is a very precise and rapid skill (Adams, 1990; Carpenter & Just, 1986), and that the recognition of words precedes the use of higher-level context information in order to influence lexical access (Just & Carpenter, 1987; Stanovich, 1980). The critical contribution of eye movement research to reading models is empirical evidence on the importance of lower-level, automatic word recognizing processing, which is taken into account in interactive L1 reading models. Rapid word recognition skills allow the reader's cognitive working memory

capacity, a short-term memory that includes both storage and processing functions, to be used for processing larger text units (Stanovich, 1980).

Zola's (1982) experiment analyzed subjects' eye-fixation data to examine the effects of semantic context on word perception. The study demonstrated that contextual and redundancy patterns did not significantly influence eye movement. The eye-fixation method has recently tended to be used to explore how individual differences in reading abilities interact with the text to determine how a reader recovers from a misinterpretation (Daneman & Carpenter, 1980).

For eye-movement experiments, rapid serial visual presentation (RSVP) is used as a research tool. In RSVP, each word or small group of words serially appears in the same location; reading processing is assessed by varying the rate of reading and studying the results (Potter, 1984, p. 91). Among independent variables of individual subjects, age, reading proficiency, and reading style may play a role in reading processes. Potter (1984) suggested using RSVP as a tool to test hypotheses about sentence and text processing. Other researchers used this method found that increasing the rate of reading did not prevent comprehension, but caused a substantial decrease in recall (Forster, 1970). Chen's (1983)'s study using RSVP showed subjects' individual differences in their reading abilities in response to varying text structures. The method was sensitive enough to detect individual differences in terms of processing time and rate of retrieval in recall of a critical topic-giving word and the influence of the word recall of other parts of the ambiguous paragraph.

Another eye-movement method used in experimental research focusing on

comprehending processes is measuring the amount of time taken to read one word or a sentence during reading. For example, in an experiment, subjects press a button to display a word on a screen. The computer records the subjects' reading time (RT) between intervals. Reading time experiments include the word-by-word procedure, which considers three aspects of reading: the linguistic aspects of the text, the cognitive demands of the reading task, and the reader's ability (Aaronson & Ferres, 1984, p. 31). The experimental procedure includes variations of those three aspects of reading as independent variables. Based on obtained data, inferences are made about each dimension of reading. Because this procedure is easier and less expensive than other experiments such as eye-movement, while obtaining data that are as reliable and valid as data collected from other methods, it has gained reading researchers' attention (Just & Carpenter, 1984). Aaronson and Ferres (1984) suggested it as a tool to investigate individual differences in the reading processes as it is sensitive enough to examine RT patterns among individual subjects for each trial.

Although these on-line experiments are useful for identifying text-driven processing, they are usually supplemented with reading performance tasks to tap into the comprehension process (Rankin, 1988). Also, higher-level processing in reading may not be fully analyzed by these experimental methods.

Differing from experiments emphasizing on-line measurement of the comprehension process, which are mostly concerned with the reading process from text-driven processing, classroom-based experiments are designed to examine reader-driven processing training effects on reading comprehension. A number of studies have shown

the positive effects of schema-building activities (Short, 1982; Singer & Donlan, 1982; Barlett, 1978; Geva, 1983) and strategy training (Brown et al., 1981; Brown & Palincsar, 1982; Cook & Mayer, 1983). As the focus of reading research has recently moved to individual, self-controlled strategic reading, some L1 studies have focused on the effects of training readers in cognitive reading strategies, which resulted in increased awareness and better use of strategies (Garner et al. 1983; Raphael & Mckinney, 1983; Paris et al., 1984).

1.2 Miscue Analysis

Miscue analysis is one type of descriptive reading research method that focuses on the process of reading. In this method, the researcher collects oral reading samples from readers' observed responses that deviate from expected responses, and makes inferences about the reading process from the oral reading errors (Leu, 1982, p. 421). The focus is on the text, and what the reader does with the text at the word level. Oral reading errors are often referred to as 'miscues' as readers' cognitive and linguistic systems may be mistakenly cued in the process of interacting with text (p. 423). Linguistic miscues are analyzed under the categories of graphic and phonemic similarity, and semantic and syntactic acceptability (Leu, 1982).

Miscue analysis is often used in L1 reading studies aimed to gain insights into the types of information that the reader uses while they are engaged in reading for comprehension. For example, when a L1 reader substitutes *dimes* for *money* while reading the sentence "She shook the piggy bank and out came some money", this indicates that she was using the syntactic and semantic information provided in the

sentence. If she substituted *many* for *money*, it may reveal that she was using the graphic information in comprehending the sentence (Cziko, 1980, p.102).

In L1 reading studies using miscue analysis, there is a general trend that L1 readers produce more contextually acceptable miscues than graphophonically similar miscues to the original text (Biemiller, 1970; Burke & K. Goodman, 1970). Another trend is that most readers' miscues tend to be more syntactically acceptable than semantically acceptable (Burke & Goodman, 1970). Also, during reading, proficient readers use more contextual information and less graphic information than less proficient reader (Goodman, 1973; Smith, 1971). These conclusions mean that the reader brings semantic and contextual information to the text.

Miscue analysis is useful to identify general reading patterns when readers respond to text at the word level. However, a question regarding an assumption underlying the use of this method is that oral reading behavior and the silent reading process are the same or nearly identical phenomenon (Allington, 1984). Even though Beebe (1980) argued that "an analysis of oral reading miscues is an effective way of inferring what kinds of miscues may occur during silent reading" (p. 335), there is a possibility for differences between these two processes (Leu, 1982).

In addition, miscue analysis research has shown contradictory results. Differing from general trends discussed above, other researchers concluded that proficient readers used contextual information equally or less and rely on graphic information equally or more than less proficient readers (Beimiller, 1970; Weber, 1970). Furthermore, the analysis of oral reading errors produced by both children and adults

indicate that readers rely on both graphic and semantic information (Biemiller, 1970; Clay, 1968; Goodman, 1965). Other studies showed that some situational variables influenced oral reading error patterns. For example, instructional methods, whether based mainly on decoding or meaning, influenced second graders' oral reading error patterns (DeLawter, 1975). Also, depending on teacher feedback factor or types of texts, miscue patterns were affected (Wixson, 1979).

These complicated data seem to imply that general trends that were identified from miscue analysis do not seem to be necessarily applicable to individuals who have different backgrounds, strategies, and purposes for reading (Wixson, 1979). Success in using one type of information may depend on the function of complex interactions among several variables such as individual differences in readers' reading skills and background, and different types of materials, rather than a function of general characteristics of proficient or less proficient readers.

1.3 Think-aloud Protocol Analysis

Another descriptive method which has recently gained popularity in reading research, especially in the area of process-oriented research, is think-aloud protocol analysis. As focus in L1 reading research has evolved from the product of reading to the process of reading, and from identifying general patterns of reading behavior to individual, strategic reading behavior, think-aloud protocol analysis seems to be the most appropriate tool for attaining information, or at least conscious information, about how an individual reader arrives at comprehension during reading. Differing from other methods such as eye-movement or miscue analysis which focus on unconscious reading

behavior, in the think-aloud method, the reader produces verbal data regarding the process of conscious engagement with text.

Think-aloud protocol refers to subjects' verbal statements of either what they understand from a text or what they are thinking as they process a text (Barnett, 1989, p. 172). The analysis of think-aloud protocols can provide a subset of information underlying the cognitive processes involved in reading comprehension. Whitney and Budd (1996) suggest that think-aloud protocols may uncover "an internal structure that is not revealed by frequency counts" (p.345) as researchers have access to readers' processing strategies in various reading situations.

Think-aloud protocol analysis begins with the collecting of verbal data from readers. Verbal data is compiled by collecting subjects' verbalized thoughts and experiences while they are performing a given reading comprehension task. During this verbalization, it is important that students only "think-aloud" and not explain what they are doing (Ericsson & Simon, 1993).

There are two types of data collection in process-oriented research using think-aloud protocol, depending on when data are obtained: (1) retrospective verbal data that readers report after completing the reading task, (2) introspective data and think-alouds, obtained during the reading task (Block, 1986). Introspective data allow to reveal more directly why readers fail to understand or how they are processing text than retrospective data (p. 464).

A number of researchers support the usefulness of verbal data in the think-aloud method in research. Long and Bourg (1996) suggest that verbal reports are useful

in exploring “inferential processing during text comprehension, individual differences in comprehension performance, and the process involved in conversational discourse (p. 330)”. Whitney and Budd (1996) have also identified verbal reports as useful “to explore the relationship between memory and inferences, to study strategic processes, to test particular predictions made by various process models of text comprehension, and to explore individual differences” (p. 345).

The think-aloud method was used first to study problem-solving processes (Smagorinsky, 1989) and adapted later in the field of writing in order to gain a better understanding of the writing process. Flower and Hayes (1981) used this method to examine the types of decisions a writer makes while writing. While the think-aloud method is used in writing research to develop a model of writing process by identifying a hierarchy of a writer’s decisions, L1 reading researchers have used the think-aloud method to identify the cognitive strategies and knowledge that competent L1 readers use in reading, and to compare the performance of older and younger readers (Olshavsky, 1977; Church & Bereiter, 1983; Olsen et al., 1984).

Verbal reports can also reveal cues about how working memory works in information processing. According to recent models of working memory and comprehension (Just & Carpenter, 1992), working memory involves different kinds of information processing. These models suggest that readers need to activate a small subset of information in order to make knowledge accessible and available at the conscious level so that they can use it for comprehending a text. Whitney and Budd (1996) claim that it is this information that can be articulated by readers who are thinking

aloud.

In addition, the think-aloud method is more beneficial for studying higher level processing in reading, such as the inferences, predictions, schema elaborations and more deliberate comprehension strategy choices, while experimental procedures are more available for the analyses of lower level, automatic processing such as perception of features, letters or letter patterns (Olson et al., 1984). Especially, the think-aloud method is suggested to be a useful means for studying individual differences in higher level processing (p. 284).

The think-aloud method can be useful, not only for researchers, but also for readers. Scardamalia and Bereiter (1983) claim that using the think-aloud method in reading often increases the metacognitive awareness of children, and offer it as an instructional device for reading and writing for L1 children. Readers may become aware of the strategies they use when they verbally express what they do during reading. Through this process, they may notice some weaknesses in their reading skills. Realization of those weaknesses may provide opportunities to reexamine their reading habits. Therefore, some readers can benefit from think-aloud protocols.

In sum, verbal reports collected from think-aloud protocol analysis seem to have a number of advantages. One major advantage of think-aloud protocol analysis in reading research is that it can provide descriptions of how readers use their strategies to compensate for comprehension gaps (Poulisse et al., 1986). Second, think-aloud protocols provide detailed data regarding which knowledge-based processing occurs and how it interacts with each other during reading (Long & Bourg, 1996). Think-aloud

protocols are also useful for investigating individual differences in readers' comprehension strategies (Whitney et al. 1991). Another advantage is that think-aloud protocols provide descriptions of higher level cognitive activity such as reasoning, which experiments fail to provide (Afflerbach & Johnston, 1984). Additionally, it provides a direct view of a reader's deliberate but hidden mental activity that is hardly captured by other methods (Block, 1986). Finally, it may reveal readers' affective components of reading processes (Afflerbach & Johnston, 1984).

In use of verbal data in reading research, one possible concern about the validity of data collected from the think-aloud method is that verbalization may alter the process of normal reading. However, a number of studies have shown that verbalization does not interfere with the cognitive process. Karf's (1972) study indicated that there were no reliable differences between the think-aloud group and the control group in terms of solving problems except the amount of time taken for the task. Similar results were found in other studies (Weisberg & Suls, 1973). Also, another concern is related to one aspect of this method, which is used to investigate essentially invisible mental processes, as a number of inferences and assumptions are made based on collected data. A question remains regarding whether the subjects really have ability to describe the processes they perform. As verbal protocol analysis is supported by a set of assumptions, Afflerback and Johnston (1984) suggested that the assumptions supporting think-aloud protocols describe only the domain within which verbal data are most useful compared to other research tools and beyond which their value is suspect (p. 308). From this perspective, the question would be better posed on the conditions under which the think-

aloud is performed. Thus, it needs to describe the conditions under which the verbal protocols are collected in order to be cautious in an analysis of data.

Considering these advantages of the think-aloud protocol analysis, it has become recognized as a useful tool to provide a view of cognitive reading processes, if used and analyzed appropriately, in L2/FL reading research as well as L1 reading research. The following section will discuss some examples and results of L2/FL studies which used this method, and samples of the types of results that they have produced.

2. L2/FL Reading Research Methods

Since L1 reading models have provided insights into L2 reading models, L2/FL reading researchers have consulted L1 reading research methods to investigate the L2/FL reading process. L2/FL reading research has benefited from the awareness of evolving trends in L1 reading research which focuses on the process of reading. Thus, in process-oriented reading research, data collected from the on-line measures are more appropriate than the data collected from the product of reading, such as test results. On-line measures include experiments on eye-movements, miscue analysis, cloze procedure and the think-aloud method. Within each of these methods, research tendencies have evolved from an emphasis on identifying general patterns of proficient or less proficient L2/FL readers' characteristics to an emphasis on how the levels of processing interact with each other to contribute to L2/FL reading comprehension within individuals.

2.1 Experimental Design

Relatively few L2 reading studies have used experimental methods, probably because of the difficulties of controlling many relevant variables and of designing classroom experiments. Also, L2 reading research has benefited from L1 reading studies in terms of similar elements shared between L1 and L2/FL reading and because of the relatively short history of L2/FL research compared with L1 research. Thus, L2/FL research tends to focus on investigating the relationships between L2/FL reading comprehension and the factors that differentiate L2/FL readers from L1 readers.

Several L2 studies have been conducted, using the eye-movement method. Tullius (1971) conducted an eye-movement study to investigate the reason why L2 students take more time to read a L2 passage than L1 students. This study showed that they took longer because of the longer duration of each eye fixation, not because they make more eye fixations per line or more frequent regressions to check back on information when they encountered understanding difficulties.

Oller (1972), using eye-movements, also found that the main difference between L2 students and L1 students in reading speed was due to L2 students' longer duration of fixations in reading. Oller concluded from the results that L2 readers relied more on visual information and less on contextual constraints.

As well, Bernhardt (1987) used eye movements to measure the reading process of L1 and FL readers of German by investigating the stages in processing through fixation duration and reading speed. This study revealed that L1 and FL proficient readers read more quickly than less proficient readers did. In other words, less

proficient L1 and FL readers tended to exhibit low-level processing strategies by reading slowly and longer. German L1 readers tended to pay more attention to function words in a phrase than to content words in the phrase, differing from Carpenter & Just (1983) L1 reading study results showing that native readers of English attended to content words more than function words. It was also found that readers paused longer when text features did not meet their expectations.

Among L2 reading studies that have chosen to use experimental methods, the main focus has been on instructional facets related to reading, such as testing the effects of schema-activating or building activities on reading comprehension. Carrell et al. (1989) study demonstrated that metacognitive strategy training using a semantic mapping technique through pre- and post-reading sessions was effective in L2 improving reading comprehension among experimental groups who received training. In other studies, similar positive effects for the strategy training were found among experimental groups when compared with control groups (Hamp-Lyons, 1985; Kern, 1989; Raymond, 1993).

However, instruction-related research is a clearly complex area, as seen by the fact that opposing training results were achieved from two L2 reading training studies using experimental designs. Johnson (1982) reported that treatments to expose the participants to the target vocabulary did not have a significant effect on reading comprehension of the participants. Carrell's (1985) study demonstrated that the training treatment in recognition of different types of rhetorical organization of L2 texts had a significant impact on the amount of information recalled by the participants as well as recognition and use of the trained discourse types. These opposing findings may be

attributed to difficulties in controlling other potential variables, such as varying levels of language proficiency, text types, or attitudes varied among individuals. Also, in experimental reading studies using data collected from standardized test results in order to measure subjects' comprehension, some consider that the validity of the measures used to obtain test scores and validity of comprehension questions following a reading passage are in doubt, because scores of a reader's comprehension may vary depending on the measurement used (Connor, 1987, p.11). Another source that should not be ignored in interpreting results seems to be a possibility of the 'researcher affect', which might influence the results of an experiment by inadvertently using procedures that may lead to conclusions support the preferred explanation (Jackson, 1995, p. 262). In addition, this product focus makes it hard to tap the precise mental processes of how to arrive at comprehension while reading.

2.2 Miscue Analysis and Cloze Procedure

As discussed in the L1 research method section, miscue analysis in reading research has demonstrated that researchers can infer types of information that readers bring with them to a text by analyzing their oral reading errors. Similarly, through analyzing errors made on cloze tasks, cloze procedures can also be used to reveal types of L2/FL reading strategies employed in the process of reconstructing the message of a text. Some L2/FL researchers used these two methods in their studies, and the findings and limitations as an L2/FL reading research tool are presented.

Compared with L1 reading research, there have been fewer studies of L2 reading that have used miscue analysis. L2/FL reading researchers tend to identify how

L2/FL readers process text based on the meaningfulness and grammaticality of oral reading errors (Connor, 1981). Devine's (1987) research, based on collected oral reading samples from L2 readers, revealed a positive correlation between reading proficiency and overall language proficiency, and a negative correlation between poor reading strategies and overall language proficiency. Analyzed linguistic miscues showed that poor reading strategies, producing syntactically and semantically unacceptable oral reading miscues, were less used as general language proficiency improved. Cziko (1980) analyzed L2 oral reading errors, and found that native French-speaking students and highly advanced L2 students used both graphic and semantic information, while less proficient L2 students relied more on graphic information in reading. Rigg's (1988) study, which analyzed oral miscues collected from L2 children, concluded that the L2 reading process did not greatly differ from the L1 reading process captured by Goodman and Burke (1973, cited in Rigg). For example, their oral reading was, on average, relatively accurate (miscues were less than 20 % of the text), and most of their miscues were semantically acceptable (i.g. *His sister cried louder* instead of *His sister's cries grew louder*). When their miscues did not make sense, they tried to correct them. This study suggested the use of oral reading as "a window on the reading process" (p. 217).

In L2 studies using miscue analysis, there are similar criticisms regarding its underlying assumptions and findings that are evident in L1 reading research, and were discussed in the previous section. The limited oral language proficiency of L2/FL readers should be considered when L2 oral reading miscue data are used to infer their

reading comprehension process (Devine, 1988). For example, graphic miscues can be produced more than semantic miscues because of a L2 reader's weak vocabulary knowledge, rather than his/her reading strategy of reliance on graphic information.

In a cloze procedure, the reader is required to reconstruct a text, in which every *n*th lexical item is deleted, by filling in the blanks with words that are appropriate morphologically, syntactically, and semantically (Carrell et al., 1993, p. 953). It has been suggested by Carrell et al. (1993) that the cloze procedure could be used to provide a "window" into reading strategies as readers' responses to cloze items could provide evidence of what readers were trying to do in their attempt to make sense of the text (p. 956).

The cloze procedure, developed from an L1 text readability testing method, has been used to measure L2/FL language proficiency. Backman (1985) identified four types of knowledge that are applied in a cloze procedure: (1) clause-level, syntactic knowledge, (2) sentence-level knowledge, (3) intersentential knowledge constrained by textual features of the discourse, and (4) extra-textual knowledge (p. 539). As noted, the cloze procedure can also be a useful tool for researchers to infer readers' L2/FL reading comprehension process by analyzing readers' responses to cloze reading tasks. To some extent, the cloze procedure can be considered a kind of written correlate to miscue analysis, which is used to investigate the reading process by analyzing readers' oral errors. There are some differences, however. This method is perhaps more closely related to the typical silent reading in which readers engage than the oral reading carried out during a miscue analysis, and can involve more conscious reflection than what occurs

in oral miscues.

L2 reading researchers have suggested that the cloze procedure is an important tool in investigating general patterns in terms of similarities and differences between L1 and L2 reading strategies. Hauptman (1979) argued that the cloze procedure is a valid instrument for studying reading strategies in both L1 and L2 reading, and used it as a research tool to elicit information about L1 and L2 reading strategies. The analysis of cloze errors collected from this study revealed that subjects' ability or inability to use semantic information also corresponded to their L1 reading strategies. More advanced L2 subjects made fewer syntactic errors but more semantic errors.

Carrell et al.'s (1993) study also showed similarities between L1 and L2 readers' reading strategies in English text comprehension using the cloze procedure. However, the L2 group used different strategies from their L2 reading strategies in their Chinese text comprehension. L2 Chinese subjects made syntactically acceptable responses more in the L2 cloze than in the L1 cloze because of so called 'language-based' strategies, as termed by Carrell et al. (p. 963). Elley (1984) also used a cloze procedure to compare L2 reading difficulties among three L2 groups with different L1 backgrounds, Fijians, Indians, and Europeans. From the analysis of cloze errors, this study showed remarkable similarities in the groups' L2 reading difficulties.

Jonz (1987) used the cloze procedure to reveal subjects' use of cohesive ties in reading comprehension. This study demonstrated the positive effect of cohesive ties on L2 reading comprehension more than on L1 reading comprehension among subjects. However, there were no significant differences between L1 and L2 reading strategies in

the text without redundant cohesive ties.

The cloze procedure seems to be used mostly for exploring general reading strategy patterns inferred from L2/FL readers' responses on cloze tasks. However, inconsistent L2 study results may indicate that cloze procedure may not be appropriate to attain data pertaining to how a certain type of strategy may or may not lead to an adequate understanding. Hauptman's study analyzed cloze task errors indicated that advanced L2 readers made more semantic errors than intermediate L2 readers. In contrast, Carrell et al's (1993) study revealed that L2 Chinese subjects made semantically acceptable responses more for the L1 cloze than for the L2 cloze but more syntactically acceptable responses for the L2 cloze than for the L1. These complicated results perhaps imply that cloze procedure is more appropriate for measuring grammatical competence than identifying certain types of strategies leading to a better comprehension.

2.3 Think-aloud Protocol Analysis

As the usefulness and the value of the think-aloud protocol as valid data are recognized in L1 research, several L2/FL reading researchers have called for its use in L2/FL reading to gain further process-oriented data for descriptions of what a L2/FL reader is doing while reading (Alderson, 1984; Cohen, 1984; Cohen & Hosenfeld, 1981). The think-aloud protocols were used first in L2 writing process to reveal that composing is non-linear, exploratory, and generative process. In the composing process, L2 writers discover and formulate their ideas to express appropriate meaning. (Raimes, 1985; Zamel, 1982, 1983).

Since Hosenfeld (1977) began to use this method to investigate reading

strategies of successful and unsuccessful L2 learners, the think-aloud protocols have been collected in L2/FL reading research in order to provide a direct view of a reader's mental processes which are usually hidden during silent reading. Within usage of the think-aloud protocol analysis, L2/FL reading research focus has evolved from identifying general patterns of the reading strategies of good and poor readers to individual differences in strategy use during reading.

In Hosenfeld's (1977) study, the think-aloud technique was used to identify the reading strategy differences between successful and unsuccessful L2 readers when they assigned meaning to the printed text. Hosenfeld also suggested the use of this technique as an instructional tool in order to help unsuccessful readers acquire effective strategies, as she believed that L2 students could improve their reading skills when they "replace their less effective strategies with effective strategies" used by successful readers (p. 110).

Hosenfeld (1984) reported two case studies which used think-aloud and introspective/retrospective techniques in order to investigate whether unsuccessful readers can acquire the effective strategies of successful readers. The first case showed notable improvement in implementing successful readers' strategies after strategy practice sessions, but failed to acquire some of the effective strategies of successful readers such as being able to (1) identify the grammatical function of words; (2) skip inessential words; or (3) change the form of words before looking them up in a glossary. In Hosenfeld's second case study, after two weeks of remedial sessions learning the strategies of successful readers, the subject improved considerably in that he started to guess the meaning of new words by using relevant information that he had and read in

broad phrases. In this study, the failure of implementing strategies used by successful readers in a short period time may imply that knowing certain types of strategies does not immediately lead to actual use of these strategies during reading. Individual differences in L2/FL readers' reading ability in their L1, language proficiency, learning style, cognitive resources, or background knowledge may play a role in terms of the effectiveness of using relatively new strategies.

Block (1986) also used think-aloud protocols to identify the comprehension strategies employed by six non-proficient ESL students who had all spent between three and five years, and three non-proficient native students. From this research, Block categorized the learners into two categories: integrators and nonintegrators. Block concluded that their first language background was not related to their reading patterns, saying that "the development of strategy use...does not seem to depend on language-specific features" (p. 485).

Sarig (1987) used think-aloud measures to elicit process data from EFL students, aiming to compare their reading processes of their native language (Hebrew) and English as a foreign language. Sarig's results showed wide differences in individual students' repertoire of reading strategies in both native language and English; each student used different combinations of good and poor reading strategies. Use of a few or even one poor strategy resulted in poor performance in reading comprehension. Therefore, Sarig did not support the classical dichotomy between good and poor readers that Hosenfeld (1977) indicated (p. 118). Another finding of this study indicated that students used the same repertoire of reading strategies in both their L1 and L2.

Additionally, those reading strategy types that were sources of successful or unsuccessful comprehension in one language had a similar effect in the other language.

As well, Block's (1992) study used the think-aloud protocol analysis to explore and compare the comprehension-monitoring processes of L1 and L2 readers while reading a passage of expository text. In examining the think-aloud transcripts, it was found that subjects' reading proficiency seemed to be more influential than their language backgrounds on the differences in their monitoring; although most subjects recognized the existence of their reading problems, proficient readers identified the problems more frequently and verbalized their strategic actions more than less proficient readers did. In addition, three phases of comprehension monitoring that operated similarly for both L1 and L2 readers were identified: the evaluation phase of problem recognition, the action phase of taking strategic actions, and the checking phase of revising the problem. In this study, the think-aloud protocol analysis was useful in revealing reading processes in progress.

4. Conclusion

My study aims to elicit information about the reading processes through the analysis of data collected from participants engaged in academic-type reading, and the evidence of the strategies they use to get an adequate understanding of the text. I have chosen to use verbal protocol analysis for my exploratory study into the L2 reading process for several reasons. First, the think-aloud protocol analysis is a useful tool to gain direct descriptions of reading strategy use processes which otherwise could be

investigated only indirectly. Another reason is that the think-aloud protocol analysis allows for tapping into higher-level processing strategies including comprehension monitoring during L2 reading. A third advantage of this method is that the think-aloud data provide information on how varying levels of cognitive reading processing contribute to a reader's misunderstanding or adequate understanding of a text. Additionally, the think-aloud data permit the investigation of individual differences in reading strategies use during reading. As well, the think-aloud analysis is a useful tool to conduct an open-ended pilot study on L2 reading processes, which is exploratory in nature. Finally, verbal reports allow a L2 reader's affective responses such as interests in the topic and personal opinions of the given text. For these reasons, think-aloud protocol analysis can be best used to gain on-line processing data regarding how individuals attempt to resolve reading difficulties and which type of strategies contribute more to each individual's comprehension.

Chapter Four

The Study: Method and Findings

This chapter describes seven reading cases which were selected to investigate individual differences in reading processes among Korean students in Canada. All participants had studied English as a foreign language (EFL) from junior high school to university in the same Korean educational system, but have different backgrounds in terms of field of study, English proficiency, and amount of time exposed to ESL pedagogy in Canada. Specifically, this exploratory study investigates each individual's repertoire of reading strategies employed, considering their varying language competence and the amount of time exposed to ESL pedagogy. It also examines how each strategy relates to the readers' comprehension when they are engaged in reading academic passages from the reading section of a test of English language proficiency for university students. The language test chosen is the Carleton Academic English Language (CAEL) assessment.

This chapter includes two main sections. The first is a description of the research method and the rationale for using passages from the test. It also includes the data collection procedure, the descriptions of participants, and the procedure for data analysis. The second is a report on the findings. It includes, first, an outline of their individual reading strategies that emerged through their verbal protocols. Later, an analysis of the data from the verbal protocols is presented and a comparison is made of

each participant's use of types of processing and strategies from the perspective of comprehension monitoring.

1. Method

1.1 Material

The CAEL assessment is a standardized test designed to assess students' oral, reading, listening, and writing skills for identifying students whose level of English proficiency is adequate for study at the university level. Additionally, at Carleton, the CAEL is used for placement purposes in the context of a gradual admission procedure which allows students to study on a limited basis even though their level of English is below that required for full-time study.

The reading section of the CAEL assessment includes two reading selections followed by a number of open-ended comprehension questions. The question format is structured to elicit information, i.e., main ideas or specific details, from assigned readings. (Fox, 1996). The reading passages from the CAEL assessment were used in this study for number of reasons. First, the CAEL assessment includes a reading section which is aimed at measuring academic reading performance by using two text selections on a single topic, ones which are adapted from introductory level university textbooks or those found in journal or newspaper articles. My study is aimed at tapping the reading processes of L2 readers who are pursuing academic goals in Canada. Thus a passage used to measure academic performance seems to be the best for the purpose of my study. A second reason is that the length of the readings is substantially longer than other

standardized tests, so that the passages more closely resemble actual academic texts. As well, although reading academic texts to answer comprehension questions may not seem to be as representative of the reading process undertaken in university contexts, these comprehension questions attempt to provide the participants with a purpose for reading so that they can focus their attention on key information in the texts (Fox, 1996, p.16).

Also, the five page reading selection appears to be long enough for the participants to use their repertoire of reading strategies that are used in ordinary reading situations. In addition, the test includes comprehension questions which I can use in order to provide participants with academic, guiding purposes for reading. However, comprehension questions were not used for the purpose of measuring participants' ultimate level of comprehension because of the variable of the time limit. While the CAEL assessment is a "speeded" test, in which test takers' level of academic English is measured under the pressure of a limited amount of time, a time limit was not imposed in my study in order to focus on how an array of strategies is used. Some readers took much longer to complete the reading than others, making a comparison between them less meaningful. For this reason, not imposing a time limit appeared to preclude the possibility of assessing underlying reading proficiency on the basis of participants' performance level. In addition, the situation in which these verbal protocols were produced is not the same as the test-taking situation of the CAEL assessment. The CAEL assessment is structured around a topic; thus a writing prompt is provided at the beginning of the assessment and a lecture regarding the topic follows so that a test-taker is scaffolded in the reading section as well as the writing section. In contrast, in my

study, only one main reading selection was provided with no scaffolding information. It would not be meaningful to compare the participants' scores on those comprehension questions.

1.2 Participants

Seven Korean students were selected to produce verbal protocols, from which data were analyzed for differences in reading strategies. In order to compare the effects of proficiency level and ESL learning experiences, students were selected from Carleton University's ESL Intensive Course (IC) 25⁴ and graduate school. A total score of 30 on the CAEL assessment is required to be placed in IC 25 ESL classes at Carleton University. The approximate equivalent score range of the Test of English as a Foreign Language (TOEFL) is 490-500. The three ESL students were either attending or had attended Carleton University intensive course IC 25, an intermediate level ESL course. Among them, two students had lived in Canada for about seven months, while the other student had arrived just two months previously. The English language requirement for admission to Canadian graduate schools is at least a score of 50 on the CAEL assessment or a score of 550 on the TOEFL. Three out of the four highly advanced level students were currently studying at the graduate level, and fourth student is studying in the Certificate of Teaching English as a Second Language (CTESL) program. Among these highly advanced students, two students had taken ESL classes for at least two terms, while two of the graduate students did not have any ESL class experience. More detailed

⁴ ESL Intensive Courses (IC) at Carleton are offered at four levels, called IC 10 (basic), IC 20 (low-intermediate), IC 25 (high-intermediate), and IC 30 (advanced) and each course focuses on English for Academic Purposes. The IC consists of 25 hours of scheduled language learning activity per week.

information about each participant is included in the discussion of data analysis in section 3.1. The table below contains participants' background information.

Table 1: A description of participants' background information

	Language Proficiency	CAEL band	Exposure to ESL Pedagogy	Undergraduate Major	Current Program
Junghae	Highly advanced	50 or higher	Two Terms	Early Childhood Education	M.A program
Juhyun	Highly advanced	50 or higher	No	English Language & Literature	M.A program
Dasom	Highly advanced	50 or higher	One year	English Language & Literature	CTESL program
Minje	Highly advanced	50 or higher	No	Teaching English	M.A program
Sungsik	Intermediate	30	Two terms	Telecommunication	ESL program
Chansu	Intermediate	30	One term	Political science	ESL program
Byungki	Intermediate	30	No	Biology	ESL program

1.3 Data Collection Procedure

Two booklets were given to the participants for this study. One booklet contained two reading passages and a one-page glossary. The comprehension questions from the question booklet were also provided. The topic of the two reading passages used for this study was 'Food Preservation'. The first passage was one-page long, and was used for the participants to practice producing the think-aloud protocols. The second

passage was five-pages long, and was used as the main text for this study. Ten open-ended comprehension questions contained in the question booklet were provided for participants to use them as guiding purposes for reading.

The initial phases of the verbal data collection included 30 minutes devoted to gathering personal information about the participants. Included in this were several questions regarding their perceptions of differences between the pedagogical approach used at Carleton and that of the Korean educational system in reading instruction, their L2 reading strategies and their personal opinions about important factors in L2 reading and difficulties of L2 reading. Then, I gave them an opportunity to practice verbalizing the reading process while they were reading the first passage included in the CAEL assessment. When they seemed to be comfortable with the think-aloud technique, I gave them the five page main reading passage with comprehension questions. They were allowed to produce think-aloud protocols in either their L1 or L2. For the most part, all participants chose to complete the think-aloud task in their L1, using English occasionally to rephrase words. The verbal protocols were recorded. I did not set a time limit for producing their think-aloud protocol because I tried to simulate a typical, private L2 reading situation in which there is no set time limit. If the participants are under time pressure, they might not make full use of their repertoire of reading strategies or use different strategies.

1.4 Data Analysis

Data for each participant were collected on audio-tapes in either Korean or English, depending on the participants' preferences, and translated into English and then

transcribed. An analysis of the protocols was done descriptively for two reasons. First, given the length of the passage, this study revealed a number of variations of the participants to manage the material. For example, two participants skipped some parts of the passage, which they specifically mentioned were not important for answering the comprehension questions, while other participants tried to understand each sentence in the passage regardless of questions. Thus, it seemed to be important to focus on how the strategies were used, and how they were interrelated. In addition, as is discussed below, in a number of cases, the distinctions among types of strategies described in the literature are not always clear-cut, and it is precisely this ambiguity that is important to capture. Furthermore, my research questions were concerned more with the process of how a particular strategy leads to adequate or inadequate understanding than with the statistical results of strategies used to facilitate participants' comprehension.

In the description given below of the reading strategies used in the participants' reading processes, the strategies were initially characterized as text-driven or reader-driven, and the focus was given to strategies which would be classified into one of these two categories. These categories were adapted from Carrell's (1989b) distinction between local, bottom-up, decoding types of strategies and global, top-down types of reading strategies (p.125). Later, another category of metacognitive strategy was added to take into account strategies which could not easily be classified into one or the other of these, but rather seem to serve to manage the interaction between higher level and lower level processing. However, during the data analysis, I discovered that the distinction between reader-driven and text-driven strategies was not always clear and so I included

in the descriptions data about how the reader uses different types of strategies to link the text and his or her own background.

Let me describe and exemplify the strategies which characterized each of these categories. Text-driven, decoding processing strategies refer to deliberate text-dependant actions that are related to word meaning, translating individual words or sentences, and depending on sentence syntax. Any strategic behaviors which proceeded from the incoming printed data in the passage to higher-level processing were put under the text-driven processing strategies. The translation of the sentence into Korean, for example, “어떤 심각한 변화는 기록되지 않았다 (No significant change has been reported) ” was classified as a text-driven processing strategy (for other examples, see Appendix 1). In contrast, reader-driven processing strategies include conscious reading actions in which readers explicitly depart from their prior knowledge to predict or understand the text. Reading behaviors such as bringing contextual information and making predictions or hypotheses were put under the reader-driven strategy category, because they were conceptually driven in order to verify hypotheses and predictions at word, sentence or text level. Thus, even at the word-recognition level, there was evidence of reader-driven strategies as some participants made hypotheses of some words. For example, this statement about *“This first sentence is talking about something important, but the idea is not clear to me yet. I’m thinking about that the degree of chemicals should be stronger to kill cockroaches more effectively as they are developing their resistance to the chemicals”* was classified as a reader-driven processing strategy, as the participant brought her prior knowledge to understand the sentence (for

other examples, see Appendix 2). Other strategies which involved any metacognitive awareness were classified as metacognitive strategies: strategic reading actions which indicate that readers are aware of what they think and do to monitor their comprehension. For instance, the statement about recognition of comprehension such as *“This part summarizes information that I didn’t understand quite well before, so I’ll read it more carefully and spend more time on understanding it”* was classified as a metacognitive strategy (for other examples, see Appendix 3).

As noted above, a careful examination of the protocols revealed that in many cases, it was not relevant to base the classification simply as based on the simple dichotomy between the text or the reader. The protocols revealed a complex process of sequencing strategies whose interactive nature needs to be examined to see how successful or unsuccessful comprehension is achieved. In the same way that Grabe (1991) described schema as a theoretical metaphor for the reader’s prior knowledge, we can treat the terms text-driven or reader-driven as metaphors to better understand reading processes. Consequently, although the strategies were described in terms of Carrell’s categories, in many cases the strategic behavior could be better seen in the participants’ statements as an interaction between levels of processing. In this instance, one participant seemed to interactively employ all these three types of strategies in an attempt to understand this one sentence, “For products that are permitted to be irradiated, commercial use of irradiation depends on a number of factors including the demand for the benefits provided, competitiveness with alternative processes and the willingness of consumers to buy irradiated food products”. After reading aloud until the phrase ‘the

benefits provided', she said, "*why is the word 'benefits' here?*" (which would be classified as a metacognitive strategy). Then she said, "*competitiveness, ah! Irradiation may not have been widely used yet* (which would be classified as a reader-driven processing strategy as she made an inference by using contextual information) *to see this clause* 'commercial use of irradiation depends on a number of factors' (she translated this part, which would be classified as a text-driven processing strategy) *because irradiation should be better than other processes which can replace irradiation* (this rephrasing of text would be classified as a reader-driven processing strategy since she seemed to bring her knowledge of how irradiation should be when she saw the word 'competitiveness'), *because the number of customers who buy irradiated food products should be increased* (she interpreted the word 'willingness' in this way with the concept of competitiveness in her mind, which would be evidence of a reader-driven processing strategy). This example seems to show how the strategies were interactively used, which cannot be easily captured by simply listing the types of strategies used in this verbal protocol.

2. Findings

The following section presents each individual participant and the data collected while producing verbal protocols. A brief description of each student is provided, including background information. The reading situation is then described in terms of the duration of each participant's reading process, and reaction to the given reading task. Following this, the participant's reading strategies are explained in detail. Additionally, examples of comprehension monitoring strategies used by the individual

are illustrated.

2.1. Individual differences in reading strategies

Seven cases described below illustrate a range of individual differences among reading strategies employed by each of the seven Korean L2 students.

2.1.1. Case One:

Junghae⁵ is a graduate student who took ESL classes at Carleton for two terms. She attended a Philippine elementary school for five years, where English was used as a medium of education. Her undergraduate major was Early Childhood Education and she completed a certificate program in English as a second language (CTESL).

She took one hour and five minutes to read the passage and answer the questions. She seemed to have conflicts between new strategies that she learned from ESL pedagogy and old strategies with which she had been familiar:

*I learned new strategies here, but I still notice that I rely on old reading strategies when I do academic reading these days. Even though I know I don't have to know every detail of information from the texts, it is hard to resist my old strategies of trying to understand every sentence.*⁶

She also described that she did not engage in a topic:

I read articles without thinking. During reading, I focus on comprehending the article of finding the answers. If you ask me my opinion about this topic now, I would say this is an issue that we should consider carefully, but I didn't think of any opinion during reading.

While producing her verbal protocol, she read the questions first and then tried to find answers. In general, she seemed to be more comfortable with using what would be classified as text-driven processing strategies, especially when she considered that a

⁵ The participants' names are pseudonyms.

⁶ This is a direct translation from Korean into English.

certain part of the passage should be comprehended, because she translated phrase by phrase to fully understand it. *"This sentence is too long, so I should read phrase by phrase"*. For other parts of the passage, she used a scanning strategy comfortably to find detailed information or a specific word to answer a question. *"This question is asking for the applications. I'm not trying to understand every word or sentence now, therefore I'm moving my eyes to find the cue word for that answer."* When she encountered difficult sentences that she did not understand after the first reading, she used strategies such as rereading a sentence, dividing it into several phrases by using sentence syntax, and then translating phrase by phrase into Korean in order to facilitate comprehension. Yet she seemed to do this only when she felt these sentences were important for answering the comprehension questions. Otherwise, she skipped sentences she felt were unimportant for answering the questions.

In the text-driven strategies she used, there is still evidence of her schema playing a role. For example, when she attempted to guess at unknown words, she used her schema to help her decoding (*"in the word 'microorganism', micro may mean small"*), and also used contextual information to decode sentences. (*"after reading the following parts of this sentence, now I can understand that this sentence 'the levels of radiolytic products are minute' may mean the levels of radiolytic products are low"*.)

She sometimes self-monitored her own comprehension to determine from where her uncertainty came, which is evidence of the first stage of comprehension monitoring noted by Block (1992). In this evaluation stage, she determined whether the problem sentence was important to spend further time on. For example, she said, *"I don't*

understand this sentence because there are several words I don't know" or *"I don't understand this because this sentence is too complicated"*. In some cases, self-monitoring her comprehension led to her trying various strategies such as rereading, guessing or translating to understand a part of the passage. However, in one case, her use of scanning strategy misled her understanding. The inconsistencies between her understanding of the sentence and meaning in the paragraph would have been detected if she had monitored her understanding across sentences. While scanning for specific information regarding the safety of irradiated food, she said, *"Oh, this sentence 'however, it will add to the choices we have to improve the safety of our food supply' may imply that irradiated food is not safe"*. Once she felt she had found the answer to the comprehension question, she did not look any further, even though this answer was wrong.

Junghae seemed to rely on text-driven strategies in parts of the passage that she indicated a need to comprehend more fully. In other cases, she used various strategies including reader-driven strategies and self-monitoring.

2.1.2. Case Two:

Juhyun is a graduate student who studied theology for three years in Australia without any ESL class experiences. She majored in English language and literature in her undergraduate studies in Korea.

She took less than one hour to produce verbal protocols, partly because we were using her lunch break, and partly because she said personal problems were bothering her that day so she could not fully concentrate on the reading task that she was asked to

complete. She skipped one question because she said she could not easily find the answer and she did not feel like finding it because she was not interested in the topic. She said her understanding of the passage seemed to be at about 60 %, because time was not sufficient, and because she considered this was like a test-taking situation in which she thought each individual sentence did not need to be understood. She said the purpose of reading determined the way she read. She was the only one who described her affective response to the passage during reading. Regarding reading strategies, she said she had developed her own ways of reading in English based on the translation skills she learned in Korea.

She mentioned the necessity for a bottom-up processing, for example translating every English word or sentence into Korean, when she considered she had to clearly comprehend part of the passage. *"I have a feeling about the meaning of radiolytic products, but I can't clearly understand it because I can't translate it into Korean. For example, I don't need to translate some English words, such as TV or computer, because we also use these words in everyday life in Korea. However, I should translate words or sentences into Korean when I need to have a clear meaning"*. But nonetheless, she did not necessarily translate some parts, again because of her lack of interest in the topic. *"This part about radiolytic products isn't smoothly translated into Korean, but I don't want to try to understand it again, especially it is not a topic that I like"*. When she encountered unfamiliar words that she needed to understand, she also tried to guess the meaning from part of the word. *"Radiolytic seems to be related to rays because of 'radio' part"*.

In Juhyun's verbal protocol, she used top-down processing while simultaneously monitoring her initial guess by predicting what content would occur in succeeding portions of a paragraph and formulating questions. For example, *"In this section, I was expecting information about the process, but the word 'inspections' is not what I expected, so I'm wondering why this word is here."* She also used headings and the organization of the text to predict or understand the flow of ideas. *"I'm reading the first two sentences to know what this section is about"*.

She often used higher-level strategies to understand content by rephrasing and relating previous information in the passage to new information. *"Agriculture Canada helps the food industry to be more competitive, that's why this paper is published"*. She seemed to be tolerant of ambiguity in the text and able to skip parts or reread them later if necessary. *"I have a vague understanding about ionizing radiation, but it's still a very abstract idea, so I'll make a mental note of the word 'ion' for a later use, but I'll skip these sentences without translating"*.

She also mentioned that she easily understood and remembered sentences which were related to her real life experiences, which is evidence of reader-driven processing strategy. *"I understood this paragraph about the extension of shelf life very well, because there were no difficult words to understand and the content was closely related to real life experiences"*. Also, she tried to look at supporting details to guess the meaning. *"Radiolytic products should be something concrete, but now I can't see any specific examples of them here, so I'll read more"*.

She facilitated her comprehension of sentences by activating her background

knowledge, another reader-driven processing strategy. *"This first sentence is talking about something important, but the idea is not clear to me yet. I'm thinking about that the degree of chemicals should be stronger to kill cockroaches more effectively as they are developing their resistance to the chemicals"*. She often reread sentences that she considered important to her. *"This part summarizes information that I didn't understand quite well before, so I'll read it more carefully and spend more time on understanding it"*. She also seemed to be able to use a scanning strategy. *"I skip these sentences here without translating until I meet sentences talking about 'how food is irradiated'"*. Unlike other participants, she sometimes emotionally reacted to the text. *"It is not the kind of topic I like"*. *"I don't want to read this part"*. For Juhyun, it seems that she mostly employed reader-driven processing to have a general meaning of a passage, but she also used text-driven processing when she encountered the sentences that should be clearly understood.

2.1.3. Case Three:

Dasom is enrolled in a CTESL program at Carleton after one year of ESL classes both at Carleton and a private school in B.C. She studied English language and literature in her undergraduate studies in Korea.

She took about two and half hours to produce verbal protocols and to answer the questions. She said she developed her own L2 reading strategies through extensive reading required in her undergraduate studies, even though she had been taught only translation skills at high school. When she heard of some reading strategies in ESL pedagogy, such as getting the overall idea first and going back to the problematic

parts later, she stated that it was kind of confirmation that her strategies were right. Her difficulty with a complicated sentence in the passage could partly be attributed to her unfamiliarity with the think-aloud technique. She said *"if I think-aloud like this, I don't think I can remember content because my energy seems to go to verbalizing process"*.

While engaged in the verbal protocol, she used text-driven processing by translating word by word into Korean to understand the text. Sometimes, she could not grasp the meaning of a sentence from the first translation. Presumably she was busy assigning a meaning to each word, so she had to think about the sentence again after the first translation in order to make sense of a relatively complicated sentence. She also attended to sentence syntax; *"This sentence has an 'it...which' structure"*.

Sometimes, she made use of reader-driven processing by using her linguistic schemata. For example, *" 'as' often leads a reason"*. She also commented that she should keep a sub-topic in her mind while reading the section containing the sub-topic. She tried to make a comparison between sections by summarizing each section; *"X-rays have still defects, while gamma rays....it doesn't have similar information about gamma rays"*.

When she realized, through self-monitoring, that her initial guess was not consistent with the following part of the paragraph, she was able to correct it through the use of higher-level processing. She corrected the wrongly guessed meaning of a word by using higher-level strategies such as using contextual clues. *"Is shelflife something to do with a shell? Here, shelflife may mean kind of a life span to see this sentence 'their shelflife can be extended from 5 to 15 days'"*.

During reading, she mostly attempted to translate the text into Korean sentence by sentence. During the process of translating, she usually assigned a single dictionary meaning to a word. For example, in the sentence 'the energy can be emitted either continuously or in short intense pulses', she translated the last phrase, 'in short intense pulses' as *"in short, strong regular beating of the blood"*.

2.1.4 Case Four:

Minje is a graduate student who is studying applied language studies. She has no ESL learning experience. She studied 'teaching English' as her major in her undergraduate studies in Korea.

She took about two hours to produce verbal protocols. She said she did not learn any reading strategies in schools in Korea and she just followed what she was taught in order to get good scores on the tests. She said, although her major was 'teaching English', she studied her major using textbooks written in Korean. During reading, she frequently expressed her opinion; *"it sounds good for our health rather than using preservatives"*.

While engaged in think-aloud reading, she occasionally used text-driven strategies, translating some sentences into Korean when she could not understand them right away. However, she often formulated questions regarding reasons for new information in order to make connections with previous or subsequent information; *"Many kinds of levels of radiolytic products are very small. Why are radiolytic products coming up in this sentence?"*

Although she mentioned that she never learned any reading strategies, she

appeared to mostly rely on reader-driven strategies and simultaneously monitored her comprehension very actively. For example, after looking at the words 'Agriculture Canada' and 'competitiveness' and then activating her background knowledge, she rephrased the sentence:

One of the roles of Agriculture is to help the food industry take advantages of available food processing technologies to enable them to produce safe, high quality products, thereby ensuring the competitiveness of Canadian foods, both at home and abroad'

as *"to see the word 'competitiveness, Agriculture Canada seems to be involved in helping the food industry produce safer food and more effectively."*

She used top-down processing strategies while monitoring her comprehension by making predictions to relate previous information to new information in a new paragraph and confirming them later in her summary of the paragraph. *"This section seems to be going to explain about the waves mentioned in the previous section". "It (another source) moves electrons to get to the demanded energy level. If it gets high speed, does it become a beam? I have to reread from the first sentence. Now it is becoming clearer"*. Additionally, higher-level strategies such as using contextual information were used to guess the meaning of unfamiliar words. *"I don't know the meaning of the word 'optimum', but it seems to be important to understand applications. (after reading the following part of the sentence) Ah! The proper amount of dosage is needed"*.

She often used rephrasing strategies for either summarizing what she understood or making a connection between previous information and new information. However, she used text-driven processing by analyzing the structure of a sentence and

translating it into Korean when she could not grasp its meaning during the first reading.

She constantly monitored her comprehension by organizing or summarizing the important ideas in each paragraph or after reading several sentences of a section in order to ensure that her comprehension of a part was consistent with other parts of the passage. She also kept monitoring her comprehension by making a prediction about it or formulating a question, and later confirming it to see if her guess was right. “*Why is this word in this sentence?*”; “*What is a dosimeter?*”; “*It probably seems to measure something*”; “*Ah, it measures!!*”. She also corrected her initial misinterpretation by monitoring her comprehension (see the section 4.2 for example).

2.1.5. Case Five:

Sungsik has been in Canada for seven months. He is currently attending an ESL class at an adult ESL school after completing IC 20 and 25 at Carleton University. He has an undergraduate degree in telecommunications in Korea and is planning to apply for graduate studies in computer science in Canada.

It took two hours and fifteen minutes for him to complete the reading passage and answer the questions. He explained that his old reading strategies learned in Korea and his new reading strategies learned in ESL pedagogy got mixed and confused him during reading. For this reason, he felt his reading speed seemed to be getting slower. He said he needed to adapt or follow what he was told in ESL pedagogy to do to improve his reading skills.

During Sungsik’s verbal protocol, he relied heavily on text-driven processing by translating nearly every sentence in the text into Korean in order to understand it. In the

process of translating every word, his oral miscues misled his understanding. For example, in the sentence 'they have also shown that all of the known radiolytic products derived from irradiated foods are also found in unprocessed foods', he substituted 'deliver' for 'derive' thus it caused his misinterpretation. In an attempt to guess the meaning of an unknown word, he tried to divide it into lexical parts, however, his oral miscue misled his guessing of the word; *"Foodborne-illness? It may be something to do with the bone in the meat"*. However, his use of text-driven strategies proved effective. In guessing unknown vocabulary, he was the only one who divided the word 'shelflife' into "shelf" and 'life' to guess the meaning of the word. Later, he confirmed its meaning from another sentence.

He used top-down processing strategies by utilizing his prior world knowledge to fill a comprehension gap or infer a meaning of a sentence, when the sentence was difficult to understand. For example, he speculated about the meaning of a sentence based on his understanding of several words in the sentence. In the sentence 'each application should be evaluated on its own merits as to whether irradiation provides a technical and economic solution that is better than traditional processing methods', he misinterpreted it as *"each application is better than traditional processing technology"*. He also used top-down processing strategies and self-monitoring by making a prediction and using prior knowledge to reconsider his understanding. *"What is irradiation? It may be something like preserving foods using rays"*; *"Applications may refer to the benefits of irradiation. Its disadvantages might come in the next section"*. He rephrased the contents of a sentence and tried to relate previous information to proceeding

information. *"These are factors that were mentioned in the previous sentence".*

Sungsik relied on text-based strategies such as translating sentence by sentence. Although he sometimes tried to use top-down processing strategies and some comprehension monitoring through inferring the meanings of sentences, misinterpretations often occurred based on his incorrect understanding of previous parts.

2.1.6. Case Six:

Chansu has been in Canada for about seven months. He completed IC 20 and is currently taking IC 25. He hopes to continue studying political science at a graduate school in Canada.

He spent two hours and fifteen minutes engaged in think-aloud reading and completing the questions. He said the strategies he learned in ESL pedagogy often did not work well for him especially in reading English books, although he thought strategies he learned at Carleton seemed to be effective in reading comprehension. He often mentioned that the CAEL assessment passage was difficult to understand. He expressed this affective response resulting from his incomplete understanding; *"I didn't grasp the clear meaning of the word 'ionizing energy' from the beginning and it is still affecting my understanding of this sentence. I don't know what will happen if I answer the question regarding this word".* Unlike most other participants, he expressed his opinions about the text. *"Microorganisms can be destroyed by irradiation. This seems to be harmful". "This is about economic factors. I don't agree with this. Even though the cost or marketability is important, we should more carefully investigate its effects if it has the slightest chance of causing any chemical change".*

Chansu's verbal protocol revealed that he seemed to mainly rely on text-driven processing strategies by translating sentences into Korean to understand it. A lot of misinterpretations occurred in the process of translating due to his relatively insufficient linguistic competence, given the passage. Although he employed strategies such as rephrasing, continuing to read for further clarification, and repeatedly reading the problematic parts of the passage, misinterpretations continuously occurred. Another source of his misinterpretation was the oral miscues that he had made frequently in the passage (substituted 'preferred' for 'referred'; 'dried' for 'dairy'). These miscued oral errors misled his understanding. He expressed his anxious feeling regarding incomplete understanding as *"there seems to be a block to interfere with my understanding when I read a text in English"*.

Chansu used reader-driven processing strategies by activating his prior knowledge to understand the text. *"The shorter wave lengths have greater energy. I have heard this. In this case, background knowledge is helpful"*. He occasionally formulated questions, evidence of top-down processing, but only at a local level, to relate new information to previous information in previous sentences. *"Why is the word 'ionizing energy' in this sentence although it doesn't follow the content of the previous sentence?"*

He relied on reader-driven processing strategies to compensate for his deficiency in other skills. For example, he interpreted the sentence:

A conveyer system moves foods to be irradiated in boxes and carries them through a chamber containing the irradiation source. The dose, or amount of ionizing energy absorbed by a product, depends on the distance from and the amount of time it is exposed to the source.

as *“A conveyor is used because of the distance and amount of time it takes to convey foods and because the source is too dangerous to be exposed”*. In this case, he over-relied on top-down processing by activating his background knowledge. As he did not fully understand the original, complicated sentence, he activated his prior knowledge based on his knowledge of the word ‘conveyer’, which is that a conveyer is used to move things, and that radiation can be dangerous if people are exposed to it without any proper equipment. His background knowledge was activated in order to fill the comprehension gap which occurred due to a lack of his linguistic competence.

In summary, Chansu seemed to rely a great deal on text-driven strategies based on his translation of each word or sentences, however, a lot of misinterpretations occurred. He also tried to use reader-driven processing strategies, it seemed, to compensate for his deficiency at the linguistic level, such as speculating on the meaning of sentences and activating his prior knowledge based on words that he knew, but these also resulted in misunderstanding of sentences because of his relatively weak capability of accurate low-level processing.

2.1.7. Case Seven:

Byungki is an ESL student who arrived in Canada shortly before beginning IC 25 at Carleton University. He studied biology at the undergraduate level in Korea for a year before coming to Canada. He studied EFL from junior high school to high school.

He spent around three hours producing verbal protocols and complete the comprehension questions. He said many times while producing his verbal protocol that the text was too difficult for him to understand. He also often expressed his opinion about

the text. *"I envy this situation because we don't use this kind of high technology"*.

Overall, he relied on text-driven strategies by translating every word or sentence. When he encountered unknown words, he used several strategies to guess their meanings. He tried to use the grammatical structure of the sentence; *" 'However' must be used to contrast these two sentences"*. He also tried to divide a lexical item into parts to guess the meaning of an unfamiliar word. *"Dosimeters remind me of barometers. These things seem to measure something" ..*

He also relied on top-down strategies to compensate for his relative weakness at the linguistic level. He used discourse strategies, when, for example, he looked at the organization of the sections in the passage. *"The first two sentences may be the main idea of this paragraph"*. Additionally, he tried to use higher-level processing, such as using contextual clues to guess unknown words. *"The 'treatment' usually means something done to cure an illness, here it seems to be something to do with the process of producing"*. Another strategy used was to try to summarize the key points of the paragraph after reading several sentences. *"I'm trying to put new information about these three resources in order in my mind. Here, the best source is gamma rays, the usage of an electron beam has been limited, and there have been attempts to convert an electron beam into X-rays"*. Additionally, he tried to refer to previous information to facilitate his understanding of a sentence he was reading. *"Because the result of the petition was not satisfactory, the irradiation was not helpful?"*

Differing from other participants, Byungki monitored his comprehension at the word level by applying several possible meanings of the word in order to find the best

meaning in the particular sentence. “Does the word ‘conventional’ mean routine, general, or conservative?”, “In ‘clearance for the irradiation of poultry’, does it mean cleanness, or elimination?”. He also occasionally looked at lexical clues to understand some phrases through self-comprehension monitoring;

First I thought the food irradiation was related to digestion, but to have that meaning, it should have mentioned something like hormones, human organs, etc, but I haven’t found those words here. So I need to go back to the “radiation and ionizing energy” section

In this case, comprehension monitoring allowed him to take a strategic action, which was going back to the problematic part in order to have clearer understanding, as the noun phrase ‘the food irradiation’ seemed to be a key concept for understanding the text. Additionally, as he got more familiar with the ideas and words of the text, he became more confident and tried more strategies in order to ensure that his understanding was consistent with his comprehension of other parts of the passage.

He generally relied on text-driven strategies to understand the text. He sometimes used higher level strategies to fill comprehension gaps in the process of reading. He tried to use various strategies to achieve a better understanding of the text. In spite of these strategies, he misinterpreted a number of sentences due to his relatively weak linguistic competence. However, through comprehension monitoring, he was occasionally able to correct his initial misinterpretations.

2.2. Discussion and Analysis

Because this study taps the strategic processes used in L2 reading comprehension from open-ended verbal data produced by a limited number of

participants, the results should be treated as exploratory. Some possibly important factors such as the participants' L1 reading abilities, interests, and learning styles, as well as text characteristics, were beyond the scope of this study. Additionally, one should be cautious in generalizing the results as the L2 reading process, because participants' reading process might have interfered with the task of producing verbal protocols, as one participant pointed out. Despite these limitations, the data obtained provide unique and in-depth information about some of the normally invisible L2 reading processes.

Neither participants' linguistic proficiency, nor ESL exposure seemed to influence critically their decisions to select a particular type strategy. For example, the intermediate level students, as well as the highly advanced participants, attempted to use both reader-driven and text-driven processing and a combination of strategies, such as guessing the meaning of unknown words from the context, relating previous information to proceeding information, and looking at the organization of the text to facilitate comprehension. Participants who did not have any ESL experience were as able to use higher-level processing strategies such as using background knowledge and comprehension monitoring as those who had ESL experience in which reader strategies were taught.

In addition, heavy-reliance on either reader-driven, or text-driven processing did not always lead every participant to achieve an adequate comprehension of the text. Rather, self-monitoring their comprehension at both higher and lower levels played a key role to link the types of processing strategy. For example, some participants took a strategic action by relying on their prior knowledge when they were aware of their

misinterpretations of a word or a sentence through comprehension monitoring. In cases where the participants were able to apply their linguistic competence appropriately to solve the comprehension problems detected by comprehension monitoring, a better understanding was achieved. In the following section, I will analyze some examples of how a particular text-driven or reader-driven processing strategy was misused and led to a misinterpretation of the meaning of the text. Then I will illustrate some examples of how better comprehension was achieved through comprehension monitoring.

2.2.1. Analysis of Participants' Misinterpretation Occurring in Their Protocols

2.2.1.1 Misuse of Text-driven Strategic Processing:

As most participants mentioned their lack of vocabulary knowledge as one of the crucial causes of problems in their reading comprehension, knowing a lot of vocabulary appears to definitely be helpful in understanding the text. However, translating word by word based on their memorized vocabulary knowledge seemed to interfere with their understanding when some participants identified a word by assigning a single dictionary meaning to a word, a strategy which they developed during their studies of EFL in Korea, without checking whether the assigned meaning of the word was consistent with other intrasentential or intersentential information. Evidence of self-monitoring which involves actively searching for cues to test one's understanding of part of the text within the larger context was not revealed in the cases in which the misinterpretation of words occurred.

For example, Dasom seemed to have a few problems in her reading

comprehension process because of misuse of text-driven processing strategy. Despite her highly advanced English proficiency, she did not monitor carefully whether her comprehension of the words was appropriate or not. She assigned a single dictionary meaning 'rot' that she had memorized before to the word 'decay' in the sentence 'Cobalt-60 source continuously decays giving off gamma rays, which are used to irradiated food'. She interpreted this as "*Cobalt-60 becomes rotten*" instead of 'loses its power'. Also, she interpreted the sentence 'microorganisms are more vulnerable to conditions that are unfavourable to microbial growth' as "*to the conditions that dislike microbial growth*" because she assigned 'like' to the word 'favour' instead of 'suitable'. As well, she continued assigning the meaning of 'a formal written request to appeal to somebody in authority' to the word 'petition' instead of 'a formal application' although her meaning did not quite fit in the meaning of the sentence. Even though she knew the meanings of a lot of words, her inappropriate translation of some words interfered with her understanding of the sentences in some cases.

In another case, Sungsik was not able to detect his misinterpretation of words. Thus he did not try to change the meaning of a word 'minute' as a unit of time, once he assigned it in the sentence 'levels of radiolytic products are minute and there are no toxic substances formed in irradiated foods' although this meaning, as related to time, was not consistent with the meaning of the sentence.

When the participants needed to guess the meaning of an unknown word, a strategy such as dividing a lexical item into parts was often employed as a useful tool. However, it also seemed to be misleading in some cases. Minje was often right on track

when guessing the meaning of an unfamiliar word, but her attempt to analyze the meaning was not successful in this case. *"I don't know what 'neutrons' means, but I guess they are something to do with 'brain nerves' when I think of a word 'neurological'".* She did not attempt to reflect on this interpretation in light of the overall meaning of the paragraph.

In the sentence 'Irradiation works by sexually sterilizing any Trichinella spiralis parasites that may be present, so they would be unable to reproduce', Dasom also got confused with the meaning of the sentence once she associated the phrase 'sexually sterilizing' with an inappropriate meaning 'sexually stimulating'. Later, she had to skip the sentence after a few trials, because she did not monitor her comprehension of this phrase in the context of the subsequent paragraph to correct her first assigned meaning to the phrase. *"Does 'sexually sterilizing' mean 'sexually stimulating'? I can't think of other meaning"*. Although text-driven processing strategy was often used among most participants, it misled their comprehension in some cases when the participants did not actively search for contextual clues to check the appropriateness of its use.

2.2.1.2. Misuse of Reader-driven Strategic Processing:

Reader-driven processing such as activating background knowledge helped the participants accurately guess the meaning of a sentence or unknown word in most cases. However, this did not always work. It sometimes even interfered with or misled participants' understanding of a sentence or word when they failed to monitor whether their prior knowledge applied was consistent with other contextual information in part of the text. Juhyun, a highly advanced student, used a reader-driven processing strategy by

activating her prior knowledge when she read the sentence 'Microorganisms can be destroyed by irradiation.' "*I know that there are both harmful and useful microorganisms*". When she read the next sentence 'Bacterial spores, however, are only killed by high doses which mean that the foodborne disease, botulism, is not necessarily prevented by irradiation.', she thought "*it is talking about a potential danger of killing microorganisms that we might need*". In this case, her prior knowledge seemed to interfere with her interpreting process so that she could not clearly construct the meanings of the sentences.

In Minje's case, her prior knowledge also seemed to mislead her understanding, even though her language proficiency was very advanced. When reading the sentence 'While microwaves have enough energy to make molecules move. X-ray and gamma rays with shorter wavelengths have more energy allowing them to dislodge electrons from the molecules in the food to form electrically charged particles, called ions.', she associated microwaves with an electron machine, "*In microwaves, waves make foods be ionized.....Ions seem to be made from the process*".

Misuse of reader-driven processing strategies seemed to occur not only because of the participants' own prior background knowledge, but occasionally, also because of new knowledge formed during the process of comprehending the text. In these cases, background knowledge was misused when it formed a rigid inflexible idea that was not open to adjustments, as more text was decoded and more meaning constructed. Byungki, an intermediate student, seemed to develop new knowledge about the relation between microorganisms and irradiation from the first sentence

'microorganisms can be destroyed by irradiation'. This newly formed knowledge appeared to inappropriately influence his understanding of other complicated sentences. While reading the sentence, "It appears that microorganisms that survive the irradiation process are injured and are therefore more vulnerable to conditions that are unfavourable to microbial growth and are more likely to be killed by cooking," he interpreted this as "*microorganisms are injured in the process of irradiation, and they are more likely to be destroyed under the conditions and by cooking*".

In Chansu's case, his misinterpretation of a verb 'work' as a noun 'workers', evidence of misuse of text-driven strategy, misled his understanding of the sentence. Based on his misinterpretation of the word 'work' and the name of the parasite '*Trichinella apiralis*', he inadequately understood the sentence 'Irradiation works by sexually sterilizing any *Trichinella apiralis* parasites that may be present, so they would be unable to reproduce'. He said, "*this is about the workers for irradiation and diseases that they may get because of their working environment. This is serious*". Inadequate interpretation of this sentence became his newly formed knowledge, which contributed to his misunderstanding of the next sentences such as 'the FDA approved the irradiation of fresh pork to control *Trichinella apiralis* in 1996'. He tried to use reader-driven processing by bringing his prior knowledge to support newly acquired knowledge and to interpret this as "*I know this story. I've heard that, in the US, the meat processed by the radiation brought harmful effects to people*". This case demonstrated how a reader-driven processing strategy by applying new knowledge acquired from the previous sentences could mislead the succeeding comprehension of the participant when

the participant did not monitor whether his inference about the meaning of the sentence was correct by actively referring to other intersentential information in the paragraph.

2.3. The Role of Comprehension Monitoring:

Some cases discussed above show that misinterpretations were made when a type of strategy or text processing was inappropriately used. Minje's protocol demonstrated how her initial misinterpretation of the first sentence was adjusted by monitoring her comprehension through a process of continuously predicting and confirming or rejecting her interpretations based on new information presented in the text.

First, she made a hypothesis about the meaning of a key word in the paragraph through activating her newly formed knowledge that irradiation is related to food preservation, which is a type of reader-driven processing: In this sentence, 'Irradiation can extend the shelflife of foods in a number of ways', *"shelflife may mean some organisms or something like that in the foods, something that prevents foods from spoiling?"* Then, she recognized that information which came later in the next sentences in the paragraph did not match with her first hypothesis of the word. *"Why is the word 'irradiation' here while these sentences are talking about extension?"* She tried to self-monitor her comprehension by making a connection between the predicted meaning and new information. *"Does reducing the number of spoilage organisms relate to food irradiation?"*. Then, she began to incorporate new information in the sentences to newly formed schemata. *"Reducing the number of spoilage organisms may be one of the processes of irradiation"*. Finally, she confirmed the newly incorporated schema by

acknowledging her initial error in her first hypothesis of the word, when she read the last sentence in the paragraph. *“Ah, shelflife means something like a preservation period. I didn’t understand it at the beginning of this paragraph”*. With this newly incorporated schema through comprehension-monitoring, she continued reading, eventually making another prediction about another new idea in succeeding parts of the text. Through this monitoring process, she was able to keep constructing her ideas about the topic of the text based on information presented in the text. This case showed that continuous comprehension monitoring through making predictions and confirming or rejecting based on incoming intersentential or intrasentential information in a text could help the participants use effectively and appropriately any type of processing strategy for a better understanding of the text.

3. Answering the Research Questions

This section presents the findings of the present study, organized around the research questions offered in the Introduction.

3.1. Research Question 1: Are there noteworthy differences in the range of processing strategies used by L2 readers with intermediate level of English proficiency and those with highly advanced language proficiency?

The present data summarized in the table below, using Carrell (1989)’s categories, indicate that English language proficiency level does not seem to play a critical role in the range of processing strategies used by participants. One highly advanced participant did not employ her prior knowledge and mostly relied on text-

driven, decoding type processing strategies, while other highly advanced participants considered text organization, contextual information, or their prior knowledge to facilitate their word, sentence, and paragraph level understanding. Intermediate participants also used similar strategies in an attempt to understand the passage.

Table 2: a list of processing strategies used by seven L2 participants

	Reader-driven processing strategies	Text-driven processing strategies	Metacognitive processing strategies
Junghae (highly advanced, two terms/ ESL learning experience)	use headings, bring contextual information to bear on her understanding of words or sentences	translate only sentences word by word, which she considered important into Korean, use sentence syntax	recognize what is important or not, monitor her understanding
Juhyun (highly advanced, no ESL experience)	use headings to guess content in a section, use her prior knowledge to facilitate her understanding at the paragraph level, predict what content will occur,	translate only sentences word by word, which she considered to be important into Korean, look at sentence syntax	recognize what is important, skip unimportant parts, formulate a question, confirm her guess
Dasom (highly advanced, two term ESL experiences)		translate the whole passage word by word, look at sentence structures	
Minje (highly advanced, no ESL learning experiences)	look at text organization, use her prior knowledge to facilitate paragraph-level understanding, bring contextual information to bear on her understanding of individual words, try to understand causal relationship between sentences, predict what will occur, make predictions on word, paragraph level	translate only several difficult sentences for clear understanding	formulate a question, self-monitor frequently her understanding on sentence or paragraph level, recognize what is important and skip unimportant parts, confirm her guess

Sungsik (intermediate, two term ESL learning experiences)	use his prior knowledge to facilitate comprehension at the word or sentence level, bring contextual information to predict what will occur, make a prediction on word-level, predict what will occur	translate the whole passage word by word, look at sentence structures	State his success or failure in his understanding, confirm his guess, speculate beyond the information presented in the sentence
Chansu (intermediate, two term ESL learning experiences)	use his prior knowledge to facilitate sentence level understanding,	translate most part of the passage word by word, which he considered to be important, look at sentence structures	skip the sentences which are considered to be unimportant
Byungki (intermediate, no ESL learning experiences)	use text organization, bring contextual information to bear on his understanding of individual words, use his prior knowledge to facilitate sentence level understanding, connect the topic sentence and supporting details, refer to previous information to facilitate understanding,	translate the whole passage word by word, look at sentence structures, look at the glossary to understand the meaning of words	acknowledge a lack of background knowledge of the topic, formulate a question, monitor his understanding at the word level

3.2. Research Question 2: Are there noteworthy differences between the range of strategies used by students with ESL learning experiences, and those with only EFL learning experiences?

The present data summarized in the table 2 seem to show that there are no noteworthy differences in types of processing strategy between participants with ESL learning experiences, and those with only EFL experiences. The interview data also indicate that participants who had been exposed to ESL classes which focused on strategic reading had not incorporated newly learned strategies while they engaged in L2 reading. Junghae said, *"I learned new reading strategies here, but still I have noticed that I rely on my old reading habits especially when I do academic reading these days for*

graduate study". Chansu agreed with the usefulness of newly learned strategies, but in fact *"I think they are really effective. I have been trying to use them, but they don't work well especially in reading academic books"*. Sungsik described that he was even confused, *'In my case, old and new strategies got mixed and I got confused. My reading speed seems to be getting slower. If I continue studying here, I may get better, but not right now'*.

3.3. Research Question 3: Do L2 readers in general, rely on one type of reading strategy, or utilize both types of strategies, reader-driven and text-driven, interactively?

The present verbal data seem to support the interactive-compensatory model of L1 reading of Stanovich (1980), which emphasizes that a reader utilizes a process at any level to compensate for weaknesses of at any other level. Participants frequently relied on text-driven strategies when they had little background knowledge of the topic 'food preservation'. Also, they occasionally used top-down, reader-driven strategies when they encountered unknown words or difficult sentences in order to fill a comprehension gap.

Also, the data were consistent with the findings of Sarig (1987) and Anderson (1991), which suggested that use of a particular strategy type does not always lead to a better understanding. Reader-driven processing strategies or text-driven processing strategies occasionally misled some participants' understanding. Interactive use of a type of processing strategy in combination with other types of strategies seems to be more important than applying a single, reader-driven or text-driven type of processing strategy.

3.4. Research Question 4: Do L2 readers use their metacognitive abilities during their reading comprehension process, and what role does it play?

The present data appear to support Cassanave's (1988) argument that comprehension monitoring is important in order to take appropriate strategic actions in the reading process. The participants used their metacognitive abilities to actively self-monitor their comprehension on the word, sentence, or paragraph level in light of an ongoing construction of meanings of throughout the text. Comprehension monitoring played an important role to link text-driven and reader-driven processing at both higher and lower levels of comprehension processes. For example, two participants scanned the text first to find necessary information for answering questions, and later they employed text-driven processing strategies after they recognized that they did not clearly understand the important section enough to answer the questions. In addition, comprehension monitoring enabled some participants to check whether their comprehension was consistent with previous or subsequent information in the text so that they could have a more adequate understanding of a word or a sentence in a bigger picture. Some participants who were aware of the hypotheses made in previous parts were able to correct or take strategic actions when they discovered that the hypotheses did not fit into their understanding of succeeding parts of the text. When participants kept their initial guess of the meaning of unknown words or sentences without monitoring, they often failed to attain an appropriate understanding about that part. Misinterpretation often occurred when they were unable to determine whether a strategy or processing was appropriately used to attain correct understanding in that given

situation. In applying comprehension monitoring strategies, the amount of time exposed to ESL pedagogy did not seem to be significantly influential, because the participants who did not have ESL experience were able to use those strategies as well. Comprehension monitoring is not independent of L2 linguistic abilities, however. Highly advanced participants seemed to use those comprehension monitoring strategies more comfortably and effectively than intermediate participants.

Chapter Five

Implications for L2/FL Reading Instruction

Chapter two is devoted to a review of literature about L2/FL reading processes. Depending on the educational, philosophical paradigm prevalent at a particular time, the focus of reading in instruction has evolved from text-driven processing to reader-driven processing. This evolution has occurred with the development of L2/FL reading models benefiting from the development of L1 reading models, but also taking into account differences between L2/FL readers and L1 readers. Rather than the strictly text-driven models or reader-driven models, pointed to in earlier research, the interactive models have gained recognition both in L1 and L2/FL reading research, emphasizing simultaneous use of both text-driven and reader-driven processing in an interaction between reader and text. Specifically, interactive-compensatory models argue that one level of processing may compensate for a weakness at other levels if it is used appropriately. Among reading strategies applied to the reading process in order to make interactive use of both types of processing, the importance of comprehension monitoring through metacognitive awareness has recently been emphasized.

The study discussed in the fourth chapter offers supporting evidence that individual differences, regardless of participants' linguistic competence and ESL experiences, play an essential role in terms of their decisions to select a type of processing while reading. Furthermore, it was found that comprehension monitoring,

rather than over-reliance on one type of processing, can help participants confirm or refute their initial hypothesis at both lower and higher level strategies.

Although the study is not conclusive, some implications for classroom applications can be gained. In this discussion, it should be noted that the implications must be seen as limited and suggestive, because the findings of the study may reflect factors of participants' purpose in reading and a reading setting in which a reading monitor was present, both of which are not strictly typical L2 reading situations. This chapter suggests some pedagogical implications for L2/ FL reading instruction based on the findings of the present study and previous L2/FL reading research. These implications are revealed in four distinct features which emerged from the verbal data analysis: vocabulary development; acquisition, elaboration, and application of background knowledge; use of comprehension-monitoring; and individual factors.

1. Pedagogical Implications for Vocabulary Development

As the messages are carried from author to reader through words in a text, a lack of sufficient vocabulary knowledge may be one of the main sources of reading difficulties in L2/FL reading comprehension. For example, in the data collected from the verbal protocols, more misinterpretations were made among lower level language competency participants than their more advanced counterparts due to their relatively weaker vocabulary knowledge. Also, almost every participant cited vocabulary weakness as a major source of difficulty in L2 reading comprehension. Juhyun said;

In my case, my reading problems come from my weak vocabulary. Weak grammar knowledge can be compensated for if I can follow the flow of

the ideas in the text, but when my reading gets blocked due to unknown words, there is nothing I can do unless I look up the word in a dictionary

Yet it is not just knowing the meanings of words that leads to good reading comprehension.

In some cases, although the participants knew the meaning of a word in the text, misinterpretations sometimes occurred when a single, memorized dictionary meaning was assigned without considering the context in which the word was used (see chapter four for examples). This reading habit was formed at a young age when they began to study English in Korea. Minje described how she learned vocabulary:

Memorizing vocabulary was an endless job for me. I tried to memorize all words in a vocabulary book. I set a time limit to complete memorizing all the words in the vocabulary book, for example, within 20 days, and kept writing the unknown words until I became familiar with them..... I memorize the Korean meaning of English words.....The teacher gave us a list of words to memorize. We took a test on the words on the following day.

All participants, independent of their linguistic proficiency, expressed the idea that they had developed their knowledge of vocabulary by memorizing a single dictionary meaning of a word. Although students might learn some vocabulary needed to comprehend a text, memorizing a meaning of a word without context does not seem to be an efficient way to expand vocabulary knowledge, considering the participants' immense efforts to memorize all the words in vocabulary books. Another weakness of memorizing words without context seems to be that assigning a memorized dictionary meaning to a word without monitoring its appropriateness may become routine. Chansu explained his view of vocabulary development in Korea;

Teachers asked us to memorize as many words as possible, but they didn't ask us to know the exact meaning of each word, or how to use it. I and my friends just tried to memorize all the words contained in a 22,000 or 33,000 vocabulary book. Even if we were able to memorize all the words in the book, I doubt if it would have been effective. I think I wouldn't have a big problem understanding a text only with

vocabulary knowledge of a few thousand words if I understand clearly the meaning of each word. I often notice in ESL classes that Korean students seem to have problems applying different usage of a word although they seem to know relatively more difficult vocabulary that students from other countries.

The inefficient way of blindly memorizing words in addition to L2/FL students' insufficient vocabulary knowledge seem to add another difficulty to the participants' reading process. As well, the L2/FL reading pace can be interfered with by this way of memorizing a meaning of a word. Dasom described how her word memorizing routine in reading gets in the way of her reading comprehension:

Whenever I look up the words in a dictionary, I feel like memorizing all the different meanings of a word in the dictionary and it takes time, then I get lost from the flow of ideas in the text being read.

Cross-cultural aspects of vocabulary can also add difficulty to L2/FL reading. Although words can be translated from one language to another, the cultural connotations of the words can be different according to each culture. For example, from the verbal protocols, Juhyun described her difficulty of including poultry meat in the category of food because of cultural differences in the concept of food. Koreans generally do not consider poultry a food; rather it would be an ingredient in a food (meal); *"I can't decide whether poultry products are examples of food, so I'll read more. I think poultry products belong to a bigger category than foods, so I can't decide it as an answer"*. This kind of cross-cultural aspect of L2/FL reading does not seem to be carefully considered in memorization of L2/FL word meanings.

Given these interview data and verbal protocol data collected from seven participants, memorizing meanings of a word without context and without monitoring its appropriateness in a context does not seem to be an effective way of developing

vocabulary knowledge. The importance of accurate and rapid word recognition can not be ignored in reading comprehension in interactive L2/FL reading models, as automatic word recognition allows L2/FL readers to use their cognitive capacity for employing higher-level, top-down strategies (Eskey, 1973). Thus, it is necessary to look at the research to discover better ways of developing vocabulary knowledge.

In order to reduce students' anxiety about weak vocabulary and help them facilitate their reading comprehension, teachers need to present the words that appear frequently in a particular text before the students read the text. Aebersold and Field (1997) suggest presenting "topic-specific" or "content-specific" vocabulary in pre-reading activities to help the students gain a general meaning of those words (p. 139). Yet, introducing a word does not automatically lead the students to understand and use the word because many types of knowledge are involved in word acquisition. Nation (1990) identifies four categories of knowledge about a word: form (the word in print and its grammatical forms), position (the grammatical patterns and structures in which the word can be used), function (the types of situations in which the word would likely appear) and meaning (the various meanings and nuances of the word) (p. 29-32). Thus, just previewing the topic-specific words before reading may not be sufficient for the students to acquire the words. However it may raise their consciousness so that they can constantly monitor their understanding when they encounter words that were previously introduced in a text.

Learning vocabulary semantically in a meaningful reading context can help students engage in L2/FL reading more effectively and interactively as they can use

contextual information. Hague (1987) recommends using three semantically oriented vocabulary activities which are used in L1 vocabulary learning. For example, through a “semantic association technique”, students brainstorm all the words related to the context of a text. Then the teacher and the students discuss the new words or cluster them based on concepts crucial to the text, which is similar to “semantic mapping”. During these activities, the students can compare similarities or differences among words. Lastly, students engage in a “semantic feature” technique in which they focus on the distinctions between closely related words. They examine how these words are used in what context in the text. Research has shown that learning words in context, through these types of activities, is more effective than relying on the dictionary (Gipe, 1979).

These activities can be more useful if the students compare their own vocabulary learning styles with these vocabulary activities presented. Through this, they can realize the effectiveness of these semantically based learning techniques. This recognition may lead the students to self-monitor, without help from their teacher, what they do when they encounter unknown words in a different text. Also, exposure to a variety of semantically based vocabulary learning activities may lead students to be aware of the benefits of using contextual information. As students are able to adjust the meaning of a new word based on the context in which they are found, students can through self-monitoring, confirm or alter the predicted meaning of the word.

2. Pedagogical Implications for Acquisition, Elaboration, and Application of Background Knowledge

As schema theory, or a top-down model of reading, emphasizes the importance of the role of background knowledge in reading comprehension, the verbal data showed how activating the background knowledge of the participants' could facilitate their comprehension. For instance, while reading the sentence 'the shorter the wave length, the greater the energy', Chansu mentioned "*I have heard this. In this case, my background knowledge is helpful*". Based on his understanding of the sentence, he was able to infer information about the other sentences as well. He also described the necessity for background knowledge for a topic when he wanted to adapt newly learned reading strategies in ESL pedagogy:

I have been trying to use newly learned strategies, but they don't work well especially in reading academic books although I think I can use them in reading magazine or newspapers. I don't get the overall meaning from the first reading, because I have little background knowledge about a particular topic. If I have it, it will be much easier to approach the topic.

Minje also expressed that she benefited from her background knowledge in reading for her graduate studies, "*Reading itself is not very hard because I have background knowledge about the field. I don't think it takes a long time to read and understand academic articles*".

As indicated from these data and reading research findings discussed in the chapter two, background knowledge plays an important role in L2/FL reading comprehension. It can also be used to compensate for L2/FL readers' weak vocabulary or syntactic knowledge when a comprehension gap occurs due to a lack of knowledge in

these areas. There are several ways of facilitating students' background knowledge in classroom settings. First, pre-reading activities can be beneficial. Carrell (1984b) argues that activating existing background knowledge as well as building new background knowledge should be done, through pre-reading activities, to help the reader to read better. These background knowledge-building activities need to include not only discussions on the topic of the text, but also bringing cross-cultural aspects of the text, if necessary. Some research has demonstrated that developing cultural knowledge about the topic facilitates the L2 reader's understanding of the text. (Johnson, 1981; Steffensen & Joag-Dev, 1984; Floyd & Carrell, 1987)

In addition to cultural and topic-specific schema, the reader's background knowledge of the text organization is beneficial for understanding the overall idea of a text without paying attention to the meaning of every word or sentence in a text. Knowledge of text organization seems to allow students to see a bigger picture rather than remain focussed at the lower levels of a text such as word or sentence level. Consistent with the present data in this study, a study by Carrell (1984a) indicated that helping L2 students identify different discourse structures seemed to be effective in improving reading comprehension, retention and recall. Research by Connor (1984) showed a similar result.

In order to have students become familiar with L2/FL text structures and develop their ability to follow text structure, Barnett (1989) suggests teachers show a summary of text structure types to students so that they become familiar with the different types; then have students read a text ordered by a recognizable structure to

discover the structure type, and analyze the author's intention in using a particular structure. Other variations, such as asking questions regarding structures, can be used to help students monitor whether they can follow the structure, or to facilitate their understanding of the text. Background knowledge of rhetorical organization can be used more effectively if the readers are able to activate their knowledge and monitor its appropriate use, depending on the purpose of their reading and the strategies used to meet the purpose.

Applying background knowledge appropriately is as important as activating or developing knowledge in reading. Through self-monitoring comprehension, either at the lower or higher levels, L2/FL readers can constantly check whether the application of their background knowledge is consistent with their understanding of other parts of the text in order to prevent over-reliance of their background knowledge.

3. Use of Comprehension Monitoring

The verbal protocols collected from the participants revealed the individual characteristics employed in reading strategy choice. It seemed that simply knowing a particular type of strategy did not guarantee its success. For example, guessing the meaning of a word by dividing it into parts helped a participant understand a particular paragraph better, but misled another participant's understanding of a difficult sentence. Thus, the reader needs to know his/her own strategy resources and decide which is an appropriate strategy depending on the type of text and the purpose or task of reading. If the reader can adjust his/her strategy use by confirming or rejecting his/her predictions

through comprehension monitoring based on semantic information, the strategy can be more effectively used to recover from comprehension problems that may occur in the reading process.

From the verbal data (see the chapter four), Minje demonstrated how she recovered from a reading problem which occurred after her initial inappropriate prediction of the meaning of a key word in a paragraph. By using the information that followed in the paragraph, she was able to use her cognitive ability to monitor whether her initial prediction was right or wrong.

Interestingly, there was a lack of correspondence between what some participants said, during the interview, they would do in reading and what they actually did in the verbal protocols. Dasom, who had studied ESL here in Canada, said in an interview, *“in academic reading, I try to get an overall idea from the first reading, and if I don't understand it well, I repeat reading the problematic part later”*. However, she translated nearly every sentence. In Byungki's case, he did not describe any reading strategies during the interview, but he actually used some. For example, he used contextual information to guess the appropriate meaning of a word in the sentence, *“The ‘treatment’ usually means something that a doctor does to cure an illness, but here it should be something to do with the process of producing something related to food irradiation”*. These verbal reports are similar to what L1 researchers have found (Phifer & Glover, 1982). Baker and Brown (1984) attempted to explain this discrepancy by using two kinds of knowledge: declarative knowledge (knowing it), which is different from procedural knowledge (knowing how). In other words, knowledge that a particular

strategy is useful does not mean that it is actually used.

In L2/FL reading research, Barnett (1988) investigated the relationships among reading comprehension, strategy use and perceived strategy use. In her conclusion, FL readers who reported their use of reading strategies understood more than those who did not think they used any. Carrell's research (1989b) examined the relationships between readers metacognitive awareness of various types of reading strategies and their reading ability in both their L1 and L2. For L1 reading, more readers relied on the use of "local" reading strategies (focusing on grammatical structures, word-meaning, text details) (p. 127). For FL reading, at a lower proficiency level, the local reading strategies increased reading performance, while use of global strategies was not related to FL readers' better comprehension. By contrast, L2 participants' reading performance, which was at a higher level than FL readers, had a positive correlation with 'global' reading strategies (use of background knowledge, focussing on the 'gist' of the text, textual organization) (p. 125).

The results of this study imply that a particular strategy, whether it is "local" or "global", does not always produce the same results. As discussed in chapter four, using background knowledge does not always lead readers to successful understanding, although it is a type of "global" strategy. As Carrell suggested, instructions need to be devoted not only to teaching reading strategies, but also to helping students self-monitor the appropriateness of their strategy use so that they are able to efficiently use combination of these strategies depending on the type of text and the purpose of their reading.

Once metacognitive awareness is raised, L2/FL students can enhance comprehension monitoring abilities through practice and explanation of techniques. For example, Casanave (1988) suggests that students be asked to reflect on their understanding by answering questions inserted between paragraphs. Questions may ask students to reflect back on what they have read, to think ahead to what they will read, and to relate their world knowledge to the text (p. 292). This practice of reflecting on what students do in reading after each paragraph may help students improve their metacognitive abilities so that they become more aware of where their own reading problems occur and what kind of strategies can be applied to overcome the problems.

Reciprocal teaching developed from L1 reading research (Palinscar & Brown, 1984) can also be introduced in L2/FL classroom settings. In reciprocal teaching, the teacher provides an instructional scaffolding by modeling how to form a meaningful array of comprehension monitoring questions after each paragraph in a text (p. 169). Then students gradually take the teacher's role to attempt to formulate similar questions. With systematic guidance and encouragement from the teacher, students eventually develop their own ways of monitoring their comprehension.

When teachers try to have learners examine and improve the effectiveness of their reading comprehension strategies, think-aloud protocols can also be very effective to examine reading processes even though they are relatively unknown to many teachers. Think-aloud techniques can be useful for learners. When learners express verbally what they do during reading, they may become aware of the strategies they use. Through this process, learners may notice some weaknesses in their reading skills or some

misinterpretations which occurred by applying a strategy inappropriately. Realization of their weakness and sources of misinterpretations may provide opportunities to reexamine their reading habits. Therefore, some learners can potentially benefit from using think-aloud protocols for self-monitoring.

4. Individual Differences

The think-aloud protocols the participants produced showed that the repertoire of reading strategies employed to perform the given task can be attributed to individual learner factors rather than level of language proficiency. Particular use of reading strategies was not specific to any level of language proficiency among the participants. Although most participants began studying English as a foreign language in Korea, learning under similar methods, they seemed to have developed their own way of reading based on their circumstances. Juhyun illustrated this:

What I learned from school in Korea was to translate word by word or sentence by sentence, but I never learned how to deal with the whole text. I have developed my own way reading with the translation skills I learned from my school in Korea.

Also, the degree of impact of ESL pedagogy, which emphasizes the importance of strategic reading, depends on individual factors. Dasom seems to have easily adapted ESL strategic reading approaches to her own:

I have combined the strategies I learned from ESL classes with my reading style, I think I read strategically in Korea when I was a university student. As I had a huge amount of required reading (as my major was English language and literature), which was not manageable with the translating habit, I developed my own combination of effective strategies. When I heard these strategies were useful in ESL classes, it confirmed that my ideas of reading were right and I became more confident.

However, it seems more difficult for Juhyun to assimilate this ESL approach as her

own. Juhyun described how it is hard to change her reading style:

I learned new strategies here in Canada, but I have noticed that I still rely on my old reading habits when I do academic reading these days for graduate study. Even though I know I don't have to understand every detail of the text, it is hard to resist my old reading habit of trying to understand every sentence. It is hard to apply different strategies for different reading tasks.

Thus, teaching several strategies itself is not sufficient enough to lead some students to successfully use these newly learned strategies. Furthermore, knowing several strategies does not automatically mean that L2 readers can use them effectively, as discussed previously.

These data lend support to Anderson's (1991) study which concluded that there is no single set of strategies that significantly contributes to success, based on two reading comprehension measures used. Success on a standardized reading comprehension test was related to the level of subjects' language proficiency, while success in reading textbook type materials can be attributed to individual factors such as level of interest, motivation, learning style, and background knowledge. He argued that strategic reading involves knowing not only what strategy to use, but also how to apply strategies efficiently as well as how to combine them with other strategies. He mentioned background knowledge on the topic and a solid vocabulary base as factors that may influence the success of using strategies.

Sarig (1987) agreed with the contention that there is a high degree of individuality in the reading process. Sarig's study reported that personal reading strategies showed an individuality in the combination of reading strategies. While the results of the study showed that each reader had his/her own personal reading style which

had its own benefits and drawbacks in reading comprehension, Sarig, nevertheless, did not support the dichotomy between good and poor reading. He argued that success in reading could be attributed to the quality of the reader's unique combination of reading strategies rather than a lack of certain strategies. In both subjects' L1 and L2 reading, the study revealed that a particular strategy led to success and failure to almost the same extent, and that each individual's unique combination of strategies was used almost to the same degree in both languages. He concluded that there seemed to be a transfer from L1 reading processes from L2.

5. Conclusion

Given these studies and the verbal protocols obtained from the seven participants, L2/FL students can benefit from classroom activities that ESL/EFL teachers may provide to improve their reading comprehension. In classroom activities, L2/FL readers' lexical and syntactic development should be carried out in a meaningful context. Also, reading instruction should include which activities activate or build L2/FL readers' vocabulary and background knowledge, considering the students' language proficiency and field of study. Students will be able to simultaneously use their various knowledge resources built around a topic of text so that their use of both text-driven and reader-driven processing can contribute to successful comprehension. Additionally, they should be able to self-monitor to determine whether the meaning of a word or newly developed knowledge within the text corresponds to the general flow of ideas in the text so that they can adjust their comprehension.

It is apparent that reading instructions should focus not only on introducing the strategies that successful readers use, but also on leading students to access their own assets already developed in their first language. L2 readers also need assistance in developing their abilities to self-monitor to determine whether a particular reading move, which they may unconsciously or consciously make, is being used successfully. Through comprehension monitoring such as the process of formulating predictions and confirming or rejecting these predictions, the reader can interactively use a variety of strategies including both text-driven and reader-driven processing and check the appropriateness of any strategy use from the perspective of overall comprehension of a text. As a result, a reader's own combination of strategies can be efficiently used to its maximum.

Individual factors should be taken into account in reading instruction so that L2/FL readers become aware of their own reading strengths and weaknesses. As discussed in chapter four, the amount of time exposed to ESL pedagogy, which emphasizes strategic reading, did not significantly result in participants' actual use of those strategies they had learned in ESL classes in the reading task in this study. This may indicate that just teaching new effective strategies for a limited period of time does not always have immediate impact on students' actual use of those strategies. The acquisition of those strategies or new ways of improving readers' schemata involves too many complex factors to be easily optimistic about the role of reading instruction. However, the interview data indicated that those participants were more aware of strategic reading than those who did not have any ESL experiences. Thus, teaching new effective strategies may increase students' metacognitive awareness of what they do

during reading. This awareness may lead to students' self-monitoring to check which strategies result in success or failure in L2 reading comprehension. Based on the realization of positive effects of interactive strategy use in reading comprehension, each individual can increase her/his confidence to determine which strategy can be applied or used more effectively in a particular reading situation.

Chapter Six

Conclusion

My study aimed at tapping deliberate L2 reading processes to explore how levels of second language proficiency are related to L2 students' use of particular types of text-processing or strategies; how the amount of time exposed to ESL pedagogy, which focuses on strategic academic reading, are related to L2 students' choice of particular types of strategies; and what contributes to the appropriate use of a particular type of text-processing or strategies in academic reading situations. In this section, I will summarize the findings of my study, discuss the value of the think-aloud protocol analysis as a research tool for investigating L2 reading processes, and offer suggestions for further research.

My study results are suggestive rather than conclusive due to the limited number of participants, the presence of a reading monitor during reading, the use of an academic, technical text as a material, and the lack of information about the participants' L1 reading abilities. In spite of these limitations, the present study offered revealing information about the L2 reading process.

Verbal data collected from seven Korean students taking either ESL classes or graduate programs indicated that levels of language proficiency did not seem to be significantly related to participants' use of types of text processing or strategies. Both highly advanced and intermediate participants appeared to use similar kinds of text

processing or strategies while reading. Interestingly, two highly advanced participants articulated reasons for choosing to use text-driven processing strategies when they felt they needed to clearly understand the text to answer comprehension questions, while most intermediate participants did not mention any reasons when they relied on text driven processing strategies. This may imply that all participants had strategic resources that could be applied to the reading situations. This lends support to Block's (1992) finding that "strategic resources seem more important than specific linguistic knowledge for proficient ESL readers" (p. 336).

In terms of the effects of the amount of time exposed to ESL pedagogy, participants who had had no ESL learning experiences were also able to use a variety of strategies even though they said they never learned any reading strategies when they studied English in Korea. The distinction among declarative, procedural, and conditional knowledge is useful to explain this phenomenon (Paris et al., 1983). Interview data indicated that most participants seemed to have declarative knowledge about task goals for academic reading, for example, they knew that their comprehension goals for academic articles were different from reading newspapers. Participants who studied ESL in Canada articulated that they had gained procedural knowledge, yet still in a declarative form, about their repertoire of reading strategies, such as scanning and skimming. This procedural knowledge is often acquired from direct instruction or deduced from repeated experiences (Paris et al., 1983, p. 303). However, declarative knowledge is still not sufficient for effectively applying those newly learned strategies.

In addition, there was no clear evidence that a particular type of text processing

or a set of strategies significantly leads better understanding. These results are congruent with Anderson's (1991) study which concluded that "there is no single set of processing strategies that significantly contributes to success" (p. 468). Thus just knowing and applying a variety of strategies does not appear to be sufficient for achieving an adequate comprehension. Conditional knowledge such as knowing *when* and *why* is required to apply various strategic actions (Paris et al., 1983, p. 303). This notion of conditional knowledge may explain why participants who had been exposed to strategy instruction in ESL pedagogy were not able to effectively apply newly learned strategies in my study. In addition, a type of strategy is only appropriate for some situations in reading. Success in one type of strategy may depend on one's ability to selectively apply a type of strategy in accordance with particular goals for reading and types and complexity of text. For example, if a strategy of skimming is carried out because a reader encounters difficult words or boredom with reading, reading part of the text can not be considered to be a good strategy itself. However, speeded reading or previewing headings to achieve a particular goal for comprehension would be strategic reading. Thus, a reader needs to determine if s/he is successful in the application of the strategies.

In order to determine the appropriate use of a type of text processing or strategies, one needs to think about what s/he is doing while reading. This ability is called metacognition (Block, 1992, p. 320). Through metacognitive awareness, one identifies the misuse of a type of strategy and detects comprehension failures so that s/he can take strategic actions to correct or revise comprehension failures. Data from my

study revealed that most participants were able to monitor their comprehension and identify reading problems to some extent. However, some examples from data show incomplete use of monitoring. In other words, some participants only expressed that problems existed, which is first evaluation phase that Block (1992) noted. They did not move further to next action stage to take strategic actions such as using intrasentential or intersentential information so that they could check and revise at the final stage. The process of identifying intrasentential or intersentential inconsistency in comprehension seemed to be different from the process of taking fix-up strategies and revising inconsistent comprehension. Another finding from the data revealed that highly advanced participants seemed to be able to use intersentential information in the paragraph to check whether their initial hypothesis was appropriate or not, while intermediate participants seemed to monitor their comprehension at word-level by using intrasentential information.

Comprehension monitoring seemed to play a role in linking various types of processing or strategies in order to achieve better understanding. For example, when Bungki made the hypothesis that food irradiation was something to do with digestion by using reader-driven processing, he attempted to confirm this hypothesis by using text-driven processing by looking for words such as hormones or human organs to understand the paragraph. Later, when he identified that this processing was not consistent with intrasentential information, he decided to take actions, such as going back to the 'radiation and ionizing energy' section, to check and revise his initial hypothesis. Thus, the metacognitive ability to self-monitor comprehension is valuable not only for better

understanding but also for selecting an appropriate type of processing strategies.

In addition to these findings from the verbal data, the think-aloud protocol analysis was found to be a useful, process-revealing research tool. Unlike experimental design, which approaches the reading process from text-driven processing, or miscue analysis which deals with unconscious oral reading errors, the think-aloud protocol analysis is advantageous in that it uncovers how readers arrive at comprehension through their conscious reports, and allows the readers to uncover this too. It is beneficial in discovering the open-ended aspects of the L2 reading process rather than verification of predetermined hypotheses, as in experimental design, or the search for semantic or syntactic information usage, as in miscue analysis. In regard to this research, think-aloud protocol analysis was beneficial in revealing the idiosyncratic characteristics of the research participants, as well as the interaction of the multiple aspects of L2 reading comprehension explored in this research. Nonetheless, it must be kept in mind that there are many reading processes that occur below the level of conscious awareness that this research methodology cannot tap.

The present study offers unique data regarding L2 academic reading situations as exploratory research that can be seen as thought provoking for future inquiry. Further L2 reading research is needed to examine the role of comprehension monitoring to compare participants at varying L2 proficiency levels and varying L1 reading abilities and L2 reading abilities to examine the effects of different types of texts on L2 reading comprehension monitoring; and to study the effects of participant variables such as age, motivation or disciplinary knowledge on L2 reading comprehension monitoring.

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Appendix 1:

Examples of Text-based Processing Strategies

- “어떤 심각한 변화는 기록되지 않았다 (No significant change has been reported)”
- “요구되어진 결과는 의심할 여지가 있는 어떤 통계학적인 의미가 있는 그런 *small numbers* 에 *based* 했다 (The claimed effects were based on small numbers which were of questionable statistical significance).
- “I’m looking at ‘and’ and looking for verbs connected by ‘and’ to break this sentence to make it easier to translate”.

Appendix 2:

Examples of Reader-driven Processing Strategies

- *“This first sentence is talking about something important, but the idea is not clear to me yet. I’m thinking about that the degree of chemicals should be stronger to kill cockroaches more effectively as they are developing their resistance to the chemicals”.*
- *“I know that there are both harmful and useful microorganisms. I guess it is talking about a potential danger of killing microorganisms that we might need”.*
- *“The shorter wavelengths have greater energy. I have heard of this. In this case, my prior knowledge is useful”.*

Appendix 3:

Examples of Use of Metacognitive Abilities

- *“This part summarizes information that I didn’t understand quite well before, so I’ll read it more carefully and spend more time on understanding it”.*

- *“ I have vague understanding about the ionizing radiation, but still very abstract. I made a mental note about the word ‘ion’ for the later use, but I’ll skip these sentences without translating them”.*

- *“In this section, I was expecting information about the process, but the word ‘inspections’ is not what I expected, so I’m trying to figure out why this word is in this sentence”.*

IMAGE EVALUATION TEST TARGET (QA-3)

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